Instructional Assessment Report

Prepared for Randolph Southern School Corporation

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Instructional Assessment Report

Purpose of Report

The leaders of Randolph Southern School Corporation plan to boldly transform the learning environment of their district by providing a high-access digital environment for all students. The purpose of the Instructional Practice Report is to assist their leadership team in creating a Strategic Plan. Using this report, leaders will develop specific goals and metrics, ensure sustainability, establish norms and culture, build leadership capacity, shift the pedagogical culture, and transform learning.

The Instructional Assessment process consisted of three steps: ISTE Standards-T surveys, Classroom Observations, and Focus Groups. Teachers and administrators received a link to the ISTE Standards-T online surveys before we came onsite. The Classroom Observations took place on February 28, 2014. We visited twenty-nine classrooms. The Focus Groups also took place on February 28, 2014 and consisted of four different groups: administrators, teachers, community stakeholders and students.

Contents

This report contains the following information:

- ISTE NETS-T Survey Findings
- Focus Group Interviews with teachers and students
- Observations from classrooms
- Recommendations
- Reflection Questions
- Appendix

ISTE NETS-T Survey

Overview

The International Society for Technology in Education (ISTE) is a non-profit organization whose mission is to assist teachers and education leaders in creating powerful connections among all learners. The ISTE Standards are the most respected technology integration standards in education today. Through partnerships with over 100,000 educators all over the world, ISTE has created definitive standards for learners, teachers, leaders, and coaches. According to their website, the benefits of using the ISTE standards include:

- Improving higher-order thinking skills, such as problem solving, critical thinking and creativity
- Preparing students for their future in a competitive global job market
- Designing student-centered, project-based, and online learning environments
- Guiding systemic change in our schools to create digital places of learning
- Inspiring digital age professional models for working, collaborating and decision making

ISTE NETS-T Results

We studied the summary of responses in order to break down the data and identify results, which will guide the creation of your professional learning plan.

- **Standard 1: Facilitate and Inspire Student Learning and Creativity**
    - 62% of teachers report that they are modeling and allowing students to use creativity and innovation three or more times per grading period.
    - 38% report that they are allowing opportunities for students to solve "real-world" problems with digital tools and resources three or more times per grading period..
    - 62% of teachers said that they allow student collaboration three or more times per grading period.
    - 31% of teachers report that their students have the opportunity to share knowledge in virtual environments.
    - While 79% of teachers report that they engage with colleagues in shared learning experiences in a face-to-face environment, only 21% had experience engaging in a virtual environment.

- **Standard 2: Design and Develop Digital Age Learning Experiences and Assessments**
    - 55% of teachers report that they allow students to use digital tools three or more times per grading period.
    - 55% of teachers report sometimes using digital tools and resources to customize learning.

- **Standard 3: Model Digital Age Work and Learning**
    - Only 28% of teachers regularly collaborate with students using digital tools and resources.
    - 55% of teachers regularly use digital tools for research and learning.
    - Only 34% of teachers regularly ask students to use digital tools for research and learning.

- **Standard 4: Promote and Model Digital Citizenship and Responsibility**
    - 45% of teachers have never taught students about digital information and technology safety.
    - Only 10% of teachers regularly teach about responsible use of social interaction technology.

- **Standard 5: Engage in Professional Growth and Leadership**
    - Only 9% of teachers participate in global learning communities to discuss student learning.
    - 52% of teachers have an awareness of what effective technology integration looks like.

Focus Group Interviews

Leaders

Interviews with the Superintendent (Donnie Bowsman), the Randolph Southern Community Elementary Principal (Donald Allen), the Randolph Southern Community Jr.-Sr. High School Principal (D.J. Knotts) and the Director of Technology, (Annette Wilson) revealed a variety of insights.

- The administration communicated a vision to start with 1:1 device in grades 7-12 and perhaps include grades 5 and 6.
- The administration recognizes that a shift in culture will have to occur as they transition from a traditional learning environment to a blended learning environment.
- The timeline of 1:1 implementation is contingent upon finances.
- The administration recognizes the need for a clear vision to be communicated to all stakeholders.
- A recent overhaul of the network included wireless capability.
- A concern was voiced about personnel needed to move the corporation forward.
- They partnered with Five-Star in order to leverage their resources and knowledge to move their school district forward.

Teachers

A total of nine teachers participated in two separate the focus groups.

- When asked about ways teachers allow students to use creativity with or without technology they shared:
    - student choice with writing, drawing, etc.
    - projects
        - making movies with a flip camera
        - making an all about me electronic baseball card
- Teachers reported that the main communication between faculty, teachers, students, and parents occurs via email. There is also a call/text alert system that is used to inform parents of weather related changes.
- Elementary teachers report Annette Wilson uses data from NWEA to assign individual learning paths via Study Island. Students in Algebra and English 10 take Acuity.
- 6th grade classrooms have 1:1 laptops.
- Elementary teachers shared that Annette Wilson teaches digital citizenship during computer lab class.
- Teachers communicated a vision for a a 1:1 roll-out of devices but were unaware of a timeline or at which grade level the initiative would be implemented.
- Teachers believe professional development needs to ongoing.
- Teachers communicated a desire to know how to use the device before it is deployed to students.
- Teachers report the “Tech Board” has not met on a consistent basis this school year.

Students

A group of students were interviewed at each building.

- While there were certainly differences as far as events within classrooms at each level, there was a pattern of responses from students that revolved around direct instruction, worksheets, and assessment.
- When asked about the use of technology in their classes, there were reports of teachers showing videos to introduce or reinforce concepts via the projector.
- Some students discussed using computers to conduct research. Others reported recently making a movie to introduce a topic in science. One elementary student shared she recently used Google Docs to write a report with a fellow student.
- Elementary students reported they rarely use the textbook. When asked if a textbook was required for learning, all students answered it was a tool and they didn't necessarily need it for learning.
- Students confirmed that they are using various types of social media including the following:
    - Facebook
    - SnapChat
    - Twitter
    - Instagram
    - Vine
- Elementary students reported learning about digital citizenship in computer class.

Stakeholders

Four stakeholders took part in the focus group.

- Stakeholders did not have knowledge of the corporation's vision for integrating technology.
- Stakeholders believe that professional development for the teachers is important to the success of technology integration.
- Stakeholders know there are some computers in each elementary room and a computer class is required to earn a high school diploma.
- Main communication between school and home takes place via email. They receive alerts from the call system when school is delayed or canceled due to weather. Only one parent was aware of the Jr./Sr. High Facebook page.
- Parents of high school students have access to information via PowerSchool.
- All stakeholders agree that students should have devices. They believe the corporation is behind others in the area in regards to technology.
- Stakeholders expressed interest in eLearning Days replacing snow make-up days.

Classroom Observations

Overview

The purpose of the classroom observation is to identify patterns of innovation and instructional style in the classrooms, which will help determine professional learning experiences that may be most beneficial. Our observation tool is also designed to gather further evidence beyond the survey on some of the ISTE NETS-T standards that are observable. Our observer visited twenty-nine classrooms throughout the corporation.

The following areas of learning are identified as important in creating an effective and innovative academic environment. It is not possible to observe every criteria in every classroom during the observation; the data in this report represents patterns and examples that were identified during short “snapshots” of classroom activity.

The observations do not measure individual teacher effectiveness. Direct teaching is needed and can be an effective form of instruction, especially when combined with effectively curated curriculum. However, if direct teaching is the predominate teacher activity in a majority of cited observations, changing the culture to utilize pedagogies that emphasize collaboration should be considered.

Our indication of learning criteria as “none observed” during this visit is not a statement that it does not exist within the class or school culture. These criteria and observed evidences are listed to serve as a guide in helping the leadership team identify areas of strengths and weaknesses.

ISTE NETS-T Standard 1: Student Learning and Creativity

- *Teacher-Learner (Shared) Interaction (NETS-T1d)*
    - In 25% of the classrooms, the teacher was facilitating a group discussion or leading a Socratic-type discussion.
- *Direct Teaching (NETS-T1d)*
    - Teachers were lecturing or giving notes in 56% of observed classrooms.
- *Individual student seat work (NETS-T1d)*
    - In 44% of the classrooms students were actively doing worksheets or answering questions out of the book.
- *Students taking test/watching movie (NETS-T1d)*
    - Observed in 19% of classrooms.
- *Group work (NETS-T1d)*
    - In 14% of classrooms, students were working together to review worksheets and/or working together on questions from the book.

ISTE NETS-T Standard 2: Digital Age Experience and Assessment

- *Evidence of Student Use of Technology (NETS-T2a)*
    - Only 19% of classrooms had students using any sort of digital device.

Evidence of customized or personalized learning (NETS-T2c)

- 44% of classroom observed evidence of customized or personalized learning occurring during the observation. It is noted there were several rooms set up to accommodate this type of learning.

- *Evidence of systems are in place to use data to drive instructional decisions (NETS-T2d)*
    - This was observed in only 19% of classrooms.

ISTE NETS-T Standard 3: Model Digital Age Work and Learning

- *Room set up to maximize collaboration (NETS-T3b)*
    - 63% of the rooms had learning spaces (tables or arranged/grouped desks) capable of encouraging collaboration.
- *Evidence of Active Teacher Use of Technology (NETS-T3d)*
    - 19% of the classrooms had teachers actively using available technology for instruction. It was observed that there were clickers, projectors, and document cameras in some classrooms that were not used during the observation.
- *Evidence of use of social media for communication (NETS-T3d)*
    - None observed.

ISTE NETS-T Standard 4: Promote and Model Digital Citizenship and Responsibility

- *Evidence of student use of digital resources and tools (NETS-T4b)*
    - 25% of the classrooms demonstrated evidence of student use of digital resources and tools. This includes the use of iPads, iPods and computers.
- *Evidence of equal student access to digital tools and resources (NETS-T4b)*
    - 19% of the classrooms observed demonstrated evidence of equal student access to digital tools and resources. Please note this included the classroom for students designated as high ability.

Dominant Cognitive Level (Bloom's)

Bloom's Taxonomy was developed during the 1950's by Benjamin Bloom as a means to categorize and encourage higher-order thinking skills. The taxonomy is intended to mirror the steps in the thinking process from remembering information to having the ability to put it back together in new and interesting ways. During the 1990's the taxonomy was revised by one of Dr. Bloom's students, Lorin Anderson, who changed the steps to emphasize creation as a higher-thinking skill and changed noun level descriptors to verbs. In 2007, Andrew Churches published a digital taxonomy map in order to demonstrate how Bloom's can be applied to instructional technology. Evidence of these levels being taught within a low-access classrooms are a good indicator that current instruction can more easily be adapted to higher-thinking skills using instructional technology.

- *Remembering*
    - 94% of classrooms had evidence of this from lecture, worksheets, and bookwork.
- *Understanding*
    - 75% of classrooms had evidence of this from lecture, worksheets, and bookwork.
- *Applying*
    - In 38% of classrooms we observed some form of application - mostly in mathematics.
- *Analyzing*
    - 38% of classrooms included some writing that involved this cognitive level.
- *Evaluating*
    - In 19% of classrooms we observed some form of students evaluating.
- *Creating*
    - In 7% of the classrooms we observed some form of students creating.

SAMR Model

The SAMR (**S**ubstitution, **A**ugmentation, **M**odification, **R**edefinition) method was developed by Dr. Ruben Puentedura in order to show how instructional technology can impact classroom instruction. It also offers a progression for adopting technology effectively into the classroom.

Teacher SAMR

- *Substitution*
    - 13% of classrooms had teachers using their projector as a substitute for writing on the board.
- *Augmentation*
    - None observed.
- *Modification*
    - None observed.
- *Redefinition*
    - None observed.

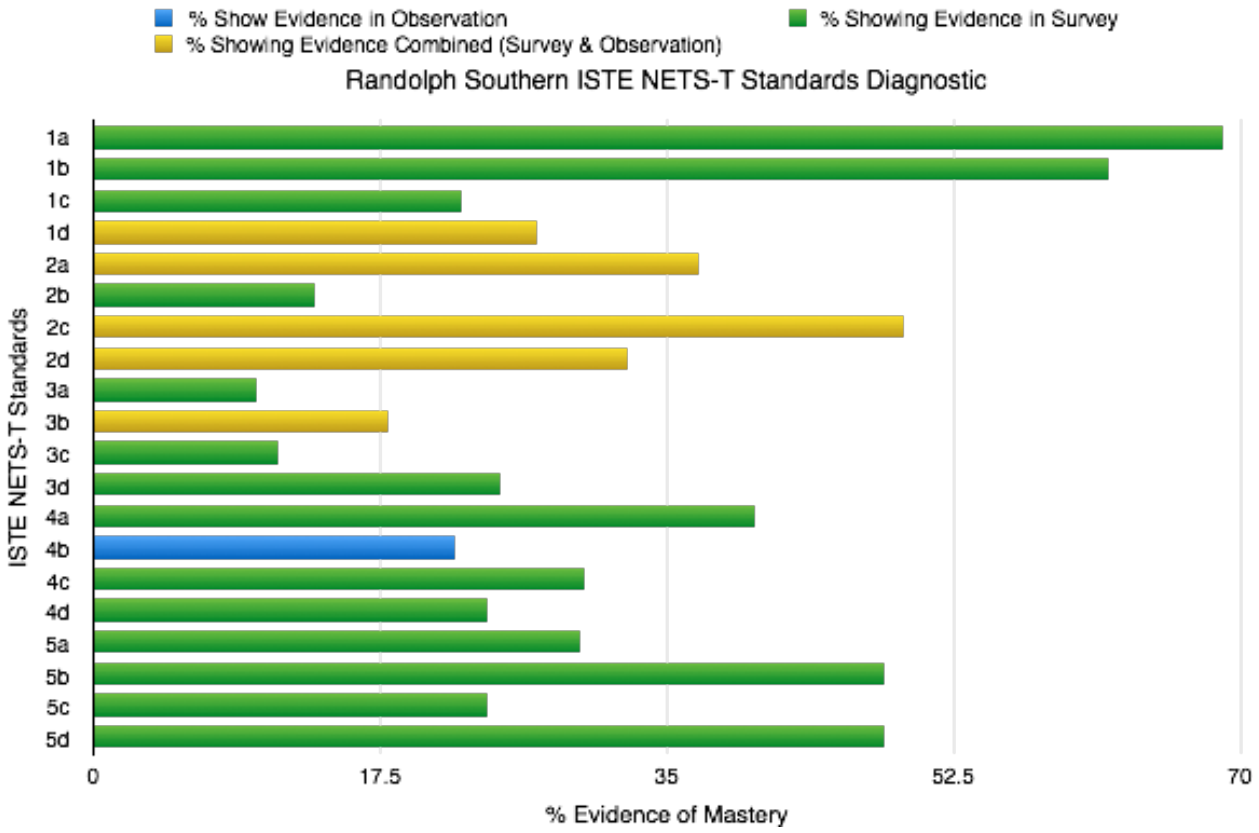
Student SAMR

- *Substitution*
    - In 19% of classrooms, students were seen using a computer as a substitute for paper and pencil.
- *Augmentation*
    - In 13% of classrooms, students were creating a slide show presentation.
- *Modification*
    - None observed
- *Redefinition*
    - None observed

ISTE Baseline Data

Explanation

Above are the baseline levels for each ISTE standard. The BLUE levels were determined from the observation, the GREEN levels were determined from the survey, and the YELLOW levels are a combination of surveyed and observed practices. We will perform another survey and observation one year from now in order to determine growth from these base levels.



FINDINGS & RECOMMENDATIONS

ISTE NETS-T Standard 1: Student Learning and Creativity

Without technology in each student's hands, it isn't surprising that the use of digital tools is around 32%. However, it is concerning that over half of the teachers have never engaged with students in a virtual environment.

- **Randolph Southern Community Schools should consider providing time and training for teachers to become comfortable with a learning management system such as My Big Campus.**

Using a learning management system is a first step in creating a blended classroom. In addition, a minority of teachers know how to engage with peers or find resources in a virtual environment.

- **Randolph Southern Community Schools should consider increasing the capacity of the staff through onsite trainings, courses, and eCoach development so that they can be self-directed in finding resources and ideas that are openly available online.**

The majority of classrooms observed revolved around direct teaching and the use of worksheets. While there is still value in these methods,

- **In addition to the self-paced course, Randolph Southern Community Schools should consider having teachers participate in online courses to increase teacher awareness and implementation of methods that can increase student-directed learning once they have access to devices.**

ISTE NETS-T Standard 2: Digital Age Experience and Assessment

Again, it isn't surprising that we have found low use of digital tools since there is little student access to technology. While 19% of classrooms had evidence of data-based decision making, this is an area we need to target. Along with increased engagement, the use of devices will give teachers more opportunity to collect data for use in informing and differentiating instruction.

- **Randolph Southern Community Schools should consider providing time and training for teachers to become comfortable analyzing data. This could include utilizing Excel spreadsheets and or investing in a data warehouse such as Pivot.**

ISTE NETS-T Standard 3: Model Digital Age Work and Learning

Students appear to have limited experience researching with digital tools. The numbers addressing collaboration would be improved through proper training on a learning management system (as recommended above). Only 15% of the teachers were observed using the technology currently available to them.

- **Randolph Southern Community Schools should consider creating a Teacher Expectation Measurement Tool to ensure teachers understand the expectations for technology use in their classrooms.**

ISTE NETS-T Standard 4: Promote and Model Digital Citizenship and Responsibility

There isn't a clear plan for promoting digital citizenship, and neither students nor faculty could communicate the expectations for acceptable technology use.

- **Randolph Southern Community Schools should consider creating a district plan to address digital citizenship and expectations for social interactions online.**

ISTE NETS-T Standard 5: Engage in Professional Growth and Leadership

It is very important that all stakeholders are aware of a clear vision for effective technology integration. With only 52% of teachers reporting that they have an awareness of what effective technology integration looks like, it is clear that we have some work to do in increasing awareness and communication.

It is a strength for Randolph Southern Community that the leaders have a passion for increasing student access to technology for increased engagement and learning. We can not stress enough the importance of strong leadership during any shift within a school district (See Appendix C). However, there is still some work to be done in communicating this vision to all stakeholders. If a school doesn't tell their story clearly and accurately, then someone else will.

- **Randolph Southern Community Schools should consider creating a clear and specific strategic vision with a communication plan to be used and shared with all stakeholders.**

Miscellaneous

Any issues other than optimal network work performance will make any efforts to integrate technology unsuccessful. During our Instructional Assessment it was noted that a recent upgrade included investing $120,000 in wireless and an overhaul of the entire network. The Five-Star Technology Assessment will analyze network performance. If issues are found, this assessment report will note the issues and provide recommendations on correcting the issues related to speed and reliability.

TIMELINE RECOMMENDATIONS (BASED ON READINESS INDICATORS)

There are thirteen indicators we have identified as items that must be in place to give schools confidence in moving forward with their implementation plan. It is our belief that these indicators must be fully met before a school places devices in the hands of students. The roll-out of a 1:1 is one of the largest changes a school district is likely to make, so we urge that every step is taken to ensure the success of the initiative. In order to determine if a school district's timeline is feasible, we determine their current level within each indicator and then estimate the time it will take to bring all indicators to completion.

- ❑ **VISION FOR IMPLEMENTATION IS CLEARLY DEFINED BY THE LEADERSHIP TEAM**
  - ❑ INCOMPLETE
- ❑ **VISION FOR IMPLEMENTATION IS UNDERSTOOD BY TARGETED TEACHERS**
  - ❑ INCOMPLETE
- ❑ **STRATEGIC PLAN FOR ROLLOUT IS IN PLACE**
  - ❑ INCOMPLETE
- ❑ **DISTRICT WIDE TECH TEAM IS IDENTIFIED AND MEETS ON A REGULAR BASIS**
  - ❑ INCOMPLETE
- ❑ **INFRASTRUCTURE IS SATISFACTORY**
  - ❑ TO BE DETERMINED BY FIVE-STAR TMS TECH AUDIT
- ❑ **PLAN FOR SUPPORTING AND REPAIRING DEVICES**
  - ❑ INCOMPLETE
- ❑ **TEACHER EXPECTATIONS FOR CLASSROOM USE OF TECHNOLOGY HAVE BEEN DEFINED**
  - ❑ INCOMPLETE
- ❑ **COACHING SUPPORT PLAN IS IN PLACE**
  - ❑ INCOMPLETE
- ❑ **POLICIES AND PROCEDURES HAVE BEEN UPDATED (RUP)**
  - ❑ INCOMPLETE
- ❑ **COMMUNICATION PLAN FOR ALL STAKEHOLDERS IS IN PLACE**
  - ❑ INCOMPLETE
- ❑ **DEVICE HAS BEEN SELECTED**
  - ❑ **INCOMPLETE**
- ❑ **DEVICE IS AVAILABLE FOR TEACHER USE/EXPLORATION**
  - ❑ **INCOMPLETE**
- ❑ **LEARNING MANAGEMENT SYSTEM (LMS) IS IN USE AMONG TARGETED TEACHERS**
  - ❑ INCOMPLETE
- ❑ **GOOGLE APPS FOR EDUCATION (GAFE) IS IN USE AMONG ALL TARGETED TEACHERS**
  - ❑ INCOMPLETE

Reflecting on the Report

In the spirit of quality instructional practice, your own reflection on these observations and recommendations will provide powerful conversation to move your school improvement work forward. To support your analysis of this report, we have provided some questions for your consideration. We recommend that you share this report with all stakeholders. It may be productive to allow time for discussing what you find most compelling and what your next steps may be as a result. You may decide to share the report in its entirety, or you may share just the executive summary. The most important idea is that teachers, parents, the school improvement team, and the principal have an opportunity to review and provide their own reflections on the strengths, challenges and next steps.

Staff meetings, parent information meetings, newsletters, grade-level team meetings, and PLC meetings provide structures where the report could be shared and discussed. By sharing it with the staff, you provide those who chose not to participate an opportunity to learn and respond to these ideas.

Some Questions to Guide Your Analysis of This Report:

- What do you see as your strengths reflected in this report? What strengths would you add?
- What do you see as challenges for your school as reflected in the report? To what extent do you agree? Why? What would you add?
- Which recommendations do you find most useful? Why?
- Which recommendations do you find most challenging? Why?
- Given this information, what actions might you suggest your school and teams take?
- What might you do, individually, as a result of this report?

ACKNOWLEDGEMENTS

Thank you to Randolph Southern School Corporation for inviting us to be part of your instructional improvement work. You were gracious in welcoming us into your school to learn from your practices. We know how extremely busy and valuable your time is, and each of you took time to share your thoughts and perceptions. Thank you! Your honest and thoughtful comments and reflections were thought provoking.

The professionalism depicted by all teachers is an excellent model for educators across Indiana. Your students were also profoundly insightful; they seemed excited to talk about their experiences and the possibilities for their schools. A special thanks goes to them as well.

Thanks to Annette Wilson and Donnie Bowsman for inviting us to examine the instructional practices in your district; we appreciate the time spent setting up and organizing our visit. Your combined energy and vision for moving your district forward will serve the corporation well as they make this shift. It is only through clear and decisive leadership that a transition of this magnitude can hope to be successful (Buckingham, 2006 & Appendix C).

FIVE-STAR TIS PHILOSOPHY

- A digital divide exists in this country among all educators.
  - Gu, Zhu, & Guo, 2013; Margaryan, Littlejohn, & Vojt, 2011; Prensky, 2001
- We are in the middle of an epidemic of high-access/low-use learning environments.
  - Wood, Mueller, Willoughby, Specht, & Deyoung, 2005
- Teaching educators is different than teaching students.
  - Transformational Learning Theory states that adults learn by viewing all new information through a lens created by their personal and professional experiences.
    - Dirkz, 1998
  - Much training doesn't meet the needs of adults, and, therefore, isn't relevant.
    - Sawchuck, 2010
  - Professional learning experiences for teachers must be high-quality, and relevant to the problems they face.
    - Gaible & Burns, 2005
- There is a powerful relationship between educator beliefs, practices, and student learning.
  - Teachers need to understand WHY they need to change their methods.
    - Clarke & Hollingsworth, 2002
  - Professional learning experiences must be decontextualized and contextualized.
    - Nuthall & Alton-Lee, 1993
  - We must measure the impact professional learning has on student achievement.
    - Opfer & Pedder, 2011
- Integrating technology is a process and not a "light switch."
  - Redefinition
  - Modification
  - Augmentation
  - Substitution
    - Bloemsma, 2013
    -

- We must measure all professional learning experiences.
  - Participant Reaction
  - Participant Learning
  - Organization Support and Change
  - Participant Use of Knowledge and Skills
  - Student Learning Outcomes
    - Guskey, 2002

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APPENDIX A

Coached teachers . . .

- Practice more frequently and developed greater skill
- Use new strategies more appropriately
- Exhibited greater long term retention of knowledge and skill
- More likely to explain the new strategies to their students
- Greater cognition about purpose and use to think with new strategy

Student Achievement Through Staff Development, Bruce Joyce & Beverly Showers

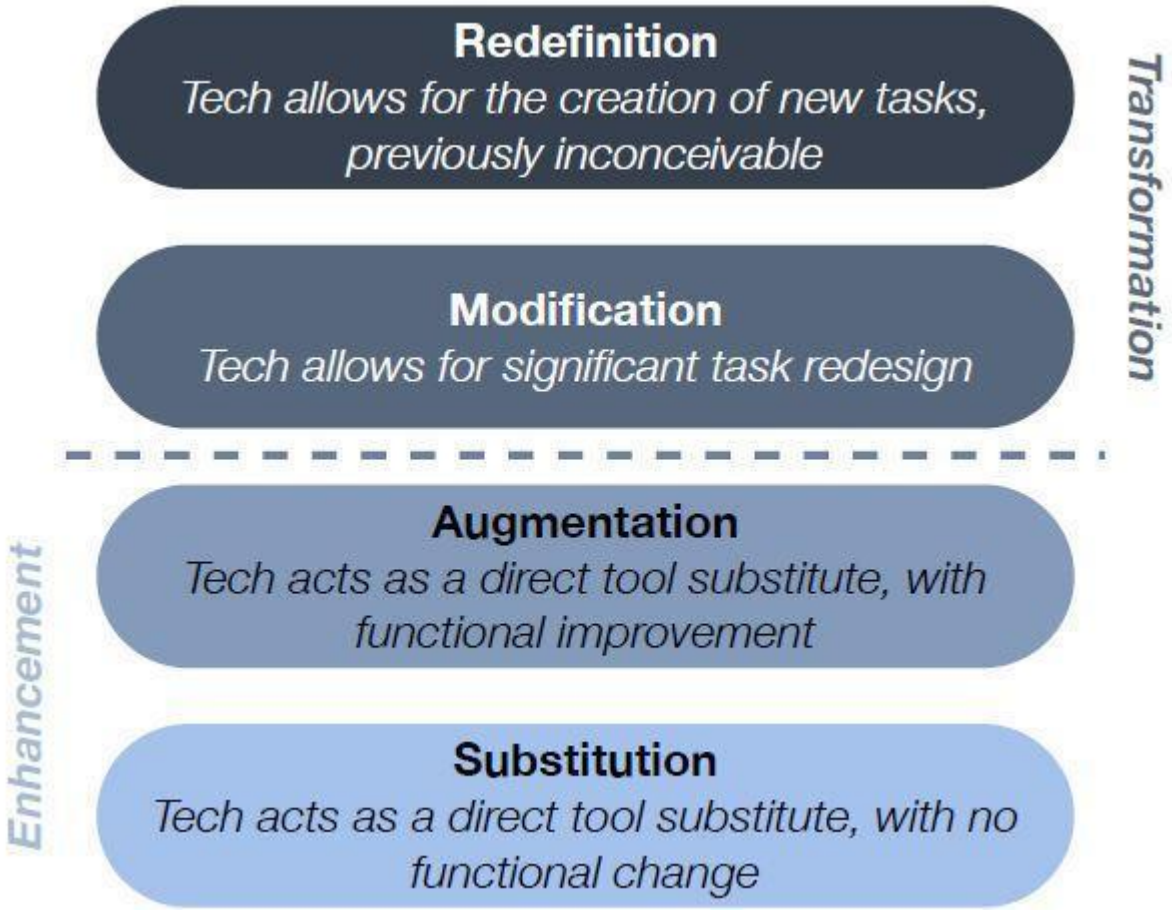
TYPES OF TRAINING	KNOWLEDGE	SKILLS	TRANSFER
Theory	10%	5%	0%
Demonstration	30%	20%	0%
Practice	60%	60%	5%
Coaching	95%	95%	95%

ASCD 2002

APPENDIX B

Taken from SAMR Model.

http://www.hippasus.com/rrpweblog/archives/2011/10/28/SAMR_TPCK_In_Action.pdf



APPENDIX C

Taken from Findings reported by Project Red.

Finding 4: The principal's ability to lead change is critical. Change must be modeled and championed at the principal level.

The impact of a good principal has been widely documented. Good principals also contribute to distributive leadership, in which team members surrounding the principal play an important role. As shown in earlier studies, strong district leadership is also essential for successful schools. All levels of leadership are important, individually and collectively, including school boards, superintendents, and assistant superintendents for curriculum, instruction, technology, finance, and operations. Project RED analysis shows that within the school the principal is one of the most important variables across the 11 education success measures, suggesting that change leadership training for principals involved in large-scale technology implementations is of paramount importance.

http://www.projectred.org/about/research-overview/findings.html

Randolph Southern Technology Assessment

03/07/2014

Technology Assessment

Overall the technology at Randolph Southern is at an advanced point for 1:1 but does have some room for improvement in regards to switching, wireless coverage, and connectivity. There are many factors that apply when designing a network for 1:1 use. Below we will outline the infrastructure and overall assessment of the technology at Randolph Southern.

Switch Infrastructure

- The switching infrastructure is mostly adequate to handle a 1:1 deployment. The Dell 7048P switches are about a year old and have the capacity to move traffic at needed speeds. The Dell 7048Ps are stacked in each network closet forming one logical switch. An extra Dell 7048P switch is connected via Ethernet to the stacks in the MDF and IDF2 for wireless APs. Wireless Access Points (APs) are connected directly to the stack switches in IDF1.
- Connections between the MDF and the IDFs are 10GB fiber. Connections between the stacks and the "wireless" switches are 2 x 1000Mbs bonded together. All switch ports are 10/100/1000Mbs.
    - **Recommendation:**
        - **Join all switches to the stack in each closet.**
- The MDF has 27 open ports available for additional APs. IDF-1 will need an additional switches if APs are added, there are no open ports in this switch stack. IDF-2 has 36 open ports for additional APs.
- There are three HP switches (1810G-24, 1810G-8, and 1810G-8) that we were not able to access. These switches are used for server connections. They are connected back to the main switch stack over a single gigabit connection. They are connected to each other in a looped fashion.
    - **Recommendation:**
        - **Connect all servers to the Dell stack**
- Mini switches are throughout the school building where pods of computers are located. Annette expects those to be removed as 1:1 moves forward and wired labs are phased out.
- Configuration/Segmentation is very important when creating a robust network and needing things to work without interruption. There should be more segmentation utilizing VLANs. Currently AP management, wired data, and wireless data coming from the RANDSO SSID are landing on the same vlan. APs should have their own Management VLAN. The other SSIDs are set up for their own VLAN across the entire school building.
    - **Recommendation:**
        - **Add VLANs for segmentation, tweak configurations as needed.**
        - **Insure latest software running on all switches**

Wireless Infrastructure

- The Aerohive wireless solution is an excellent solution for wireless implementation. In our experience, we see that a one-AP-per-classroom is a solid, stable, high throughput solution for 1:1 environments. We have seen performance issues with the Aerohive 121 APs. The Aerohive 330 APs are much more robust holding more connections and throughput.
    - **Recommendation:**
        - **Use Aerohive 330 APs where highest density of users are expected**
        - **Update the hive controller and Aps to the latest firmware.**
- Gathering areas such as gyms, cafeterias, and auditoriums have needs for large numbers of users for events such as device rollouts/enrollments, educational speakers where users utilize interactive content, and general guest access for events. Multiple APs in these locations are a necessity for connectivity.
    - **Recommendation:**
        - **Add AP in gathering areas**
- The wireless spectrum is an ever changing medium that utilizes the controller to mitigate issues with changes in the environment to keep a steady connection to the wired backbone network. A solid wireless infrastructure requires a great deal of trial and error starting with a basic best-practice setup and then tweaking trouble spots as they arise. Looking through the setup of the Aerohive cloud-based controller we found a number of issues pertaining to radio settings, authentication types, and legacy radio speeds that can create slowness in the spectrum. Walking through the school using a spectrum analyzer we noticed a lot of channel overlap with connectivity drops and slow roaming.
    - **Recommendation:**
        - **Tweak wireless configurations as needed to create an optimal spectrum for throughput and connectivity.**
        - **Controller side power and channel management, updating or creating new radio profiles for a high density deployment.**
        - **Assign the correct names to the Aps within the hive manager will help to identify Aps quickly and will improve the ability to troubleshoot issues.**
        - **Rate limit and firewall guest network**

Wiring and Physical Infrastructure

- The physical cabling of the building for Ethernet is in pretty good shape as far as we can tell from seeing the endpoint connections. Fiber connections are terminated to industry standards utilizing 50 micron Multi-Mode fiber with 10Gbs throughput. This is ideal.
- The individual network closets are very clean and organized with vertical and horizontal Panduit cable trays. This is a very clean and organized way of dealing with cabling.
- For troubleshooting purposes it is best to label as much as possible for clarity. Color-coordination of patch cables where possible is also an ideal practice. Green cables are used for wireless in the closets at Randolph Southern for the most part but there were some green patches not going to APs in a few locations.

- **Recommendations:**
  - **Label all switches for names and IP addressing, utilize color-coordinated patch cables explicitly for a single purpose (APs, switch uplinks, server connections, phone connections, etc).**

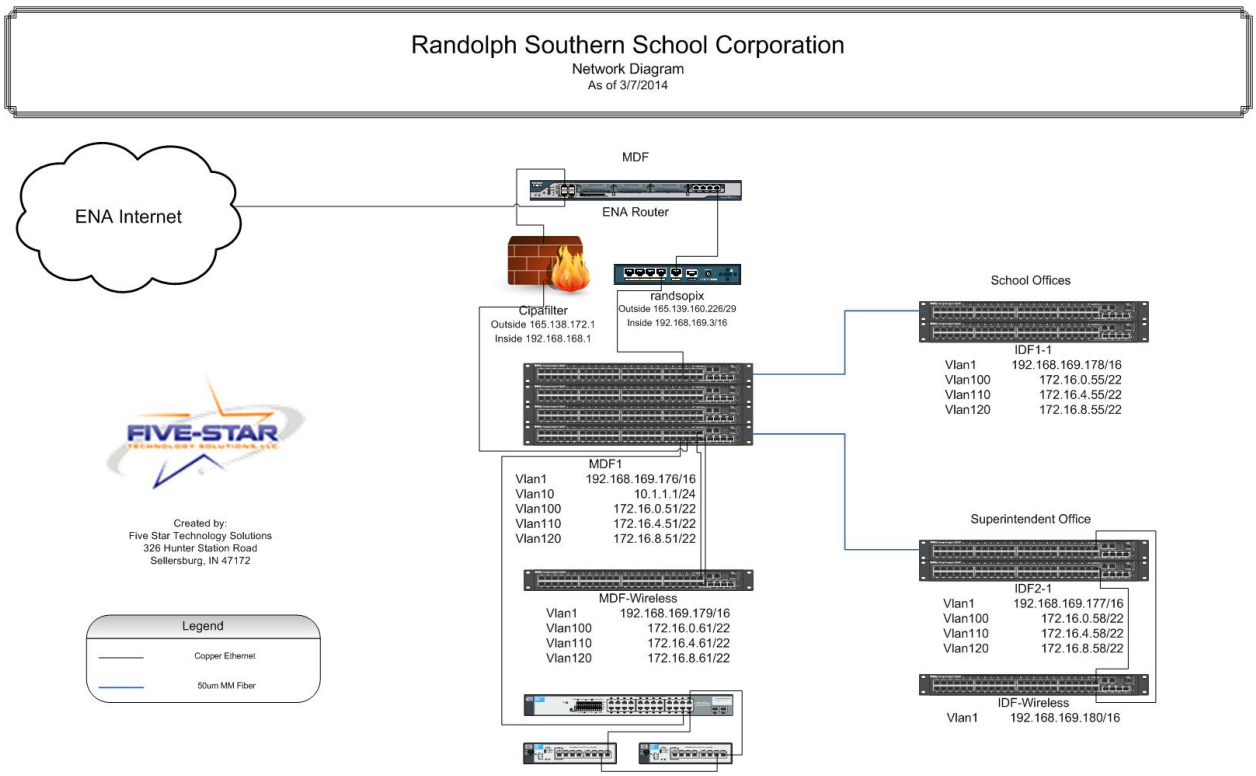
Bandwidth

- The current Internet circuit is 20 Mbs. This is very undersized for a school moving to a 1:1 environment. Today's devices are very chatty to the cloud and require quite a bit of bandwidth for updates, applications, and general use. A school of this size should plan to increase bandwidth substantially.
  - **Recommendation:**
    - **Increase Internet circuit at least to 40Mbs with expectations to increase as the need arises.**
    - **Start investigating options for additional bandwidth from other providers for redundancy. While there is not an immediate need it will be beneficial to have this information in hand.**
- Knowing where bottlenecks occur and exactly how much data you are passing through the network is vital to performance. Monitoring of all network devices on a per-port basis is extremely valuable. There are lots of tools out there to accomplish this (MRTG, SolarWinds, Spiceworks, etc).
  - **Recommendations:**
    - **Install a bandwidth monitoring solution for the network.**
    - **Gather traffic trends to see where the majority of your traffic is being generated (Games/Streaming Media/Etc). This will help you to decide where you can better utilize your bandwidth.**

Server Infrastructure

- Two HP DL165s(G6-USE110N64N/G7-USE110NDG3) servers currently in use. Warranty is still valid as seen in the tables below. Hardware was clearly labeled.

Warranty type:	Contract
Service type:	**HP Next Day HW Support**
Service type:	**HP Hardware Maintenance Onsite Support**
Status:	Active
Start date:	Mar 23, 2011
End date:	Mar 31, 2015


Randolph Southern School Corporation
Network Diagram
As of 3/7/2014
ENA Internet
MDF
ENA Router
Cipafilter
Outside 165.138.172.1
Inside 192.168.168.1
randsopix
Outside 165.139.160.226/29
Inside 192.168.169.3/16
School Offices
IDF1-1
Vlan1 192.168.169.178/16
Vlan100 172.16.0.55/22
Vlan110 172.16.4.55/22
Vlan120 172.16.8.55/22
MDF1
Vlan1 192.168.169.176/16
Vlan10 10.1.1.1/24
Vlan100 172.16.0.51/22
Vlan110 172.16.4.51/22
Vlan120 172.16.8.51/22
Superintendent Office
IDF2-1
Vlan1 192.168.169.177/16
Vlan100 172.16.0.58/22
Vlan110 172.16.4.58/22
Vlan120 172.16.8.58/22
MDF-Wireless
Vlan1 192.168.169.179/16
Vlan100 172.16.0.61/22
Vlan110 172.16.4.61/22
Vlan120 172.16.8.61/22
IDF-Wireless
Vlan1 192.168.169.180/16
FIVE-STAR
Created by:
Five Star Technology Solutions
326 Hunter Station Road
Sellersburg, IN 47172
Legend
Copper Ethernet
50um MM Fiber