INVESTIGATING THE FEASIBILITY OF BYOD IN NORTHWEST MISSOURI SCHOOL DISTRICTS

By

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Submitted to

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Submitted in Fulfillment for the Requirements for

61-683 Research Paper
Summer 2012

May 17, 2013
ABSTRACT

This study was completed to determine the feasibility of the BYOD model within northwest Missouri schools. School districts are searching for an effective and cost efficient method to deliver electronic devices for each student. Six schools were surveyed to better understand student access to portable electronic devices for use at school.

A survey was administered to six school districts across northwest Missouri school districts. Students responded to statements by indicating a level of agreement or disagreement. Each statement offered varying elements regarding student ability to bring portable electronic devices for use at school. Survey responses provided the data to determine if BYOD is feasible for the six school districts participating. In determining feasibility of BYOD implementation, school districts had to indicate at least 75% of students who were capable of utilizing personal portable electronic devices at school.

After the study was concluded, the data indicated four out of the six school districts surveyed could successfully implement the BYOD model. The two remaining school districts had more positive reaction to bringing devices to school than negative, but did not meet the standard of 75%. Students from five of the six school districts indicated family use of portable electronic devices would not prevent them from bringing the device to school. This study indicated the BYOD model is feasible for northwest Missouri schools.
INTRODUCTION

Background, Issues, and Concerns

School districts continually search for instructional technology that results in higher student achievement. Ongoing budget constraints limit technology options for many districts, while other school districts add technology that marginally impacts student achievement. District leaders search for the most efficient way of adding technology leading to the biggest academic results.

The Bring Your Own Device (BYOD) model is a resource that can boost student achievement with minimal expenditures. Implementing a BYOD model may pose new security risks for a district. The network may require firewall adjustments and added wireless access points to accommodate the BYOD model.

Schools implementing the BYOD model within their district will inevitably have students who do not have a portable electronic device. A plan will need to be in place to accommodate students who do not have the ability to bring their own portable electronic device. One potential solution calls for the school district to purchase portable electronic devices for those who are unable to provide their own. Students who are in need of a portable electronic device may check-out a device through the library just like a book would be checked out (Bush, 2013a). Issues will arise out of this option as well. Devices can easily be damaged especially by students who do not provide adequate care. Additionally, devices will be a target of theft.

Practice under Investigation

The practice under investigation regards the effectiveness of the BYOD model. An investigation took place evaluating whether student access to portable electronic devices is
BYOD Model 4

widespread enough within area school districts that such a model could be successfully implemented.

*School Policy to be informed by Study*

Student use of personal portable electronic devices within the classroom and throughout the school may need to be adapted. Inviting students to use portable electronic devices exposes concerns such as access to social media. A “responsible use” policy should be implemented regulating use while on the school network (Bush, 2013a).

An effective wireless area network may need to be implemented which is capable of handling the increase of network users. The network may need to be revised requiring student log-in when utilizing the portable electronic device on school district property. Furthermore, security breaches are more likely with a BYOD model; network security measures must be enhanced to accommodate the increased risk.

*Conceptual Underpinning*

Learners in today’s educational setting are digital natives whereby motivation to learn is increased when technology is incorporated into the instruction. Despite increased use on instructional technology, school districts still need more computing devices for student access. Unfortunately, school district budgets are stretched and rarely have the flexibility to add much needed student computers. An untapped resource may exist by allowing students to bring portable electronic devices to school to assist in their learning.

Students using family-owned or personally-owned portable electronic devices will typically experience increase in student motivation. A student’s familiarity with their own personal device could potentially reduce frustration with navigating software and applications used for learning. Additionally, more learning activities will be digitally driven which increases
motivation for students. Student motivation leads to better concept attainment and retention of knowledge. By implementing BYOD and reaching 1:1 student computing, student motivation will positively impact student achievement.

Statement of the Problem

The need for technology in the classroom still remains despite efforts to fulfill the need throughout the last couple of decades. Technology needs remain which allow individualized instruction within the classroom. School districts continue to search for the most effective and efficient way to utilize technology in the classroom while being asked to reach higher achievement with fewer resources. One-to-one student computing places a computing device in each student's hand within a school district; however, many school districts lack budget flexibility to provide such resources.

Individualized instruction is widely accepted as the most effective form of instruction. The effectiveness of individualized instruction stems from the ability to provide differentiated instruction. Learners in today’s classrooms are driven by technology. An added benefit of technology is the ability to provide differentiated instruction. Therefore, a computing device for each learner will improve student achievement.

Purpose of the Study

The purpose of this study is investigating the BYOD model and determining if it is a feasible solution for northwest Missouri school districts. Student access to portable electronic devices is investigated as part of the determination.

Research Question(s)

RQ1: Is the BYOD model feasible for school districts in northwest Missouri?
Null Hypothesis

The BYOD model is not feasible for school districts in northwest Missouri.

Anticipated Benefits of the Study

Unused resources exist within the student population by way of the BYOD model enabling 1:1 student computing and limiting budget expenditures for school districts within northwest Missouri. Further benefits may include improved student motivation and classes resembling a blended classroom leading to a more post-secondary learning experience.

Definition of Terms

BYOD model – a method of incorporating technology in the classroom by allowing student and faculty to bring their own portable electronic devices

1:1 student computing – an initiative to place a computing device in the hands of each student within a school district

portable electronic device – a mobile computing device that has internet connectivity and information technology resources

Summary

A study was conducted to investigate if the BYOD model is a feasible option for school districts within northwest Missouri. In order to determine successful implementation potential exists, seventy-five percent or more of the student population within a school district need to have access to a portable electronic device. If survey data concludes feasibility exists, school districts should implement the BYOD model to enhance instruction resulting in higher student achievement. Since not all students have access to portable electronic devices, it is necessary to determine if such a method would be effective for a school district.
Benefits from implementing BYOD include financial savings for the school district, increased student motivation, and potentially higher student achievement. However, the BYOD model does present challenges. A number of students within a school district will not have access to a portable electronic device and accommodations would need to be made to create equal access to devices. Also, some school districts will not have the wireless network infrastructure necessary to support the devices.
REVIEW OF LITERATURE

The Bring-Your-Own-Device trend makes sense. It’s cost-effective and lets students use the device they already know and love (Lepi, 2012). Attempting to force the growing numbers of people on school and college campuses to abandon their mobile devices, even for a few hours, isn’t the solution (Cisco, 2012). Student motivation has shown to increase when technology is effectively implemented in classrooms. Learners of this generation have grown up learning, living, and playing on mobile devices—and they want to use them inside and outside the classroom (Cisco, 2012). Instruction can be enhanced through the BYOD model allowing students to better connect with the content in a way that is conducive to their learning needs. In utilizing portable electronic devices, school districts can maximize the number of ways student’s access instruction, inside and outside of the classroom, in a style that suits them better (Rolls, 2013).

School districts faced budget constraints during the recent economic downturn leaving 1:1 student computing initiatives unlikely and unaffordable for many districts. The 1:1 initiative impacts student achievement by engaging learners through technology; achieving 1:1 student computing means acquiring a computing device for every student in the school district. Two methods exist when implementing a 1:1 initiative: purchasing a portable electronic device for every individual in the organization or transitioning to a BYOD model.

Implementing the BYOD model involves a significant undertaking that is not as easy as instructing parents to buy portable electronic devices for their children to bring to school. Many BYOD and other 1:1 learning projects have failed across the world because, although the devices have been put in place, the bandwidth and infrastructure have not been adequate to support them (Bush, 2013b). Many school districts and organizations have wireless infrastructure within their
computing network. However, this is not enough to transition to BYOD. Implementing a BYOD model and moving to a computing ratio of at least 1:1, some students and teachers will be logged onto the school’s network with more than once device – leading to more pressure on the network with every device that is being supported (Bush, 2013b). Bandwidth issues will be unique to the school district due to varying numbers of student population, district location, and use of the network. For example, certain age groups within a school it is more likely that students will use different types of digital technology that may or may not be more bandwidth heavy than other tools and services (Bush, 2013b). Some schools may rely more on video-based instruction which will consume more bandwidth, thus, creating a need for more bandwidth within the school district.

More concerns exist for BYOD models beyond wireless infrastructure and bandwidth. Safety and security are added issues when implementing BYOD. First, there is physical safety and security. Schools need to carefully consider what procedure they will put in place if a student-owned device is stolen or damaged. This should include at school and at home as well as the journey between the two (Bush, 2013b). Many will express concerns of placing expensive and fragile devices in the hands of students. Therefore, school districts need to be proactive in hosting a parent meeting during the evening to educate parents on their role within deployment of the BYOD model (Bush, 2013a). These meetings can also be useful to facilitate the signing of devices over to students and families (Bush, 2013a). By educating all parties involved in the BYOD implementation, this will attempt to limit incidents that could occur because of BYOD.

Security measures will need to be revised to accommodate BYOD. Additional firewalls or traffic monitoring systems should be added to successfully manage the additional devices on the network. This part of the BYOD implementation will be unique to each district.
Additionally, a policy must be devised and accommodations made for those families who are unable to acquire a portable electronic device for the student or students in their family. In order to meet equal access and ensure 1:1 student computing for all students, schools implementing BYOD must allow students to check-out a range of devices from the school library in the same way that they might check-out a book (Bush, 2013a).

When educating all parties involved in a BYOD implementation, a “responsible use” policy must be communicated and agreed upon by the parents and students (Bush, 2013a). This is necessary for students bringing their own device along with students checking-out devices from the school library. Furthermore, the school district will need to add to the computer use policy on adaptations for BYOD along with adding insurance measures provide adequate replacement coverage for the additional devices.

Additional concerns around the BYOD model involve teacher’s ability to introduce and effectively instruct using the additional resources. A BYOD program could save money if implemented properly, but tossing teachers into a BYOD environment without any training wouldn’t be very effective (Chadband, 2012). Teacher training would be an important element of a successful BYOD program, but there is not a one-size-fits-all approach when teaching others how to implement BYOD. Because BYOD offers differing aspects of instruction, it would be difficult to train in one area. School districts having piloted the BYOD model describe the most effective way is for a technology director to provide a general overview on using portable electronic devices, followed by teacher-led workshops who have gained expertise in a certain area, and finally, an environment where collaboration between teachers and administrators takes place (Chadband, 2012).
The education profession has an opportunity to be progressive and incorporate new technological models during the same time IT departments in the private sector are learning to implement BYOD. Seventy-four percent of companies allow BYOD usages in some fashion (Lepi, 2012). Historically, education has been reactionary to change instead of leading the efforts on an innovative undertaking. Evaluating BYOD and the potential advantages within the model will help educational leaders in understanding benefits and challenges of the BYOD movement. In doing so, students could either be at the forefront of the revolutionary change or left behind.

Finally, the benefits and challenges are worth exploring for northwest Missouri school districts because of the enhanced instruction that could be gained but also the monetary resources that could be saved for a district. Exploring the effectiveness of the BYOD model will expose many obstacles that need to be resolved; however, gauging the feasibility of implementing BYOD into area schools is the first step.
RESEARCH METHODS

Research Design

A quantitative study was conducted to investigate if students from northwest Missouri school districts had access to portable electronic devices. Within BYOD, students will utilize the devices at school to drive learning activities. Students were surveyed to create the data within the study. The student responses available in the survey were strongly disagree, somewhat disagree, somewhat agree, and strongly agree. To discourage biased feedback, the survey was titled “Technology Use Survey” and responses were added regarding preferences about technology use at school. Within the responses were three questions used to investigate student access to portable electronic devices.

The independent variable in the study was student feedback regarding access to portable electronic devices that can be used at school, while the dependent variable tested was the feasibility of implementing a BYOD model within northwest Missouri school districts.

For this study, a standard was established to determine effective implementation. In order to show feasibility of the BYOD model, surveyed students of a school district must show agreement of seventy-five percent or higher. Survey results which indicate seventy-four percent or less determine the BYOD model is not feasible at the school district.

Study Group Description

Ten school districts were invited to participate in the survey. Students from six schools throughout northwest Missouri participated in the study. Four schools chose not to participate. The schools were selected to participate in the study because of the location, size of community, and demographics. Four school districts participated in the study; each school district routinely has a 7-12 student population of 120 or less. One school district participated in the study which
routinely has a 7-12 student population of 300 or less. Finally, the largest school district participated in the study which routinely has a 7-12 student population of 1,000 or less. No schools in this study have attempted to implement the BYOD model to date.

Data Collection and Instrumentation

A survey was constructed using Google Form. The survey asked students to respond to ten statements: four statements regarding student access to a portable electronic device and the ability to utilize the device for school purposes, while six statements were presented regarding student preferences about the use of technology at school. Students were given the response options of strongly disagree, somewhat disagree, somewhat agree, or strongly agree in the survey. See Appendix A for the survey.

The survey was administered in business classes. Business teachers at the school districts were emailed with the survey URL address provided. Next, students were instructed to access the URL address to participate in a voluntary survey. Students were given the option to not participate in the study.

Statistical Analysis Methods

A survey was conducted to determine if the BYOD model is feasible for northwest Missouri school districts. Six school districts participating in the survey provided the data. Descriptive statistics were used to analyze the data. Each student surveyed indicated strongly disagree, somewhat disagree, somewhat agree, or strongly agree based off a statement provided.
FINDINGS

A survey was administered to six northwest Missouri school districts investigating the feasibility of the BYOD model. The analysis provides tables, graphs, and a narrative gathered from the student responses on the survey.

Figure 1: Student Response for BYOD Access

![Bar chart showing student responses](image)

<table>
<thead>
<tr>
<th>School</th>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>12%</td>
<td>8%</td>
<td>27%</td>
<td>53%</td>
</tr>
<tr>
<td>Median</td>
<td>12%</td>
<td>7%</td>
<td>29%</td>
<td>55%</td>
</tr>
<tr>
<td>Maximum</td>
<td>33%</td>
<td>17%</td>
<td>33%</td>
<td>72%</td>
</tr>
<tr>
<td>Minimum</td>
<td>0%</td>
<td>0%</td>
<td>20%</td>
<td>25%</td>
</tr>
<tr>
<td>S. Deviation</td>
<td>0.120940757</td>
<td>0.066833126</td>
<td>0.04792355</td>
<td>0.16765043</td>
</tr>
</tbody>
</table>

School 2 showed highest percent of agreement with the statement. Seventy-two percent of students surveyed from School 2 indicated “strongly agree” regarding access to a portable electronic device. School 2 had the least number of participants for the survey. School 1, School 3, and School 6 also showed high percentages in strongly agreeing with the statement. School 5
data revealed the most evenly balanced responses across the four categories while also having the highest percentage of students who strongly disagree about access to portable electronic devices. School 5 indicated more strongly disagree responses than strongly agree. However, when combining the agreement and disagreement categories, School 5 agreed to the statement at 54% versus 46% disagreement. School 3 and School 4 also had fairly evenly distributed responses. School 2 did not respond with any disagreement to the statement, yet, indicated 100% of students surveyed agreed have the ability to bring a portable electronic device to school. School 1 had second lowest opposition to the statement as 3% of students surveyed indicated disagreement. The largest standard deviation came from the strongly agree category with a deviation of 0.16; the smallest standard deviation was the somewhat agree response with a deviation of 0.47. Four out of six schools showed significant agreement with the statement. In combining the agreement categories, School 1 agreed at 97%, School 2 agreed at 100%, School 3 agreed at 77%, and School 6 agreed at 86%. Interestingly, School 6 had the highest student population in this survey grouping while showing strong support of bringing a portable electronic device to school. School 6 also had the most survey participants at 64. Two schools not showing as strong of support for this statement as the others were School 4 and School 5 whom agreed with this statement at 69% and 54% respectively.
School 2 again showed the highest percentage of those who strongly agree regarding the ability to bring a personal device to school. School 2 indicated 72% strongly agree while 94% of students surveyed show some form of agreement. School 1, School 3, and School 6 also represented the next level of schools who showed strong agreement with the statement. School 1 and School 2 did not show any percentage of strong disagreement. Again, School 5 had more who strongly disagreed with the statement than those who strongly agreed. Additionally, School 5 indicated 59% disagreement with this statement compared with 41% agreement. School 4 responded with 67% agreement regarding the ability to bring a personal device to school. The
largest standard deviation was for the strongly disagree response which showed a deviation of 0.17. The smallest standard deviation of 0.061 was for the somewhat disagree response. Schools showing significant agreement with this statement were School 1, 80%; School 2, 94%; School 3, 83%; and School 6, 86%.

*Figure 3: Student Response for BYOD Access – Family Use*

<table>
<thead>
<tr>
<th>% of Student Responses</th>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>45%</td>
<td>21%</td>
<td>16%</td>
<td>18%</td>
</tr>
<tr>
<td>Median</td>
<td>47%</td>
<td>19%</td>
<td>17%</td>
<td>18%</td>
</tr>
<tr>
<td>Maximum</td>
<td>57%</td>
<td>33%</td>
<td>23%</td>
<td>29%</td>
</tr>
<tr>
<td>Minimum</td>
<td>33%</td>
<td>13%</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>S. Deviation</td>
<td>0.107827022</td>
<td>0.085186071</td>
<td>0.059132619</td>
<td>0.073756356</td>
</tr>
</tbody>
</table>

School 1 and School 5 both responded relatively evenly to the statement regarding family member use of a portable electronic device which may prevent the student from bringing the device to school. School 2, School 3, and School 6 were the top three to show strong disagreement for the statement. Fifty-six percent of those surveyed from school 2 indicated
strong disagreement. School 3 and School 6 responded with 57% and 50% respectively for strongly disagreeing. School 2 responded with the least percentage of agreement to the statement revealing access to devices are not limited by family members. The lowest percentage was 6% for both somewhat agree and strongly agree. The largest standard deviation was for the strongly disagree response. The deviation was 0.10. The smallest standard deviation was for the somewhat agree indication. The deviation was 0.05. Schools showing the most significant disagreement with this statement were School 2, 89%; School 3, 70%; and School 6, 66%.
CONCLUSIONS AND RECOMMENDATIONS

The outcomes discussed in this study show school districts in northwest Missouri can look to the BYOD model as a feasible solution for adding instructional technology. The findings reveal an untapped resource available within the student population for adding portable electronic devices as an instructional tool. Not only would school districts be gaining technology resources usable for instruction at little cost, but student motivation would increase with use of their own portable electronic device.

Four of the six schools analyzed in this study confirmed access to a portable electronic device exists with over 75% of surveyed participants. In evaluating a school district for potential BYOD implementation, administrators should analyze the 75% student access to a portable electronic device for their own student population. Inevitably, a certain percentage of the student population will not have access to their own portable electronic device. Thus, school districts will need to provide devices for students who do not have their own to insure equal access exists for the instructional tool. School districts providing devices for 25% or less of the student population are a more feasible solution and an effective way of reaching 1:1 student computing.

The BYOD model is an effective solution for many schools with students who have access to portable electronic devices. However, two schools in this study indicated bringing a device to school could present issues. School 4 and School 5 indicated access to a portable electronic device is not as widespread in their school districts. While both schools did have a majority of the students indicated access to a device was possible neither school had over 75% agreement with the student population. This is where school leaders would have to analyze the district and make a decision that is best suited for their situation. School 5 indicated 54% of the student population had the ability to bring a device to school. However, the financial burden of
purchasing devices for the remainder of students who do not have access may be too much for
the district to assume; thus, leaving the BYOD model not feasible for a school district.

In considering the BYOD model, the expense of adding wireless infrastructure and
teacher training must be factored. These elements add to the financial commitment necessary to
successfully implement BYOD. Also, an educational meeting would be important to inform
district patrons on the process to provide a smooth transition.

The conceptual underpinning is supported by these research findings. Despite increased
efforts to add more instructional technology, school districts still need additional resources to
achieve 1:1 student computing. Untapped resources exist within the student population by way of
the BYOD model. BYOD has many benefits but the model does not come without challenges.
The BYOD model could be a major cost savings mechanism utilized by a school district to
improve student achievement through 1:1 student computing. Data suggests the resources are
available for many school districts.

After completing this study additional research studies could be conducted to better
understand the effect of BYOD on student achievement. After successfully implementing the
BYOD model, a study could be performed analyzing test scores for pre-BYOD and post-BYOD.
This research could show the relationship between learning activities possible through BYOD
and student achievement. Additionally, a study could be conducted to determine what
instructional tools are most effective when using BYOD. Within this study, the most prominent
instructional tools could be compared to understand which tools provide more improvement in
student achievement.
REFERENCES


APPENDIX A

Technology Use Survey

Directions: Respond the selection that is most identifiable for your situation. Portable Electronic Device refers to a device with information systems and Internet connectivity such as a cellphone, laptop, or a tablet.

1) I have the ability to bring a portable electronic device to school.
   a. Strongly Disagree
   b. Somewhat Disagree
   c. Somewhat Agree
   d. Strongly Agree

2) I am motivated by using technology in school.
   a. Strongly Disagree
   b. Somewhat Disagree
   c. Somewhat Agree
   d. Strongly Agree

3) I have the ability to bring a portable electronic device to school that is my own personal device.
   a. Strongly Disagree
   b. Somewhat Disagree
   c. Somewhat Agree
   d. Strongly Agree

4) I would be motivated to learn in a class that is taught almost completely based off using a portable electronic device.
   a. Strongly Disagree
   b. Somewhat Disagree
   c. Somewhat Agree
   d. Strongly Agree

5) I spend more time preparing for my classes if I can access chapter notes, video lectures, and assignments online.
   a. Strongly Disagree
   b. Somewhat Disagree
   c. Somewhat Agree
   d. Strongly Agree

6) If the school had portable electronic devices to checkout for use at home, I would need to utilize their devices.
   a. Strongly Disagree
   b. Somewhat Disagree
   c. Somewhat Agree
   d. Strongly Agree
7) I consider my portable electronic device to be outdated.
   a. Strongly Disagree
   b. Somewhat Disagree
   c. Somewhat Agree
   d. Strongly Agree

8) I might not be able to bring a portable electronic device to school regularly due to a family member’s need to use it.
   a. Strongly Disagree
   b. Somewhat Disagree
   c. Somewhat Agree
   d. Strongly Agree

9) I would spend more time preparing for my classes if I could access notes, lectures, course information, and homework online.
   a. Strongly Disagree
   b. Somewhat Disagree
   c. Somewhat Agree
   d. Strongly Agree

10) I can successfully use a portable electronic device.
    a. Strongly Disagree
    b. Somewhat Disagree
    c. Somewhat Agree
    d. Strongly Agree