Technology Ready Schools Evaluation

Instructional Technology Program Review

*Whiteriver Unified School District*

October, 2014



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# I. Introduction

## Summary

Starting in the 2012-2013 school year, Whiteriver Unified School District (WUSD) received four Title I School Improvement (SIG) grants under the State of Arizona’s Technology-Ready Schools and Classrooms initiative. Whiteriver used these grants – at Cradleboard Elementary, Seven Mile Elementary, Canyon Day Middle School and Alchesay High School – to develop a program that supports STEM-focused learning across the district (and specifically in the four grant-receiving schools). This program has been commonly and collectively referred to in the district as the “Tech Ready Grant”. The Tech Ready grants focused on building a technology infrastructure that would enable the use of tablet computers in the four grant-receiving schools and in training teachers in the implementation of grade and subject-area-specific STEM curriculum units. To accomplish these tasks, the district spent the first year of the grant (2012-2013) attending to infrastructure issues such as improving the district’s network, increasing server capacity, and purchasing/installing a range of software systems as well as over 1,000 tablet devices. During this first year, the district used grant funds to hire 10 staff to support the rollout of technology in schools, teacher training, and curriculum development. In the second year of the project (2013 – 2014), the district’s Tech Ready work focused on implementing STEM units and training teachers in the four grant-receiving schools. Grant funds expired at the end of September 2014, so technically the work of the four Tech Ready grants has ceased as of September 30, 2014. Nevertheless, the district has actively worked to sustain the Tech Ready work and there are several initiatives currently under development to continue the STEM curriculum activities at some level across the district.

The following report is both a summative evaluation of the two years of Tech Ready work as well as an overall “audit” of where WUSD currently stands with regard to the larger goal – still aligned with Tech Ready -- of integrating technology as a tool for teaching and learning across the district. Since the four Tech Ready grants were so substantial (totaling nearly $5.1 million dollars, approximately half of that amount spent on technology infrastructure), it is reasonable to assume that the district has made a substantial investment in building its capacity to integrate technology. Much of this investment is – or should be – durable and should therefore position the district to have a strong technology integration effort for some years into the future. Just how durable this investment turns out to be has much to do with how well the district creates the systems and expectations that systemically support technology integration. Thus, a major thrust of this report is to examine just what Whiteriver now has in place with regard to technology integration and to recommend how the district should move forward with using and building its instructional technology effort.[[1]](#footnote-1)

This evaluation is rooted in a set of qualitative performance indicators developed by WUSD stakeholders through a process facilitated by the evaluators.[[2]](#footnote-2) These indicators (see Chapter 2, and the Appendix) are intended to assess the district’s performance in utilizing and supporting technology in ways aligned with national standards as well as along the vectors of action specified in the Tech Ready proposals. For example, since “High Quality Professional Development” is a clearly identified focus area (a vector of grant-funded action) in the Tech Ready grant, the High Quality Professional Development indicator describes the attributes of a teacher professional development program that meets national standards as well as the specific values of the teachers and administrators in WUSD. In such a way, there are five qualitative indicators that have been designed for this evaluation – and by extension for Whiteriver’s instructional technology effort. These indicators frame the findings and recommendations in the following report. Chapter 2 of this report provides detailed findings for each of Whiteriver’s five indicators. Chapter 3 focuses on recommendations. Findings and recommendations are summarized in Table 2 later in this introductory chapter.

Overall, the evaluators find that the district has engaged in a dramatic and often tumultuous process of bringing technology into the district and its classrooms. Over the past year, the Tech Ready grants have touched nearly every classroom, teacher, and student in the district. Teachers and students now have access to a tremendous quantity of technology tools and resources that simply did not exist prior to the advent of the grants. All teachers have been offered technology training, and many have received intensive instructional support in utilizing technology tools within their classrooms and curricula. Teachers district-wide report acquiring new technical skills. In terms of infrastructure, the district has doubled its Internet bandwidth, created a much expanded wireless network, increased its server capacity many times over, and nearly doubled the number of computing devices it had before the grants. Further, virtually all of the newly-purchased devices are wireless and thus lend themselves readily to being used in a highly student-centered, project-based, learning environment. All of these developments are very positive and definitely go in the direction of fulfilling the district’s performance indicators for Tech Ready and the instructional technology program in general.

That said, it is clear that Whiteriver is at a very early stage in its progress toward truly meeting the standards set out by its indicators. The evaluators find that there exist several significant barriers to fully realizing the promise that instructional technology has to transform teaching and learning in WUSD. Chief among these challenges is the district’s structure for managing instructional technology. While the Tech Ready grants have dramatically expanded the district’s infrastructure, the current level of technical staffing, and even more importantly, the policies and structures employed to manage infrastructure, are far from adequate. The ultimate effect of these difficulties (all detailed in Chapter 2) is to severely limit the effective use of the infrastructure by teachers and students. Whiteriver’s teachers are not currently able to fully utilize much of the 21st century technology provided by the grants (and that otherwise exists in the district). In order to remedy this situation – particularly given the current lack of funding to add “new” technical staff – the district needs to reorganize its technology effort so that existing instructional (non-IT department) staff have substantially more control over the use and function of technology resources. As a bottom line, the district’s technical efforts must fall under the guidance of *instructional* staff and not be controlled by a severely understaffed information technology (IT) department. It is important to emphasize that this is not an issue of “who” controls and manages the technology, but rather is more a point of “what role” manages technology. As a school district where the primary mission is instruction and learning, technology use and policies must be guided by curriculum and instruction. Technical issues must be solved with a priority placed on effective teaching and learning. While the evaluators are sure that this has always been the stated intent of the district, in practice it seems that technical and security concerns have all too often been allowed to trump instructional needs. This dynamic needs to change in order for the district to meet its indicators and to move ahead in providing its students a truly 21st century learning environment.

The evaluators are also concerned that as the district moves beyond Tech Ready as the primary motivator and support of technology integration, the district may be relying too heavily on outside funding and support to sustain its technology-related teacher professional development and curriculum integration work. Aside from a few examples where school principals have found internal resources to support staff who can focus on technology integration and support, the district has no district-funded instructional technology support. Several of the Tech Ready staff have been picked up by H.E.D.Y. and while that is certainly a positive interim solution, it doesn’t address WUSD’s ability to sustain momentum for the long term. Through ongoing reliance on outside funding, WUSD itself has not demonstrated a commitment to maintaining instructional technology staff. This means that *the district* does not employ any staff working at a district level who focus on issues of instructional technology support – specifically as relates to teacher professional development and curriculum integration. Whiteriver’s indicators call for technology to be a thoroughly integrated, core resource for teachers and students. This cannot be the case if technology is perceived of as an outside-funded, add-on service. The real issue here is not where the funding comes from but rather about the value that the district places upon instructional technology. Working to find district funding for instructional technology support would indicate that the district sees technology as a core service.

Even more to the point about “core service”, and looping back to the issue of how technology is managed in the district, the evaluators note that the district has room to grow in terms of how it understands “technology” within instructional environment. Here it seems that all too many teachers and administrators feel that in practice technology is a subject unto itself and therefore belongs in some sort of technical domain that sits separate from the normal business of teaching and learning. All too often Whiteriver teachers refer to technology integration as “learning about technology”. Likewise, many aspects of teacher technology use have been relegated to something that “technology staff” do. Furthermore, the amount of control exercised by IT staff over teacher technology use has only re-enforced this perspective. Teachers have not been granted full access to the tools and resources that they might need to start the process of “owning” technology as simply one aspect of standard teacher practice. So once again, the solution to this dilemma of how to increase teacher ownership of technology is to organize the district’s technical efforts as an *instructional* function (supported as necessary by IT) that is integral in all teacher practice. The basic orientation of district instructional technology efforts needs to be “Let me show you – teacher – how you can do this thing you want to do.”. This is a substantial change from the current IT message which is all too often mostly perceived of as “Here’s why you cannot do this.”

Despite these organizational, systemic challenges, the evaluators believe that WUSD is well-positioned to make strong strides in terms of effective instructional technology integration. What is required to start this positive progression is a district-wide effort to develop a clear vision for technology’s central role in teaching and learning. Then, building upon this vision, the district needs realistic goals and action plans and an on-going process of assessing progress toward fulfilling the vision. In short, the district needs a strategic technology plan that can provide a roadmap for future efforts (including future solicitations for both district and outside funding/support). This plan can be rooted in the visionary indicators created for this evaluation, and the goals and actions should be informed by the recommendations (and findings) found in the following document. It is essential though that the planning work involve the active engagement of the entire WUSD community and be broadly perceived of as work related to the district’s core instructional mission. The evaluators are confident that through such work, Whiteriver will indeed realize the its vision of providing a truly 21st century learning experience for all of its students.

## Methodology

This evaluation report is designed to serve several purposes for the Whiteriver Unified School District. At its most basic level, the data herein provides a picture of the degree to which the district met the goals and objectives of the Title I-funded Tech Ready grants. While the quantitative achievements of Tech Ready – number of teachers served, devices purchases, units developed, etc. – are documented elsewhere, this evaluation provides information on how well the district met qualitative indicators for the grants. These qualitative indicators have been developed by the district (see below) and serve to measure the impacts of the grants around deep goals related to student outcomes and instructional supports. Flowing from this examination of deep impact, the evaluation also exists as a record of the current status of the broader process of instructional technology integration within the district. This recognizes that Tech Ready has to fit into the broad instructional mission of the district.

The findings and recommendations contained in this report are intended to fuel a lively discussion and priority-setting process related to technology’s role in teaching and learning in Whiteriver. This discussion – which will start with the October 28, 2014 presentation of this evaluation report -- is a key part of framing the district’s use of instructional technology within the broader context of teaching and learning. Given the overlap and shared emphasis of initiatives such as STEM education, the Common Core, 21st century learning, and technology standards such as the National Education Technology Standards (NETS), this evaluation offers insight into a more comprehensive set of issues than simply the use of technology to support STEM. Its orientation and recommendations keep pace with current educational practice and research around the use of technology within a student-centered educational environment that encourages the development of essential thinking and life-long learning skills.

### Indicators and Data Collection

The following report presents data and findings related to how Whiteriver’s teachers and students use technology to support learning in line with a set of visionary performance indicators created by the district. These indicators exist in five domains – Student Outcomes, High Quality Professional Development, Instructional and Technical Support, Infrastructure and Hardware and Capacity-Building and Sustainability. These domains derive from the five categories of actions/goals in Whiteriver’s Tech Ready grant proposals, and thus frame the basic areas of investigation of Whiteriver’s instructional technology evaluation. In order to determine the district’s performance within each of these areas, the evaluators collected data about teacher, administrator, parent, and student work, beliefs, and attitudes related to the indicator in each category. Analysis of the collected data resulted in a set of findings, presented in the next chapter, and ultimately considered against the evaluators’ knowledge of relevant educational research and best practice. The resulting recommendations are reported in the final chapter of this report.

Whiteriver’s evaluation indicators were developed with a committee of district stakeholders in May, 2014. This meeting, follow-up discussions with district leaders, as well as the overall evaluation process and work, has been facilitated by Sun Associates, an external educational program evaluation firm with specific expertise in instructional technology evaluation and planning. Subsequent to the indicator development, the evaluators created a range of data collection instruments (see Appendix) such as interviews and observation protocols. The evaluators visited every classroom in each of the five school buildings. In addition to the in-person data collection, the evaluators also administered teacher and student online surveys. Table 1 below shows the *n* values for data collected.

## Data Collected

|  |  |
| --- | --- |
| **Data** | **Number (N)** |
| *Teachers Interviewed (including focus groups)* |
| Elementary | 6 |
| Secondary | 6 |
| *Teachers Surveyed* |
| Elementary | 91 |
| Secondary | 41 |
| *Students Surveyed*  |
| Elementary | 50 |
| Secondary | 128 |
| *Classroom Observations[[3]](#footnote-3)* |
| Elementary | 17 |
| Secondary | 26 |
| *Principals Interviewed* |
| Elementary | 3 |
| Middle | 1 |
| High | 1 |
| *Other District Staff Interviewed* |  |
| Tech Ready Staff | 6 |
| District Administrators | 4 |

**Table 1** – Evaluation data collected[[4]](#footnote-4)

The following report makes considerable use of quotes taken from the various interviews and focus groups conducted by the evaluators. These quotes are noted by indented *italicized* type and are verbatim with edits only for clarity and to ensure anonymity.

## Summary Findings/Recommendations Table

| **Indicator Strand** | **Findings (Pages 13 – 43)** | **Recommendations (Pages 44 – 55)** |
| --- | --- | --- |
| ***Student Outcomes*** |
| 4Cs and ISTE NETS-S | * Students have access to technology devices and computer-based-instruction systems at all grade/subject levels in the district.
* There is disagreement among teachers at different grade levels that their students have grade-level appropriate technology and digital literacy skills. (Elementary teachers generally feel that their students are NOT skilled, whereas Secondary teachers are mixed in their assessment. Principals across all levels are generally positive about student technology skills.)
* Most teachers, K-12, find that their students do not use technology in ways that the evaluators identify as aligned with NETS-S
* There is no clear “standard” in the district for what it means for a student to be technology skilled or digital literate or for what it means to “integrate” technology within the instructional environment. There is no clear or uniform understanding of the 4Cs or how technology supports the development of these.
 | * Establish a district orientation that recognizes and supports technology as a teaching and learning objective that is overseen by instructional staff versus technology staff. This starts with the development of a strategic technology plan that is rooted in an instructional vision, but continues to the development of staffing and oversight for technology that emphasizes the predominance of curriculum over technical issues.
* Expand teacher understanding of “technology integration” to focus more on student-centered, inquiry-based, learning environments that move beyond teacher-directed uses of technology (such as projection, presentation, etc.).
* Develop a clear set of K-12 student and teacher technology expectations and provide the teacher professional development to support these expectations.
 |
| Personalized Learning Environment that Emphasizes PBL and STEM | * The majority of teachers report that they do not have the necessary infrastructure and support to consistently operate a personalized learning environment.
* Tech Ready has done and admirable job in an impossibly short period of time to train and create awareness of PBL and STEM among WUSD teachers.
 | * Develop a district vision that emphasizes – and a plan that supports – a personalized learning environment for all students.
* Institutionalize the Tech Ready-initiated professional development and related staffing so that the training offered via Tech Ready can become a systemic part of the WUSD student experience.
 |
| ***High Quality Professional Development*** |
| Teacher Fluency in Technology Skills and PBL-Related Pedagogies | * WUSD teachers are proficient in the use of basic instructional technology tools for personal and professional productivity as well as for routine (teacher-centered) teaching tasks.
* Tech Ready hired and enabled an admirable professional development staff (in terms of quantity of hired staff and the skills that staff possessed)
 | * Institutionalize the Tech Ready-initiated professional development and related staffing so that the training offered via Tech Ready can become a systemic part of the WUSD student experience.
* Build district capacity – largely through improvements to the management of the network infrastructure and updating of policies – to achieve a 1:1 computing environment (as was the original intent of the Tech Ready grants).
 |
| Implementation of an Effective Professional Development Model | * The PD model employed by Tech Ready staff was well-received by teachers, but had insufficient time to operate and show widespread results. In those cases where Tech Ready STEM Developers had close contact with teachers, there was growth in these teachers’ awareness of student-centered technology-infused learning.
 | * Institutionalize the Tech Ready-initiated professional development and related staffing so that the training offered via Tech Ready can become a systemic part of the WUSD student experience.
 |
| ***Instructional and Technical Support*** |
| Technical Support | * While the grants hired a (relatively) large number of staff who might have been able to provide technical support – and who attempted to provide such support – this staff was largely ineffective at actually providing such support due to the way that WUSD organizes and identifies “technical support” staff.
* Many IT-department policies (e.g. the limiting of technology administration privileges to only IT department staff) are not in sync with the needs of teachers and students and do not seem to be driven by instructional concerns.
 | * Ensure – through reorganization of the district’s technical and instructional technology staff and the creation of a visionary strategic plan that emphasizes instructional/curriculum goals versus technical concerns – that technical staff support teachers’ needs.
* Ensure that building-level support staff have sufficient technical privileges to address basic technical issues such as workstation configuration, permissions, user accounts, etc.
* Leverage existing “Computer Teacher” positions to provide at least some minimum level of technical assistance in each building.
 |
| Instructional Support | * Tech Ready brought in a large number of staff to provide Instructional Support (including the Coaches who ostensibly provided Technical Support, but also did a fair bit of what would be know as instructional support in other districts).
* In its short time of operation, relatively little time was available for instructional support staff to work on Tech Ready classroom implementation. This was compounded by myriad infrastructure configuration and management issues. Nevertheless, Tech Ready Developers did work with some teachers in all buildings.
 | * Institutionalize the Tech Ready-initiated instructional support and professional development so that the training and instructional support offered via Tech Ready can become a systemic part of the WUSD teacher and student experience.
* Ensure – through planning and budget – that there are technology instructional support staff positions to support classroom-based technology integration.
 |
| Systems | * WUSD teachers and students have access to a wide range of CBI and assessment systems.
* Tech Ready staff have done an admirable job establishing and maintaining the district’s new LMS
 | * Continue development of the district LMS by continuing to expand the number of connections made between instructional technology integration expectations and grade/subject area curriculum maps (pacing guides, etc.)
 |
| ***Infrastructure and Hardware*** |
| Infrastructure Capacity | * WUSD has a very high device to student ratio. There are many many machines available to teachers and students. More than half of those machines are less than two years old.
* The district’s internal network is highly problematic. IT policies and practices have resulted in a network that is overloaded, over-built, too complicated, and difficult to administer effectively.
* There is insufficient Internet bandwidth. Attempts to protect this scant resource have resulted in further overload on the internal network and much user frustration.
* Demands for technical support far outstrip supply, and efforts to expand and streamline technical support (for the benefit of users and usability) have been thwarted by the IT department in the name of technical control and user protection.
 | * Overhaul the way that the technology infrastructure is managed and organized. Establish policies and procedures that foster user responsibility in lieu of user disablement. Emphasize the achievement of instructional and curricular objectives over “protecting” the infrastructure.
* Increase Internet bandwidth to recommended standards (for school district Internet bandwidth). This will reduce the need to limit user access to the Internet; and this in turn will reduce the need to replicate the WWW inside the district’s network (i.e., take apart the walled garden).
* Provide users with competent, enabled (i.e., with sufficient technical access privileges), technical support.
* Commission an independent “technical audit” of the district’s network architecture, bandwidth, and administration (this should inform the specific infrastructure plan component of the district-wide strategic technology plan).
 |
| Policies  | * The Internet firewall filtering policy is detrimental to teacher and student morale and is inadvertently hindering the development of student digital literacy skills.
* The IT department has become the arbiter of policies that impact instructional issues. Issues identified as “technology policy” are in fact instructional/curriculum issues.
* WUSD does not have an effective forum for debate on issues related to policies that have any relation to technology.
 | * Provide clear curriculum and instruction oversight over policies such as how the firewall is enabled and administered.
* Ensure that the district’s strategic technology plan and vision drive the discussion and formation of technology-related policy.
 |
| Digital Literacy | * The district’s Internet firewall, and other attempts to “control” student access to resources is inadvertently hindering students’ development of digital literacy skills.
* There is no current digital literacy curriculum
 | * Reduce the barriers to student digital literacy by allowing students (and teachers) more access to the authentic, real-world, information and resources available on the Internet.
* Ensure that there is a digital literacy strand within the district’s scope and sequence of student technology skills (as reflected via lessons/activities on the LMS)
 |
| ***Capacity-Building and Sustainability*** |
|  | * This indicator is future-oriented and inspires future planning work.
 | * Develop a district-wide strategic plan for technology that starts with the Student Outcomes indicator as its vision and that proceeds to implement the recommendations of this evaluation (particularly those related to technology organization, staffing, and professional development)
* Ensure that the district’s strategic technology plan is developed with a wide-base of WUSD stakeholder involvement/input.
* Create the position of Director of Instructional Technology to oversee and coordinate the district’s strategic plan to bring technology to bear on issues of teaching and learning.
 |

**Table 2 –** Summary of Findings and Recommendations.

# II. Findings

In this chapter, the evaluators analyze the data collected from Whiteriver’s teachers, students, and administrators in relation to the district’s indicators.

## Student Outcomes

Whiteriver’s descriptive indicator for technology’s role in supporting student skills and outcomes describes the district’s ideal for how technology should support all students in their learning regardless of grade, subject, or teacher. This indicator is as follows:

*WUSD students are proficient in basic technology skills and demonstrate critical thinking, information and media literacy, and responsible digital citizenship in line with National Educational Technology Standards (NETS-S). Utilizing a variety of digital tools within a personalized learning environment (i.e. student input or choice) that emphasizes PBL and STEM, students synthesize information and develop knowledge in support of curriculum-based learning objectives. Technology supports all students in the development of communication and collaboration skills with peers both in the district community and globally.*

The Student Outcomes indicator breaks down into two closely related themes – implementation of 21st century learning standards and the creation of a personalized, problem-based, learning environment. Whiteriver’s performance in meeting each of these is addressed below.

### 4Cs and ISTE NETS-S

The indicator states:

*WUSD students are proficient in basic technology skills and demonstrate critical thinking, information and media literacy, and responsible digital citizenship in line with National Educational Technology Standards (NETS-S).*

and

*Technology supports all students in the development of communication and collaboration skills with peers both in the district community and globally.*

Whiteriver Unified School District’s intent, as stated in its indicator, is that student use of technology in the classroom should be aligned with – and supportive of – standards that emphasize thinking and learning skills. Commonly, these standards are broadly referred to as supportive of a 21st century environment. The basic idea is that when appropriately integrated into the classroom environment, technology exists as a tool that facilitates the development of a critical core set of skills such as communication, collaboration, critical thinking and creativity (also known as “the 4Cs”). Further, the district aims to develop in students the ability to evaluate information resources and to interact effectively and responsibly with others online. The NETS-S standards referred to in WUSD’s indicators describe uses of technology in which students ---guided by inquiry---learn to gather, synthesize, and make ethical use of information from a variety of media sources.

Looking across the data from all schools in WUSD, it is clear that technology is integrated into teaching and learning in a variety of ways. Although not all of these uses of technology map directly to the district’s indicator for student outcomes, it is important as part of this evaluation to represent the range of roles that technology plays in the district, and to understand the educational value ascribed to it by teachers and administrators.

At elementary schools in Whiteriver, the evaluators observed the use of document cameras and projectors in many classrooms. Teachers told the evaluators that they frequently use projectors to share student work, stream videos, and visit websites in support of whole class activities. Survey data from both teachers and students support the claim that teacher use of technology for large group presentation is regular feature in Whiteriver’s elementary classrooms.

*I use PowerPoint on a weekly basis to present my lessons.*

*I have started using technology more because of the Mimeo and United Streaming*

*My teacher shows us videos and shows us how to complete a lesson.*

*My teacher shows videos to do math*

Projectors and document cameras were also present in many of the classrooms observed at the junior high school. There, teachers described using technology frequently to help classes explore topics related to literature or to expand on themes in social studies using online resources. Junior high school students’ survey comments mirrored those from the elementary school, describing ways that teachers use technology to present information to the class:

*My teacher shows us videos in the classroom and also to show us a lesson or a fun game for us in math sometimes*

*They use it for viewing us our vocabulary words, and information or videos about what we are learning.*

*They use technology for attendance, videos, get some information on what they researching.*

Observations at the high school yielded similar patterns of teacher technology use as a presentation tool. One math teacher displayed student work with the document camera as the group reviewed the assignment, another was showing a DVD movie, while another accessed a YouTube video pertaining to the calculus lesson. Many teachers use PowerPoint and classroom projectors, as indicated by secondary student comments:

*They use the computers to show us PowerPoints and to use the internet to show us educational videos.*

*projects our days work shows us our plans for the future in the class*

*they use technology to present the work we are learning*

*to give us power point presentations and to help us better understand the lesson*

The evaluators also observed and heard about the use of a number of programs and software systems intended to support the development of student literacy and mathematics. In particular, there is heavy use of Accelerated Reader in all elementary schools. The evaluators heard that most elementary students (in all elementary schools) have regular, weekly computer time in school computer labs where a frequent activity is working on Accelerated Reader. Likewise, the elementary schools were observed to have the vast majority of their books coded for Accelerated Reader. Elementary students also use their lab time for various math tutorial programs and keyboarding practice. This work in the lab is a scheduled activity for students (teachers typically drop their students off in the lab and the students are then monitored by a computer lab aide). There seems to be much less frequent use of the labs for class-based tasks such as research or the development of presentations or student projects.

As detailed in the introduction to this report, the Tech Ready grants supplied document cameras, projectors, and tablet devices to classrooms throughout WUSD (with the exception of Whiteriver Elementary). In the words of the Tech Ready grants, the introduction of these tools into the classroom was intended to “provide students with opportunities to engage with technologies that they will encounter in the larger world” and to enable students to develop 21st century learning skills in a 1:1 environment. In short, the vision supported by the grants is one of project-based learning in which students interact directly with technology tools to gather, evaluate, synthesize and present information (rather than simply watching or being presented to). This intent is clearly reflected in Student Outcomes indicator defined by the district.

The Student Outcomes indicator not only specifies that students will have access to technology, but rather that through regular use of technology tools within the learning environment they will develop proficiency with 21st century tools and resources. The evaluators find that at the present time, the degree to which students possess sufficient technology skills is a matter of some disagreement among teachers and principals. On the survey, teachers in two Tech Ready schools indicated that they believe that their students currently have grade-appropriate technology skills, while those in two other schools were neutral about their students’ skills. A related question pertaining to whether students arrive each fall with the necessary technology skills to use technology effectively for learning was answered in the negative for all three elementary schools. Middle and high school teachers were neutral on incoming skill level of students. As a broader point that goes beyond whether or not students possess technology skills, it is clear to the evaluators that Whiteriver teachers do not hold a common set of expectations as to what students should possess as far as “technology skills” at each grade level. While the district LMS does attempt to map various student skills to curriculum-based tasks (see below), there has not yet been time to adopt and implement the various activities that would illustrate these skills to teachers (and teach them to students).

On the whole, principals were more positive about student technology proficiency, though they remain concerned about students’ abilities related to keyboarding, online research and more advanced computer applications such as Excel.

*I think that they’ve very comfortable with using the iPads…they can navigate through them easily. In the computer lab, they have the gist of getting on and logged in and the simple things. All my students are lacking in the area of keyboard skills.*

*…they’re taking to learning about Powerpoint and stuff like that fairly easily….grasping that info quickly.*

*[Students are] proficient with iPads…they know how to manipulate, get on there with reading and math apps. …with more traditional computers they have a harder time, mouse skills, navigating programs, etc.*

*…as far as research skills, they don’t have it…and they don’t know how to use E*x*cel…*

The concern noted in this last administrator quote relates also to the NETS-S skill of media literacy, which is at the heart of the Student Outcomes indicator. NETS-S specifies that students need to be able to locate, organize, synthesize, and evaluate information from a variety of sources as part of the definition of technology proficiency.

Whiteriver, teachers responded on the survey with mixed assessments as to the degree to which they feel that students are able to demonstrate media literacy. As seen in relation to survey question 4a (see Figure 1, below), in grades K-8, teachers generally believe that students “demonstrate critical thinking by evaluating and selecting appropriate information resources”. Teachers at the high school were neutral on this question. Likewise, on the issue of digital citizenship (question 4c), teachers at Cradleboard and Seven Mile generally believe that students demonstrate safe and ethical uses of technology, while Junior high and high school teachers (as well as those at Whiteriver Elementary) were neutral on this survey question. It is clear from talking with various individuals at the district, that no definitive policy (or even philosophical position) has been developed in Whiteriver to address students’ digital citizenship skills. Most teachers are aware that with new technology tools comes both the opportunity and responsibility to address online behavior, but as yet in Whiteriver, there exists no official set of rules to guide actions or expectations in this regard.



**Figure 1** – Teacher Survey Question 4, “Degree of agreement with the following statements”. Responses by school and by sub-question. Note that the graph shows the mode response from teachers in each category.[[5]](#footnote-5)

Teachers’ assessments of the *frequency* with which their students engage with other NETS-S activities reveal a more uniformly negative picture across the district. (see Figure 2, below, for a graphic representation of teacher survey question 2) Data from all WUSD elementary schools indicates that students “virtually never” use technology in the ways described by the NETS standards, or in turn, by the district’s indicators. These activities include creating original work products, working collaboratively with peers, using digital tools to conduct research, and using technology to explore concepts and solve problems (see the NETS-S standards in the Appendix). Even at Canyon Day, students are said to only use technology to support creativity and research “several times per year”. Otherwise, their frequency of NETS-S activities mirrors that of the elementary schools. Research and problem solving at the high school were given the highest frequency rating by teachers, “at least once per week” and “2-3 times per month”, respectively.[[6]](#footnote-6)



**Figure 2 --** Teacher Survey Question 2, “Frequency that your students engage in these (NETS-S) skills”. Responses by school and by sub-question. Note that the graph shows the mode response from teachers in each category.

Overall, the evaluators find that in light of the Tech Ready grants’ focus on creating opportunities for student-centered technology use within a PBL environment, the incidence of the sorts of student activities that align with the district’s Student Outcomes indicator is very low. Comments from teachers about their experiences with Tech Ready-supplied technology help to shed light on some of the other factors contributing to this finding in WUSD.

*We have the equipment, but many sites are blocked or access is denied. The students do not have e-mail ability and to do a blog or a Prezi they need e-mail accounts*

*This grant has provided me with training and ideas of how technology could be effective in my classroom if the school had the capability to run all the resources provided. It has been very disruptive as of today due to the fact that the system crashes and students lose their work. The system does not always work and that makes it very difficult to plan and to make the students and I want to try to use the technology. We can never get everybody logged on and have little to no support on fixing these matters. The network has too many blocked sites and this becomes very aggravating to the students. We are not allowed to have e-mail addresses for the students which means there is no way to set up Prezi sites for them to use or to allow them to use blogs like our curriculum maps ask for.*

*The technology doesn’t reliably work*

*There are either too many programs/sites blocked, or our network can't handle the capacity.*

*…some parts of it have been a big headache….it is hard to plan using tech when there always seems to be some problem going on and it can’t be addressed by the tech people in our school.*

*Most of the time, students can log in and get on, but the net day, 5 of them can’t get on….it’s a network issue. The Broadband is increased but it’s a wifi issue.*

*Technology in the classroom was minimal since it did not function regularly.*

The infrastructure and support issues referred to in these and many other teacher comments will be discussed in detail later in this chapter; but even at this early point in the findings it is essential to note that infrastructure and support issues are limiting factors in the ability for Whiteriver’s teachers and students in achieving the teaching and learning goals of the Tech Ready grants. As will be noted throughout the findings, it is impossible to discuss teacher, student, or learning outcomes without noting that issues associated with infrastructure were intimately tied to the degree to which these outcomes were achieved. In summary of the present discussion about student engagement with NETS-S, it is important to note that, due to a variety of factors, the present environment in many WUSD classrooms does not adequately support attainment of NETS-S or 21st century learning for all students.

### A Personalized Learning Environment that Emphasizes PBL and STEM

The indicator states:

*Utilizing a variety of digital tools within a personalized learning environment (i.e. student input or choice) that emphasizes PBL and STEM, students synthesize information and develop knowledge in support of curriculum-based learning objectives.*

Attainment of this portion of Whiteriver’s Student Outcomes indicator depends upon the presence of the same conditions for technology integration as touched on in the last section. In addition to reliable access to functioning technology and online resources, project-based instruction requires a level of comfort and skill that many teachers in WUSD seem to have only begun to develop. As will be discussed in greater detail in the Professional Development section of this report, the Tech Ready grants supplied a variety of supports to improve teacher skills in the areas of PBL and STEM education. Technology Integration Coaches were brought in to provide hands-on assistance to teachers around learning to use classroom equipment such as projectors, document cameras, tablets, and iPads. Likewise, the STEM Developers at each school focused on providing instructional support to teachers in implementing STEM curriculum units and other technology-infused activities.

On the survey, in question 4g (see Figure 1, above), teachers were asked to what extent they agreed with the statement, “my students use technology to support project based learning (PBL)”. Across all grade levels, teachers most often gave neutral responses, suggesting that these things do happen, but not with great regularity. They rated their understanding around *how* to use STEM and PBL to address core academic curriculum objectives only slightly more strongly overall. Teachers estimate that they taught PBL/STEM units once or twice last year. Even at these low numbers, however, it is clear that when it was possible to implement these new lessons, teachers did so, and enjoyed great success:

*[Students] were proud to show their parents on family night, the result of STEM learning*

*They were fascinated. They read more and worked harder. They were more engaged. They still talk about it*

*They really enjoyed them, If they could do STEM units all day they would have definitely done that.*

*Students enjoyed the projects. It made it easier for them to remember concepts because it was hands-on.*

*The students enjoyed the hands-on activities, they were more focused and engaged*

*Students were all engaged and highly motivated to work on their science projects*

*Students were engaged and motivated to participate in the discussions. Students were comfortable in working outside the classroom in conducting the activity.*

The Tech Ready grants sought to accomplish a great deal in a short amount of time. Where student outcomes are concerned, there is, as yet, only a small amount to show following barely 18 months of grant implementation. Nevertheless, many WUSD teachers use their new devices – such as projectors and document cameras -- regularly in the classroom to support traditional teaching and learning tasks. Others have worked closely with Tech Ready staff to learn new pedagogies and have begun to embrace PBL as a way to meet curriculum objectives. Still others have implemented STEM activities with their students and are eagerly seeking additional opportunities to innovate and expand the use of technology in their classrooms.[[7]](#footnote-7)

*[Tech Ready] has supplied my classroom with very nice tablets which were useful in our writing lessons*

*The Tech Ready grant has given our kids so many opportunities through the ipads, which allows them a method of learning that is engaging and they love.*

*We got new laptops for teacher use. Ipads were used in the classroom, making student learning more engaging*

*The use of mobile apps and online activities supplemented my students’ learning*

*This tech does help for all age levels. Learning that opens up the world besides what they see here on the reservation, plus communicating with other nationalities*

*I can use the ipads as a supplemental device to support reading and math concepts and different grade levels*

*There are many apps that are user friendly to my students and help with remediating basic skills*

The evaluators find that the difficulties encountered in implementing the 1:1 student to computer ratio envisioned by the Tech Ready grants have impacted the district’s ability to fully embrace personalized learning as described in the Student Outcomes indicator and the grant proposals. To fully meet the spirit of project based learning, students need ubiquitous access to devices as afforded by 1:1. However, due to various policy issues this level of access was not available during the time of the grants.

## High Quality Professional Development

In order for technology to produce the student skills and outcomes described in Whiteriver’s student indicator, it is necessary for teachers to possess the skills, vision, and resources for using technology in ways that support best practices in pedagogy and student learning. Essentially, teachers need to deploy technology as a tool that is *intentionally* targeted at supporting particular student outcomes; and these outcomes (as discussed earlier) should be in line with national standards and accepted best practice related to the development of higher order student thinking/learning. Therefore, Whiteriver’s indicator for teacher professional development states:

*Through a variety of on-going professional development opportunities, WUSD teachers are supported in gaining and refining knowledge of both content and pedagogy. They demonstrate proficiency in the use of available technologies, and regularly implement PBL lessons that integrate technology meaningfully into the student experience. Professional development has a positive impact on the classroom as demonstrated by teacher effectiveness and student learning. Professional development is based on teachers’ needs and addresses specific learning goals as necessary to develop mastery. The predominant professional development model is one of practice/debrief/practice/debrief/observation, which includes classroom walkthroughs, observation tools, coaching/mentoring feedback and teacher evaluations regarding the quality of training/mentoring and implementation of specific strategies and methods.*

This indicator focuses on two aspects of Whiteriver’s professional development– teacher fluency and the nature of the specific professional development model chosen by the Tech Ready grant trainers. These aspects are discussed below.

### Teacher Fluency in Technology Skills and PBL-Related Pedagogies

The first part of Whiteriver’s Professional Development indicator focuses on the outcomes of teacher professional development. Specifically, the indicator calls for teachers to have leveraged professional development for gaining both technology and pedagogy skills. In terms of the former, teachers should be facile in their use of available technologies such as computers, networks, and peripheral devices (many of which were supplied via the Tech Ready grants). In terms of the latter – pedagogy – the indicator expects teachers to use these technology skills in ways that support PBL. The evaluators examined both of these aspects of the Whiteriver teacher experience.

As a way to assess teachers’ fluency with the technologies available in WUSD, teachers were surveyed as to the frequency with which they use technology to perform a variety of functions related to productivity and instructional practice. This data, associated with Teacher Survey Question 3 is shown in Figure 3, below. Here the data shows that overall, teachers in Whiteriver are proficient with the tools that they have at their disposal, and use them regularly for a variety of teaching tasks. Teachers report using technology frequently to communicate with one another, prep for lessons, and conduct student assessments “at least once per week”. At most schools in Whiteriver, technology plays a role in authentic assessment twice per month.[[8]](#footnote-8) In an environment that is rich with technology resources, many Whiteriver teachers demonstrate comfort and confidence accessing these tools for their daily teaching tasks.



**Figure 3 --** Teacher Survey Question 3, “Frequency with which you engage in these (NETS-T) skills”. Responses by school and by sub-question. Note that the graph shows the mode response from teachers in each category.

As has been noted above, while many teachers utilize technology for routine teaching tasks, these tasks are often related strongly to a rather traditional, teacher-directed/centered, pedagogy. Tasks such as presentation, projection, and sharing resources from teacher to students, while common and essential in all classrooms, still do not directly relate to the student-centered, inquiry based, environment envisioned by STEM educators and the Tech Ready indicators specifically. It is clearly the intent of Tech Ready that ultimately teachers will learn (through ongoing professional development and support) how to integrate technology as a hands-on tool for *student* use in a PBL environment. See **Table 3**, below, for a simple representation of the contrast between traditional teacher-directed instruction and the more student-centered environment envisioned by Tech Ready and similar initiatives nationwide.[[9]](#footnote-9) In this regard, the evaluators find that technology is not frequently used by Whiteriver’s teachers for promoting student collaboration, communication, and creativity. Teachers at all Whiteriver schools most often reported that they “virtually never” use technology to create student learning experiences that engage students in collaborative environments that promote global and local communication”.

|  |  |  |
| --- | --- | --- |
| **Traditional Learning Environments** |  | **New Learning Environments** |
| Teacher-centered instruction | ⟶ | Student-centered learning |
| Single sense stimulation | ⟶ | Multisensory stimulation |
| Single path progression | ⟶ | Multipath progression |
| Single media | ⟶ | Multimedia |
| Isolated work | ⟶ | Collaborative work |
| Information delivery | ⟶ | Information Exchange |
| Passive learning | ⟶ | Active/exploratory/inquiry- based learning |
| Factual, knowledge-based learning | ⟶ | Critical thinking and Informed decision-making |
| Reactive response | ⟶ | Proactive/planned action |
| Isolated, artificial context | ⟶ | Authentic, real-world context |

**Table 3** – Establishing new learning environments and incorporating new strategies.

In order to work toward its professional development goal (as broadly described in the High Quality Professional Development indicator), the Tech Ready grants enabled the hiring of four Technology Integration Coaches to help teachers develop new skills related to using technology in the classroom. At the most basic level, Coaches worked with teachers to introduce them to the specifics of the grant-supplied devices, and provided timely assistance in setting up and troubleshooting the equipment. Coaches also ran workshops in each building to facilitate the integration of tablets and other new devices into teachers’ regular practice. For the most part, these workshops focused on the actual operation of technology devices, accessing network resources, etc.

Four STEM Developers were also hired through the Tech Ready Grant specifically to focus on the creation of a series of technology-rich, project-based learning activities. These developers were charged with identifying individuals at various grade levels who would be interested in learning new teaching methods and integrating technology more fully into student learning. With one STEM Developer assigned to support teachers at each level, new activities were introduced through demonstration, co-teaching and mentoring. Participating teachers found the lessons to be extremely motivating to students, and noted that they would like to be able to include more such experiences in the future.

Elementary teachers[[10]](#footnote-10) estimated on the survey that they interacted with Tech Ready Coaches and STEM Developers either “rarely” or only “a couple times during the school year”. At the junior high school, the largest group of teachers reported that they had weekly interaction with Coaches. The most common response to this question from high school teachers was that they interacted only a couple of times during the year with Integration Coaches or STEM Developers. The work of the Tech Ready staff was quite apparent to the evaluators as it was often mentioned in teacher comments. For example:

*Our Tech people have been readily available for staff as needed. They also have provided staff PD presentations as far as using the attendance and grading systems. For those of us not immediately getting the techniques down, Tech staffers have made themselves as well as online tutorials available to us*

*They provide pre-service trainings. Last year, they taught us the basics of tablet use and how we can integrate this to classroom instruction. This year, they taught us how to set up an interactive class website. They also assisted the teachers to put up the Innovation Nation STEM Festival, which turned out to be a huge success.*

*They have come in to help me with laptops and will do a demo. Rodney also showed us how to access our web page and may features in our last department meeting. Our tech staff is very helpful and has offered to assist us in bringing technology into our classroom*

Noting the variety of professional development assists offered to Whiteriver teachers during the Tech Ready grants, the evaluators find that still overall, teacher opinion was mixed on whether the grants provided enough professional development to enable them to confidently teach PBL and STEM units on a regular basis in their classrooms. The evaluators attribute most of this mixed opinion to the fact that the Tech Ready grants had very little time to deploy professional development relative to the large number of teachers who needed and desired such training. As noted earlier, at best the Coaches and Developers had one school year in which to work. Further, the professional development model was one that separated teacher contact into that which came from the Coaches (who focused on infrastructure issues) and that from the Developers (who focused on the PBL and STEM content of the grants). While logical – teachers need to learn how to physically operate technology before they can meaningfully integrate it – this model naturally delayed the Developers from reaching many teachers during the very short grant period. In addition, various infrastructure and technology organization issues (see the Technical and Instructional Support indicator findings, below) tended to frustrate and complicate the efforts of the Coaches and therefore also muted their ability to effectively serve many teachers. Nevertheless, it does appear that the model utilized by the Tech Ready professional developers is one that proved effective in settings where teachers were able to participate and infrastructure issues could be resolved. The effectiveness of the model is covered by the second part of Whiteriver’s Professional Development indicator.

### Implementation of an Effective Professional Development Model

In specific reference to the Tech Ready professional development model, Whiteriver’s indicator states:

*Professional development is based on teachers’ needs and addresses specific learning goals as necessary to develop mastery. The predominant professional development model is one of practice/debrief/practice/debrief/observation, which includes classroom walkthroughs, observation tools, coaching/mentoring feedback and teacher evaluations regarding the quality of training/mentoring and implementation of specific strategies and methods.*

As noted in the introduction to this report, the professional development aspect of the Tech Ready grants focused on training teachers in the implementation of grade and subject-area-specific STEM curriculum units. The district hired 10 staff (with grant funds) to support the rollout of technology in schools, teacher training, and curriculum development. In the second year of the project (2013 – 2014), the district’s Tech Ready work focused on implementing STEM units and training teachers in the four grant-receiving schools.

The overall orientation of the Tech Ready staff – nearly all of whom focused on professional development and teacher support – was well-reflected in the titles provide to these staff. The grants hired “Coaches” and “Developers” and this is in line with the practice/debrief/practice/debrief/observation model described in the indicator and in the grant proposals. The evaluators find that teachers across the district were aware of this model and felt that it was beneficial. In particular, Coaches were lauded for their “patience” and overall helpfulness in dealing with novel – and not always cooperative – technology. Developers were likewise praised and many continue their work beyond the end of Tech Ready (funded through other sources).

Overall, the evaluators find that the Tech Ready professional development model is one that is very effective. This assessment is further supported by the fact that so much about what the Coaches and Developers do is reflected in national standards for instructional technology coaching, professional development and support. Much of the work of Whiteriver’s model and technology professional development staff is mirrored in the ISTE NETS-C standards.[[11]](#footnote-11) The evaluators feel that this will be even more the case as the STEM Developers (funded via H.E.D.Y.) continue to work with Whiteriver teachers and are able to move beyond the first – “I do” -- stage of the professional development model.

## Instructional and Technical Support

As with anything that one intends to see implemented at the classroom level that is generative of student learning outcomes, technology integration must be bolstered by effective supports at the district level. In other words, districts need to create a suitable climate for technology integration to flourish within buildings and within individual classroom settings. Whiteriver’s third indicator for its technology program review relates to these supports.

*A fully supported technology infrastructure and readily-accessible technical assistance facilitate the ubiquitous use and seamless integration of technology tools within the teaching and learning environment. All teachers and students have access to current and fully functional technology tools within a culture that fosters student-centered learning and creativity, and promotes the development of 21st Century learning skills.*

*Teachers receive timely technical support from District IT and school-based technology staff, enabling them to perform universal functions such as accessing the Student Accountability Information System and Learning Management System as well as using classroom teaching tools and student devices.*

*Teachers receive technology integration instructional support through modeling and site-based technology integration coaching, developing proficiency in the use of 21st Century instructional technologies, district STEM lessons, and other resources as dictated by the curriculum. Coaching around the use and integration of new pedagogical strategies and technology tools takes place within a gradual release of responsibilities model (practice/debrief/practice/debrief/observation and evaluation) where appropriate professional development is tailored to the individual needs of teachers.*

This indicator breaks down into three logical categories –Technical Support, Instructional Support, and Systems. Please note that access to technology infrastructure, a subject that is touched upon in this indicator, will be discussed in detail in the following indicator – “Infrastructure and Hardware”.

### Technical Support

The indicator states:

*Teachers receive timely technical support from District IT and school-based technology staff, enabling them to perform universal functions such as accessing the Student Accountability Information System and Learning Management System as well as using classroom teaching tools and student devices.*

In this component of its Instructional and Technical Support indicator, Whiteriver focuses on how teachers benefit from technical support for their use of classroom technologies.

In terms of teachers being able to “perform functions” through the assessment and learning management systems, the evaluators find that several such systems are in place for Whiteriver teachers. Teachers regularly report use of these. Where difficulties do present is in terms of teacher access and in-district support of these systems, and these problems are mostly related to network issues. For example, in the use of Galileo, some teachers and administrators noted difficulties in finding enough “working” workstations to effectively use the system for testing. These problems did not relate to an actual lack of workstations (e.g., all schools had well-stocked computer labs that would be ideal for Galileo use), but rather the problem seemed to be that some number of the workstations in the labs could not be booted onto the network in order to use Galileo. This points to an issue with technical support. School staff indicated that IT department staff had been alerted to the difficulties, but that it was unclear what the resolution was to the problems or if anyone had been in the building to address the problems. For example:

*Well, I think that it’s an overwhelming task for our district to keep up with the needs in terms of infras. There are a lot of times where the tech doesn’t work. And when it does work, it doesn’t work the way it should. It’s an overwhelming task given the amount we have and the number of personnel we have who are responsible for that.*

*…For most of the year I did not have any support. My classroom computers did not work often and the tech people when they were called did not come right away or return and make the needed repairs.*

Comments such as those cited above also touch upon a common complaint on the part of teachers, and that is frustration with the technical support available to support their technology use. Whiteriver’s indicator calls for “readily accessible” technical assistance. Here it is important to note that the district’s situation with regard to technical assistance is complicated. Within the district, there are a number of different ways in which services that teachers consider “technical assistance” are delivered. These are:

* Assistance provided by IT department staff -- This staff contained 2.5 individuals – the Director of IT, a part-time technician, and a full-time help desk attendant – during the time of the Tech Ready grants. Prior to the grants, there was only 1.5 FTE in the IT department (the Director and the part-time technician).
* Assistance provided by the “Technology Integration Coaches” employed by the Tech Ready grants at Cradleboard, Seven Mile, Canyon Day and Alchesay.
* Assistance provided by the “STEM Developers” employed by the Tech Ready grants.
* Assistance provided by school-specific staff such as technology teachers and computer teachers/aides.

As a basic point, it is clear that from the typical teacher’s perspective, any individual who was able to work with him/her to address issues of technology function or integration was “technical assistance”. Teachers seldom initially differentiate between one staff role or another and rather just seek help where they can find it. Where this becomes problematic is in situations such as those often encountered in Whiteriver where technical assistance requests need to be routed to the proper individual due to the fact that different individuals have different technical rights and privileges with regard to their ability to address problems. Specifically, in Whiteriver, most networking problems (i.e., most of the technical problems encountered by users) require the privileges of the IT department to remedy. At times during the Tech Ready grants, the IT department consisted of just a single individual (the IT Director) who had the ability to address any issue requiring a password for a workstation or a network login. While the number of authorized individuals eventually grew to 2.5, this was during a time when 1,500 devices were being added to the network (along with nearly 1000 existing devices). It is clear that getting the proper type of technical support (i.e., support that could address the most commonly occurring user issue – anything related to networking) was a frustrating challenge for Whiteriver teachers during the time of the Tech Ready grants.

#### Factors Contributing to Issues Around Technical Support

The evaluators find that the issues around “insufficient” technical support result primarily from a technology management structure that provides insufficient privileges to those staff whose job it is to support teachers in their use of technology.

One example of this problem is the fact that during the Tech Ready grants, the Technology Integration Coaches were explicitly not authorized to address network problems and did not have any control over device configuration. While the Integration Coaches proved quite helpful in introducing teachers to the basic use of devices (see Professional Development section, above) and in setting up and managing physical access to the devices, the Coaches had practically no more privileges than teachers when it came to fixing issues related to changing device configurations or solving problems related to logins (at least anything beyond a lost or forgotten password; anything requiring a true reset of info at the server would require IT department intervention). For example, in several schools, the evaluators were told about a problem in which IT department intervention was required to address an issue with Bluetooth keyboards that ended up getting mismatched with their paired tablets. Since no one at the school had the ability to access the Bluetooth settings on the tablets, once a keyboard was switched from one tablet to another, the result was two tablets with non-functioning keyboards. As this sort of scrambling occurred within a cart of tablets (frankly, a not un-expected issue when devices are used in a school environment), fewer and fewer devices would work with keyboards. The only remedy authorized by the IT department was for IT department staff to make its way to the afflicted cart and to check, reset, and re-pair everything. Naturally this situation quickly became untenable across four buildings and 900 tablets. Similarly, several principals reported that significant numbers of computers in their computer labs and classrooms “did not work”, and the evaluators observed numerous machines with notes stuck to them indicating that they were “broken” or “locked up”. Teachers and administrators noted that the only remedy to this situation was for someone from the IT department (which at the time of the on-site data collection once again had only a single individual who had access to network and device passwords) to come and reset a machine.[[12]](#footnote-12)

The evaluators emphasize that the problem with Whiteriver’s technical support is not about having a sufficient *number* of staff engaged broadly in technical support. During the Tech Ready grants four Technology Integration Coaches were employed and deployed in the four Tech Ready grant schools. Rather, the problem is that there are an insufficient number of people who have been granted the ability to provide technical support on those matters that require access to passwords and network administration privileges. High level administrative privileges are required for too many routine tasks. The only staff who have such privileges are those who report directly to the IT director. The evaluators found that the Technology Integration Coaches were specifically referred to as people who “do not work for the IT department” and hence could not be granted access for reasons related to network and device security. The evaluators believe that Whiteriver is choking its own performance (in this case, the performance of technical support staff) by creating unnecessary barriers in the name of “security”. If these barriers were reduced, it is quite likely that teachers would be very satisfied with technical support and would have reported much greater levels of satisfaction with technology. The end result of that would be higher levels of technology integration even within the very compressed timeframe of the Tech Ready grants.

The evaluators note that repeatedly throughout the district, comments were made as to the lack of “technology skills” or savvy on the part of anyone in the district other than the small number of IT department staff. As one principal noted:

*My biggest fear is there is not enough man power with tech savvy to fix problems. Pierre is overwhelmed and each building could use someone with his knowledge. If we are going to move forward, we need someone that can lead us from 7 until 4 that can help us with technology. If it breaks.. we are dead in the water. The students deserve better.*

Another staff member noted:

*The system is just way too complicated. It’s not designed for even an average user. Unless you’re new coming out of college, the teachers we have are very not tech savvy. 85 to 90% of teachers do not check their email daily. So that tells you what kind of user we have here at Whiteriver. And the systems we have here at Whiteriver are confusing. It’s just beyond most people. It’s not reliable and on top of that it’s just complicated. It comes easily to Pierre, but it doesn’t come easily to teachers at WR.*

The evaluators feel that it is important to challenge this opinion by noting that what *is* truly limited in the district is the granting of administrative privileges to those in the position to address the routine technical support issues that arise when teachers use technology in the classroom (e.g. accessing system settings to pair keyboards, attach to printers, change device network settings, etc.). As noted several places in this report, the Tech Ready grants included a comprehensive and commendable support structure designed to enable teachers to integrate new tools into their practice. Comprised of technical support staff (the Technology Integration Coaches) and pedagogy support staff (the STEM Developers) this structure, as envisioned in the grant, would have gone a long way toward helping teachers develop comfort, confidence, and new skills. Unfortunately, due to restrictions placed upon Integration Coaches’ and STEM Developers’ technology privileges (and thus their ability to assist in the classroom) progress for many teachers was undermined.

As a related matter, and as referenced in the second quote above, there is a sense among many teachers that the system in WUSD is far too complex for the average user to be able to navigate. This is a perception that is likely fueled by repeated failures to log into the network or frustrations accessing necessary material. Rather than assuming, however, that teachers in Whiteriver are not sufficiently “tech savvy”, the evaluators suggest that it is the configuration of the system that is most at issue. In fact, according to the evaluators’ data on teacher skills, it seems that the average teacher in Whiteriver has the basic competencies related to using technology for productivity and practice that one would expect of teachers anywhere.[[13]](#footnote-13) In an environment with too many complexities and insufficiently enabled support staff, teachers tend to assume that their difficulties are a product of their own lack of “tech savvy” rather than something more fundamental about the way the system is set up. While the specifics of network configuration will be discussed later in this report, for the purposes of the discussion of tech support it seems fair to say that the current network environment is one that seems both to require frequent administrative intervention and to prevent the majority of people from being able to do much to help themselves.

In short, in terms of technical support the evaluators find that WUSD is definitely not meeting its indicator. There does not appear to be sufficient technical support to enable teachers and students to make adequate use of the rather rich hardware (and network appliance) infrastructure that exists. Teachers and administrators report near constant levels of frustration in terms of their technical support requests. This seems largely due to the fact that the existing very small IT staff is clearly overwhelmed by the task of servicing – and controlling – the many workstations and systems in the district infrastructure. The selected solution to this situation has not been one of enlisting other staff – such as the Tech Ready staff or school technology staff such as Computer Aides or Computer Teachers – in supporting technology, but rather to double-down on control of the infrastructure. The system has been tied down tightly in an attempt to make it “controllable” by a staff of one or two people. Unfortunately, this effort has clearly failed. It is simply not possible for one person to control 3,000 devices and the networks that these devices attach to (including the Internet). The end result is an infrastructure with insufficient technical support that not work effectively for anyone desiring to use it support and develop a 21st century learning environment. This clearly is not in the spirit of Whiteriver’s indicator.

### Instructional Support

The final portion of Whiteriver’s Instructional and Technical Support indicator deals specifically with the *instructional* support offered to teachers around using and implementing instructional technology in the classroom. The indicator states:

*Teachers receive technology integration instructional support through modeling and site-based technology integration coaching, developing proficiency in the use of 21st Century instructional technologies, district STEM lessons, and other resources as dictated by the curriculum. Coaching around the use and integration of new pedagogical strategies and technology tools takes place within a gradual release of responsibilities model (practice/debrief/practice/debrief/observation and evaluation) where appropriate professional development is tailored to the individual needs of teachers.*

The type of support described in this part of the indicator relates strongly to pedagogy, curriculum and instruction. This is not the same as technical support. Rather, instructional support is more closely aligned with technology professional development.

The work of the Tech Ready Technology Integration Coaches and STEM Developers has been discussed earlier in this chapter. Just to recap, the Integration Coaches focused on providing hands-on assistance to all teachers in the four Tech Ready grant-receiving schools. This assistance was oriented largely around learning about the basic operation of student wireless devices (tablets and iPads), learning to use classroom equipment (such as projectors and document cameras) purchased with the grants, and starting to bring classes of students online to engage in technology-infused curriculum activities. In practice, the Technology Integration Coaches served as front-line technical *and* instructional support to teachers in the four grant-receiving schools during the 2013-2014 school year.

The STEM Developers – one at each grant-receiving school and one district-wide – focused on providing *instructional* support to teachers in implementing the STEM curriculum units that the STEM Developers created. At least one unit per grade level was created and posted on the district’s LMS (Moodle). As has been discussed earlier in this chapter (in the section on Professional Development), the STEM Developers worked with a subset of teachers in each school to coach these teachers, model lessons, and generally to co-teach the STEM units during the 2013-2014 school year.

As has been discussed earlier, the work of the Technology Integration Coaches and the STEM Developers was complicated and challenged in a number of ways mostly related to technology infrastructure. First, it is very clear to the evaluators that the process of bringing 1500 devices online in the district would have been an enormous challenge in any district. The Technology Integration Coaches were working with full faculties of teachers who had very little prior experience in managing student technology use, much less nearly 1:1 access with new devices. Further, the various networking and technology administration challenges faced by the Coaches were quite difficult. Central to these difficulties was the fact that the Coaches had to rely upon a very small IT staff to handle even the most routine network and system administration tasks. Without access to the passwords necessary to make changes to workstation/device configurations, the Coaches did their best to roll out hundreds of devices in their schools.

The STEM Developers worked in a mode where they intentionally followed the Technology Integration Coaches in terms of working directly with teachers. The Developers needed to ensure that teachers had access to the various systems and resources (that the Coaches trained teachers in using/accessing) necessary to implement the STEM units. Therefore, the Developers tended to engage teachers later in the 2013-2014 school year than did the Coaches. The Developers in fact spent as much time during the Tech Ready grant period actually writing units as they did working with teachers to implement the units. The work of developing the units was indeed significant, particularly when it is considered that the Developers needed to construct the Learning Management System (LMS) on which the units reside. This system – Moodle – is one that the Tech Ready grant staff (Developers and Coaches) have been “given access to” and are therefore able to effectively manage its content. Moodle is also used to document grade level and subject area curriculum and therefore includes the pacing guides now being rolled out to all Whiteriver teachers. The overall effect is that the Moodle LMS, as implemented by Tech Ready, has become a central system for documenting and managing curriculum across the district. The evaluators find that this is a significant development that is attributable to the Tech Ready grants and one that falls within several of the district’s indicators for the grants.

As noted in the indicator section on Professional Development, the evaluators do find that the STEM Developers employed the practice/debrief/practice/debrief/observation model with teachers. Overall, the Developers seemed to find success in their work with teachers. As several of the Developers noted:

*We were told not to pressure the teachers, but were also told that they wouldn’t do it unless it was mandatory. So we did PD to promote the positive aspects of STEM. So every teacher I met with wanted to work with us. We had a meeting at the start of the year with a bunch of teachers where they came up with some ideas and themes for STEM. From those themes, when teachers said they wanted us to come into their classroom, I would go and help them develop lessons.*

*[At my school] we were told that it wasn’t mandatory for teachers to do the STEM stuff, but that we were looking for champions. So before we launched a STEM unit we would overview it and then model it for teachers. I do we do you do.*

Teachers reported satisfaction with this model and their interactions with the STEM Developers. The ultimate success of the Developers in terms of their ability to support and work with teachers is reflected in the fact that at the termination of the Tech Ready grants, three out of the four Developers (plus the leader of the initiative’s professional development component) have been retained to continue their work supporting teachers in the implementation of STEM-based professional development.[[14]](#footnote-14) The evaluators find that this effective extension of STEM Developer time is a good thing given the fact that the Developers really had relatively little time to work with teachers during the course of the Tech Ready grants. This is reflected by some teacher comments:

*We were supposed to have all of these units that were developed for us that we could jump into, but that never happened. [The STEM Developer] tried, but it never happened.*

*They created some really nice stuff on Moodle, and teachers haven’t had training on how to use that. We have a curriculum and we have Moodle. There wasn’t much training for teachers to move their stuff to Moodle.*

### Systems

Another aspect of Whiteriver’s Instructional and Technical Support indicator pertains to the development of systems such as the Learning Management System and the accountability and testing system. In Whiteriver, notable systems include Galileo and AIMSweb for student assessment, MyLearningPlan for teacher professional development management, and Moodle as a basic learning management system. Teachers and students also make heavy use of Renaissance Learning’s Accelerated Reader. The evaluators did not uncover any significant level of dissatisfaction with any of these systems among district teachers. These systems are quite standard within their categories (assessment, LMS, etc.) for school districts and all present as solid systems with good levels of acceptance and support in the K-12 marketplace.

In particular, the evaluators find that the Tech Ready team and the STEM Developers in particular have been able to construct a robust system for demonstrating to teachers the potential that technology has in the instructional environment. For example, the Tech Ready team has been able to work around the restriction that exists on the use of video/camera apps to store images on the tablet devices (a restriction that cannot be changed by non-IT staff and therefore impacts every device in the district) by creating a function within the LMS that allows users to store video on local area network servers. This solution was created with IT staff as a way to preserve IT’s ability to control devices and yet to provide users with the ability to actually use their devices to create instructional content. The LMS also provides support for the creation of class websites and basically provides the framework for teachers to create local area network resources that do not require direct access to the Internet.

One down-side of the Tech Ready team’s involvement in the LMS is that what should be a mission-critical, central service to all district teachers is now in effect something that is operated by staff who are not funded directly by the district. Furthermore, the Tech Ready team’s involvement in the LMS also extended (during the period of the grants) into a certain measure of organizational and operational support of other district systems such as the grading system, the assessment system, and other subscription-based curriculum resources. It is unclear at the time of this writing as to whether or not the former Tech Ready staff (who are now paid for by outside funds and who are technically consultants to the district) will continue their role in supporting these systems or if support of these systems will become a function of the IT department.

## Infrastructure and Hardware

*The district’s technology infrastructure -- hardware, software systems, and network -- has adequate capacity to support the teaching, learning, and administrative needs of its users. Users are fully aware of the technology resources available for their use and are confident in the ability of the district’s technology staff to adequately support and maintain the infrastructure. Teachers can easily contact the technology department to resolve filtering issues or other difficulties. District technology support staff have adequate (industry-standard??) systems administration in place so as to quickly and efficiently troubleshoot the network and manage devices including iPads, tablets, and desktop systems.*

*Configuration and use of the district’s network is guided by a set of acceptable use policies geared toward open access to websites and dictated by the instructional and learning needs of teachers and students. Policies and protections are in place so that students accessing the district’s network interact responsibly on social media sites, and learn appropriate digital citizenship skills in line with NETS-S standards.*

Much of what is specified in this indicator with regard to infrastructure and its impact on the instructional environment has been discussed earlier in this chapter in relation to other indicators. Nevertheless, the clear emphasis that the Tech Ready grants had on infrastructure development – nearly half of the funds, or around $2million, were invested in infrastructure upgrades – warrants specific attention to infrastructure capacity, policies around access to and use of technology, and the digital literacy that students could gain through use of instructional technology tools and resources.

### Infrastructure Capacity

The evaluators note that nearly half of Whiteriver’s Tech Ready grant funds were devoted to acquiring new and upgraded technology infrastructure. Among the many infrastructure improvements brought by Tech Ready were improved WiFi access, upgraded servers, upgraded Internet bandwidth, classroom devices such as projectors and document cameras, and the addition of a considerable number of computer/workstations. In terms of the latter, the district purchased approximately 900 new Windows tablets, nearly 400 iPads, and over 200 PC laptops during the first year of the two-year Tech Ready grants. This purchase of a large number of devices was in keeping with the district’s initial objective in the Tech Ready initiative to effectively create a 1:1 computing environment for students in Grades 3 – 12 (and 1:3 for students in Grades K – 2).[[15]](#footnote-15) In the space of a single year, Whiteriver added just under 1,500 wireless computing devices to its infrastructure, effectively doubling the total number of devices on the district’s network.

The infrastructure improvements acquired through Tech Ready funds supplemented an already rather robust district technology infrastructure. Whiteriver’s students and teachers had – and continue to have – access to a technology infrastructure that is quite comparable to typical districts the size of Whiteriver. The evaluators find that each Whiteriver school has at least one computer lab (several schools have multiple labs) that generally has about 25 – 30 workstations, most classrooms (particularly at the three elementary schools) have four to six computers for student use, each school has at least one server, and all of these machines are linked to the district network. There are student computers in every school library, and a host of printers exist in every building. In addition to a host of productivity applications (MS Office), the district operates and maintains software systems that support student assessment as well as basic skill development and remediation (e.g., in mathematics, reading, keyboarding, etc.). These student systems will be discussed further in the following section of this chapter. Many of the desktop computers in labs and classrooms operate as thin client machines that receive application service from building and district servers. Building and district servers also provide users with file storage and sharing service. All of these devices and functions existed prior to the advent of Tech Ready’s infrastructure improvements. The bottom line is that the Tech Ready grant added substantially to an already quite substantial district technology infrastructure. By the numbers, Whiteriver has an extremely well-equipped technology infrastructure.

Despite these strong numbers, Whiteriver’s technology infrastructure does have its weak points, and these overwhelmingly relate issues of device connectivity. As the following staff quote illustrates, network problems consistently “get in the way” of instructional use of the district’s infrastructure:

*We have an incredible infrastructure here and about half of the grant went to updating that infrastructure. We have it in place and it works from time to time. But it’s not instructionally reliable. Today I was in a lesson with [another teacher] and he was doing an activity and everyone’s screen started recycling. Everyone was engaged and all of a sudden they couldn’t work anymore. We have so much of that going on at so many different levels.*

An examination of this sort of problem – similar issues with machines connecting, staying connected, and remaining reliable are found frequently in Whiteriver’s data – reveals that the “infrastructure” capacity problems are a complicated web of issues that stem from both technical and human limitations.

#### Bandwidth

Whiteriver’s district wide-area network (WAN) is built around a 2 gigabit fiber optic backbone, which is both industry-standard for school district networks and is normally quite sufficient for typical K-12 student and teacher use. On the other hand, the district’s connection to the Internet is only 80mb/sec. While this is apparently double the bandwidth that the district had before the Tech Ready grants paid for bandwidth improvements, the evaluators note that national guidelines call for a district the size of Whiteriver to have a minimum of a 300mb/sec Internet connection.[[16]](#footnote-16) This is nearly four times the current amount of bandwidth coming into the district.

Knowing that its incoming Internet “pipe” is potentially a significant bottleneck in system performance, Whiteriver’s IT department has implemented a number of solutions intended to limit the impact of the low-bandwidth Internet connection. For example, Whiteriver’s network has been configured with a very large number of WAN-based servers. Whiteriver locally stores, serves, and caches material that more typical district networks rely upon Internet cloud-based services for. Whiteriver teachers and students are not generally permitted access to Google Docs (although exceptions are made upon request) and instead all file storage is on local servers; the district maintains a caching server for Discovery learning; teachers have found ways to cache YouTube so that direct Internet access to YouTube is not always required. Students do not have district email accounts (either via a cloud service such as Gmail or via the district’s own servers). Furthermore, the district’s firewall aggressively filters web traffic to the extent that some widely used educational services (e.g., BrainPop) are blocked for most users. All of these district-based services and controls have resulted in the district only typically utilizing approximately half of its current 80mb/sec Internet bandwidth.[[17]](#footnote-17) The down-side of this aggressive use of internal services and filtering of Internet traffic is that internal network traffic has saturated approximately half of the available 2gigabits.[[18]](#footnote-18) The result for users is that they see poor network response at their workstations. While many users told the evaluators that the problem was “a lack of Internet bandwidth”, the evaluators find that the real problem is an inefficient bandwidth allocation. Whiteriver’s internal network is bogged down in part because it is trying to do things that typical, modern, K-12 WANs are not required to do.

Adding to the internal bandwidth woes of Whiteriver’s WAN – and in the category of “things that typical K-12 WANs are not required to do” -- are several issues relating to how the network has been configured.[[19]](#footnote-19) First, the vast majority of Whiteriver’s devices are thin client. This naturally requires that devices log into district servers and then remain in constant communication with servers to receive application and data support. While this allows the district to maintain the use of “old” machines (which can in effect simply function as terminals to district servers) on the network, it also increases internal network traffic. Thin client traffic alone should not be a bandwidth problem as many district networks operate thin clients, but this traffic in addition to what appears to be a considerable amount of traffic coming from workstations attempting failed logins and other incomplete server requests as well workstations accessing WAN-based servers seems to have contributed to bogging down the WAN. The district’s wireless network apparently suffers similar problems to the wired WAN. Here the issue seems to be that the district operates a rather large number of virtual private networks (VPNs) and these are possibly causing issues with access point performance. Many non-technical WUSD staff believe that the basic problem with the network is “a lack of bandwidth” on the WiFi network as this comment illustrates:

*We need more stability with internal wifi and more bandwidth. We need more in the building.. When all units are on at once it goes poorly. This is common two or three times a week that we have issues with our access to the Internet. Some teachers are flexible and resilient and can deal with that, others just shut down if it doesn’t work right.*

In fact, the evaluators find that the real problem is not a lack of Internet bandwidth, although the district certainly does not have sufficient Internet bandwidth. Rather, the evaluators find that WUSD users are stymied by problems on the local area network that come into play well before the Internet gateway is reached. Ironically, bottlenecks on the local area network seem to result from the variety of controls and “solutions” IT staff have put into place in order to preserve Internet bandwidth. The result is that while the district’s limited Internet bandwidth is indeed spared, internal barriers have resulted in an equivalent slow-down of user service.

#### District-Imposed Limits on Bandwidth

At the root of these issues is what appears to be a strong desire to segment network traffic (using limited resources) and to filter network traffic for security. In terms of the former (segmentation), it appears that IT has created different networks for different user-types that might attach to the network. There are a number of different virtual networks for multiple different types of devices and for different classes of users. While some degree of differentiation is certainly desirable, it seems that Whiteriver has taken this to the extreme and has created a much more complicated network than would be warranted by the number of users and number of services served. All of this is apparently rooted primarily in desires to conserve Internet bandwidth and to prevent different classes of users from accessing various resources in and out of the WAN. See the discussion of “Policies” later in this chapter for a further exploration of Whiteriver’s filtering and user access policies.

With the above technical discussion as a background, the evaluators find that unfortunately the bulk of Whiteriver’s infrastructure users – teachers and students – do not have “*ubiquitous use and seamless integration of technology tools within the teaching and learning environment*” that is called for in the district indicators. On the contrary, users typically report that their technology use is anything but seamless. While a uniform majority of teachers in all five schools felt that they “have access to the technology tools that [they] need to support teaching and learning”,[[20]](#footnote-20) teachers were equally uniform in their stated opinion that their (and their students’) technology access was hindered by a multitude of usability issues. For example:

*Kids have to log off once on the server and again to get the device to go off. If they don’t do that correctly, it corrupts the device.*

*we have tablets and 1:1, but there’s a problem every day and every day some students cannot log in. There’s always a problem with the tablets and the kids get frustrated.*

*This grant has provided me with training and ideas of how technology could be effective in my classroom if the school had the capability to run all the resources provided. It has been very disruptive as of today due to the fact that the system crashes and students lose their work. The system does not always work and that makes it very difficult to plan and to make the students and I want to try to use the technology. We can never get everybody logged on and have little to no support on fixing these matters. The network has too many blocked sites and this becomes very aggravating to the students.*

*[Tech Ready] has provided tablets, which students can't use, Tech support that can't fix our problems, and worse connections and issues than before we upgraded.*

It is important to note that these comments are but examples of a widely expressed displeasure – in the survey, in focus groups, and in one-to-one discussions with the evaluators -- that teachers stated with regard to the functionality of the “widely available” technical infrastructure.

### Policies Around Access to And Use of Technology

Whiteriver’s indicator states:

*Configuration and use of the district’s network is guided by a set of acceptable use policies geared toward open access to websites and dictated by the instructional and learning needs of teachers and students. Policies and protections are in place so that students accessing the district’s network interact responsibly on social media sites, and learn appropriate digital citizenship skills in line with NETS-S standards.*

WUSD’s Infrastructure and Hardware indicator is specific around the impact of *policies* in mediating user access to and use of the district’s technology infrastructure. The indicator refers to policies around technical support, system administration, and acceptable use.

The evaluators find that Whiteriver does indeed have a standard (for K-12 school districts) acceptable use policy (AUP) that students and staff must agree to in order to gain access to the district network. In this regard, the district is meeting its indicator. Where problems seem to lie is in the district’s Internet filtering policy. The evaluators heard repeatedly from teachers and administrators that there are various frustrations with the district’s filters. For example:

*Our filters are pretty strong, which is a good thing but it can be frustrating. Things that they used and worked are sometimes re-blocked later.*

*…There are either too many programs/sites blocked, or our network can't handle the capacity.*

*It was frustrating because the technology would work, would be too slow, webpages that were given to us by the TR team would be blocked, etc.*

As these comments illustrate, many Whiteriver teachers are uncertain as to whether the problems they experience are related to a lack of bandwidth or very rigorous Internet filtering. The evaluators find (as has been discussed earlier) that the problems are due to overly-aggressive filtering that has been put into place so as to preserve Internet bandwidth and enhance security. Regardless of the order of these problems (which comes first, the lack of bandwidth or the aggressive filtering?) the end result is that teachers cannot access resources that they would like to have available for their students. This results in a dilemma that a teacher survey respondent highlighted as follows:

*[I would like the] Ability to access Web 2.0 tools, without being blocked. Ability to access Google tools without being blocked. … Trust in the fact that I am capable of monitoring my students' internet use and capable of teaching netiquette so that they can truly have access to the world wide web (block the porn, but please don't block Dictionary.com, for example!).*

In other words, this teacher – and the others in the district that expressed similar sentiments to the evaluators – is saying that s/he *cannot* actually achieve the condition that is described in the district’s indicator when it says:

*…Policies and protections are in place so that students accessing the district’s network interact responsibly on social media sites, and learn appropriate digital citizenship skills in line with NETS-S standards.*

If Whiteriver teachers cannot actually access Internet resources that challenge their students’ digital media literacy skills, then they have lost an important way to teach those skills to students. Specifically, in the present circumstances, teachers do not have the freedom to exercise their own judgment as to what sites they can show students. Furthermore, it appears that the bottom line for Internet filtering is one that is set by the IT department with limited input from instructional staff. Teachers and IT staff agree that when a teacher encounters a blocked site that s/he would like to access, the first response is to ask the *IT department* for permission to get past the block. The IT department then determines if the block is necessary and valid and only asks administration (i.e., a principal) for an opinion if the teacher questions the IT department decision. It is clear to the evaluators that this policy/process is one that frustrates and discourages teachers and that practically places most decisions concerning filtering in the hands of non-instructional staff. The evaluators heard a number of comments from teachers indicating that it was the IT department that made the ultimate decision related to filtering. Whether or not this is actually true, it doesn’t matter if teachers *believe* that this is true.

*What I would like to see is for the effort to be put into the curriculum and the guide and map and then a plan for how tech is going to support that plan. But instead we have 2 sep things. Tech is set up for a business environment and not the needs of teachers.*

*I would like to see an educational technology position for the district. We have an IT department but not that.*

The evaluators find that the IT department’s filtering policy is strongly shaped by a desire to restrict network access to all social media. The IT department feels that it is necessary to block access to Facebook in order to protect teachers (and students) and to remain in compliance with federal law. The evaluators note that there is no federal law that specifically requires blocking access to social media.[[21]](#footnote-21) What *is* required is that districts have a robust and lively decision/debate about the merits of categorically blocking certain types of sites and the instructional basis for such policies. This is in the spirit of Whiteriver’s above-quoted indicator. Unfortunately it seems that much of this debate has not happened in the open in WUSD. Rather, teachers and (more importantly) administrators have opted to consider issues related to filtering part of being “tech savvy” and hence have defaulted to allowing IT staff to make decisions related to filtering.

### Digital Literacy

The issue of how filtering impacts teachers’ ability to teach digital literacy connects to a larger issue (also unfortunately rooted in technology “policy”) of 21st century learning. The evaluators find that the district’s efforts to create what is essentially a “walled garden”[[22]](#footnote-22) by replicating Internet resources (e.g., YouTube, cloud-based services, email, etc.) within the local network is actually cutting students off from access and exposure to the “real” Internet. This becomes particularly apparent when considering the district’s indicator for Student Skills and Outcomes. Here there is the intent that Whiteriver’s students exercise *choice* in technology tools and resources and develop communication and collaboration skills with students both locally and globally. Nevertheless, Whiteriver students do not have the ability to exercise choice, and the opportunity to communicate is severely limited. “Global” communication is largely barred, and even local communication is limited. Whiteriver students do not have district-provided email addresses, and teachers frequently note that this limits their ability to communicate and to use a wide variety of systems. It is not surprising that the vast majority of all Whiteriver students note that they virtually never communicate with their teachers via email (see Figure 4 below).

The evaluators note that while teachers and students are blocked from accessing Facebook when on the district network, the school district has a Facebook page that has been organized and maintained by the Tech Ready grant staff. This page is linked to from WUSD’s Moodle, although it is doubtful that any teacher can reach the page from the Moodle while working on the district network. Rather, teachers likely access the page from home and so the blockage from school is simply a technicality that has little bearing on actual use and is motivated by a misunderstanding of federal policy. None of this addresses the real issue of digital literacy. As one administrator pointed out:

*A big part of tech that we don’t address with our teachers and students is digital citizenship. … That’s a big piece of what’s been missing in the whole process that we’ve been through. It’s definitely something that we need to address with our kids and even their parents. We have to figure out a way to educate our students on this. We get into Facebook wars all of the time. A lot of the Facebook access happens at home. It’s still [the school’s] when it happens, doesn’t matter if they got to Facebook from home or school.*

Another administrator made a similar point:

*…21st C learning is about exposing students to real life situations that they don’t otherwise get… Virtual field trips, videoconferences, online pen pals from other countries and doing research on those countries*

The point that both of these administrators make is that Whiteriver students cannot become truly digital literate unless they have a wide range of digitally-mediated experiences.



**Figure 4** – Student reported frequency of email communication with teachers (Question 7f)

## Capacity Building and Sustainability

*In order to achieve effective and sustainable 21st Century learning environments in WUSD’s classrooms, the district ensures the development of, and communicates, a clearly defined plan for the integration of technology district-wide. This plan is rooted in work flowing from the district’s STEM initiatives, but builds upon this foundation through the creation of district-wide policies aimed at sustaining and expanding the use of technology-infused pedagogies across the curriculum and in all district classrooms. There are clear expectations and a mapping of how PBL and STEM units map to curriculum standards. The ultimate goal of WUSD’s work in technology integration is to ensure that all district students develop the skills and dispositions necessary for lifelong success in their community. To this end, the district communicates its vision and plans to the larger community as a way of creating a base of support among parents and business leaders and to explore models for securing ongoing funding.*

*The district plan is aligned to national and local standards with measurable essential learning outcomes (such as curriculum standards and the CCL). The district ensures equal and adequate access to technologies and learning opportunities for all students and staff through the existence of a robust technology infrastructure, effective technical supports, and teacher/staff professional learning that emphasizes the role of technology in meeting curricular and learning objectives. The district maintains and constantly reviews policies necessary to ensure safe and ethical technology use.*

During the work involved in framing Whiteriver’s Tech Ready evaluation, the evaluators were careful to create an indicator for each aspect of the grant’s program of work. “Capacity Building and Sustainability” is indeed a part of the program of work and is mentioned in the Title I proposal. This certainly makes sense given that it is clear that funding any work in the district would have little value if the district did not attempt to find ways to extend the impact of the funding well beyond the end of the grant period. Likewise, it is clear that the funds provided to the district were all about building the capacity of the district to engage in the development of the sorts of student outcomes described in the Student Outcomes indicator.

At the same time, an *indicator* for what it would look like for Tech Ready to have built capacity, and more importantly to have sustained impact is something that could not really be realized or measured until well after the conclusion of the grant. Since this evaluation is occurring at the exact end of the grant (10/2014), measurement of this indicator is not possible. Despite this, it happens that the work that the district stakeholders did on this Capacity Building and Sustainability indicator perfectly describes the *ongoing* work that the district must do as it aims to leverage Tech Ready for future benefits. As such, this indicator becomes the basis for discussing the Recommendations that are detailed in the next chapter of this report.

# III. Recommendations

In light of the findings detailed in the previous chapter, the evaluators have developed recommendations for Whiteriver to consider so as to improve district performance in meeting its indicators and in moving ahead in its efforts to make instructional technology a significant tool for teaching and learning in the district.

The evaluators note that many of these recommendations would ideally be implemented through the development of a district-wide strategic technology plan and that furthermore, the development of such a plan is the logical next step in Whiteriver’s technology work. Therefore, these recommendations are all made within a context of the sorts of goals, objectives and actions that should be embedded in a multi-year strategic technology plan.

While there is no arguing with the basic logic that all roads in education should lead back to improving student outcomes, it is also often true that improving student outcomes requires the implementation of a number of interim or smaller goals and actions that can prove just as challenging for a district as creating large impacts. Therefore, the order in which these actions are approached becomes important in terms of creating an overall strategic approach to achieving the overarching goal – or vision – related to student outcomes. This being very much the case in Whiteriver, the recommendations in this chapter are presented below in order of strategic importance and value rather than by the order presented in the district’s indicators.

## Adopt a Vision that Emphasizes Instruction over Technology

As part of its evaluation work for the Tech Ready grant, Whiteriver stakeholders created an indicator for “Capacity Building and Sustainability”. This indicator was created in response to one of the program categories for the Tech Ready proposal, but in fact the indicator is much more forward-looking than it is about evaluating any existing work of the grant. The indicator states:

*In order to achieve effective and sustainable 21st Century learning environments in WUSD’s classrooms, the district ensures the development of, and communicates, a clearly defined plan for the integration of technology district-wide. This plan is rooted in work flowing from the district’s STEM initiatives, but builds upon this foundation through the creation of district-wide policies aimed at sustaining and expanding the use of technology-infused pedagogies across the curriculum and in all district classrooms. There are clear expectations and a mapping of how PBL and STEM units map to curriculum standards. The ultimate goal of WUSD’s work in technology integration is to ensure that all district students develop the skills and dispositions necessary for lifelong success in their community. To this end, the district communicates its vision and plans to the larger community as a way of creating a base of support among parents and business leaders and to explore models for securing ongoing funding.*

*The district plan is aligned to national and local standards with measurable essential learning outcomes (such as curriculum standards and the CCL). The district ensures equal and adequate access to technologies and learning opportunities for all students and staff through the existence of a robust technology infrastructure, effective technical supports, and teacher/staff professional learning that emphasizes the role of technology in meeting curricular and learning objectives. The district maintains and constantly reviews policies necessary to ensure safe and ethical technology use.*

In light of the findings presented in the previous chapter, the evaluators recommend that Whiteriver set about the process of putting into place the sorts of things described in the Capacity Building and Sustainability indicator. As stated in the Tech Ready proposal(s), it is the ultimate goal of Tech Ready to establish a sustainable instructional technology program in the district. Logically, this makes sense as the Title I funding that supported Tech Ready clearly intends that the impact of the funded program of work is something that builds capacity in the receiving district to carry on the funded work well beyond the end of the original funding. It is clear to the evaluators, particularly evidenced through discussions with the district superintendent and the (recently retired) federal programs director, that Whiteriver strongly wants to meet the spirit of Title I and the Tech Ready grants.

As a first order of business in meeting this intent, the evaluators recommend that Whiteriver make substantive changes in how it organizes and manages its instructional technology efforts. Key to that reorganization would be a dedication to defining and implementing a vision for instructional technology that emphasizes *instruction* over *technology*. The evaluators recommend that Whiteriver set about the work of creating a strategic plan for technology that is rooted in a vision for technology that aligns with the Student Outcomes indicator. Again, this indicator states:

*WUSD students are proficient in basic technology skills and demonstrate critical thinking, information and media literacy, and responsible digital citizenship in line with National Educational Technology Standards (NETS-S). Utilizing a variety of digital tools within a personalized learning environment (i.e. student input or choice) that emphasizes PBL and STEM, students synthesize information and develop knowledge in support of curriculum-based learning objectives. Technology supports all students in the development of communication and collaboration skills with peers both in the district community and globally.*

This indicator is very closely aligned with the vision statements found in most district technology plans.[[23]](#footnote-23) Of course the district should work to ensure that this vision truly meets with its community’s needs, but such discussion and refinement is a part of the district technology planning process and therefore naturally occur when the district engages in planning (as will be discussed below).

Whiteriver needs a vision for technology’s role in supporting the pedagogies and practices that generate the sorts of student outcomes that the district believes are important for all students to achieve. This vision needs to be one that ties to the learning outcomes described in other district visions and plans (e.g., the district and school improvement plans).

Whiteriver’s strategic technology vision and the plan for implementing that vision (see below) should be the conceptual framework for establishing and then implementing a range of technology policies. This is why the evaluators’ recommendation related to vision comes at the top of a list of recommendations. Many of the following recommendations relate to specific elements of the district’s technology implementation, but everything should tie back to the vision. For example, current concerns about the district firewall (Internet filtering), various technical procedures related to login, and (more to the point) about how decisions are made impacting things like filtering and network access need to be set in district-wide policy, aired and created openly (by the committee) and of course guided by the overarching vision for technology. Likewise, another important issue – budgeting – needs to be approached as *budgeting to fund the district technology plan,* and not as an ongoing discussion about “deciding how to spend this year’s technology funds”. The plan should provide the context for making decisions (including the ever-important budgeting decisions). That is the point of a strategic plan; and specifically, the point of a strategic plan that is created collaboratively by stakeholders is that everyone will have input into the making of those decisions, strategically. The strategic plan starts with a vision for the overall purpose of that plan.

## Establish Instructional Technology Leadership

If the district’s vision for technology is one that emphasizes instruction, student learning, and student outcomes, then the district needs to organize its technology efforts so that decisions related to technology be made based on achieving instructional outcomes and not primarily on issues related to administration of technology. Simply put, Whiteriver needs to chart where it wants to go instructionally and then demand that the technology be administered in such a way as to support the instructional mission. The IT department has to be oriented toward making instruction happen at a pace and toward objectives set by instructional staff. Instructional staff cannot be told that things cannot happen, but rather only that things will happen in response to instructional needs and in alignment with the strategic technology plan.

Key to the recommended reorganization is that district staff should shift from the present perspective of viewing any instructional activity that involves the use of technology as a “technology activity” to be handled by “technology” staff. Rather the focus should be on the teaching and learning inherent in the activity. The technical details of enabling a particular instructional task – e.g., how to access some system or network necessary for student work – should be subsidiary to the instructional need. Of course to make this happen, staff need to be assured that IT staff will facilitate access on the technical front. It must be stated that this has not been the experience that many teachers have had in Whiteriver.

If Whiteriver were operating from a position where technology had not received any funding and there were simply no resources available, then it might be reasonable to assume that it was indeed impossible to implement a technology environment that provided access to the sorts of basic services available in school districts nationwide. But the fact is that Whiteriver has made tremendous investments in instructional technology for years. The current Title I investment of nearly $2.5 million dollars in under two years is more than ample evidence of the wealth that the district has devoted to its technology supports. The next section of this chapter of recommendations will detail some of the ways that the actual technology infrastructure could be reorganized, but even more basic to addressing Whiteriver’s difficulties is the organizational need to firmly establish a Curriculum and Instruction guidance and direction for technology.

Specifically, the evaluators recommend that the district create the position of Director of Instructional Technology and that this position oversee technology both in terms of how it fits within the instructional environment as well as how it’s supported technically. This would without a doubt be a new position in the district. The current IT department would become the technical part of the *Instructional* technology organization.

Specifically, the evaluators recommend that the district target a technology staffing structure similar to that displayed in the organizational chart below.

Key to this proposed organization is that the focus of the Instructional Technology Department should be on providing technology leadership that is directly connected to the district’s vision for student learning. The following table illustrates the shift in focus from technical to technology leadership.

|  |  |
| --- | --- |
| **Technical Leader**(Traditional IT Director Position) | **Technology Leadership**(Proposed Director of Instructional Technology) |
| Configuring networks and local servers  | Mediating contracts for cloud-based and contracted services. |
| Supervising technicians  | Evaluating outsourced work and setting up effective help-desk processes. |
| Writing technology plans  | Working interdepartmentally with curriculum, staff-development, public relations, assessment, and strategic-planning leaders. |
| Providing technology devices to staff and students | Providing access to school network resources accessible with personal devices. |
| Writing policies that dictate behaviors and ban activities  | Writing guidelines and curriculums that encourage safe and responsible use. |
| Knowing about the *how*  | Understanding the *why* of a new technology in education. |
| Preserving the status quo  | Implementing new technology applications and best practices. |

**Table 4** – Contrast between Technical Leadership and Technology Leadership.[[24]](#footnote-24)

The ideal levels of staffing for each of the various positions should be determined as part of the planning process, and it may well be that it would take multiple years for the district to reach “ideal levels” for each position or overall. In general, the targets should be:

* One Instructional Technology Specialist for each building. This individual will focus on the implementation of technology at the classroom level and will primarily serve as a professional developer/coach for teachers. This position is very much in line with the “STEM Developers” brought in as part of the Tech Ready grant, although focused more broadly on technology integration with the general curriculum and not necessarily “STEM”.
* Three Technicians for the district. These staff are dispatched from a central location and travel to buildings on a rotational and as-needed basis to address problems related to malfunctioning equipment and network connection.
* One Network Administrator. This person is responsible for monitoring network performance and dealing with configuration issues of network systems (e.g., the Learning Management System, the Assessment System, etc.)
* Two Help Desk Staff. These individuals take help desk requests and provide technical assistance such as that which can be handled via the phone or email (e.g., resetting user accounts, basic troubleshooting, etc.). The Help Desk staff are responsible for opening trouble tickets, dispatching technicians when required, and monitoring the resolution of tickets.

The evaluators recommend that the Instructional Technology Specialists (ITS) be charged only with providing instructional support to teachers (see below). They should not be “front line” technical support. Rather, they should work closely with technicians, and this collaboration will be facilitated by the fact that the ITS and the technicians will all be ultimately directed by the Director of Instructional Technology. Further, the Instructional Technology Specialists (once these are full-time positions and not add-on responsibilities to existing teachers) should unambiguously report to the district’s C&I-aligned instructional technology department.[[25]](#footnote-25) Classroom teachers should come to understand that the instructional technology specialists are allies with them in implementing technology as a tool for learning, and that both teachers and ITS rely on the expertise of technicians to insure that the infrastructure functions properly.[[26]](#footnote-26)

It is important to note that Whiteriver continues to need now and into the foreseeable future an IT department. There is a clear role in the district for competent network managers, engineers, and support technicians. But this role is one that must function in collaboration with the instructional direction that oversees the district’s technology effort. As Doug Johnson (the author of the ASCD article from which the above table comes) states:

*Even though I couldn't install a router if my life depended on it, I can describe in plain English things like routers, packet shapers, firewalls, deployment servers, thin clients, Active Directory, DaaS, WAPs, and a whole host of TLAs (Three Letter Acronyms)—what they are, what they do, why they are important, and what specs to think about when considering them. I read continually and broadly in many areas of technology. But I depend on my IT staff, especially my patient network manager, to teach me and help me make good collaborative decisions.[[27]](#footnote-27)*

The key point here is “good collaborative decisions”. Whiteriver needs to construct an instructional technology organization where such collaboration can occur.

## Align Policies With The Instructional Vision

Inherent in the above recommendations about organizing Whiteriver’s technology efforts around an instructional versus technical mandate and implementing a vision for technology driven by student outcomes is that school and district technology “policies” will become more “friendly” to teachers as they work to implement technology in the classroom. An immediate, short list of recommended changes in current policy includes the following:

* Allow staff other than IT department staff to make basic changes to workstation configurations and user accounts. Specifically, enable building-level support staff (those equivalent to the Technology Integration Coaches and the STEM Developers during the time of Tech Ready funding) to actually manage the technical resources that they oversee in their buildings.
* Clearly define a district-wide policy for administering the district’s Internet firewall and place responsibility for overseeing this policy with the Director of Instructional Technology (not the IT director)

It may seem somewhat anticlimactic to have only two items on the list of recommendations for user-friendly policies, but based on the evaluators’ findings these two basic changes would address the vast majority of the user issues with how technology is currently implemented in the district. Further changes and refinements to policies would come through the strategic planning process and through the various structural changes that come from the plan (see below). Nevertheless, making these simple changes would have immediate impact on the technology infrastructure, and these impacts – and solutions – are discussed below.

### Upgrade Internet Bandwidth

It is said that many of the restrictions put into place for users of Whiteriver’s network are intended to preserve the district’s limited Internet bandwidth. To be sure, the evaluators find that at 40mb/sec, the district has approximately 1/3 the bandwidth that would be recommended for a network the size of that in Whiteriver. Nevertheless, the district’s aggressive filtering and heavy dependence on network servers has ultimately proven to be a disservice to network users. Universally, Whiteriver users complain of a “lack of bandwidth”, and whether that lack is at the Internet connection or on the district’s WAN, the end effect is equally problematic. Whiteriver should upgrade its Internet connection.

It may be necessary for the district to more thoroughly investigate vendor pricing and the degree to which various district funds and funding resources can be used to support the purchase of more bandwidth. Furthermore, it is not clear to the evaluators as to whether the district is properly utilizing the various discounts and reimbursements available from E-Rate. It is possible that if the district could clarify some of these pricing and reimbursement issues then the cost of the upgrade could be significantly offset. Investigation of these issues, as well as others related to the technical functioning of the district’s network infrastructure, may be best addressed through hiring a network consultant to come and do a network audit for the district. It is important that the consultant brought in to do this work be familiar with the current federal and state policy related to E-Rate as well as other K-12 networking issues.

### Reduce Barriers for Teacher/Student Participation in the Digital World

In line with, and continuing, the recommendation about allowing students and teachers greater access to the Internet, the evaluators want to emphasize the need to open the district’s Internet firewall to allow greater access to the variety of resources and systems (including social media) available.

The evaluators find that the current strategy of essentially rebuilding the Internet *inside* the district’s network is one that should not continue. Already the district has spent a disproportionately large amount of its funding on buying and installing servers as a way to provide local storage and to cache Internet resources. But the Internet is by definition an ever growing and ever more complex environment and therefore attempts to keep it bottled up are bound to fail. Further, a key part of the educational use of the Internet is around teaching students (and teachers) how to navigate the real world of data and information. Whiteriver’s strategy of walling its users off from this real world is counterproductive to digital literacy, digital citizenship, and is expensive to boot.

On several occasions, district staff discussed the need to prevent teachers and staff from accessing social media – particularly Facebook – via the district’s network. Reasons given for this centered around “federal law” that supposedly mandates that districts block Facebook and also the fact that there have been cases in the recent past where various staff have used social media to issue threats against other staff. In response to the former (the supposed law), the evaluators can unequivocally state that there is no such law. Rather, the FCC (which oversees compliance with CIPA – the federal act that requires schools to maintain Internet firewalls) has explicitly stated that schools do not have to block social media.[[28]](#footnote-28) In terms of the latter – the referenced use of social media to facilitate “threats” between staff – the evaluators recommend that these matters be dealt with by the district’s personnel policies. In fact, both the student and teacher use (and possible misuse) of social media should be covered in the district’s Acceptable Use Policy (AUP). The AUP should clarify what constitutes “acceptable use” of any district technology or district network access and should define how abuses will be handled. The evaluators note that the district does indeed have an AUP, although it is not entirely clear whether students and staff are clear as to the contents of the AUP.[[29]](#footnote-29)

Once again, the evaluators note that the “walled garden” that Whiteriver has attempted to create for its users is one that is an impossible objective, a source of tremendous frustration for users, and ultimately detrimental to the development of digital literacy skills that students (and teachers) need to develop. When the system that aims to protect users ends up preventing teachers from fully utilizing the curriculum resources that the district – via the Tech Ready grant and other ongoing efforts – has funded the development of, it is clearly time to revisit how that protective system works. Whiteriver needs to engage in a top-to-bottom review of the content of its technology policies and even more to the point, how those policies are implemented. This work too ties back to the need for a district-wide strategic technology *plan* and the staffing and organizational structures to develop and implement that plan

## Develop a Strategic Technology Plan

In order to start the work of developing a district technology plan, the evaluators recommend that Whiteriver establish a district-wide technology committee. This committee should be composed of stakeholders – teachers, administrators, parents, and students where appropriate – who perform several key functions as a steering committee for Whiteriver’s technology efforts. First, this committee should oversee the development of the district’s strategic technology plan. It should be noted that this committee could largely be composed of the same individuals – with a relatively few additional people --- who came together to create the Tech Ready grant indicators/evaluation; and has been noted above, much of the key elements of a strategic plan have already been developed through this Tech Ready evaluation work. The table below shows the connection between evaluation elements and strategic plan elements.

| **Strategic Technology Plan Component[[30]](#footnote-30)** | **Tech Ready****Technology Program Review****Component** | **Completed?** |  |
| --- | --- | --- | --- |
| Vision Statement | Student Outcomes Indicator | Yes | Should be reviewed and perhaps expanded/modified in the strategic planning process |
| Current Status | Tech Ready Evaluation/Technology Program Review report | Yes | Simply reference the evaluation report and perhaps include the 2 or 3 page evaluation summary (from Chapter 1 of the report) in the technology plan. |
| Goals | Components of all indicators | Yes | Most of the goals exist in the indicators as well as in the evaluation findings and recommendations. Reflection on the evaluation report along with examination of a strategic plan format will help surface the final goals |
| Action Plans | (no – this is a unique part of the technology plan and therefore must be developed) | No | While it is essential to create detailed action plans for each goal as part of the planning process, much of the basis for what actions need to occur can be found in the evaluation report |
| Instructional Technology Staffing Plan | Recommendations | Somewhat | While a specific staffing plan needs to be developed in the technology plan, most of what that staffing plan needs to cover is present in the evaluation report |
| Infrastructure Description/Plan | (No, this would need to be documented specifically for the technology plan) | No | This is simply a description of existing infrastructure plus a detailing of what (if any) infrastructure needs to be built to accomplish the goals/actions of the technology plan |
| Evaluation and Assessment | Indicators  | Somewhat | Map the evaluation indicators back to the technology plan’s goals. Reference the instruments used in the evaluation that can now be used for on-going assessment of the technology plan. |
| Budget | (No, but this is something that in fact occurs as a normal district process and therefore should not need to be “additional work” for the planning process) | No | A budget should naturally flow from the actions (over time) detailed in the technology plan’s action plans, staffing plan, and infrastructure plan. This can transpire as part of the district’s normal annual budget process. |

**Table 5**  -- Strategic Technology Plan elements mapped to technology evaluation components.

As the third column (“Completed?”) of the table shows, a good part of the work for technology planning has been either completed or seeded via the current evaluation work. Nevertheless, it is essential to emphasize that the most important part of the planning process is in fact the convening of the planning team of district stakeholders and the ensuing conversation about the district’s vision, goals, actions, and related structures (technology staffing, technology oversight, the nature and structure of the infrastructure). It is precisely this conversation that the evaluators find has been absent in Whiteriver and as a result, the districts efforts have suffered from a lack of coordination and a lack of overall instructional purpose. The planning process brings a conversation about instructional technology to the fore and establishes technology and its use as a tool for teaching and learning as something that the entire district community owns.

Aside from broad conceptual guidance, it is clear that Whiteriver has many large and small decisions to make around how it implements technology and therefore around what gets written into the technology plan. Some of these specific issues that the plan should address are described as follows.

### Staffing to Support Technology Integration

As has been discussed in the recommendation (above) on Creating an Instructional Technology Organization, it is essential that the district focus its technology staff on the instructional (vs. technical) issues of technology integration. Describing the appropriate staffing levels and organization for technology should be part of the technology plan.

### Professional Development

As detailed in the findings related to Whiteriver’s Professional Development indicator, Whiteriver teachers clearly need professional development in both the “how-to” technical aspects of technology use as well as the instructional and pedagogical issues related to technology integration. In the Tech Ready grant, these two types of professional development were handled by the Technology Integration Coaches who focused on “how-to” and the STEM Developers who focused on integration and pedagogy. Unfortunately, neither of these types of staff were particularly effective given the barriers created by limited access to infrastructure.

With the creation of an instructional technology-focused technology organization, and the changes in staffing structure described above, it should be possible for the district to engage in the instructional and pedagogical professional development that teachers need. As was mentioned repeatedly by Whiteriver teachers and administrators, it made no sense to engage in training for technology/resources that no one could access. This comment applied to both access to devices as well as (and more importantly in the evaluators’ findings) resources that have been blocked by the firewall and network. With a change in structure, and removal of a number of the barriers such as excessive firewall blocking and restrictions on device configuration, it would then make sense to commence with professional development.

The evaluators recommend that the primary vehicle for technology professional development be the building-based Instructional Technology Specialists (ITS). These staff need to be broadened from their previous (and current?) roles in primarily supporting “STEM” and rather focused on providing instructional assistance across the curriculum. Regardless of curriculum focus, the emphasis of the ITS on supporting teachers in making technology a meaningful tool for student engagement and learning remains.[[31]](#footnote-31)

In general, Whiteriver’s technology professional development should have the following characteristics:

* Professional development must be directly connected to pedagogy. In other words, teacher training must be around how to use various technologies in support of pedagogy. Technology training cannot be “just about the technology”, but must always explicitly tie to the intended purpose (which should be about teaching and learning) for using that technology. Therefore, technology professional development must be organized and delivered by trainers who have actual curriculum and classroom experience.
* Professional development must be job-embedded and be offered “just in time”. Likewise, it needs to involve instructional coaching and mentoring. Therefore, technology professional development should be delivered by Instructional Technology Specialists who can go into teachers’ classrooms and work with teachers with their own students. This also implies that the Instructional Technology Specialists be full-time providers of this sort of professional development, as this time-consuming (but highly effective and very much inline with educational best practice) method is not one that can be implemented by individuals who have their own students to teach and who cannot be devoted solely to the delivery of professional development.
* Professional development must include time for teachers to reflect on their learning and to practice what they have learned over time. Leveraging teacher planning time, PLCs, and other informal “learning” times is critical for the skills learned during formal professional development to take hold.
* Professional development must be connected to a clear set of teacher skills expectations (which in turn have to be connected to expectations related to student skills and outcomes). Further, these expectations must ultimately – after adequate training has occurred – be incorporated into teacher evaluation and accountability measures.

The evaluators recommend that the Instructional Technology Specialists (new positions, described earlier in this chapter) be the lead providers of teacher technology professional development in Whiteriver. These ITS should be the beneficiaries of various “turn-key” trainings such as those offered by other training providers in the area.

### Clear Expectations for Student and Teacher Technology Integration

The evaluators note that the work done in the Tech Ready grant to create and populate the district’s Learning Management System (Moodle) goes a good part of the way toward creating a uniform set of skills-based “standards” for technology integration. The evaluators recommend that this work continue by continuing to populate the LMS with activities and units that exemplify the sorts of things that Whiteriver students and teachers can do to effectively integrate technology as a tool for teaching and learning. In addition, the district should continue to organize its professional development around the LMS activities so that all teachers can do the sorts of instructional activities described in the LMS. Here, it is essential that administrators create the expectation that *all* teachers will ultimately teach these units. The work of building these expectations, and training teachers in meeting them, should be documented in the goals and actions of the strategic technology plan.

### Technology Policy

The strategic plan should clearly document a process whereby the district – through the district-wide technology committee and under the overall guidance of the Director of Instructional Technology – continuously reviews and updates the various technology policies that impact student and teacher use. Examples of such policies include:

* The district’s Acceptable Use Policy (AUP)
* The district firewall and filtering policy
* The district’s policies related to ERate use and reimbursement[[32]](#footnote-32)
* Personal device policy (i.e., using personal devices such as phones, tablets, and laptops on the district network)
* 1:1 technology policy (i.e., policies related to the provision of 1:1 devices to students)

### Ongoing Evaluation and Assessment

All strategic plans should have an evaluation and assessment component that ensures monitoring of key benchmarks and indicators. Whiteriver’s planning effort – as shown in the table above – has the advantage of already having a set of indicators tied to key components of the district’s instructional technology effort. The plan itself should describe how assessment of these indicators will continue for the life of the plan and how this evaluation will drive continuous improvement in the use of technology to support teaching and learning.

# IV. Appendices

## Whiteriver’s Indicators

**Student Outcomes**

WUSD students are proficient in basic technology skills and demonstrate critical thinking, information and media literacy, and responsible digital citizenship in line with National Educational Technology Standards (NETS-S). Utilizing a variety of digital tools within a personalized learning environment (i.e. student input or choice) that emphasizes PBL and STEM, students synthesize information and develop knowledge in support of curriculum-based learning objectives. Technology supports all students in the development of communication and collaboration skills with peers both in the district community and globally.

**High Quality PD**

Through a variety of on-going professional development opportunities, WUSD teachers are supported in gaining and refining knowledge of both content and pedagogy. They demonstrate proficiency in the use of available technologies, and regularly implement PBL lessons that integrate technology meaningfully into the student experience. Professional development has a positive impact on the classroom as demonstrated by teacher effectiveness and student learning. Professional development is based on teachers’ needs and addresses specific learning goals as necessary to develop mastery. The predominant professional development model is one of practice/debrief/practice/debrief/observation, which includes classroom walkthroughs, observation tools, coaching/mentoring feedback and teacher evaluations regarding the quality of training/mentoring and implementation of specific strategies and methods.

**Instructional and Technical Support**

A fully supported technology infrastructure and readily-accessible technical assistance facilitate the ubiquitous use and seamless integration of technology tools within the teaching and learning environment. All teachers and students have access to current and fully functional technology tools within a culture that fosters student-centered learning and creativity, and promotes the development of 21st Century learning skills.

Teachers receive timely technical support from District IT and school-based technology staff, enabling them to perform universal functions such as accessing the Student Accountability Information System and Learning Management System as well as using classroom teaching tools and student devices.

Teachers receive technology integration instructional support through modeling and site-based technology integration coaching, developing proficiency in the use of 21st Century instructional technologies, district STEM lessons, and other resources as dictated by the curriculum. Coaching around the use and integration of new pedagogical strategies and technology tools takes place within a gradual release of responsibilities model (practice/debrief/practice/debrief/observation and evaluation) where appropriate professional development is tailored to the individual needs of teachers.

**Infrastructure and Hardware**

The district’s technology infrastructure -- hardware, software systems, and network -- has adequate capacity to support the teaching, learning, and administrative needs of its users. Users are fully aware of the technology resources available for their use and are confident in the ability of the district’s technology staff to adequately support and maintain the infrastructure. Teachers can easily contact the technology department to resolve filtering issues or other difficulties. District technology support staff have adequate (industry-standard??) systems administration in place so as to quickly and efficiently troubleshoot the network and manage devices including iPads, tablets, and desktop systems.

Configuration and use of the district’s network is guided by a set of acceptable use policies geared toward open access to websites and dictated by the instructional and learning needs of teachers and students. Policies and protections are in place so that students accessing the district’s network interact responsibly on social media sites, and learn appropriate digital citizenship skills in line with NETS-S standards.

**Capacity Building and Sustainability**

In order to achieve effective and sustainable 21st Century learning environments in WUSD’s classrooms, the district ensures the development of, and communicates, a clearly defined plan for the integration of technology district-wide. This plan is rooted in work flowing from the district’s STEM initiatives, but builds upon this foundation through the creation of district-wide policies aimed at sustaining and expanding the use of technology-infused pedagogies across the curriculum and in all district classrooms. There are clear expectations and a mapping of how PBL and STEM units map to curriculum standards. The ultimate goal of WUSD’s work in technology integration is to ensure that all district students develop the skills and dispositions necessary for lifelong success in their community. To this end, the district communicates its vision and plans to the larger community as a way of creating a base of support among parents and business leaders and to explore models for securing ongoing funding.

The district plan is aligned to national and local standards with measurable essential learning outcomes (such as curriculum standards and the CCL). The district ensures equal and adequate access to technologies and learning opportunities for all students and staff through the existence of a robust technology infrastructure, effective technical supports, and teacher/staff professional learning that emphasizes the role of technology in meeting curricular and learning objectives. The district maintains and constantly reviews policies necessary to ensure safe and ethical technology use.

## ISTE NETS Essential Conditions

Necessary conditions to effectively leverage technology for learning.

|  |  |
| --- | --- |
| **Shared Vision** | Proactive leadership in developing a shared vision for educational technology among all education stakeholders, including teachers and support staff, school and district administrators, teacher educators, students, parents, and the community |
| **Empowered Leaders** | Stakeholders at every level empowered to be leaders in effecting change   |
| **Implementation Planning** | A systematic plan aligned with a shared vision for school effectiveness and student learning through the infusion of information and communication technologies (ICT) and digital learning resources |
| **Consistent and Adequate Funding** | Ongoing funding to support technology infrastructure, personnel, digital resources, and staff development |
| **Equitable Access** | Robust and reliable access to current and emerging technologies and digital resources, with connectivity for all students, teachers, staff, and school leaders |
| **Skilled Personnel** | Educators, support staff, and other leaders skilled in the selection and effective use of  appropriate ICT resources  |
| **Ongoing Professional Learning** | Technology-related professional learning plans and opportunities with dedicated time to practice and share ideas |
| **Technical Support** | Consistent and reliable assistance for maintaining, renewing, and using ICT and digital learning resources  |
| **Curriculum Framework** | Content standards and related digital curriculum resources that are aligned with and support digital age learning and work |
| **Student-Centered Learning** | Planning, teaching, and assessment centered around the needs and abilities of students |
| **Assessment and Evaluation** | Continuous assessment of teaching, learning, and leadership, and evaluation of the use of ICT and digital resources |
| **Engaged Communities** | Partnerships and collaboration within communities to support and fund the use of ICT and digital resources  |
| **Support Policies** | Policies, financial plans, accountability measures, and incentive structures to support the use of ICT and digital learning resources for learning and in district school operations |
| **Supportive External Context** | Policies and initiatives at the national, regional, and local levels to support schools and teacher preparation programs in effective implementation of technology for achieving curriculum and learning technology (ICT) standards |

## ISTE NETS-S (Student) Standards

**1. Creativity and Innovation**

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

1. Apply existing knowledge to generate new ideas, products, or processes
2. Create original works as a means of personal or group expression
3. Use models and simulations to explore complex systems and issues
4. 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.

1. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media
2. Communicate information and ideas effectively to multiple audiences using a variety of media and formats
3. Develop cultural understanding and global awareness by engaging with learners of other cultures
4. 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.

1. Plan strategies to guide inquiry
2. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media
3. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks
4. 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.

1. Identify and define authentic problems and significant questions for investigation
2. Plan and manage activities to develop a solution or complete a project
3. Collect and analyze data to identify solutions and/or make informed decisions
4. 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.

1. Advocate and practice safe, legal, and responsible use of information and technology
2. Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity
3. Demonstrate personal responsibility for lifelong learning
4. Exhibit leadership for digital citizenship

**6. Technology Operations and Concepts**

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

1. Understand and use technology systems
2. Select and use applications effectively and productively
3. Troubleshoot systems and applications
4. Transfer current knowledge to learning of new technologies

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## ISTE NETS-T (Teachers) Standards

**1. Facilitate and Inspire Student Learning  and Creativity**

Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face  and virtual environments.

1. Promote, support, and model creative and innovative thinking and inventiveness
2. Engage students in exploring real-world issues and solving authentic problems using digital tools and resources
3. Promote student reflection using collaborative tools to reveal and clarify students’ conceptual understanding and thinking, planning, and creative processes
4. Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments

**2. Design and Develop Digital Age Learning  Experiences and Assessments**

Teachers design, develop, and evaluate authentic learning experiences and assessment incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS·S.

1. Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity
2. Develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress
3. Customize and personalize learning activities to address students’ diverse learning styles, working strategies, and abilities using digital tools and resources
4. Provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching

**3. Model Digital Age Work and Learning**

Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society.

1. Demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations
2. Collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation
3. Communicate relevant information and ideas effectively to students, parents, and peers using a variety of digital age media and formats
4. Model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning

**4. Promote and Model Digital Citizenship and Responsibility**

Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices.

1. Advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources
2. Address the diverse needs of all learners by using learner-centered strategies providing equitable access to appropriate digital tools and resources
3. Promote and model digital etiquette and responsible social interactions related to the use of technology and information
4. Develop and model cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital age communication and collaboration tools

**5. Engage in Professional Growth and Leadership**

Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources.

1. Participate in local and global learning communities to explore creative applications of technology to improve student learning
2. Exhibit leadership by demonstrating a vision of technology infusion, participating in shared decision making and community building, and developing the leadership and technology skills of others
3. Evaluate and reflect on current research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of student learning
4. Contribute to the effectiveness, vitality, and self- renewal of the teaching profession and of their school and community

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## ISTE NETS-C (Coaches) Standards

**1. Visionary Leadership**

Technology Coaches inspire and participate in the development and implementation of a shared vision for the comprehensive integration of technology to promote excellence and support transformational change throughout the instructional environment.

1. Contribute to the development, communication, and implementation of a shared vision for the comprehensive use of technology to support a digital-age education for all students
2. Contribute to the planning, development, communication, implementation, and evaluation of technology-infused strategic plans at the district and school levels
3. Advocate for policies, procedures, programs, and funding strategies to support implementation of the shared vision represented in the school and district technology plans and guidelines
4. Implement strategies for initiating and sustaining technology innovations and manage the change process in schools and classrooms

**2. Teaching, Learning, & Assessments**

Technology Coaches assist teachers in using technology effectively for assessing student learning, differentiating instruction, and providing rigorous, relevant, and engaging learning experiences for all students.

1. Coach teachers in and model design and implementation of technology-enhanced learning experiences addressing content standards and student technology standards
2. Coach teachers in and model design and implementation of technology-enhanced learning experiences using a variety of research-based, learner-centered instructional strategies and assessment tools to address the diverse needs and interests of all students
3. Coach teachers in and model engagement of students in local and global interdisciplinary units in which technology helps students assume professional roles, research real-world problems, collaborate with others, and produce products that are meaningful and useful to a wide audience
4. Coach teachers in and model design and implementation of technology-enhanced learning experiences emphasizing creativity, higher-order thinking skills and processes, and mental habits of mind (e.g., critical thinking, meta-cognition, and self- regulation)
5. Coach teachers in and model design and implementation of technology-enhanced learning experiences using differentiation, including adjusting content, process, product, and learning environment based upon student readiness levels, learning styles, interests, and personal goals
6. Coach teachers in and model incorporation of research-based best practices in instructional design when planning technology-enhanced learning experiences
7. Coach teachers in and model effective use of technology tools and resources to continuously assess student learning and technology literacy by applying a rich variety of formative and summative assessments aligned with content and student technology standards
8. Coach teachers in and model effective use of technology tools and resources to systematically collect and analyze student achievement data, interpret results, and communicate findings to improve instructional practice and maximize student learning

**3. Digital Age Learning Environments**

Technology coaches create and support effective digital-age learning environments to maximize the learning of all students.

1. Model effective classroom management and collaborative learning strategies to maximize teacher and student use of digital tools and resources and access to technology-rich learning environments
2. Maintain and manage a variety of digital tools and resources for teacher and student use in technology-rich learning environments
3. Coach teachers in and model use of online and blended learning, digital content, and collaborative learning networks to support and extend student learning as well as expand opportunities and choices for online professional development for teachers and administrators
4. Select, evaluate, and facilitate the use of adaptive and assistive technologies to support student learning
5. Troubleshoot basic software, hardware, and connectivity problems common in digital learning environments
6. Collaborate with teachers and administrators to select and evaluate digital tools and resources that enhance teaching and learning and are compatible with the school technology infrastructure
7. Use digital communication and collaboration tools to communicate locally and globally with students, parents, peers, and the larger community

**4. Professional Development & Program Evaluation**

Technology coaches conduct needs assessments, develop technology-related professional learning programs, and evaluate the impact on instructional practice and student learning.

1. Conduct needs assessments to inform the content and delivery of technology-related professional learning programs that result in a positive impact on student learning
2. Design, develop, and implement technology-rich professional learning programs that model principles of adult learning and promote digital-age best practices in teaching, learning, and assessment
3. Evaluate results of professional learning programs to determine the effectiveness on deepening teacher content knowledge, improving teacher pedagogical skills and/or increasing student learning
4. **Digital Citizenship**

 Technology coaches model and promote digital citizenship.

* 1. Model and promote strategies for achieving equitable access to digital tools and resources and technology-related best practices for all students and teachers
	2. Model and facilitate safe, healthy, legal, and ethical uses of digital information and technologies
	3. Model and promote diversity, cultural understanding, and global awareness by using digital-age communication and collaboration tools to interact locally and globally with students, peers, parents, and the larger community
1. **Content Knowledge and Professional Growth**

Technology coaches demonstrate professional knowledge, skills, and dispositions in content, pedagogical, and technological areas as well as adult learning and leadership and are continuously deepening their knowledge and expertise.

* 1. Engage in continual learning to deepen content and pedagogical knowledge in technology integration and current and emerging technologies necessary to effectively implement the NETS·S and NETS·T
	2. Engage in continuous learning to deepen professional knowledge, skills, and dispositions in organizational change and leadership, project management, and adult learning to improve professional practice
	3. Regularly evaluate and reflect on their professional practice and dispositions to improve and strengthen their ability to effectively model and facilitate technology-enhanced learning experiences

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## Data Collection Instruments

### Principal Interview Questions

1. How proficient do you believe your students are at using technology in school? (goal here is to hear about “proficiency in basic technology skills...words from the indicator) If you were to enter a classroom and observe students using technology, what sorts of things would indicate to you that the student was proficient in using technology? To search for information, or to interact with a simulation or interactive web page, or to create and manipulate documents and tools?
2. What does 21st century learning mean to you? How do you know you are seeing those skills being implemented when you observe a classroom?
3. What 21st century learning opportunities are provided in your classrooms, and to what extent has the Tech Ready grant supported these opportunities?
4. Please describe how the Tech Ready grant staff have worked to support the teachers in your school over the past year. Do you believe the grant staff have been successful in providing the necessary assistance both in terms of using tech for learning AND understanding some basics around operations? *Probe for issues re. the role of the integration specialists in providing technical as well as instructional support)*
5. What are your impressions of Whiteriver’s technology infrastructure? (availability, functionality, technical support, bandwidth) What particular problems have arisen? What should be a priority moving forward?
6. Now that the initial funding of the Tech Ready grant is winding down, what in your opinion can or should be done to sustain the work that the grant has funded? What do your teachers need in order to support their work with STEM/PBL?
7. Is there anything else you would like to tell me that has not come up in the course of our discussion today?

### Teacher Focus Group Questions

1. Please describe your relationship in terms of the support you were provided by the Tech Ready grant staff in your school and in the district.

1.a. If you did not participate in Tech Ready activities, why not?

1. What are your impressions of Whiteriver’s technology infrastructure? (availability, functionality, technical support, bandwidth). What particular problems have you encountered? What should be a priority moving forward? (One thing)
2. As you observe your students use of technology, how proficient do you believe your students are at using technology to support their learning in school? (goal here is to hear about “proficiency in basic technology skills...words from the indicator)
3. What does “21st century learning” mean to you? What should students be demonstrating with regards technology as a support to their learning? ( Maybe probe for what are student strengths, research?, writing? Meaningful information gathering? Accessibility?)
4. What 21st century learning opportunities are provided in your classroom, and to what extent has the Tech Ready grant supported 21st century learning?
5. What things (not mentioned earlier) do you as a teacher individually need to be able to make technology a more viable part of your teaching and student’s experience?
6. Is there anything else you would like to tell me that has not come up in the course of our discussion today?

### Tech Ready Staff Focus Group Questions

1. Please describe how you ~~worked~~ supported (during the past school year) ~~with~~ teachers in relation to the Tech Ready grant.

2. What is your take on the “STEM vs. Curriculum Standards” conflict expressed by some (many?) teachers? How will they answer this? What is your understanding of STEM? What does that mean to you in terms of this project? Did you see examples that incorporated all facets of STEM?

3. What is your impression of Whiteriver’s technical infrastructure? What suggestions do you have for improving the way the infrastructure functions and/or is administered? Can you talk about how you have been directed in terms of priorities?

4. What, in balance, are Whiteriver’s primary challenges in terms of doing more work such as what you have done in Tech Ready?

5. Describe a success from your work within this grant. What stands out as something that really worked within this program?

6. As you reflect on the work and support you have done here, are there areas of training you wish you had from the beginning that may have helped you do your job better?

### Classroom Observation Protocol

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### Teacher Survey

http://www.sun-associates.com/whiteriver/closed\_teacher.html

### Student Survey

http://www.sun-associates.com/whiteriver/closed\_student.html

1. For the purposes of this report, “instructional technology effort” refers to the administration, training, curriculum work, hardware, software, and networking activities that support the use of technology in the teaching and learning environment. While the evaluators know that some Tech Ready funds – not to mention district funds – are used to support administrative uses of technology – including the use of technology to fulfill state data assessment and data warehousing needs – these needs and uses are not the focus of this report. [↑](#footnote-ref-1)
2. Quantitative assessment of Tech Ready impact is derived from comparison of pre/post teacher scores on Inventory of Teacher Technology Skills, a tool that feeds into the Arizona Department of Education’s Technology Integration Matrix. The results of this assessment – reported separately to the ADE – are summarized in the Appendix of this report and show overall growth in teacher technology skills over the period of the Tech Ready grants. [↑](#footnote-ref-2)
3. The count for “Observations” includes *only* those classrooms where the evaluators spent specific time observing a lesson or other classroom-based activity. In fact, all classrooms in all buildings were visited, but where classroom activity did not involve the use of technology and/or was something static – e.g., students reading silently for a period, or a traditional teacher lecture – the observation was not counted in this total. [↑](#footnote-ref-3)
4. The WUSD Tech Ready team collected data using the AZ TIM and the ITTS surveys in September 2013 and May 2014. That data is not included in this external evaluation. [↑](#footnote-ref-4)
5. The evaluators chose “mode” versus average so as to highlight the most frequent response within each group of queried teachers. Due to the very wide range of teacher responses, average tends to obscure the main point of “what did most teachers say” [↑](#footnote-ref-5)
6. The evaluators note that it is common in all districts for secondary teachers to note that their students “do research” more often than do elementary students. Unfortunately, this is more an artifact of traditional instruction than a true alignment with NETS standards. Traditional activities such as “research papers” are more commonly assigned in secondary grades, whereas the NETS standards call for “research” tasks to be present at *all* grade levels. [↑](#footnote-ref-6)
7. The evaluators note that many teachers’ comments suggest that the term “STEM” refers to virtually any use of technology within the instructional environment. Likely these teachers are focusing on the “Technology” (T) in the STEM acronym and are not truly considering integration *across* the disciplines of science, technology, engineering and math. The evaluators note that such lack of clarity as to what STEM is, and in particular the lack of focus on inquiry, is common among teachers who are new to the concept of STEM. Deeper understanding would naturally occur with more training and more attention paid to the curriculum and pedagogy associated with STEM. For a good overview of the basics of STEM education, please see http://www.cslnet.org/our-agenda/what-is-stem/ (accessed 10/20/14). [↑](#footnote-ref-7)
8. The evaluators note that most teachers were likely referring to the use of Galileo and other online testing systems as “authentic assessment”, whereas the true meaning of “authentic assessment” in the NETS standards is more about providing students with the opportunities to create authentic products and demonstrations of their knowledge. This sort of confusion is common among teachers who are in the early stages of moving from a traditional to transformed instructional environment. [↑](#footnote-ref-8)
9. The representation in Table 3 is quite similar to other models of transformed instructional environments. Examples include the AZ TIM matrix which was used by Tech Ready staff to assess Whiteriver teachers during the 2013 – 2014 school year. [↑](#footnote-ref-9)
10. Data from teachers at Cradleboard and Seven Mile are included in these counts. Whiteriver was not officially part of the Tech Ready grants and thus did not benefit from Integration Coaches I the same way. [↑](#footnote-ref-10)
11. <http://www.iste.org/standards/standards-for-coaches> (accessed 10/15/14) [↑](#footnote-ref-11)
12. The evaluators are aware that the IT department was in the process – as of September, 2014 – of training a new technician (who would be given password access after his training was complete) and re-hiring its help-desk assistant. This would increase the number of individuals with password access back to 2.5 … for 2,500 machines and all other networked devices. [↑](#footnote-ref-12)
13. There were several references in the data as to high percentages of teachers “not checking their email”, but the evaluators do not have data to confirm these staff observations. Rather, the evaluators’ survey data shows that the majority of teachers use technology to support “personal activity” at least once a week (in all likelihood, daily). Staff were observed checking email and using computers to generate documents routinely throughout the district. Principals are said to rely upon email for routine staff communication. Therefore, the evaluators believe that most teachers *do* possess a basic level of technical savvy. What they of course do not have is skills in network administration. [↑](#footnote-ref-13)
14. As of 10/1/14, one Developer has been retained on district funds in one of the schools, two other Developers and the leader of the Tech Ready team have been hired on outside funds to continue to support STEM in the district. [↑](#footnote-ref-14)
15. The evaluators note that ultimately the district did not implement 1:1 in the conventional sense of each student taking ownership of a device that they would use as exclusively “theirs” during the school day. While this was the original intention of the grants – in fact, students were originally intended to take their devices home with them – a variety of issues and concerns conspired to create a situation where students gained access to devices only at specific times during the school day; and the devices themselves stayed in classroom-based carts when students were not using them for a specific task. This situation will be discussed in more depth in subsequent sections of this report (see the Infrastructure and Hardware indicator and specifically the section on District Policies). Still, it is important to note that the grants definitely did support the purchase of a large number of devices that in fact did create a 1:1 student/device ratio for most grades. At the times when students were permitted to use technology, there was at least in principle one device per student. [↑](#footnote-ref-15)
16. SETDA’s “Broadband Imperative” - <http://www.setda.org/web/guest/broadbandimperative> - recommends this target amount for the 2014/2015 school year. [↑](#footnote-ref-16)
17. This according to the district’s IT director who monitors bandwidth usage. [↑](#footnote-ref-17)
18. ibid [↑](#footnote-ref-18)
19. Here the evaluators note that while we are well-versed in the technical basics of network design and configuration, and can speak to what is typical or “industry standard” in K-12 network design, our work should not substitute for an outside technical network audit. As will be stated in the Recommendations section of this report, the evaluators urge Whiteriver to secure the services of a technical service provider to conduct an impartial network audit. For a district and network the size of Whiteriver, such an audit should cost in the neighborhood of $5,000 and would be money well spent for the district in terms of clarifying many of the technical issues raised in the evaluators’ initial assessment of Whiteriver’s infrastructure. [↑](#footnote-ref-19)
20. Teacher survey question 4, item k. See Figure 1 for a representation of this data as well as other data from question 4. [↑](#footnote-ref-20)
21. See <http://www.fcc.gov/guides/childrens-internet-protection-act> and <http://www.eschoolnews.com/2011/09/26/fcc-opens-access-to-social-media-sites-for-e-rate-users/> (accessed 10/14/14) for more information on CIPA and how it handles issues related to social media. [↑](#footnote-ref-21)
22. <http://en.wikipedia.org/wiki/Closed_platform> (accessed 10/14/14) [↑](#footnote-ref-22)
23. http://www.sun-associates.com/planning [↑](#footnote-ref-23)
24. Adapted from <http://www.ascd.org/publications/educational-leadership/apr13/vol70/num07/The-Changing-Role-of-the-Technology-Director.aspx> (accessed 10/14/14) [↑](#footnote-ref-24)
25. It appears that at present, the stipended teachers who serve as ITS report to building principals *and* the DTC. This is likely to cause any number of conflicts that cannot be beneficial to the work of these staff. [↑](#footnote-ref-25)
26. As a related matter, the evaluators recommend that the district review the function of the various “computer aides” who work in most buildings. It seems that these staff are primarily charged with providing assistance to users of various *administrative* data systems, but it also appears that some of the aides perform functions that are supportive of instructional technology. At present, there seems to be little standardization for these positions and even less clarity in the buildings as to what these positions do. A review of these positions and functions and the creation of clear job descriptions and/or perhaps the consolidation of positions is recommended. [↑](#footnote-ref-26)
27. <http://www.ascd.org/publications/educational-leadership/apr13/vol70/num07/The-Changing-Role-of-the-Technology-Director.aspx>(accessed 10/14/14) [↑](#footnote-ref-27)
28. <http://www.eschoolnews.com/2011/09/26/fcc-opens-access-to-social-media-sites-for-e-rate-users/>(accessed 10/14/14) [↑](#footnote-ref-28)
29. <http://www.wusd.us/default.aspx?name=tech.hb.policy>(accessed 10/14/14) and <http://www.wusd.us/default.aspx?name=its.policies>(accessed 10/14/14). The evaluators note that the posted AUP is very lengthy and yet actually allows various actions that the evaluators were told by staff were expressly prohibited by IT department staff (e.g., the use of USB drives). This sort of confusion around what is or is not actually allowed by the AUP simply points to the fact that there is insufficient knowledge in the district about technology policy. Without such knowledge, teachers, administrators, and even IT staff seem to operate via a certain undesirable level of hearsay, thus undermining the whole point of establishing a policy. [↑](#footnote-ref-29)
30. See <http://www.sun-associates.com/planning> for more resources that illustrate the desired content of a Strategic Instructional Technology plan. [↑](#footnote-ref-30)
31. The ISTE NETS-C standards offer useful guidance as to the sorts of skills and objectives which should constitute the primary professional development focus of ITS. http://www.iste.org/standards/standards-for-coaches (accessed 10/14/14). [↑](#footnote-ref-31)
32. Again, as noted earlier, the evaluators believe that there may be a number of misinterpretations of ERate and CIPA policy occurring in Whiteriver. As ERate is currently in a state of flux/renewal, the evaluators urge Whiteriver to seek specific guidance – from other AZ districts and the AZ Department of Education – as ERate’s impact on the district is considered. [↑](#footnote-ref-32)