

# **FIVE COMPONENTS TO CONSIDER FOR BYOT/BYOD**

Amy S. Ackerman and Melissa L. Krupp  
*The Richard Stockton College of New Jersey, Galloway, NJ, USA*

## **ABSTRACT**

Although school budgets have plummeted due to federal and state funding reductions, adopting Bring Your Own Technology (BYOT), may address monetary tightening while simultaneously infusing 21<sup>st</sup> century learning. Implementing BYOT may provide real, rigorous, and relevant learning for the students while posing higher-order thinking questions from the teacher. This paper expands Williard's Pyramid (Ullman, 2011) by proposing five BYOT components with descriptions, examples, and recommendations within each. The five components are security, stakeholders, policies, professional development, and financial planning. The paper closes with future predictions as well as words of caution regarding BYOT initiatives.

## **KEYWORDS**

Mobile learning, BYOT, BYOD, Educational Technology

## **1. INTRODUCTION**

Throughout the world, the influence of technology has forever changed the familiar framework of schools. We were once constructed with the Industrial Revolution in mind, but now, through the implementation of 21<sup>st</sup> century skills, we are embracing a new paradigm that no one has ever built before. Through fast-paced technology integration, we can no longer educate the way we did, but rather provide a new form of education that promotes authentic learning. (Jacobs, 2010). To provide students with optimal learning, one must offer a school structure where real, rigor, and relevant learning occurs at all times. One way in which to achieve this goal is to break the barriers between students/teachers and his/her learning. The initiative, Bring Your Own Technology/Device (BYOT or BYOD), provides the platform for which students become active participants in learning both in and outside of the classroom setting by enabling employees and students to use their personal devices and connect with school/employers network. Such devices people bring include, but are not limited to the following: smartphones, tablets, E-readers such as Nook and Kindle, laptops, iPods, and many others. This paper addresses the problem and framework, five components to consider with BYOT, summary and conclusion.

## **2. PROBLEM AND FRAMEWORK**

### **2.1 Problem**

As financial budgets become tight and restrictive, school districts and employers may not afford a contemporary device for every learner and/or employee. As a result, a gap exists between what is taught and what needs to be taught in the classroom today. Are we preparing our students to be productive citizens for society as it is or as it ought to be? Or are we preparing them for the past? Students seem more motivated and interested to learn from their own devices rather than a teacher lecturing on various topics, yet we often prohibit the use of personal devices as described in technology policies and student handbooks worldwide. Through the use of Bring Your Own Technology (BYOT), teachers and students can change the focus of the classroom and become more student-centered. The role of each member of the classroom may also change to reach the student's maximum learning potential by creating a customized education for each type of learner.

## **2.2 Definition of Terms**

Bring Your Own Device (BYOD) (Norris & Soloway, 2011).

Bring Your Own Technology (BYOT) (Stanley, 2012).

Bring Your Own (BYO) (R.Cave, personal communication, April 26, 2012).

Bring Your Own Computer (BYOC) (BYOT.ME, n.d.)

Flipped Classroom – switch of instruction by giving a lecture the night before via video and using class time to help students with problems/questions or ask higher order thinking skills (Hart, 2012).

Mobile (Internet) Devices – handheld devices having internet capabilities such as iPads, netbooks, Kindle Fires (Stanley, 2012)

Tablet – mobile computer operated through a touch screen (PCmag.com, n.d.)

## **2.3 Previous Work**

Eric Williard, chief technology officer of Community Unit School District in Illinois, has developed “Williard’s Pyramid” (Ullman, 2011) explaining how one can implement BYOT effectively. These components (listed in order from most to least important) are: funding and leadership, tech planning and support, standards and infrastructure, hardware and software, and actualize. These five components coupled with professional development can be helpful when developing one’s own program (Ullman, 2011).

## **2.4 Purpose**

The purpose of this paper is to enhance Williard’s pyramid by providing groundwork for effective implementation of BYOT and project how BYOT will transform the medium of how students learn. One needs to consider many components prior to successful implementation. Some of these include security, involvement of all stakeholders, school policy, professional development, and a financial plan for sustainability. With any missing components, integration of BYOT may be unsuccessful; however, creating a seamless connection among all five components will not only strengthen the likelihood of a successful implementation, but also help the students reach beyond imaginable heights. Desired pedagogy for academic success may be realized by providing a learning environment where no child is left behind. This type of customization may enhance student productivity, engagement, equitable participation, and a wide variety of instructional resources while providing ongoing student accountability.

## **3. FIVE COMPONENTS TO CONSIDER WITH BYOT**

As an expansion of Williard’s Pyramid (Ullman, 2011), five components are presented here with descriptions, examples, and recommendations within each. The five components are security, stakeholders, policies, professional development, and financial planning.

### **3.1 Security (Component One)**

Common concerns held by most districts are how can a school monitor one-on-one devices while not jeopardizing school security? How can schools provide necessary firewalls to secure confidential data? Security is often considered to be the most important focal point when developing a BYOT plan to develop necessary safety measures to protect all parties: students, faculty, administrators, and databases filled with private information.

Whether in school or at work, people are using their personal mobile devices regardless of having a formal policy of BYOT (McCaney, 2012); therefore, security is at-risk and is an essential part of this process. Security issues include infrastructure, bandwidth, wireless networks, access points, and many others. Both administrators and members of the technology department need to converse and discuss options regarding parameters and privileges for all members to ensure maximum security while maintaining a world-class education. In addition, options such as setting up a separate wireless network for students are a viable

alternative to maintain security on important information while not compromising teachers or administrators accessibility.

### **3.1.1 Security Examples**

New Canaan High School in Connecticut (Ullman, 2011) has curbed a security problem into a working solution by asking students to register their Apple devices through a MAC address (<https://sites.google.com/a/ncps-k12.org/macaddress>) to monitor each individual device carefully. Due to budget cuts, Alvarado Independent School (Ullman, 2011) in Texas, has turned to BYOT and has found a possible solution to verify the device and user by providing a screen that flashes and asks every user to agree to connect to the network similar to using one at a hotel (Ullman, 2011). At this time, all devices will be updated with antivirus tools and become secure for the network. Although security is at the forefront of any new technology integration, parallel efforts often include ill-willed attempts to compromise the systems.

### **3.1.2 Security Recommendations**

To unravel the best security, we must provide students the opportunity to safely and securely use devices and provide a means for which to store content. Some suggestions for alternate means of security might include an additional security code for e-mail, using iCloud or web-based programs such as Dropbox/Evernote, google docs, and/or other free web 2.0 tools. Providing these alternatives for student storage will not impact the overall security of the school district, but on the contrary, will increase collaboration and communication amongst users.

## **3.2 Stakeholders need to be vested (Component Two)**

Creating a partnership among all stakeholders may enable “buy-in” and promote success on any initiative. If all members see the value of integration, the success may be astounding and all parties involved will benefit exponentially. There are several components to effective partnership that extend beyond the walls of the classroom. Stakeholders such as superintendents, principals, supervisors, curriculum developers, parents, technology departments, and members of the community, must be well-informed and see the importance of such integration because it may affect everyone beyond the classroom environment.

No longer will education be defined by student/teacher, but rather a collaborative and cooperative effort by all. The classroom school day will no longer be seven to two, but rather 24/7/365. Through shared partnership, all stakeholders may benefit and see the astounding learning we will all gain from such implementation. Partnering with technology provides the premise for which maximum learning takes place and all stakeholders contribute to the success of such a partnership (Prensky, 2010). Stakeholder buy-in enables observation of how BYOT will transform the paradigm of education where learning will be continuous, and the school will not be the sole proprietor of information transfer.

### **3.2.1 Partnering Examples of stakeholders**

Partnering is a key component to any integration, but also yields success in the classroom environment. Creating a partnership between students and teachers is essential for maximum learning to occur on both platforms. Both participants shall contribute to the classroom differently. Teachers will develop and design a real and rigorous learning environment that provokes the student’s passions while also providing the ability to integrate technology to enhance learning and create products that represents transference of knowledge. A strong partnership between the student and teacher can foster great discovery and provide the structure for lifelong learning. Bring Your Own Technology (BYOT) allows this type of learning because it eliminates the disconnect felt between what students want to learn and what they are expected to learn. In addition, it provides the student with the opportunity to build one’s knowledge and skill set while providing growth in and outside the classroom setting.

The purpose of implementing BYOT at Forsyth (Georgia) and Williamson (Tennessee) County Schools is to provide student access to technology to impart student accountability, collaboration, and immediate feedback (Stanley, 2012). This initiative provides the student with necessary tools for research and affords students to reach their individual potential (Giordano, 2011). Students will be given opportunities to see the connections between their lives and learning and will no longer be grouped by age, but rather on ability and personal interests.

### **3.2.2 Partnering with Stakeholders Recommendations**

Having a shared, common goal is essential to promote and implement BYOT in one's school district. To ensure optimal success, each member's contributions may directly affect the group as a whole. Working together will not only provide all to excel, but most importantly, enable the student to see the connection between school and real life. Students will no longer ask, "why do I need to know this," but rather say, "I need to know this because it will affect me today, tomorrow, and always." Partnerships provide pathways for positive communication to effectively carry out an objective while providing astute knowledge and observations that might not be available if working solo. In addition, global collaboration provides growth and enhances divert thinking to create innovative solutions to existing problems and unforeseen quandaries in the future.

### **3.3 Policies (Component Three)**

Permitting the use of personal electronic devices in a school district also influences Acceptable Use Policy (AUP) and student handbooks (Harris, 2012). Prior to implementing these changes, one must inform students, parents, and staff of required usage protocols (Harris, 2012; Sucre, 2012). Since students will experience increased autonomy, they must be taught correct procedures of effective usage of devices to augment learning and eliminate improper usage. The school district is responsible for providing a safe, learning environment for all students, therefore, protecting against inappropriateness on the internet as defined by the Children's Internet Protection Act also referred to as CIPA (Quillen, 2011). While integrating BYOT, the school district must provide a safe, appropriate, and secure network to ensure safety for all pupils.

#### **3.3.1 Policy Example of Liability**

Policy is very important regarding BYOT and must include financial liability of personal devices (Harris, 2012). Since these devices are based on the "student paid modules," (devices that the students pay for, not the school district) who will pay if it gets broken, lost, and/or stolen at school? Who will repair the device if malfunctioning – carrier, insurance, and/or school? Will the school confiscate the device if the AUP policy is broken?

What alternative means will the district provide if the student (family) cannot afford such a device to ensure equitable learning? What happens if a student accesses inappropriate material from a 3G or 4G network at school – who is at fault? (Quillen, 2011). When writing policy it is important to address all of these concerns to avoid future problems and/or litigation. According to a BYOT Use Contract (p. 176), Fayette County Schools (Georgia) has adopted a policy regarding no school liability of personal devices and a breach of policy if accessing from a 3G or 4G network.

#### **3.3.2 Policy Recommendations**

Since BYOT is a new concept, research is limited regarding effective implementation and/or policy; therefore, many districts are piloting programs to iron out any problems. Many suggest that prior to a full implementation of such initiative, a pilot program be developed with the oldest aged students on a "trial and error" basis. This small scale experimentation may supply the school district with valuable information to amend existing policy and/or procedure prior to full engagement by all.

### **3.4 Professional Development (Component Four)**

Ideally the classroom no longer takes the form of teacher-centered, but rather puts the attention in the hands of the student. Strong emphasis is now being placed on various types of learning such as: student-centered, problem-based, project-based, case-based, inquiry-based, active learning, constructivism, and learn by doing (Prensky, 2010). A shift in focus has taken place from teacher to student, yet the teacher's role is even more vital now than ever. The educator must provide a strong foundation for the students to acquire knowledge and skills, but the procedure in which one will learn may drastically change. Since information is easily accessible, students no longer need a teacher to pose questions that are available in google, but rather present higher-order thinking questions that promote critical thinking, analysis, collaboration, transfer, application, and many others. As a result, providing professional development for all educators will not only augment

their success, but may provide a greater breadth of knowledge in a rich, technology-based environment where learning takes place.

### **3.4.1 Professional Development Examples**

Professional development allows all professionals to develop, apply, and hone necessary skills to increase learning outcomes. Since technology is becoming more prevalent in schools today, teachers will expand their knowledge and skill sets to augment student achievement in the classroom. If school districts provide additional educational support in preparing teachers with effective technology integration, our students will be best prepared for the classroom, but most importantly, for the future workplace. Having a skilled teacher implement technology will advance creativity, collaboration, and partnership amongst all (Puente, 2012). A way in which to boost teacher effectiveness in the 21<sup>st</sup> century classroom is to provide professional development in the form of workshops, conferences, webinars, graduate school offerings, and/or peer-to-peer sharing of new research and/or technological advancements through the form of informal learning environments, blogs, and wikis, etc. Williamson County Schools (Tennessee) will provide extensive summer professional development for teachers to have effective strategies for BYOT implementation. (BYOT Summer Professional Development, 2012). These strategies include collaboration among peers regarding topics such as classroom management, personal response and communication systems, Bloom's Taxonomy (Churches, 2011), and useful web 2.0 tools.

### **3.4.2 Professional Development Recommendation**

The purpose of professional development is to provide personal growth by impacting one's knowledge, expertise, viewpoint, and awareness. Offering appropriate and relevant professional development for teachers may contribute to effective BYOT to implement new methodology. Integration of flipped (Hart, 2012) classrooms, student response systems (Puente, 2012), and global connection may make learning an integral part of one's everyday life. Teachers will be able to engage students so school will no longer be seven hours of Carnegie units, but rather an opportunity to provide a deep, profound, and tailored learning experience for the student. Furthering one's education provides a great module to students while demonstrating the importance of lifelong learning.

## **3.5 Financial Plan for Sustainability (Component Five)**

Financial sustainability provides the framework for schools (students) to achieve today and plan for tomorrow. Allocating funds is essential because it enables the district to provide necessary means for follow through of projects, plans, and integration of technology. Having sustainability in one's district, provides not only strong health, but also the necessary resources to flourish (Jacobs, 2010). To ensure sustainability, one must allocate financial resources towards this concept to warrant proper bandwidth, infrastructure, personnel, and new technology that has yet to be discovered. We must be well-prepared for the possible challenges that come along with BYOT, but also in its ability to revolutionize the classroom as we know it. To guarantee success, school districts and business administrators must shift funds from textbooks and other supplies and move toward supporting technology initiatives for 21<sup>st</sup> century learning (Puente, 2012).

### **3.5.1 Financial Plan Example**

With any new technology initiative, such as *Flipped Classroom* (Hart, 2012), BYOT (Quillen, 2011), and others in the imminent future, providing sustainability is a vital component for long-term achievement. After implementation of one-to-one devices, school districts must still monitor, maintain, and support the necessary infrastructure for perpetual achievement. To make BYOT/BYOD/BYOC effective, one must provide financial backing to ensure long-term success. School districts must focus on funds to meet 21<sup>st</sup> century learning initiatives.

School districts must prudently select certain technology software/hardware as budgets tighten further and technology expands exponentially. Districts would be wise to invest additional time in researching software/hardware that is not only trendy, but will produce higher learning outcomes. A tool may have "bells and whistles," yet may not augment the student's learning. Director of K-12 Technology (West Windsor-Plainsboro Regional School District in New Jersey), Rick Cave (R.Cave, personal communication, April 26, 2012), believes that BYO provides an opportunity for increased student outcomes by using one's own device,

internet, and valuable web 2.0 tools. Maintaining the proper infrastructure and security through financial sustainability may enable students to safely access valuable materials and create novel products for the 21st century.

### **3.5.2 Financial Plan Recommendation**

Allocating funds for technology is no longer considered a luxury, but rather an essential component to the overall budget of a school district. The main purpose of BYOT is to not only provide a decrease in overhead costs (since purchasing devices has been dropped to a nominal fee), but to provide students with various opportunities that otherwise could not be granted in a different setting. Adopting a financial framework for sustainability of BYOT and other new technology initiatives is essential so students have a fair and equitable education. Technology is growing rapidly and the potential costs to any district may be exorbitant so it is important to choose wisely to maximize funds. BYOT provides the ideal scaffold of success while minimizing overhead costs.

## **4. SUMMARY AND CONCLUSIONS**

The purpose of this paper is to focus on implementation of BYOT in any school district by addressing five viable components: security measures; stakeholder involvement; policy creation; professional development, and financial planning for sustainability.

Bring Your Own Technology (BYOT) provides the foundation for changing society into a new form. The classroom configuration will look different as mobile integration infiltrates every aspect of one's life, therefore, affecting the pedagogy of learning. Learners will have a diverse, interdisciplinary, customized global education at the disposal of one's pocket as they access everything through their mobile devices 24/7/365. This "pocket-based" learning may revolutionize education and demand greater expectations of critical thinking and problem-solving. Education will no longer be static, but will provide the learner with a real, rigorous and relevant education. This research depicts how BYOT will revolutionize education and create a new prototype of learning both inside and outside of the school setting.

With this concept and the infiltration of constructivism, students will no longer have their heads on their desks due to boredom, but rather be active participants by transferring and applying knowledge in a plethora of ways. Some examples include: podcasts, vodcasts, videoconferencing, displaying online portfolios, blogging, social networking, epals, and many others. This paper addressed the problem and framework, five components to consider with BYOT, and summary and conclusion.

### **4.1 Suggestions of what to expect in the Future**

Through the use of new and infinite technological advancements, school is changing rapidly; therefore, our design and approach shall also change to meet the needs of the individual student. From the classroom setting of desks and chairs to a more collaborative approach of café style, brick and mortar perspective may no longer be prevalent because the needs have changed drastically. In addition, the teacher's digital blueprint for academic achievement, shall outline a new perspective of innovation, critical thinking, problem-solving, transference, and application of knowledge. The intent of the new model is to transform passive learning to dynamic discovery of knowledge and skills. We shall begin to unravel universal apps compatible for all electronic devices, a classroom truly as wide as the world through global connection, semantic web, and an equitable learning environment where all students have the opportunity to experience the same education despite, race, sex, gender, age, etc. For individuals who cannot afford such devices/services such as the internet, school districts might need to consider allocating a budget for supplying school internet from home or the ability to rent/buy devices at a lower cost. With infiltration of online information and accessibility, cheating and plagiarism may be increased concerns.

Education in the 21st century has the capability of transforming education into something unimaginable, yet probable. Bring Your Own Device/Technology is the first step making this change necessary, but also possible. BYOT provides schools and businesses the ability to decrease overall costs through green initiatives and blends technology of the person with school/work. The future may hold new dynamics of learning and collaboration and may obliterate schoolhouse practices. In the future, tools may be worn versus carried to specific locations (Maes, 2009). BYOT may be responsible for the shift in educational pedagogy for we will

not amend the existing educational infrastructure, but create an innovative, never seen before, global house where Bloom's taxonomy will not only occur in textbooks, but be seamlessly integrated throughout all learning processes.

Changing the model of education will infuse the importance of the digital age and place precedence on the art and science of learning. Students will need to know how to learn through a wide variety of media, sort through what is essential/valid and what is not, and demonstrate digital citizenship. The student's device has exponential possibilities of knowledge, yet the role of an educator is to provide the framework that the digital world cannot produce. Profound facilitation, questioning, customization, and feedback will change the setting of schools as we know them today while providing an incalculable opportunity for student learning both nationally as well as globally. Having access to a myriad of resources enables all learners the opportunities for growth and constant reflection aspiring for excellence. BYOT is not just another policy or guideline that one needs to follow in education, but is the means by which education will forever be transformed.

## 4.2 Limitations of Paper

BYOT is a new initiative for technology integration and has a paucity of research regarding the effectiveness on learning outcomes. BYOT is an innovative approach of joining one's personal technology with school technology; therefore, lacking strong statistical data. In addition to the absence of quantifiable results in current BYOT pilots, websites/blogs are popping up with potentially biased treatments of BYOT. For example, blogs may appear to be providing information to advance the practitioner, yet a closer examination suggests a commercial intent to promote the sale of their products/publications, often based on contributions to the site.

## REFERENCES

- Bring Your Own Computer (BYOC). (n.d.). *BYOT.ME*. Retrieved from <http://byot.me>
- Churches, A. (2011). Educational origami – Bloom's digital taxonomy. Retrieved from [http://edorigami.wikispaces.com/#Bloom's Taxonomy](http://edorigami.wikispaces.com/#Bloom's+Taxonomy) Fayette County Schools. Protocol for the use of personal technology
- Fayette County Schools B.Y.O.T pilot program. Retrieved from [http://www.fcboe.org/files/technology\\_services/BYOT\\_use\\_contract\\_pilot.pdf](http://www.fcboe.org/files/technology_services/BYOT_use_contract_pilot.pdf)
- Giordano, M. (2011). Williamson students can bring own technology to school. Retrieved from <http://www.tennessean.com/article/20110829/WILLIAMSON01/111229024/08-29-2011-Williamson-students-can-bring-own-technology-school>
- Harris, C. (2012). Going mobile. *School Library Journal*. 58 (1), 14.
- Hart, M. (2012). The expanding school day. *T H E Journal*. 39 (3), 6.
- Jacobs, H. H. (2010). *Curriculum 21: Essential education for a changing world*. Alexandria, VA: ASCD
- Maes, P (2009). Demo sixth sense. *Ted Talks*. Retrieved from [http://www.ted.com/talks/pattie\\_maes\\_demos\\_the\\_sixth\\_sense.html](http://www.ted.com/talks/pattie_maes_demos_the_sixth_sense.html)
- McCaney, K. (2012). 9 keys to making BYOD work. Retrieved from <http://gcn.com/articles/2012/05/10/9-best-practices-for-byod.aspx>
- Norris, C., & Soloway, E. (2011). Tips for BYOD k12 programs. *District Administration*. 47 (7), 77.
- Prensky, M. (2010). *Teaching digital natives, partnering for real learning*. Thousand Oaks, California: Corwin Press.
- Puente, K. (2012). High school pupils bring their own devices. *District Administration*; 48 (2), 64.
- Quillen, I. (2011). Crafting your BYOT policy. *Digital Directions*. 23.
- Stanley, C. (2012). At one school district, the motto is BYOT - bring your own technology. Retrieved from <http://daily.fox43.com/2012/05/06/11567170-at-one-school-district-the-motto-is-byot-bring-your-own-technology>
- Sucre, G. Three BYOD benefits (2012). *Learning & Leading with Technology*, 39 (5), 8.
- Tablet (n.d.). *Pc mag online*. [http://www.pcmag.com/encyclopedia\\_term/0,2542,t=tablet+computer&i=52520,00.asp](http://www.pcmag.com/encyclopedia_term/0,2542,t=tablet+computer&i=52520,00.asp)
- Ullman, E. (2011). The new one-to-one. *Technology & Learning*, 31 (7), 54-57.
- Ullman, E. (2011). BYOD and security. *Technology & Learning*, 31 (8), 32-36.
- Williamson County Schools. BYOT summer professional development offerings for teachers 2012. Retrieved from <http://www.wcs.edu/byot/Summer%20Offerings%20Teachers%202012.pdf>