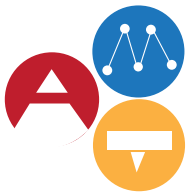


Arts Management &
Technology Laboratory

Technologies in Arts Integration Curricula

Jackie Shimshoni

June 2015

A Research Center of

Carnegie Mellon University

TABLE OF CONTENTS

INTRODUCTION

Arts integration is a term that is frequently used, but often misunderstood. The Kennedy Center defines it as: "an approach to teaching in which students construct and demonstrate understanding through an art form. Students engage in a creative process which connects an art form and another subject area and meets evolving objectives into both" (ArtsEdge). Furthermore, arts integrated learning can be accomplished through both the fine (visual) and performing arts.

The arguments and strategies for utilizing arts integration are well documented across multiple institutions, from the Kennedy Center to the Chicago Public Schools (Chicago Guide for Teaching and Learning in the Arts). Advocates point to the application of real-life skills, creativity, and patterns of thinking to non-arts subjects.

A successfully integrated classroom usually results from teachers who have received specific training (Arts Integration Solutions). Teachers may obtain this training in graduate school or, more likely, through a school partnership with an arts organization that provides residencies, trainings, and CTEs. School-wide planning and support systems are heavily encouraged to ensure high standards in both the art form and selected subject area (Arts Every Day).

Arts integration has applications across all subject areas. STEM learning is a dominant topic in pedagogical conversations, and has even been the subject of legislation focused on preparing students for competitive careers and achievement in the 21st century (U.S. Department of Education). Many policy makers feel that STEM (which stands for Science Technology Engineering

Mathematics) education is essential for the United States to regain footing in international education standings (STEM Eeucation Coalition). There has been a large push by arts advocates to expand STEM to STEAM (Science Technology **Art** Engineering Mathematics)—recognizing and incorporating the benefits of arts integration to achieve the greatest results (STEAM Education).

Most articles on arts integration do not consider technology; however, it makes sense that they should. By introducing a technological component to arts integration efforts, educators can create an innovative environment where children prepare for the creative and multidisciplinary needs of their future.

When it comes to technology in the classroom there are two sides to the equation: hardware and software. Ideally, the choices would be made simultaneously with an eye to a final objective; realistically, K-12 schools usually have capital budgets and classroom technology frameworks already in place. The following sections will explain the types of hardware available, approaches frequently used in acquiring hardware, useful software currently available in the marketplace and case studies illustrating how others have successfully integrated these technologies.

TYPES OF HARDWARE

The pieces of hardware that are being used in the classroom can be divided into three categories: laptops, tablets, and handheld devices. There are pros and cons to each, which are important to understand when deciding which one is best suited to the classroom in question.

Laptops

Laptops were the natural successor to the desktop computers of the past, and are a favorite of many. When many schools began adopting them, "tablets were not an option and handhelds were fancy digital address books" (Jackson 2013). As such, schools have had a longer time period to integrate this technology into the classroom, and in many ways laptops have proved their staying power.

There are several advantages to the laptop that makes it a top choice for many schools. They are very similar to the traditional desktop, which means less formal training is required to learn the technology. Laptops

have the widest array of functions and storage, and have a larger support network than other types of technology devices (Jackson 2013). They also boast easier connectivity with printers and other devices (Thornburg 2014).

However, laptops also have some disadvantages, such as larger size and weight, lower battery life, and occasionally higher price point compared to other in-class options. In addition, laptops are no longer the most prevalent computing device being sold on the market; as of 2013, tablets were set to surpass laptop sales by almost 30 million units (Jackson 2013).

Tablets

The tablet is the rising challenger to laptops in the classroom, and the preferred hardware for many. Advocates refer to the ease of physical use; it is compact and portable, but still large enough to operate most programs one would use on a laptop (Jackson 2013). The battery life is longer than that of a laptop, and the price per unit is generally lower (Thornburg 2014). There is a wide array of apps that can be used on a tablet, which are explained in more detail in the next section.

In the context of arts integration, the tablet allows for many motions of traditional artistry that are limited when working on a laptop. For example, free form drawing can be done using simple apps and a stylus or finger—a motion that is all but lost on a laptop without purchasing additional peripherals.

The biggest disadvantage is fragility—tablets are far more sensitive than laptops, and purchasing a protective case is an extra insurance that adds up for schools (Jackson 2013). Tablets are also less suited for word processing than a computer.

Handheld Devices

The third piece of hardware is handheld devices, e.g. a cell phone or iPod touch. A very attractive element of handheld devices is that they are highly portable and generally inexpensive. A large percentage of students already have their own handheld devices that they bring to school, a fact that can be harnessed by schools that do not have the ability to provide students with devices. Handheld devices are ideal for demographic and data collection, and are best used as an, “on-the-fly mobile tool for teachers – [ideal for] interconnection with planning, e-mail, [and] SIS (student information systems) (Jackson 2013).

Perhaps the biggest problem is that, realistically, information almost always has to be transferred back to a laptop/desktop in order to print or access certain office applications. There is also the problem of a small screen, difficulty working with text-based assignments, and a variety of capabilities and platforms from device to device.

There is a wide variation of the capabilities of hardware depending on the manufacturer and device. For a quick comparison, the following chart compares Apple brand versions of each type of hardware.

Features	Laptop	Tablet	Handheld (iPod touch)
Screen Size	11.6-15.4 inches	7.9-9.7 inches	4 inches
Price	$899-1999	$249-829	$199-299
Weight	2.38-4.46 pounds	.68-1 pound	3.10 ounces
Storage	512 GB-1TB	16-128 GB	16-64 GB
Average battery life	7-12 hours	10 hours	8-40 hours

HARDWARE ACQUISITION

When considering technology in the classroom, classroom capabilities are dependent upon the hardware that can be acquired. The largest point of concern over tech integration is the equity of such tools. As stated by Dr. Joan Assey in her paper advising the South Carolina education department, “we must be aware of equity related to distribution, training and access and create multiple strategies to make sure access to technology exists for all students” (Assey).

Understanding different methods of getting technology into the classroom is immensely helpful when devising a strategy to uphold the equity of the classroom. When looking at methods of acquisition, there are two important concepts that are frequently referenced in this field: one-to-one and BYOD.

1:1

One-to-one computing, sometimes written as 1:1, refers to efforts by many school districts to fund a computer, such as laptop, PC, handheld, or tablet for every child. Preliminary studies show that one-to-one programs can have a positive impact on student learning outcomes, with increases in

test scores and subject area proficiency (Saucers 2012).

An example of a large-scale one-to-one push is a 1-billion dollar iPad program in the Los Angeles Unified School District (Blume 2012). iPads worth $768 apiece were distributed to select students, with plans to eventually distribute them to all students in the school district. Almost immediately the initiative faced challenges, as several hundred students promptly hacked the devices and had to surrender them (Blume 2012). Schools also faced difficulties providing adequate wireless infrastructure to support the technology. Administration reactions were mixed. Some felt it was worthwhile, while others found the expenditure appalling when other, more basic needs are not being met.

Some teachers have difficulty mastering the new technology (Rotella 2013). Others face technology fatigue as policy makers switch out pedagogical tactics each year, rather than providing the long-term training and strategy necessary to make meaningful changes (Edsurge). Lack of strategy makes for poor results, especially when the technology is seen as a quick fix (November 2013). If the focus is on the piece of technology rather than the larger learning strategy behind it, one-to-one programs are almost certainly doomed to fail.

BYOD

An alternative movement to 1:1 is BYOD—which stands for Bring Your Own Device. BYOD schools ask students to bring their personal technologies such as smartphones and laptops for use in classroom instruction. BYOD has gained traction in both workplaces and schools, with 84% of high schools now implementing BYOD in some fashion (Shaffhauser 2014).

BYOD is often seen as a technology alternative for school districts that cannot afford devices for all students. Because students are furnishing their own devices, schools do not have to worry about the strategic and financial burdens of personalization, maintenance and updates. In addition, a BYOD strategy acknowledges and embraces the digital devices that students already bring to school, rather than enforcing traditional bans on devices in the classroom (St. George 2014).

Schools often take a blended approach, in which they also purchase technologies that students can use if they do not have their own device. This option is still much

cheaper, as there is not an obligation to furnish every student with a computer.

As with one-to-one, BYOD has its own skeptics (Chadband 2012). Many worry that allowing devices like smartphones into the classroom will be more of a distraction than benefit. There is also some hesitation about families being asked to make up the difference where school districts are cutting funding. Others voice concerns that BYOD could increase the prevalence of cyberbullying and personal security violations.

Like one-to-one, BYOD's success depends largely on teachers being well trained and prepared to implement this learning strategy. When stressing the importance of accessibility, Dr. Assey stated, "As teachers work with integration of technology to the arts disciplines, it is important to keep the curriculum, instruction and assessment in focus. The most successful application of technology will be combining the best learning theories and instruction with digital methods [...] In other words, the technology cannot become more important than the arts content or curriculum" (Assey).

TYPES OF SOFTWARE

One of the factors that can play into the hardware selection process is the types of apps that are available for each type of hardware. There are a vast array of apps and software available that are constantly being developed and updated. Some resources for checking up on the latest software are Apple's iPad in Education, Google's Apps in Education, and Edudemic's Best Edtech.

The Wallace Foundation's *New Opportunities for Interest-Driven Arts Learning in a Digital Age* provides in-depth research supporting the use of technology and arts in creating an engaging classroom for the 21st century. One of the many resources provided by this report is a list of numerous websites, apps and platforms that can support this type of learning.

Below is a chart highlighting a few noteworthy websites and apps:

App	Description
Bricks in Motion	Web community dedicated to the making of stop-motion film created with Legos

	and other plastic brick building toys.
Sketchup	Sophisticated modeling software that allows three-dimensional modeling that integrates art, engineering, architecture and technology
DevArt	Project in which students use computer-coding languages to create art
Instructables	Offshoot of a project formed in MIT's media lab. A community where makers document their numerous creations
Glogster Edu	Users create "glogs"—multimedia layered pages about subject area content.
Photozeen	App that uses educational quests to help amateur photographers improve their skills.
Explain Everything	Visual whiteboard display that allows the user to project information and integrate multiple media and export onto numerous platforms.
iBooks Author	Allows instructors (or students) to put together multiple media into a single e-book.
Final Cut Pro	Sophisticated movie editing software.
Inspiration Maps	App that allows students to work collaboratively to create mind-maps and create informational diagrams.
Notability	App that integrates numerous media to allow for a virtual note-taking experience that is all encompassing and visually interesting.
Nearpod	Interactive presentations that engage and assess in real time.
Interaction of Color by Josef Albers	App based on the famous book by Josef Albers that allows users to interact with

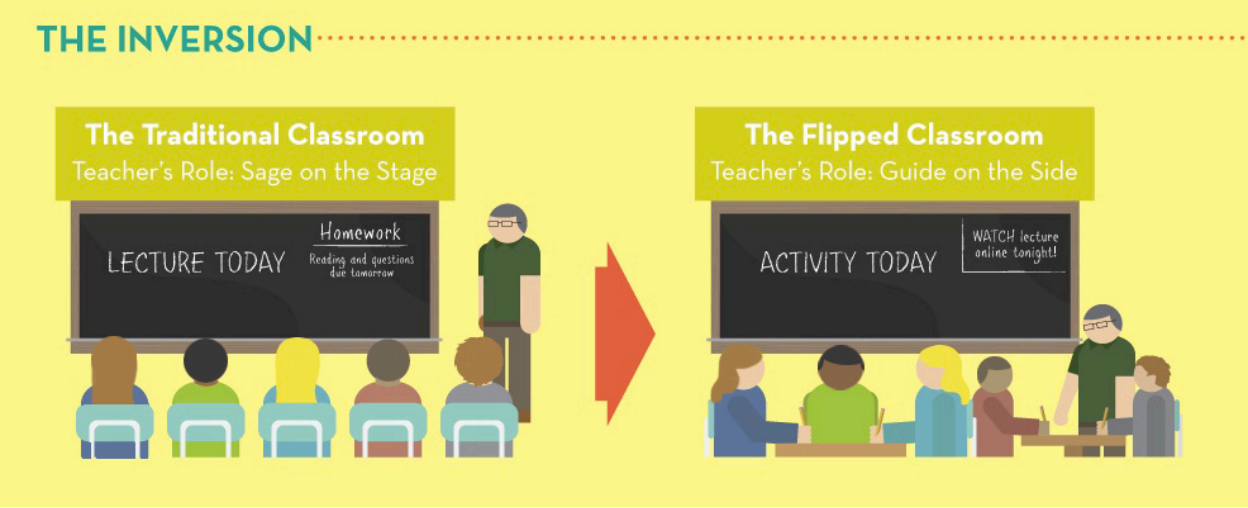
	color and designs to learn art principles.
Art Set	One of the most sophisticated virtual drawing apps on the market, allows students to have access to advanced art materials in a virtual setting.

CASE STUDIES

The following examples illustrate how teachers currently integrating technology and arts into their classrooms are doing so.

Burlington High School

Burlington High School, located in Burlington, Massachusetts is a 1:1 school utilizing tablets in their classrooms (Marcinek 2012). This school frequently utilizes a model referred to as a "flipped classroom." A flipped classroom is defined as the inversion of the traditional teaching model: instruction happens online outside of the classroom, and the homework/activity happens within the classroom. (Knewton) The illustration below shows how the flipped classroom inverts the traditional idea of the teacher's role.



Source: Knewton

One of the major activities that teachers from Burlington utilized was filmmaking. Over the course of the first eight months of implementing the tablets, teachers had students use apps such as Veditor, iMovie, YouTube, and Blogger.

Teachers at the school found it important to note that they were not teaching to the iPad; rather, they were harnessing the ability to increase dynamism and skill assessment abilities provided by the technology. The iPads enhanced the effectiveness of the flipped classroom, but do not define the model.

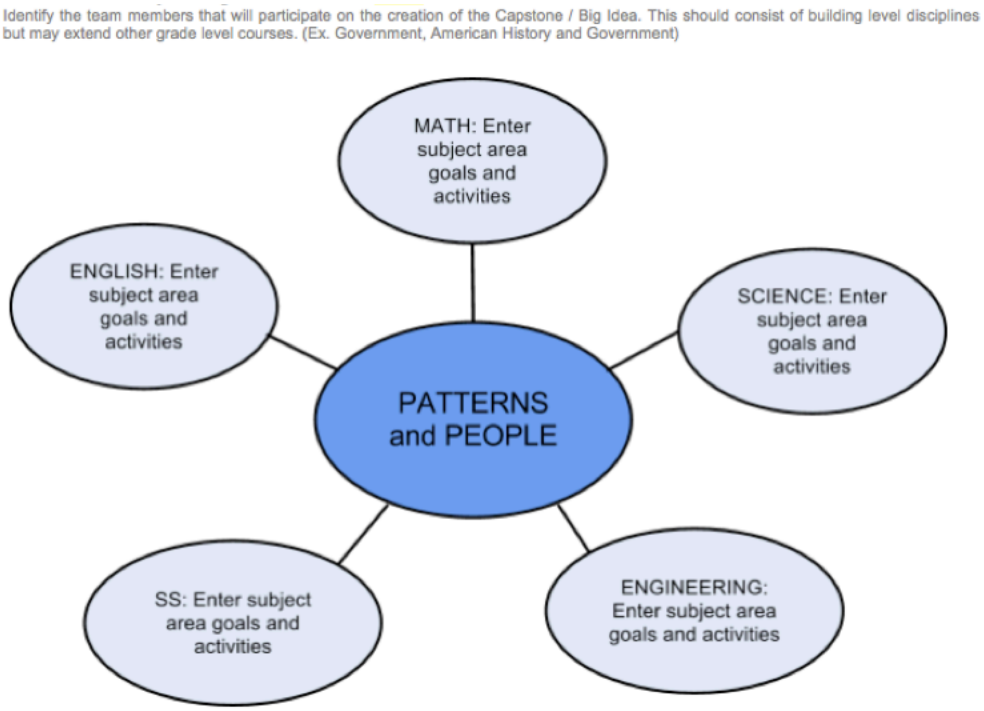
MC2 STEM

MC2STEM is a preparatory school in Cleveland, Ohio. This school also has a unique, project-based model for their instruction. As one source at the school describes it:

> *Transdisciplinary project-based learning means integrating the content of academic subjects across school and non-school settings. Each 10 week project called a "Capstone" is designed thematically to meet the Ohio state standards, make connections to Higher Ed and be relevant to industry needs and includes one to two deliverables for assessment. Clear performance rubrics are provided so students know exactly what is required for mastery* (Nobori 2012).

Transdisciplinary learning refers to a breaking down of traditional subject area silos. This model, therefore, is extremely conducive to bringing both arts and technology into the classroom.

Teachers focus on developing a detailed project plan for each capstone, rather than daily lesson plans. These plans contain mind maps helping to determine big ideas, patterns, and goals; they also require marking benchmark goals to be achieved in five traditionally subject areas by the single project (Edutopia). Assessment methods and resources needed are also laid out in this document, making it a comprehensive way of creating a fully realized learning experience for students. Teachers from this school have published sample lesson plans that give administrators interested in this model an in-depth look at how these plans are written (Nobori 2012). Below is an example of one of the many charts found in MC2STEM's Capstone Lesson Plan.



Source: Edutopia

CONCLUSIONS

Arts and technology are two huge resources for teachers wishing to innovate and create lessons with a higher degree of impact and relevance. There are a wide array of technologies available to teachers with a variety of capabilities and price points. Depending on the resources of the school in question, students have the ability to interact with technology in a variety of ways.

While technology is essential to designing a modern classroom, it is important to understand that the success of tech-based classrooms is not due to having the newest technology. Rather, the common theme in successful classrooms is a lack of educational silos and an emphasis on project-based approaches that prepare students for the real world. Thinking of innovative problems to solve and giving students jobs that speak to their skills is key. Therefore, in many respects, the teacher's job is to act as a project manager and encourage exploration rather than function as a lecturer.

> *For the last 100 years, teachers have essentially been the sage on the stage. They're the only access point of knowledge. But now, teachers are more*

> *like designers, who get to choose and develop what kinds of content their students access and which technologies they use. With new content technologies, too, teachers can quickly see assessment results of their students* (McMullen 2012).

Many fantastic technological tools are already used in the high school classroom. The key point is stated best by Dr. Peter Gouzouasis of The University of British Columbia: “Technology promoted as a panacea overlooks that technology will simply be replaced by the newest invention. The result of that rapid state of obsolescence will have little impact on social and individual transformations save to accentuate the digital divide” (Gouzouasis 2006).

APPENDIX: RESOURCES TO GUIDE ARTS INTEGRATION

There is plenty of evidence supporting technology integration; however, studies indicate that only 23% of teachers feel confident integrating technology into their lessons; when they do, it is used to present information rather than provide hands-on student learning (Vega 2013).

Many teachers who have integrated technology into the classroom have published best practice guides. Chicago Public Schools' best practices guide gives several pieces of advice for effective implementation and collaboration, along with six case study examples (Chicago Guide for Teaching and Learning in the Arts). The Kennedy Center's has a useful checklist (below) to assess integrated lesson plans:

Approach to Teaching

Are learning principles of Constructivism (actively built, experiential, evolving, collaborative, problem-solving, and reflective) evident in my lesson?

Understanding

Are the students engaged in constructing and demonstrating understanding as opposed to just memorizing and reciting knowledge?

Art Form

Are the students constructing and demonstrating their understandings through an art form?

Creative Process

Are the students engaged in a process of creating something original as opposed to copying or parroting?

Will the students revise their products?

Connects

Does the art form connect to another part of the curriculum or a concern/need?

Is the connection mutually reinforcing?

Evolving Objectives

Are there objectives in both the art form and another part of the curriculum or a concern/need?

Have the objectives evolved since the last time the students engaged with this subject matter?

Source: The Kennedy Center

Organizations such as the International Society for Technology in Education and Atomic Learning can help provide support for these educators who do not have the school-wide culture or training to begin integrating these tools. In addition, school administrators can refer to the National Center for Educational Statistics and their best practices guide, *Technology in Schools* to ensure that technology is being used effectively in their schools. Edutopia also has a downloadable guide to using mobile technology in the classroom, which provides numerous websites and pieces for further reading.

The following quote by David Thornburg articulates why selecting technological devices for the classroom so difficult—the key lies not in simply acquiring technology, but understanding how it can fit into the larger picture of the classroom.

> *With so many options on the table, the desire to grab hold of the next shiny thing has pushed some deeper questions into the background [...] the process of choosing computers for school use needs to be driven by the answers to these questions: 1) What is the educational objective? 2) What software meets that objective? 3) What platform(s) run the desired software? In other words, educators need to start at the beginning — the things teachers hope to accomplish in schools — and then move to thinking about technology, with software driving hardware selections. There are two reasons that this process is important: First, these tools are expensive and schools need to get as much use out of them as possible. Second, time in the classroom is a scarce commodity, and it needs to be used wisely.* (Thornburg)

BIBLIOGRAPHY

"Apps for Education." Google. Accessed December 15, 2014. https://www.google.com/work/apps/education/.

"Arts Integration Checklist." ArtsEdge. Accessed October 14, 2014. https://artsedge.kennedy-center.org/educators/how-to/arts-integration/what-is-arts-integration#arts-integration-checklist.

"Arts Integration Solutions | Arts Integration Training Programs." Arts Integration RSS. Accessed October 14, 2014. http://artsintegration.com/.

"Arts Integration in the Public Schools." Chicago Guide for Teaching and Learning in the Arts. Accessed October 14, 2014. http://chicagoguide.cpsarts.org/pdf/teachingresources.pdf.

Assey, Joan. "THE FUTURE OF TECHNOLOGY IN K-12 ARTS EDUCATION." ISTE Publications. Accessed October 14, 2014. http://www.dkrug.com/csed/csed_readings/c.pdf.

Blume, Howard. "L.A. Unified Takes Back IPads as $1-billion Plan Hits Hurdles." Los Angeles Times. September 30, 2013. Accessed October 14, 2014. http://www.latimes.com/local/education/la-me-1001-lausd-ipads-20131001-story.html.

Blume, Howard. "Mixed Reaction to IPad Rollout from L.A. Teachers and Administrators." Los Angeles Times. December 1, 2013. Accessed October 14, 2014. http://www.latimes.com/local/la-me-ipads-survey-20131202-story.html#axzz2pfWwu34o&page=1.

"Boosting Tech Confidence." K12 Education: 21st Century Skills PD, Technology Integration Resources and Software Training and Support. Accessed December 1, 2014. http://www.atomiclearning.com/k12.

Chadband, Emma. "Should Schools Embrace "Bring Your Own Device"?" NEA Today. July 19, 2012. Accessed October 8, 2014. http://neatoday.org/2012/07/19/should-schools-embrace-bring-your-own-device/.

"Compare IPad models." Apple. Accessed December 15, 2014. https://www.apple.com/ipad/compare/.

"Compare IPod Models." Apple. Accessed December 15, 2014. https://www.apple.com/ipod/compare-ipod-models/.

"Compare Mac Notebooks." Apple. Accessed December 15, 2014. https://www.apple.com/mac/compare/notebooks.html.

Gouzouasis, Peter. "Technology as Arts-based Education: Does the Desktop Reflect the Arts?" Academia.edu. January 1, 2006. Accessed October 1, 2014. http://www.academia.edu/2536429/Technology_as_arts-based_education_Does_the_desktop_reflect_the_arts.

"Home." STEM Education Coalition. Accessed October 14, 2014. http://www.stemedcoalition.org/.

"How to Do Arts Integration." Arts Every Day -. Accessed October 14, 2014. http://www.artseveryday.org/Educators/detail.aspx?id=212.

"IPad in Education." Apple. Accessed December 15, 2014. http://www.apple.com/education/ipad/apps-books-and-more/.

Jackson, Lorrie. "Laptops, Handhelds, or Tablet PCs?" Education World. Accessed October 7, 2014. http://www.educationworld.com/a_tech/tech/tech198.shtml.

Jackson, Lorrie. "Get the 411: Laptops and Tablets in the Classroom." Education World. April 1, 2013. Accessed October 8, 2014. http://www.educationworld.com/a_tech/tech/tech194.shtml.

Marcinek, Andrew. "Six Examples of IPad Integration in the 1:1 Classroom." Edutopia. April 24, 2012. Accessed December 1, 2014. http://www.edutopia.org/blog/ipad-integration-classroom-andrew-marcinek.

McMullen, Laura. "3 Tips on Integrating Technology in the Classroom." US News. January 25, 2012. Accessed October 8, 2014. http://www.usnews.com/education/blogs/high-school-notes/2012/01/25/3-tips-on-integrating-technology-in-the-classroom.

Nobori, Mariko. "Integrated Projects = Deeper Learning." Edutopia. October 31, 2012. Accessed October 14, 2014. http://www.edutopia.org/stw-college-career-stem-pbl.

November, Alan. "Why Schools Must Move Beyond One-to-One Computing." November Learning. February 10, 2013. Accessed December 12, 2014. http://novemberlearning.com/educational-resources-for-educators/teaching-and-learning-articles/why-schools-must-move-beyond-one-to-one-computing/.

Rotella, Carlo. "No Child Left Untableted." The New York Times. September 12, 2013. Accessed October 14, 2014. http://www.nytimes.com/2013/09/15/magazine/no-child-left-untableted.html?_r=1&.

"STEAM: About." STEAM Education. Accessed October 14, 2014. http://www.steamedu.com/html/steam-_about.html.

"Sample Projects Template." Edutopia. Accessed December 1, 2014. http://www.edutopia.org/pdfs/stw/edutopia-stw-mc2STEM-sample-projects-template.pdf.

Sauers, Nicholas, and Scott McLeod. "What Does the Research Say About School One-to-One Computing Initiatives?" Brief Castle. May 1, 2012. Accessed October 14, 2014. http://www.natickps.org/CASTLEBrief01_LaptopPrograms.pdf.

Schaffhauser, Diann. "Report: Most Schools Delivering BYOD Programs, Training Teachers in

Mobile Devices Usage." The Journal. March 27, 2014. Accessed December 12, 2014. http://thejournal.com/articles/2014/03/27/report-most-schools-delivering-byod-programs-training-teachers-in-mobile-devices-usage.aspx.

"Science, Technology, Engineering and Math: Education for Global Leadership." U.S. Department of Education. Accessed October 14, 2014. http://www.ed.gov/stem.

St.George, Donna. "Schools Move toward 'Bring Your Own Device' Policies to Boost Student Tech Use." Washington Post. September 14, 2014. Accessed October 8, 2014. http://www.washingtonpost.com/local/education/stem/schools-move-toward-bring-your-own-device-practices-to-boost-student-tech-use/2014/09/14/4d1e3232-393e-11e4-9c9f-ebb47272e40e_story.html.

"Teacher Attitudes Toward Tech." EdSurge. Accessed October 14, 2014. https://www.edsurge.com/teacher-attitudes-toward-tech.

"The Best Education Technology Resources." Edudemic. Accessed December 15, 2014. http://www.edudemic.com/best-education-technology/.

"The Flipped Classroom: Turning the Traditional Classroom on Its Head." Knewton. Accessed December 1, 2014. http://www.knewton.com/flipped-classroom/.

Thornburg, David. "The History of Ed Tech Shows It's Not About the Device." The Journal. Accessed October 14, 2014. http://thejournal.com/articles/2014/07/24/the-history-of-ed-tech.aspx?admgarea=Features1.

Vega, Vanessa. "Technology Integration Research Review: Avoiding Pitfalls." Edutopia. February 5, 2013. Accessed October 14, 2014. http://www.edutopia.org/technology-integration-research-avoiding-pitfalls.

"What Is Arts Integration?" ArtsEdge. Accessed October 14, 2014. https://artsedge.kennedy-center.org/educators/how-to/arts-integration/what-is-arts-integration.