PERCEIVED IMPLEMENTATION BARRIERS OF A ONE-TO-ONE COMPUTING INITIATIVE IN A LARGE URBAN SCHOOL DISTRICT: A QUALITATIVE APPROACH

By

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ABSTRACT

One-to-One Computing initiatives are K-12 Educational environments where student and teacher have Internet-connected, wireless computing devices in the classroom and optimally at home as well (Penuel, 2006). One-to-one computing has gained popularity in several schools and school districts across the world. However, there is limited research exploring the barriers of implementing one-to-one computing, especially on a large scale. This study utilizes a qualitative approach by interviewing six senior administrators on identifying the barriers to implementing one-to-one computing. Solutions are recommended by the senior district leadership to help secure a successful and sustainable district-wide implementation of a one-to-one computing initiative. Results from this study have implications that could drive the planning of future initiatives in large school districts across the world.

Keywords: One-to-one Computing, Technology Integration Barriers, School Technology.

INTRODUCTION

One-to-one computing, where every student in a particular class, grade level, entire school, or school district is assigned a personal computing device has been implemented in several countries (Penuel, 2006). While research has been conducted on one-to-one computing, there is limited research on identifying barriers to implementing one-to-one computing. This study focused on the implementation barriers that must be overcome to ensure the successful and sustainable one-to-one computing investment by any large school district in the United States and the rest of the world.

Prior One-to-One State Initiatives

One-to-one computing initiatives originated in states across the United States, such as Maine, Texas, Pennsylvania, Michigan, Florida, and Virginia. In late 1999 and early 2000, a one-time state surplus enabled Maine to make the dramatic step of announcing a plan to equip all of its middle school students and teachers with a laptop as part of a new state education initiative called the Maine Learning Technology Initiative (MLTI) (Silvernail, 2011). The MLTI has provided all 7th and 8th grade students and their teachers with laptop computers, created a wireless internet infrastructure in all of Maine's middle schools, and provided teachers and staff, technical assistance and professional development for integrating laptop technology into their curriculum and instruction. In 2009, MLTI expanded into Maine High Schools. The expansion was the part of an agreement, the state department of education negotiated with Apple Inc. for a reduced rate on the laptops, allowing the state to lease 100,000 machines within existing funds dedicated to Educational Technology.

The Leveraging Laptops program was created with the purpose of developing "effective models for enhancing student achievement through the integration of the laptop computer as a tool for teaching and learning in the classroom" (Florida Department of Education, 2009, p 2). In 2009, sixteen Florida's districts were providing students, at a ratio of one-to-one laptops through mobile laptop carts, mobile devices, or classroom sets of computers Cavanaugh, et al. (2009).

The North Carolina Learning Technology Initiative (NCLTI) is a public-privately sponsored partnership designed to address equity, engagement, and economic

development in North Carolina schools (Corn, 2009). In all, more than 13,000 students are currently participating in one-to-one computing initiatives across at-least 28 Local Educational Agencies in North Carolina (Corn, 2009). The NCLTI's leadership recognized the size, importance, and magnitude of a statewide implementation of technology.

Prior District-Wide One-to-One Initiatives

In 2007, the Mooresville Graded School District (MGSD) which serves approximately 5500 students adopted a six-year strategic plan which set clear goals around utilizing 21st Century resources in all classrooms. In 2007, the initial phase of the digital conversion began at Mooresville High School's English classes, where each class was provided laptop carts for each student to have their own laptop. The following summer, the district led an institute for staff that provided differentiated training for all instructional staff. During the following school year, early release days were built into the school calendar for dedicated teacher training that focused on data analysis, software use, methodology, and team training and planning. In addition, all administrative staff was involved in leadership training and weekly implementation training meetings. In the fall of 2008, all students at MHS and Mooresville Intermediate School (grades 4 – 6) received laptops for their use at both school and home. The school district also added six early release days for professional development and training to the school calendar as well as an ongoing teacher training program was implemented (Edwards, 2013).

Henrico County, (HCPS) is a suburban school district in the Richmond, Virginia area with a student population of approximately 43,000 students. HCPS is the largest single implementation of a one-to-one laptop initiative to date and one of the few successful implementations of a school district who did not receive outside support from their state. Their one-to-one computing initiative began in the spring of 2001 with the deployment of laptop computers to all high school teachers, counselors, and administrators. Each teacher received a laptop, and both in-class use, and home use was encouraged. Training began immediately with staff development sessions at multiple locations across the county. The county began to develop a site called the Henrico Learning Center (HLC), based on the Blackboard software that many colleges use to post lessons and curricula across subject areas. Deployment of the laptops to nearly 12,000 high school students began in the summer of 2001 (Boitnott, 2007).

Purpose of the Study

The importance of leadership is crucial to the implementation and sustainability of a large one-to-one laptop initiative (Oliver Molletee, & Corn, 2012; Penuel, 2006; Holcomb, 2009; Hew & Brush, 2006). This study collected data from the District Administrators, and the Superintendent's Leadership Team on the perceived implementation barriers, the size of individual barriers, and what potential solutions do senior leadership believe could be implemented to overcome these obstacles which are hindering this particular district from successfully implementing a one-to-one computing initiative district-wide. This article focuses on the second phase of this study which interviewed administrators after the completion of the survey. For this research study, the following question helped to inform the understanding of phenomenon being studied which is the perceived implementation barriers to a district-wide one-to-one laptop initiative.

What solutions and changes does senior district leadership believe can be implemented to help secure a successful and sustainable district-wide implementation of a one-to-one initiative in a large urban school district in the southeastern United States?

Method

Interview Participants

In this phase, the researcher interviewed six members of the large urban school district's leadership team. The district leadership, also known as the Superintendent's Leadership Team, consists of area Superintendents (the school district is broken into seven areas), Assistant superintendents, and chief officers.

Interview Questionnaire

The interviews were semi-structured which allowed the interviewer to ask and follow-up questions that provide deeper and more concise data collection. The interview protocol's questions were loosely structured to give the researcher, the flexibility to refocus the questions of the

interview.

Interview Procedure

The length of these interviews lasted no more than 30 minutes each. District-based leadership is extremely busy professionals, and the researcher believed that, a shorter interview length will promote participation and will not hinder the daily work requirements of these individuals. All the interview content was audio-recorded, and the researchers transcribed the interview recordings for further analysis. Corrections in the transcripts were made to ensure the precise use of participants' words. Pseudonyms were used to identify interviewees in the transcribing process and analysis to protect their identity.

Data Analysis

The constant comparative method was used to analyze the qualitative data collected (Patton, 2002). The researcher waited to conduct an in-depth analysis of the interview data until after all interview data had been gathered to avoid imposing one administrator's meanings onto another's (Seidman, 2006). Afterward, the qualitative text was organized by codes to further ascertain common themes and sub-themes.

Results

Four themes emerged from the data: Planning, Professional Development, Funding, Self-efficacy, Attitudes, and Behaviors.

Planning

The first identified theme was planning. When discussing strategies for overcoming the various planning barriers, all six interview participants discussed the importance of long-term and strategic planning that involves all departments in the school district. Interview results were broken down into three sub-themes, such as: pre-planning, long-term planning, and strategic planning. The first planning sub-theme was the importance of pre-planning in which should start many months before the implementation and should include members of every group in the district, especially ones that support a one-to-one computing initiative. Three of the six interview participants stated that, pre-planning should begin at least twelve months before deployment. One interview participant stated:

> "*if I was going to do that here (one-to-one initiative), I would gather people up who believe in the initiative and would support the implementation*" (Interviewee 4, Personal Communication, 8-6-2014).

When pre-planning, Interviewee 6 discussed the importance of not getting ahead of yourself:

> *"I think you have to be careful not to put the cart before the horse... You would have to prioritize... You would have the professional development planned and set up so you would not have devices out there used as doorstops... that is one of the big problems... I think where people go wrong is they say were going down to the Apple store, load up the truck... and we got all the toys, and we will figure out how to use them later... So I think having a plan of how we are going to use these devices before deployment is key"* (Personal Communication, 8-8-2014).

During the pre-planning process, the importance of long-term planning emerged from the interview data. Interview participants discussed the importance of thinking long-term and choosing options that might not make the most dramatic-instant impact, but implementations that are sustainable and will be able to have a steady impact for many years to come. Interviewee 1 stated that

> *"planning should be "long-term, structured, and include everything from deployment phases of devices to professional development, as well as a strategic communication plan that will target key stakeholders"* (Interviewee 2, Personal Communication, 8-4-2014).

The second aspect of long-term planning that emerged from the interview data was the importance of district leadership support. Interviewee 2 stated that

> "*the initiative should be seen as a non-negotiable commitment from all employees in the school district, and leadership should stress the importance and commitment to the initiative long-term"* (Personal Communication, 8-4-2014).

Interviewee 3 stated that,

> *"when planning, leadership should look at the district's strategic plan and mission/vision statement for*

alignment with the initiative: " how does this play into your new evaluation and growth model….Why is it important and how does this related to your mission or vision... We do not want this model to be an assessment, but I do want the principals to invest" (Personal Communication, 8-4-2014).

The final sub-theme for planning that emerged from the interview data was strategic planning. Any technological investment involves a large financial investment and some level of risk if the initiative does not produce the results, the community and the district leadership believes it should. Several of the interview participants suggested that, when planning for a large district-wide initiative, it would be more effective to divide the district into several smaller initiatives to minimize the risk and maximize the support, monitoring, as well as choosing the model that fits that particular area of the district.

Interviewee 5 proposed a staggered implementation approach:

"so we can say were going to start this in five schools... Make all of our mistakes at a small scale, learn from them and then next year were going to expand by five more so forth and so on... if you stagger enrollment over an extended period, then you can get around the funding problem……it gets around the pd because then you can do the pd in a way that is manageable" (Personal Communication, 8-8-2014).

Interviewee 5 echoed the same strategy when discussing strategic planning of a 1:1 initiative,

"when planning at a school level, leadership need to frame the initiative as one for our local kids, not the entire district... they also have made it clear to local businesses that 100 dollars means something... that every donation counts... for a lot of people of this county of this size... the size of the numbers or funding needed to fully fund the district will cause many of your participants not to engage because they believe they cannot make a significant impact financially" (Personal Communication, 8-7-2014).

Professional Development

Professional Development was the second identified theme. Two major professional development sub-themes emerged from the interview data: Curriculum-related Professional Development and Professional Learning Teams (PLTs). Three of the six interview participants discussed the impact that a one-to-one initiative would have on a teacher's curriculum and pedagogy as well as the importance of providing professional development that will help teachers make these changes. Teachers are very important to the success of the initiative and will be asked to change the most:

"Training teachers on how to infuse that into their curriculums... you are talking about remapping their curriculums... you need a whole planning year... a new curriculum just does not appear... kids will value if you teach them how and if that is the expectations... it must be reiterated on a daily basis... so that has to be built in... you cannot give kids a list of rules, and a laptop... kids will not follow just rules... It sounds easy, but it is not it is massive" (Interviewee 4, Personnel Communication, 8-6-2014).

One interview participant discussed the need to reassure teachers about their significance in the classroom:

"*Also when we are training teachers, we need to emphasis that this is merely a tool not a replacement for the teacher... It does not teach them*" (Interviewee 3, Personal Communication, 8-4-2014).

When discussing teacher professional development, the teacher must be self-motivated to learn new tools, and one of the major barriers to learning new pedagogy or tools is time. One area superintendent stated that, leadership could encourage more exploratory learning into instructional technology by purchasing curriculum aids and course management software to help the teacher with daily tasks such as grading student work, develop lesson plans, and research curriculum aides. The time saved by these technologies could be dedicated to exploratory learning:

"Teachers cannot take on an additional task or role…their plates are full… but instead of adding to the teacher plate, we can just change or reorganize their planning time... time that would have been spent grading papers, can now be spent researching new

instructional technologies and then individual teachers can share these new tools with members of their Professional Learning Teams (PLTs)" (Interviewee 1, Personal Communication, 8-4-2014)

In this new learning environment, the researchers asked the students to take control of their learning and in this new model, two of the interview participants believe that, we should ask the same of our teachers:

"*to keep up with technology and provide students the technology skills needed, teachers need to stay ahead of the curve with both*" (Interviewee 2, Personal Communication, 8-4-2014).

"*If we expect teachers to teach students that live in a technology world, we must provide them time to develop their skill sets faster than their students*" (Interviewee 1, Personal Communication, 8-4-2014).

In this new learning environment, teachers need to collaborate and learn together. Three of the six interview participants believed that, Professional Learning Teams (PLT) should exist at all levels of a large school district.

"I think the online modules might work... but what I have seen in my areas is that when you do it in small scale within their groups, then they feel safer than doing it large groups... they feel safer in their learning... I hate to say it, but their like kids... You put the topic in a big classroom and if that student does not know... then the student avoids it or does not pay attention... but if you pair them up in small groups that are less threatening" (Interviewee 3, Personal Communication, 8-4-2014).

Interviewee 1 discussed the importance of ensuring teachers bring their laptops to PLT meetings

"*just as important as teacher, PLT meetings is that teachers use their laptops in those meetings to plan, to research and etc…they need to get used to using their device just like a pen and paper*" (Personal Communication, 8-4-2014).

Interviewee 4 stated that many educators will not believe in the initiative if they do not understand the possibilities.

"I think they would have first... that individual principal must believe that this tool is valuable, and then I think they need to be educated about the endless possibilities of the tool...there are principals out there who use their computer to go on facebook and do some online shopping, and they think they are tech savvy... They have no idea of what the possibilities are... They have to be educated" (Personal Communication, 8-6-2014).

Funding

Funding was the third theme identified. When discussing funding strategies for a large one-to-one computing initiative with interview participants, many interesting ideas and strategies were discussed; but the Interview Participant 5 stated the importance of diversification when funding a technological initiative of this size:

"*In a district the size of this one... it is not a question of what funding strategy you would use but what strategies would you use*" (Personal Communication, 8-7-2014).

Interviewee 4 was a principal of a one-to-one public school. However, she did not have an issue with funding.

I was a principal of a public school in New York of a one-to-one school... First of all, I listed the barriers in order of importance First funding drove everything... if you do not have the money you couldn't buy the equipment or software... in New York I had endless money... my school had 250 students, and I had a 2.2 million dollar budget... Million of that was salary... so I still had 1.2 million to do what I needed to do... per pupil hat is a lot of money" (Personal Communication, 8-6-2014).

While every interview participant discussed the significance of funding as a barrier, each participant had a different strategy or mix of strategies to overcome the funding barrier. Four funding sources emerged from the interview data as possible funding streams that could help fund and sustain an initiative in a large urban school district long-term: reallocation of funding, grants, public-private partnerships, and parent organizations/fundraising.

The most secure and safest funding stream is simply reallocating funds from other areas. District leaders will need to sit down and make strategic choices on programs,

or services that either no longer fit the need of our students or ones that we do not have evidence that they are making an impact:

> *"I always believe you fund what matters... if you want to know what someone believes in look at their checkbook... It would take a reallocation, but it would take leaders from all departments to look at their budgets to see what were not using, what are we paying for that we do not have data for... What do we have in the schools that we are continually paying for but have no evidence that it is working?... If we move that money to 1:1 that is a reallocation"* (Interviewee 3, Personal Communication, 8-4-2014).

Interviewee 4, who has served as principal at a one-to-one school in New York highlighted the importance of reallocating money for maintenance and staff training costs. *"As much as we need funding to purchase new devices, just as important is having to fund to provide training to staff on how to use, maintain, and fix the devices we purchase:*

> *"You have to reallocate money... the biggest problem I know is the upkeep of the computer functionality... so as soon as they break... you have to have one to replace it... you do not want to have a kid without a computer in a full one-to-one... so need a tech person in every school... if the money does not allow you to hire a full-time tech, then you need to train certain members of your staff or teachers to be the ones to coordinate how these things get fixed... then you need to find time for the teachers to work on this task. As much as it a reallocation of money... it is a reallocation of skill sets... in so I may need to get training for these staff members... In the beginning, I didn't foresee the issue that laptop maintenance would be until I walked into my secretary's office one day and saw the stack of broken laptops from the floor almost to the ceiling".* (Interviewee 4, Personal Communication, 8-6-2014).

Even though the district as a whole is strategically targeting one computer to 3 student ratio, there has been individual schools that have been successful reaching at least one computer to 2 student ratio. The Interviewee 6 for the district highlighted how one elementary principal in the district had been successful with simply reallocating money from other areas:

> *"One principal that I have talked to in our district that has had previous success with computing initiatives would tell you that what they have done is reallocated money from other sources to systemically fund the purchasing of devices in particular in this case, they cut back on their playground budget"* (Personal Communication, 8-7-2014).

No matter how a large urban school district reallocates money, technology funding has to become a funding priority to ensure any technological initiative can be successful and sustainable:

> *"We have to start thinking about technology funding as not optional... like the utility bill... you have to pay the light bill... it has to be something we dedicate our self to and a consistent funding source to... we cannot depend on a bond or grant because they are not recurring funds..."* (Interviewee 5, Personal Communication, 8-8-2014).

The second funding source theme that emerged from interview data was public-private partnerships where the school district partners with a member of the business community to help fund aspects of the initiative as a whole or for an individual school or grade level. The partnership might not stop at just funding the initiative, but the business could provide consultation to the district if their business provides technological services:

> *"I would go to public-private partnership with some businesses in town... they would have to be large businesses or corporations to ensure that they could fund what they committed to... I'm going to the businessman that I know well, and I preferably want a computer hardware and software company... not just for their funding but for their expertise..."* (Interviewee 6, Personal Communication, 8-7-2014).

Public-private partnerships can be a great source of funding, but the school district must be weary of asking for too much too fast:

> *"If you hit up small businesses too hard... then you will lose them long-term... you can guilt a business into a*

big gift but if it's a gift... that is too big they will not do it again... and for the next ten years they will remind you about the time they gave you 5,000 dollars" (Interviewee 6, Personal Communication, 8-7-2014).

When partnering with businesses the school district understand that often these partnerships are agreed to by the businesses to help the business in some shape or fashion. Sometimes these businesses just want an advertisement for their funding, which can be beneficial to both parties

"*I also think our school district needs to do more partnerships with businesses where they can marketing their involvement*" (Chief Communication Officer, Personal Communication, 8-7-2014).

School districts can place themselves in tough situations in the long-term if they have made agreements with a primary vendor or business in the past:

"I think you need be careful on how you do it... not because it lacks impurity... it's the channel one discussion of the 1990's... you let me pipe channel one in, and I will give you a tv monitor for every classroom... but we must make alliances that do not eliminate other possible alliances down the road... maybe we just do several pilots within the district and limit our partnerships to pilots... what businesses want you to do and what a school district has to be careful of is agreements where a district agrees to allow one business to be the sole vendor for a product... you cannot afford to do that in a sustainability model". (Chief Communication Officer, Personal Communication, 8-7-2014).

Grants are another funding source that emerged from interview data, but unlike reallocating funding, grants are not reoccurring funds. These funds will eventually run out, and it will be up to the district to replace those funds if they want to continue the aspect of the one-to-one initiative that the grant previously funded. A large school district must look to national grants for funding due to the amount of money needed for the initiative. One interview participant suggested using local funding as leverage for larger national grants or for grants that require matching organizational funding:

"After public-private partnerships... I would look to bond money to see if I can leverage some of that funding for fund-matching grants... and then I will start looking for national grants... for a district our size we must have national grant...s for a smaller districts I might be able to get away with public-private partnerships and leveraging district money" (Interviewee 6, Personal Communication, 8-7-2014).

The final funding source discussed in the interview was fundraising by individual schools or individual parent organizations. Not every school has a strong parent organization or community support, but if a district leverages the funding for the schools that do, then other reoccurring funding from the district can be directed to low-income schools or to schools who do not have the support of strong parental organizations:

"The upside of having a large school district with a lot of schools... you have that many backyards that you can work on for funding... most of your grant money, public-private partnership money, will end up in your lower income schools with the hopes that your more supported schools will be funded through their surrounding communities" (Interviewee 6, Personal Communication, 8-7-2014).

Self-Efficacy

Self-efficacy in using technology was the fourth theme identified. New technology provides another component to an educator or educational leader's already full plate. For a technology initiative to be successful, then district leaders need to ensure that all certified professionals have the skill sets required to model and lead a classroom that infused with technology. The complexity that a one-to-one environment brings discussed by Interviewee 5:

"I think that there is a capacity and skill level issue... being an instructional leader in a school is one thing but infusing that leader in a school with a ton of technology maybe requires additional skills that might not be in those leader's skill sets" (Personal Communication, 8-8-2014).

When discussing possible solutions or strategies to address the technical efficacy barrier, three sub-themes emerged from interview data: instructional technology involvement,

on-demand technical training, and online courses for employees.

One strategy to overcoming technical efficacy in schools is to place an instructional technology professional in every school to help with technical support, repairs, and instructional technology pedagogy. One interview participant suggested that the instructional technology professional is a part of the school's leadership team:

> *"However, one thing principals are good at is surrounding themselves with smart people... so identifying people on staff that can help with this area of weaknesses…every school should have an instructional technologist... or have an assistant principal that is an instructional technologist so the principal can stay up to date on technology and look strong in this area in front of their staff..."* (Interviewee 4, Personal Communication, 8-6-2014).

In a one-to-one environment, the amount of devices and repairs needed to maintain these devices is significant. Interview participants discussed the need for each school to have computer technician or instructional technology facilitator to ensure students are not left without a device. If school budgets do not provide funding for a full-time technician, then several staff members need to share the responsibility of a full-time technician:

> *"you do not want to have a kid without a computer in a full one-to-one... so you need a tech person in every school... if the money does not allow you to hire a full-time tech, then you need to train certain members of your staff or teachers to be the ones to coordinate how these things get fixed... then you need to find time for the teachers to work on this task"* (Interviewee 4, Personal Communication, 8-6-2014).

One issue that arose from the survey and interview data was the fact that a large implementation of one-to-one devices would be distributed to individuals with multiple levels of technology skill sets. To ensure the success of the initiative, district leadership must address the issues that this might cause. Interviewee 1 proposed on-demand videos on various topics, and skills:

> "*I would propose that the district creates an online site, like a You Tube channel, or partner with a vendor to provide short, specific videos on computer related tasks*" (Personal Communication, 8-4-2014).

One interview participant proposed that the school district provides online courses for principals and assistant principals, where an instructional technology facilitator teaches the course, but school-based leadership's supervisor participates in the course as well:

> *"I think the online modules might work... but what I have seen in my areas is that when you do it in small scale within their groups, then they feel safer than doing it large groups. Our district is so large, but if I were going to do this I would break up the implementation into several different areas... go through area level training or even area level online training. So when they are posting or having an issue on how you do this... it is easier for them to hear it from another area principal that they have worked with every month every day bounces back you a response. You are less vulnerable Yes... within your area, but an instructional technologist is a facilitator/teacher... but the area superintendent is included as a manager or teacher, so they know their supervisor knows whether they are participating or not... The online provides a safe zone, but yet they know their supervisor is in there so they know they have to participate they cannot avoid this"* (Interviewee 3, Personal Communication, 8-4-2014).

Another barrier is how do the researchers get everyone infusing the initiative

> "*...everyone will be at different stages of skill sets coming into the initiative... It would be great to get Universities and businesses to get behind this... so we can show what this could do for our community and the future*" (Interviewee 1, Personal Communication, 8-4-2014).

Attitudes and Behaviors

The fifth theme identified was attitudes and behaviors. This category refers to the multiple stakeholders' groups that can have a positive or negative impact on the sustainability of the initiative long-term. This category was broken down into three different sub-themes: Political Climate, Teacher buy-in, and Understanding the benefits.

In a very large school district, Educational leaders must be aware of the politics on the local and national level as well as their impact on the district as a whole. The Interviewee 6 has over twenty years of experience working with school boards and educational leaders. He helps educational leaders navigate the current political climate:

> *"Politics is something... and I have been telling this to our board a lot... politics is something you should probably understand but something you should not play in... because it hurts when you lose... as a policy board, you can accomplish more by learning how to navigate it instead of trying to go in with blunt force... to change it" (Personal Communication, 8-7-2014).*

Navigating the political climate is unique in every situation and depends on multiple factors, with the most important factor being picked the right strategy for the current political climate:

> *"when you ask how you can get a political structure behind your idea... it is dependent on what those politicians that are in power need at the given time... so timing is a lot of it... what will work will 2014 might not work in 2016"* (Interviewee 6, Personal Communication, 8-7-2014).

These strategies also depend on which political party is in control and what they need at the time to keep in power or to get reelected.

> *"If Republicans are in control of local politics, then I would use a marketing strategy that highlights how the school is leveraging public-private partnership... to show that I am efficient with the taxpayer dollar... if Democrats are in control then I would highlight equity... we do not care who is in power politically, we just need to know the landscape and figure out how to navigate the political landscape... So know your political audience, then know the current environment, and the frame your message to ensure politicians currently in power look good... they need votes to be sustained, and we have our agenda... It depends on how much money public money you need... first you are going to have to define the need... then you have to market it in a way where the politicians believe that their constituents are wanting this initiative enacted. Politics is a boat driven business... they have to see that their constituents are not begging for the change, then we must educate the public to the point where they will begin begging for the change"* (Chief Communication Officer, Personal Communication, 8-7-2014).

Even though a lot of different factors contribute to the strategy that educational leaders need, the most important factor is knowing when the political climate is right for the initiative or the goal that the educational organization might have. This is not as easy as it sounds, since some organizations become personally invested in the program or initiative, which causes the organization to go forward with the initiative even though the political climate might not be right to deploy:

> *"What I see some organizations do, which I hope we do not... Is put your heart and soul into an initiative when it seems like the political environment is not right but they launch anyway... because if they don't, they are afraid they will lose their momentum... if it's not right... its not right... if you plant a seed in the dirt without water... its just going to die and so will your initiative"* (Chief Communication Officer, Personal Communication, 8-7-2014).

Marketing and communication plans are vital to the success of any large implementation in a large urban school district, but most times educational leaders forget the most important stakeholder group when creating these plans:

> *"Marketing is key... but a lot of times we just think about marketing to parents and to the public... but we have to market it to our teachers... there will be a lot of teachers out there... that will think this is ridiculous... I have been teaching for 25 years without a device why do I need it now... you can have all the greatest hardware and PD in the world, but if you do not have teacher support then the initiative will not be effective"* (Interviewee 5, Personal Communication, 8-8-2014).

When dealing with any stakeholder invested group in the development of children in their communities, to gain their support, you must educate these groups on the benefits of implementing the initiative. These marketing campaigns

need to target educational leaders first

> "*If the principal is not aware of the benefits of the initiative and have a belief that the initiative is important, then they will not support the changes or help to sustain them*" (Interviewee 2, Personal Communication, 8-4-2014).

The same approach should be deployed with other stakeholder groups

> "*the community must believe that this tool is valuable, and then I think they need education about the endless possibilities of the tool*" (Interviewee 2, Personal Communication, 8-4-2014).

To provide evidence of successes within the district, the school district should highlight the success of pilot programs at a school within the county and the importance of funding in expanding these successes:

> *"If I am pitching this as a public relations perspective... then I am telling stories about ways in which students use these devices and the better the tear jerker, the better... it's a story telling mechanism if it's a kid that had no interest in school and then all of sudden... so we will highlight our successes and send the message that we could do so much more if we had to fund... maybe what we want from some companies is their expertise... then if we get them invested then, they will be willing to fund something"* (Interviewee 6, Personal Communication, 8-7-2014).

The final implementation barrier category is leadership. Even though the leadership category was the lowest ranked significance barrier (3.04), but was the fourth highest barrier in importance to the success of the initiative (4.33). Even though each of the six barriers will be presented independently, they are very much intertwined, but no matter the barrier or barriers a great leader will find a way to make the initiative happen and sustainable:

> *"The key component... it is so hard to separate the barriers, they are intertwined... I think the key component is the leadership... because the right leadership will find a way to make, it happen... I see it with the magnet schools... they don't always get the money they need to fund the program fully, but a leader that invests and truly understand the importance will find a way to get it done"* (Interviewee 4, Personal Communication, 8-6-2014).

For the leadership barrier category, the authors have broken the barrier into two sub-themes: principal support and district leadership.

The school embodies the characteristics of the school's leadership. For a school to be effective with technology integration, then the principal must be able to model effective technology interaction:

> *"...in many ways the school takes on the characteristics of the principal...so I was a math teacher... so when I was principal there was math everywhere... now if you have principals just tinkering in minimum technology that is out there then the school is will not be successful with the technology"* (Interviewee 4, Personal Communication, 8-6-2014).

Not only does the principal need to model effective technology use, but they must also understand the importance of technology to the future success of their students and their school.

> "*The principal must be a visionary... they have to lead the development of the vision, they have to lead everyone to believe in the vision... the principal must believe in their capabilities with the tool*" *(Interviewee 4, Personal Communication, 8-6-2014).*

One of the major concerns of a district-wide implementation of a 1:1 computing initiative is the possibilities that the principal or school leadership will be acceptable to vulnerability or even possibly look weak do their inadequate technology skills. Area's Superintendent 2 stated that it was very important that

> "*the principal does not look weak in front of their staff members*" (Personal Communication, 8-4-2014).

The impact of school leadership with inadequate technology skills will soon begin to affect all staff members in the school:

> *"...because most of the principals will tell me "I can't even operate it myself I can barely operate the iPad... so they avoid it. If the principal avoids it, that means that is not going to be on your topic of discussion, and it*

will not be what you are pushing..." (Interviewee 3, Personal Communication, 8-4-2014).

Schools that lack principal support for the initiative is not always doing to the skill level of the principal, but can be caused by a lack of knowledge of how the devices can impact student achievement and teaching practices in their school:

"I think they would have first... that individual principal must believe that this tool is valuable, and then I think they need to education about the endless possibilities of the tool... there are principals out there who use their computer to go on facebook and do some online shopping, and they think they are tech savvy... They have no idea of what the possibilities are... They have to be educated..." (Area Superintendent 4, Personal Communication, 8-6-2014).

Finally, interview participants discussed the importance of reassuring principals that the new infusion of technology is not changing their role in the school or taking away their leadership it is simply changing their methods and their approach:

"Also, it is not changing what you do... it's Changing how you lead, its training your support, your providing the opportunities... whether it be PD, whether it be exposure, but whatever it is, as the principal you see the importance of it and you communicate it in everything you do... communicate it on every agenda, on everything you do" (Interviewee 3, Personal Communication, 8-7-2014).

Just as principal support is key to teacher success in a one-to-one environment, district leadership is key to whether individual principals are successful in this new technology-rich environment. District leaders need to build an environment that is accepting and comfortable where principals feel safe with being vulnerable and reducing the fear of failure. Interviewee 3 stated that she accomplishes this through modeling

"*I make myself vulnerable, and I am open about my skill sets strengths and weaknesses. Also, how I've overcome those... Its modeling and it starts at the top.*" (Personal Communication, 8-4-2014). Interviewee 2 echoed the importance of top-down modeling and culture development:

"*we have to address people's fear of technology... the biggest hindrance of technology... we can look around the table for funding..., but I know from a leadership standpoint, it must be top-down...everyone cannot have a fear of the technology or failure*" (Personal Communication, 8-4-2014).

District leadership also need to ensure that principals have the understanding of the devices because they will be asked to evaluate and observe teachers using these tools. One interview participant believed that before we begin educating principals, we need to ensure we have their buy-in, and they suggested we do that thorough modeling.

"How do you expect someone to evaluate something they know nothing about? How do we create buy-in... I have created buy-in with my principals with data because they see me work with data on a daily basis. I make myself vulnerable, and I am open about my skill sets strengths and weaknesses". (Interviewee 3, Personal Communication, 8-4-2014).

Finally, it is districted leadership to set up the implementation of a one-to-one initiative in a manner that limits the risk of failure, which places a significant amount of importance on the district leadership's pre-planning, piloting at a smaller scale, and even the development of best practices for all who are involved.

"We have to set it up in a way where it is guaranteed to work well... no matter what" (Interviewee 5, Personal Communication, 8-8-2014).

Limitations

Interview requests were made with every member of the Superintendent's Leadership Team with only six members agreeing to interview. This is primarily due to a lack of relationship with these non-participating members as well as how busy their schedules are. The researcher was limited by the time frame available for completion of this study.

Recommendations for Practice

Based on the results of this study, the following recommendations are being made to large school districts that are planning to implement or currently implementing a district-wide one-to-one computing

initiative:

***Planning*:** Implementation planning should start between twelve-eighteen months before initial deployment. In an ideal situation, principals would receive training first on needed skill or advice on needed changes to their leadership model followed by laptop deployment to all teachers at least six months before students receiving laptops.

Create Community Ownership: In the early planning stages, key community groups, teacher groups, local business owners and local politicians should be brought into planning meetings to help develop ownership within the groups as well as leveraging their expertise in the planning, implementation, and ongoing monitoring/ evaluation of the initiative.

Bandwidth: Before device deployment, school wireless networks and bandwidth capabilities must be updated to ensure that the school's networks can handle the influx of devices that initiative will bring.

Begin with Leadership First: Any mandated training for teachers should deploy first for the district and school leadership especially principals. This allows the leadership to be prepared to answer teacher questions and allows the trainer to receive feedback before delivery to teachers.

Principals cannot look Inadequate: No matter what principals cannot look or feel inadequate in their capabilities to lead a one-to-one school. They need to model proper and effective daily technology use. Training and online resources should be made available for all district and school leadership to ensure that leaders of all technology skill levels are receiving the training they need to be successful.

Partner with Local Universities for Training: School districts should partner with local or state universities to provide face-to-face and online training to educators as well as parents of students in the school district.

Professional Learning Teams at every Level: Teachers, principals, and district leadership should all be required to participate in professional learning teams throughout the school year, and their results of these professional learning teams should be reported to district leadership annually. District leadership should ensure that teachers and principals are provided time to participate in these teams on a frequent basis.

Instructional Technologist as a part of each School's Leadership Team: School-based leadership teams should include an instructional technologist. This position should hold the same authority level as an assistant principal and should handle all repairs, technology training, and serve as an advisor to the principal to ensure the principal is informed and up to date with important instructional technology updates or skills.

Fund the Essential Reoccurring Costs through Fund Reallocation: For an initiative to be sustainable, primary funding must be made through reallocation of reoccurring funding. Grants, partnerships, and grassroots fund-raising are not guaranteed year to year and should be avoided for key components of the initiative.

Use Private-public Partnership and National Grants for One-time Costs: While all essential reoccurring costs need to be funded by areal location of funds, national grants and private-public partnership should be sought for and leveraged for initiative enhancements or one-time up-front costs. These sources of funding should be seen as a bonus, not as the primary source of funding, because these funds are not guaranteed.

Begin Small: Start on a small scale. Large districts should not be enticed into taking on an initiative district-wide the first year or even the first few years. Large districts should start small on a manageable scale, make their mistakes on a small scale, learn from those mistakes, and let the initiative grow organically over time to a future district-wide initiative.

Provide an Implementation Frame Work: In large school districts, a one size fits all solution might not be the best options for all parties involved. Instead of having schools conform to the district-wide model, school districts should provide an implementation framework that school-based leadership can customize to meet the needs of their students in the most effective and efficient manner possible.

Market Successes: No matter the size of the initial size of the one-to-one computing implementation, the school district and the individual schools need to market the

successful impact that the initiative is having on their student individually, the student body as a whole, as well as the impact the initiative is having on the teachers' daily work in and out of the classroom.

Conclusion

This study adds valuable recommendations for administrators on how to overcome barriers during one-to-one computing implementation in the areas of planning, professional development, funding, self-efficacy and attitudes, and behaviors. The recommendations for practice are practical suggestions any administrators can benefit from.

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