This workshop is designed and led by two experienced independent school technology leaders who understand the balance technology leaders must maintain between providing access to valuable resources and protecting school constituents. Each aspect of the workshop will be taught with a specific lens on the independent school technology environment.

Attendees will depart the workshop prepared to lead an independent school through the security review process and undertake the steps necessary to ensure improved security for all areas (development, admissions, business, and academic functions) as well as the security of individual community constituents.

**TOPICS INCLUDED:**
- Exposure and Risk Tolerance Defined
- Best Practices and Reasonable Precautions
- Protected Data: Rules, Regulations and the Right Thing to do
- Comprehensive Security Policies
- Campus Strategies for Politics and Persuasion

**FEATURING TWO INDUSTRY VETERANS:**

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Jamie’s responsibilities include infrastructure, data systems, and cyber security. In June 2016, he was recognized by Infotech as a CIO Award winner for medium size organizations. At Collegiate, Jamie works with and learns from a variety of experts in the technology, legal, and insurance industries to understand the emerging field of cyber security and how it might apply to independent schools.

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The ISACS Professional Development team has partnered with many incredible Chicago hotels. The hotels are within walking distance of the ISACS classroom and as a member of ATLIS and/or ISACS you have access to the discounted rates all year long for your professional and personal travel. Visit our website for more details.
WHAT'S INSIDE....

5
THE PATH TO UBIQUITY
Renee Ramig

7
THE 1:1 HANGOVER: WHAT'S NEXT?
Andrew Shelffo, Ph.D.

10
EVOLUTIONARY PLASTICITY IN TECHNOLOGY FOR EDUCATION
J.P. Connolly

14
LEADING THE HORSE BACK TO THE BARN
Jeff Morrison, Ph.D.

16
EXPERIENCING DIFFERENCE: VOLUNTEERING FOR ATLIS AT THE PEOPLE OF COLOR CONFERENCE
Dyvar Anderson

IN EVERY ISSUE
Editor's Note 4
Book Review 18
End Notes 20
FROM THE EDITOR

ATLIS was founded in 2014 by three visionaries who realized that the time had come for a professional association that could support the work of independent school technology leaders. Gabe Lucas, Stuart Posin and Kelsey Vrooman joined together to provide a structure that would further strengthen the already supportive community that had developed in some regions among those in the field. They began by inviting those interested in the conversation to a conference in April of 2015. Over 300 professionals gathered to share experiences, knowledge, and insights for this first conference. From there, ATLIS has become a national professional association, offering targeted professional development, an already-celebrated mentorship program, resources, and networking for members and our extended community.

This year we are proud to release a journal dedicated to educational technology management, Access Points. With this publication, we hope to provide independent school technology leaders a platform to present topics, review publications, and initiate dialogue to better serve our membership and the field of education technology.

I hope you enjoy the articles and want to contribute your work in the near future.

Best,

Jeff Morrison, Ph.D.
Vice-President, ATLIS Board of Directors
Guest Editor, Access Points
I have worked in PK-12 schools for almost 35 years. We were rockin’ Commodore 64s with those external cassette players when I first started. We had two in the back of a classroom, and kids would come answer two math problems, get some feedback, and then go back to their desks. After school, students would attempt to create programs to get the word WOW to appear on the screen when they pressed the spacebar. Excitement was at an all-time high!

Soon Apple II’s were released, and schools started getting labs of these devices. Often, schools had no funds for software, so students would come weekly and use the same program over and over again. Teachers loved the lab because they now had an extra prep period once a week. At most schools, technology was an expensive novelty rather than a true educational tool.

**Evolution Towards Ubiquity**

By the mid-1990s, most schools had moved technology into the classroom. As with the phonics vs. whole language debate, there were strong proponents on both sides of the lab vs. classroom debate. Was technology more effective in a lab where students pop in once a week, or was having 2-3 desktops sitting in the back of a classroom a better option?

The greatest challenge in the nineties was that hardware was often our sole focus. There were limited resources allocated to software or, more importantly, professional development. Most teachers had no idea what to do with the few desktops sitting in the back of their classrooms, other than dust them occasionally. Schools that continued to have labs used them primarily as prep-times for teachers.

By early 2000, integration was starting to become the buzzword for technology in schools. Computer teachers actually started talking to classroom teachers about curricula. Students were working on projects that “integrated” with what was happening in class.

The main challenge for most schools, though, was that most of the technology continued to take place outside the classroom and on a defined schedule. This often meant that students were finishing their technology projects weeks (and sometimes months) after the curriculum was completed in the classroom. So, rather than technology being integrated into the curriculum, it was more about curriculum being integrated into technology. There was still a disconnect in most schools regarding technology being truly integral to learning.

As technology became more portable, schools started buying carts of laptops. Initially, this seemed like the panacea to integration. Technology could now be available in the classroom when needed. Often though, these heavy carts, stored across campus, with a scheduling system that nobody truly understood, stood in the way of regular use.

For many schools, the focus continued to be on hardware, with limited to no resources put into professional development. A few teachers would gravitate towards laptop use, often “volunteering” to store the laptops in their classroom since frequently they were the only ones using them.

Teachers were frustrated over the loss of class time when using technology. Even if they could get the cart to their classrooms, oftentimes, laptops were missing, they were not charged, and they commonly had connectivity issues. Using laptops became a chore, something that took up valuable class time with little value gained in return.

Soon another “breakthrough” happened — 1:1. Again, many saw this as “the answer” to truly getting technology to be integrated in ways that got value out of the thousands of dollars being spent. Unfortunately, this new cycle brought with it baggage from the past — limited to no professional development and ongoing technology issues that sucked up class time.

Some schools, however, were successful with their 1:1 programs. Most of these successes included well thought out and implemented networks, ongoing professional development, available funds for curriculum resources and refreshing of hardware, and readily available technology support.
As 1:1 grew, the terminology from *integration* began to morph into *ubiquitous*. What would it mean for all school community members — teachers, students, administrators, staff — to have access to technology whenever and wherever they needed it? What if technology was always accessible? What if we had technology that worked and became part of the learning and working process?

**Embracing Ubiquity**

More and more schools are embracing this concept of ubiquity. Users, including students, are determining when technology is needed, when it can help them with their learning and their working, and, just as importantly, they can determine when a non-technology approach is a better option for them. Ideally, as with all good differentiation, rarely, if ever, should all students in a classroom be seen staring at a device screen.

What does technology ubiquity look like, and how do you get there? It looks different for every school, and often it looks different throughout a school. Ubiquity in a kindergarten class is different from ubiquity in a middle school science lab or a high school math class. As with successful 1:1 programs, there are some commonalities that help to make ubiquity possible.

First, there needs to be access to technology when it is needed. This can be some flavor of 1:1 (BYOD, in-class devices, school-provided laptops, etc.), but other models, such as drop-in lab spaces, technology checkout stations, or a lending library, can work too.

Second, there needs to be ongoing, varied professional development (PD). Resources (both time and money) and commitment need to be put into training to be successful in using technology to truly impact learning. Often the best PD is teachers having time to meet with other teachers and to observe what they are doing both on and off campus. Teachers need to see what ubiquity looks like in classrooms and schools compared to their own. What does ubiquity look like in a kindergarten classroom with 10 devices and 20 kids? What does it look like in a 1:1 environment in a middle school? What about in a BYOD environment? Building in these collaboration times is a critical piece of PD.

Third, curriculum resources that match the needs of the students are essential. There are a lot of free or low-cost resources available, such as G-Suite. But relying totally on free resources will not meet the needs of all students and all teachers. There must be financial resources to buy software and online curricula for specialty classes, for students with differing needs, and for teaching.

Fourth, there must be easy access to tech support that minimizes interruptions to learning and working. Teachers need to know that if the technology they are using to teach a lesson fails, they will have quick response time from the help desk to try and get it working again. Students and teachers need to be able to get support quickly and easily inside and outside the walls of the school. Tech support structures vary greatly from school to school, but the goal must be to make technology use as seamless as possible 24 hours a day. It is no longer about what happens from 8 a.m. to 3 p.m.

As we move closer to the third decade of the 21st century, many schools are still struggling with using technology to truly meet the learning and working needs of their school communities. Moving toward creating a ubiquitous environment can help with that. The road to ubiquity is not easy. It requires the commitment of everyone. There must be resources for not only the hardware but also for curricula, professional development, infrastructure, and technical support.

Learning and working in a ubiquitous environment that has the tools and resources available when they are needed, along with the flexibility and support to be able to make choices, is powerful. I believe we can all once again experience the wonder and power we felt the first time we programmed the Commodore 64 to say “WOW” when we pressed the spacebar.
In 2013, we opened the school year by deploying 500 Microsoft Surfaces Pros to every student in our school of 7th- through 12-graders. A few months earlier, we had distributed the same model device to all of our faculty so that they could gain some proficiency over the summer. It was a big undertaking for a school that had previously relied on an under-utilized laptop cart system to provide computers in the classroom. Before our ambitious program, some students would bring in their own laptops, and teachers had school-provided devices to use, but the standardized use of computers never cracked the lessons in those classrooms. A new Head of School arrived in 2010, and in 2011 he announced plans to increase the use of technology on campus, particularly among teachers and students. Two years later, we launched our 1:1 program, named the Curricular Technology Initiative. And it worked.

It worked beyond our wildest expectations. There were bumps, of course—most notably widespread problems with our campus wireless network that came perilously close to derailing everything. But we stuck with it, and within weeks the conversations around the lunch tables changed. In addition to their usual Red Sox chatter, people began talking about what they could do with their Surfaces and sharing their discoveries about the latest features in OneNote, which quickly became the “killer” app on campus.

Fast forward two years and to a conversation I had with the Head of School and the Associate Head of School about staffing for a new Academic Technology team. This was a typical contract-time discussion at boarding schools, the time when every area of the school lobbies for more resources. I felt my case was pretty solid: in order to continue to support the program, I reasoned, we needed more resources for our faculty. “Wait,” someone in the meeting said. “I don’t understand. You’re asking for more? Everyone already has a Surface, and they know how to use it. Shouldn’t the faculty need less support now?”

The apocryphal story of Charles Duell, commissioner of the United States Patent and Trademark Office during the turn of the 19th century to the 20th century, flashed into my brain. He supposedly advocated for shuttering the Patent Office, under the reasoning that everything had already been invented. That same world view now came from my colleague. Obviously, the job doesn’t get any easier just because everyone now has a computer. Yes, the problem of putting the right technology into the right people’s hands has been addressed (note: not solved), but a whole host of other issues arises with wide-scale deployments. Most wide-scale deployments focus on the technical, logistical, and financial challenges—and rightly so. But what I’ve learned is that it’s critically important to pay attention also to the cultural and pedagogical issues at play, even if these aren’t the traditional focus for tech folks. The needs in these areas might not be readily apparent during the deployment and development stages, but they are there and will be there once the heavy lifting is done. And it’s there that the permanent revolution will happen.

This year—our fourth year of our program—we deployed Surface Pro 4 devices running Windows 10 to 500 students and 100 faculty, staff, and administrators. We have been through rollouts before, since we collect these devices back from the students each spring; however, after the dust of the opening of school settled, I realized the four areas where the support and development of our 1:1 program has changed. The morning after the celebration of success, there was still work to do.
**SCOPE CREEP**

In project management parlance, scope creep is a bad thing: the idea that projects take on more than they were first designed to handle. This usually happens because of poor project definition. We’ve seen scope creep here with our 1:1 program.

In order to get the program off the ground, we had to be parsimonious about whom we issued devices to. In the first year, we firmly held the line: only teachers and senior administrators. Then two things happened. First, the devices worked really well, and people without them became envious. Second, our non-Surface devices began to show wear. We decided to expand our distribution. Visually, it’s great that everyone is using one device, including our public-facing departments, Admissions and Advancement. We even included coaches on the sidelines. Hey, if the NFL could do it, why not us?

This expansion also made things easier from a support perspective, since now the vast majority of people are on the same device and the same operating system. However, this change required us to get a little creative with our financing. Because we went all-in with the Surfaces instead of staging the deployment over a couple of years, we didn’t want to enter into another lease that would have different terms from our initial agreement. We ended up using money from our hardware budget. Some departments also used their own funds for purchases. It meant more units to keep track of and support. However, we believed it was worth it. We spent a lot of time thinking about how many units we would need for students, faculty, administrators, and a pool of back-ups. We should have spent some time thinking about how to scale the use of the devices in years two and three.

**SUPPORT SHIFTS**

In the beginning, support for our 1:1 program focused on what we expected: the work involved in keeping the devices working and keeping people connected to the applications and software they needed to be productive. Since these were new devices—the idea of a touch screen, detachable keyboard, and a stylus was pretty novel at the time—we also spent a lot of time training users on how to use their new computers. This training really just focused on the basics.

As time has passed and our program developed, the factors driving our users—primarily our teachers—to reach out for support changed dramatically from what I’ll call the mechanical to the more pedagogical. We get fewer calls from faculty asking us, “How do I get this thing to work?” More and more, we get calls asking, “I’ve been using X and it works, but how do I make it work for lesson Y?” We welcome these discussions, of course, but we had to recognize it for what it was: a widening in our support expectations. To be clear, we still have users who struggle with mastering the track pad. But now we’re also supporting a growing cohort of what we would have at one time called “super-users,” whom I would now refer to as upper-middle users.

In planning for the aftermath of a program launch, we have to pay attention to how we will be able to deploy resources down the line, after the initial launch is over. We recognized that these curricular questions required resources beyond what we had in place in our tech department, so we worked with our Academic Office to identify teachers who had an affinity for and an interest in technology and gave them some release time—the equivalent of one season of coaching—and put them to work helping their colleagues integrate the technology into their class in appropriate ways. A question to ask as you think about a 1:1 program is this: Which resources do you have in place at your school to support use that goes beyond the nuts and bolts questions that will take up so much time in the first year?

Embedded in that question is a philosophical belief. We knew from the very beginning that we did not want our CTI to remain a tech-centric program. With that in mind, we worked closely with the Academic Office and the Dean of Faculty because we wanted our teachers and students to think of the technology and the program as part of what we do, not as an add-on. While we still have work to do in this area, our culture has changed to the point where Tech is an ally and the use of technology in the classroom is an important part of what we do.

**PROFESSIONAL DEVELOPMENT AND TRAINING EVOLUTION**

Our expectations have changed. Our hiring practices have not. The shifting needs of our faculty have put a strain on our support at times, and they have also had an impact on how we train new teachers and employees. Not only has our CTI
program effectively broadened to include administrators and staff with new machines, but we’ve expanded our use of cloud storage—we use OneDrive (and OneNote) to support more administrative functions. As a result, we have had to expand our new employee/faculty orientation. Last year we had to hire a long-term substitute teacher. Getting him up to speed was challenging, not because he didn’t have the requisite skills but because our technological expectations for teachers have grown so much.

The same applies to our students. While we like to believe that students are ahead of us on the technological curve, the fact remains that they are still middle and high school students. That means that over the summer, many of them will forget many things, including passwords. Because we take back the devices each summer and re-image them and check to make sure that every device is working properly, the kids don’t have their computers over the summer. It took us until year four to put in an hour-long technology orientation session for all new students, followed up by a day of 20-minute classes focused on making sure that students become familiar with how each teacher will be handling technology.

The question that needs to be asked and asked often is this: As we increase the expectations of our teachers and students with regards to technology, how can we put a support network in place to ensure that everyone can begin the school year at an appropriate level of proficiency?

**ADDRESSING THE WHAT’S NEXT QUESTION**

We recently completed our re-accreditation 10-year self-study. During my conversation with the tech person on the visiting committee, she asked me, “What’s next?” This is another question that is natural, but reveals the dangerous belief that launching a 1:1 program is a box to be checked off, and then it’s time to move on. Looking beyond the launch, a good 1:1 program should challenge teachers, students, and administrators to constantly think about what’s next. The true beginning of the program is not when everyone gets a shiny new computer, but when the use of that computer becomes second nature, so much a part of the school’s culture that everyone is free to continually think about—and, one hopes, dream about—what’s next. It’s all about possibility. My colleagues in the Math Department often describe to me the idea of the asymptote, a line that approaches a curve but never reaches it. That’s what a good 1:1 program should be looking to do, to strive for perfection while knowing it can never be reached.

Admittedly, that’s a bit pie in the sky. For the purposes of this article, the question that needs to be asked is “Will our program continue to be financially and technically viable going forward?” If the money and the device questions are taken care of, then you’re free to think big thoughts.
There is a phenomenon in evolutionary genetics known as phenotypic plasticity, where individuals with a single fixed genotype (i.e., genetic constitution, or which genes an individual inherits as part of his or her individual genome) can yield a variety of markedly different phenotypes (a term used in genetics to describe the physical and physiological characteristics of an individual), depending on the environmental context. To put this another way, the same individual can potentially manifest different abilities or traits to overcome the challenges of distinct environments, without changing or supplementing the underlying genetic code.

This truly is an amazing feat of evolutionary biology. Although, in the context of a publication dedicated to academic technology, this information might seem like a bit of random trivia, I would submit that it presents a successful model for academic technology leaders to aspire to. To shift direction from evolutionary to more familiar educational terms, the collective needs of our students, faculty, staff, and broader communities are best served when technologists, systems, and policies exhibit high degrees of functional plasticity, elegantly adapting to suit dynamic and changing environments without a dramatic reimagining and wholesale replacement of resources or staff.

Both the broader educational landscape and the local culture and needs of individual schools are continually in flux, and, much like the evolutionary selection pressures coming from a changing physical environment, this puts pressure on individuals (students, faculty, parents, administrators, librarians, and technologists alike) to adapt. Without plasticity, these pressures bring us face to face with the simplest (and bleakest) evolutionary outcome: the binary of survival vs. failure and/or replacement.

We have recently seen these same polar outcomes on a macro scale in educational technology. Consider the divergent histories of Maine’s laptop initiative (Morrell) and the Los Angeles iPad program (Lapowsky). It is crucial that when re-evaluating expectations for instructional technology staffing, administrative practices, device purchasing, and school policies, we seek out and select for greater plasticity in all things; this, in turn, creates and nurtures learning environments that are more adaptable and effective in supporting school pedagogy and student learning. In this article, I will examine three areas of strategic focus on the benefits of functional plasticity: academic technology staffing, systems, and curriculum.

**FUNCTIONAL PLASTICITY AND ACADEMIC TECHNOLOGY**

So what does plasticity look like in the context of academic technology staff? To best explore this question, it is helpful to first consider the last 15 or so years of educational technology as a backdrop. In the early 2000s, academic technology was resource-intensive to deploy, esoteric to operate, and, most critically, because wireless technology was in its infancy, basic connectivity itself was a limiting factor. Computers were confined largely to libraries and labs. Staffing resources, skills, and policies were primarily geared towards maintaining a physical network, and in elementary, secondary, and higher education, this remained the mode for many years. According to a 2008 Dept. of Education report, half of all public schools in the U.S. had no full-time position dedicated to technological oversight and direction, a trend that is mirrored to a roughly lesser extent in independent schools. Ironically, this lag in hiring staff may have been inadvertently advantageous, as
the fundamental utility of a technology leadership position at present has shifted dramatically away from merely managing infrastructure, resources, and servers to focusing on issues of pedagogy, culture, and student life as described below. The need for hardware and infrastructure management persists, but as a narrow slice of expertise within a more diverse pie that now includes collaborative, mission-focused initiatives, authoring of community guidelines, curricular development, and effective project management.

A key catalyst in liberating technology staff from roles solely dedicated to infrastructure and application support has been the ability to cost-effectively outsource network operations, which NAIS recognized as potentially invaluable in 2004. (Bretz/NAIS) As the scope of work inherent to technology leadership roles has expanded over the past decade, we have seen those who demonstrate great plasticity become instrumental and deeply involved in the most important work that schools do: educating and supporting our students.

This momentous shift in educational technology leadership also exposes two truths that can sometimes be difficult for schools to accept: first, technology has become a part of every aspect of school operations, and, second, not all proficient network administrators or technology support staff may be able to demonstrate the plasticity that a school might require for effective technology leadership. Doug Johnson noted in his 2013 article in Educational Leadership: “Perspective and empathy are as essential to being an effective technology director as hard technology skills or knowledge.” He is absolutely correct. A lead academic technologist will likely spend a portion of every week in every office, academic department, and division on his or her campus, and he or she must be able to listen to, work with, and support students, faculty, and administrators alike in any of their undertakings that require technology.

**FUNCTIONAL PLASTICITY OF SYSTEMS**

The role of networks, services, and applications on campus has been, for better or worse, relegated to the same level of glory and importance as plumbing: essential, expected, but neither revered nor particularly interesting to most in the school community. The sheer ubiquity of these resources, however, means that the academic technologist must be able to come to know the needs, strengths, and passions of every discrete constituency on his or her campus and must be able to listen to, work with, and guide all stakeholders in their efforts. When initiatives that require inter-departmental collaboration arise, an adept technologist will often assume a key role in coordinating and managing these projects, though no one may explicitly request this. At present, an emotionally intelligent academic technologist with diverse technical and interpersonal skills will demonstrate the greatest amount of functional plasticity, crafting solutions and initiatives to fulfill the constantly changing demands inherent to supporting a school’s mission.

A sea change in software and hardware systems available to schools has also had a major impact on the evolution of academic technologists. In two cliché words, this means The Cloud. Being able to move expensive and maintenance-intensive services, such as email or web servers, off site liberates working hours and budgetary dollars. Continuing to identify, evaluate, and migrate towards Software as a Service (SaaS) platforms, such as G-Suite for Education (formerly Google for Education) and hardware that comprehensively address the needs of schools while streamlining and simplifying management (and in turn saving maintenance time and total cost of ownership) is an imperative practice that all lead school technologists must pursue.

With regards to on-premise infrastructural technology, cutting-edge enterprise features have entered educational pricing tiers at the same time as novel user interfaces and management options have dramatically reduced complexity and total cost of ownership. Many of the current generation of wireless, security, and network appliances offer an incredible amount of adaptable versatility and functional plasticity right out of the box, and, critically, often require less training and fewer human hours to fully configure and deploy.

One specific example of hardware that has been a boon for schools is the Cisco Meraki platform (née Meraki and then acquired by Cisco), which has enjoyed a warm reception and rapid adoption in the K-12 space, due to the simplicity and flexibility of management and maintenance. Beyond investing the time to survey and evaluate available options when full depreciation or lease end dates approach, there is no longer a major practical barrier to bringing adaptable infrastructure into any campus environment.

When it comes to selecting mobile and student-facing devices, functional plasticity should be a major determining factor. If one looks at the arc of mobile technology over the past 20 years,
we see a movement from network terminals to cumbersome mobile workstations, then to overpowered and more svelte mobile computers, and back again to underpowered and even more portable devices, such as Netbooks (in 2008) and the iPad and introduction of tablet computing in 2010. The advent of these ultra-mobile devices, and smartphones alongside them, also marked a less noticeable but important shift away from discrete device storage and applications to reliance on cloud services and an assumption of near continual network access. In this regard, the evolutionary arc became more of a loop, wherein modern devices are in most cases acting as ultramodern, touch-enabled terminals rather than true standalone computers.

This evolutionary trend in mobile computing physically manifested in the initial release of the Chromebook in the summer of 2011. Essentially a web browser-only OS in a laptop-like form factor, Chromebooks were transparent terminals to the resources of the web. In the approximately five years since the introduction of the iPad and Chromebook, we have seen the Chrome devices gain adoption to the point where they represented 50% of mobile (tablet/laptop) sales in U.S. schools in Q3 of 2015 -- not including BYOD (Taylor), and iPads fall to 17% of mobile sales to schools in Q1 of 2016 (Leswing). The Los Angeles School District’s famous iPad debacle was one instance of an increasing number of schools and districts to abandon the iPad (Murphy). The rapid adoption and decline of iPads is, in some ways, similar to the market history of SMART and other Interactive Whiteboard (IWB) platforms, which began and continue to decline in deployment and usage since around 2012 (Orbaugh).

All of these hardware trends once again underscore the immeasurable value of plasticity in an educational environment, this time in the context of student and faculty facing devices. iPads, SMART boards, and even Windows and Mac OS devices, to some extent, require a school to dedicate extraordinary resources to a proprietary ecosystem; this requires that curricular development, professional development, technology support, and resource planning all be confined and tailored to the underlying technology platform, distracting efforts away from the empirical curricular material or broader pedagogical goals. Chromebooks (and, at the front of the classroom, hybrid projectors that offer an IWB experience on a traditional dry-erase writing surface) represent an option with greater functional plasticity by offering a mostly system-agnostic experience to students. While many schools do use Chromebooks in conjunction with the G-Suite for Education (Drive, Docs, etc.), a Chromebook is empirically a dumb terminal to the web (including Office 365, iCloud, etc.) and nothing more. The relative unimportance of the device, due to its reliance on cloud storage and online services, allowed for teachers to shift the emphasis for students from a specific technology product back to learning process.

Additionally, schools could use Chromebooks to effectively create the same level of access for students as a 1:1 program, but with dramatically lower costs in hardware and exponentially fewer support staff, and, critically, without the need for device monogamy since any student could pick up any Chromebook and immediately resume his or her work. The remarkable plasticity of these devices allows faculty to design projects and curricula using the web as a realistic common denominator,
which completely avoids the accessibility issues inherent to OS-specific apps as well as the perils of relying on individual device storage for all student work. Most importantly, faculty are freed from the obligation of having to teach students how to use a specific device before they can actually begin teaching them the curriculum. Chromebooks have enjoyed a prolonged moment of success, and whatever they evolve into or are replaced by, it would be a logical hypothesis that future iterations of successful student hardware would offer a great deal of functional plasticity and non-proprietary applications.

**FUNCTIONAL PLASTICITY IN THE CURRICULUM**

Finally, it is worth highlighting the rise and fall of 3D printing within the context of technology and curriculum design as a note of caution to schools about trends in instruction that center around a single technology. 3D printing saw a level of hype, industry inflation, and ultimate bubble bursting that in some ways echoed aspects of the dot-com bust of the late 1990s. No company is more representative of this rise-and-crash than Brooklyn startup MakerBot (Benchoff), which now lives on in name only. MakerBot introduced its first printer in 2009 with an open-source, open-hardware design that quickly became the darling of makerspaces and programs in K-12 schools nationwide. However, in 2012 their platform became closed source, and in 2013, they were purchased by Stratasys for a whopping $403 million. Critically, though, their hardware was the gold standard for schools due to its relatively affordable price point and large user community, and they did little to address the support and hardware woes of their users. Since the MakerBot 3D printer, countless 3D printer startups and Kickstarter campaigns have appeared and vanished, often leaving schools with labs full of unsupported or partially functional hardware. What was crucially missing from the 3D printing movement was a paced, pedagogy-driven, and school-by-school critical examination of what, exactly, was the value proposition these devices presented?

Current NYCIST President Saber Khan, in his post-mortem of 3D printing, summarizes this nicely: “The technical challenges of printing consistently with cheap hardware has made it difficult to use most 3D printers as iterative design tools, where one designs, prints, changes and reprints. Without that essential application the printers have become novelties, that only print the final draft of a project after much effort. This seems to suggest that owning the printer is not essential to being engaged in the 3D design.” While there is still great functional utility to 3D printing when used in an entirely different mode (ie., creation of project components rather than entire projects), the promise of 3D printing and printers as a revolutionary platform for project-based learning and STEAM instruction has ultimately been somewhat empty. That said, the rush into 3D printing has created a positive collateral effect in the emphasis schools began to place on makerspaces, classes, and staffing, and here again we see the value of plasticity. Thus, as broken MakerBot Replicators are trashed, the curricular designs, projects, and spaces that have sprung up around them continue to evolve and iterate onwards, restoring the emphasis on process and removing attention from the proprietary device that temporarily narrowed focus and creativity while it held the spotlight.

**CONSTANT CHANGE**

In both technology and education, change is the only constant, and our faculty, technologists, administrators, and schools as a whole must continually evolve to best suit the shifting nature and needs of our students. In this endeavor, though, we can neither predict the changes in direction and emphasis that lie over the horizon, nor can we expect that all of the human and technology resources schools have at their disposal can fundamentally adapt to match environmental shifts. We can and must continue to seek, nurture, and encourage functional plasticity, as it is our best strategy for supporting our current and future students.

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Throughout the last 10 years, education has been under a constant barrage of claims that technology will change how teachers teach and how students learn. I remember being a middle school teacher in 2006, during the wiki-blog blitz, and being told that Web 2.0 was a paradigm shift that would usher in a new era of education. Well, it’s 2016, and blogs and wikis have had an impact on education, but they surely have not been the game-changers many expected. Fast forward to today and the advent of the iPad and mobile technology. Again, educators are being told how these devices are changing how education conducts the business of teaching and learning.

But after rolling out iPads to every classroom in my school, I hear daily, from teachers and administrators alike, “What are the best apps for...?” or “How do I integrate this into my lessons?” This article in no way intends to belittle the (potential) impact an iPad or Web 2.0 tool could have on pedagogy. Rather, I feel that we have let the proverbial horse out of the barn with new technologies before first challenging the theoretical-philosophical-educational foundations of teaching and learning that have become established over 120 years of educational methods implemented in classrooms across the country, both public and private.

To usher in a new era of teaching and learning, we as professional educators must first examine the philosophical underpinnings that drive us to teach. If our goal is truly to create critically engaged learners in a collaborative environment, to become critical agents in a democratic society, then how do we take something like an iPad and challenge our pedagogical identities to engage students in a truly new and unique method of instruction?* The answer to this question does not lead to an “app,” “open source website,” or even a computer, for that matter; rather, it challenges us to look deeper and contextualize our reason for teaching. It is only after such reflection that we can effectively engage with a “tool” to provide the pedagogical bridge to achieve our instructional goals. Again, I understand that most Boards and policymakers are quick to jump on the technological bandwagon and infuse new devices, software, etc., in our schools without much consideration for the professional support teachers will need to evolve and leverage the tools and capabilities for pedagogical innovation. This leaves teachers scrambling to find the best and quickest use for the new technology they were given on the first day of pre-planning. This writing is not an indictment of teachers; they are working with what has been given to them so that the school’s investment (literally) is not being wasted. My goal is to get us to look beyond the quick fixes and refocus our sights on truly changing education through new technologies for social benefit. For we mustn’t forget what Dewey taught us over a hundred years ago — “that the educational process has no end beyond itself; it is its own end: the educational process is one of continual reorganizing, restructuring, transforming.”

It is my contention that to shift the education paradigm to meet the needs of the modern student, we must re-examine the theoretical orientation of education and reposition it within Brazilian educator Paulo Freire’s concept of communicative readiness to learn. An essential message of Paulo Freire is that learning is impossible without accounting for the position of the learner. Freire) In other words, learning is not an objective activity; rather, it can only be achieved when the subjectivity of the learner and the teacher have been considered. Without in-depth exploration of the subjective position of the learner,
the teacher fails to acknowledge her/his own position. This results in the teacher then acting as a controlling agent in that s/he is imposing, albeit most times unknowingly, her/his consciousness on the learner.

For me, the iPad and open source websites are liberating agents that provide teachers introspective vehicles that enable them to garnish and reinforce authentic student voice and individual empowerment. For new technologies to shift the entrenched, traditional educational paradigm, they need to be viewed through the lens of liberation, one that opens the door to students’ thoughts and perceptions, thereby expanding the communicative readiness of the classroom. This not only leverages the use of the technology in an organic, covert role within the pedagogical structure of the classroom, but shifts the path of knowledge and information communicated in the classroom from that of the teacher to the voice of each individual student.

I recently read that teachers and the structure of schooling may no longer be needed with the advent of new mobile technologies. After all, you can take a course from Stanford for free on iTunes U. I could not disagree more. Teachers and schools not only are needed but essential to challenge traditional forms of order and standards. It will be these discussions that will reinforce the need to meet students at the crossroads of modern learning if we are to truly engage them in innovative pedagogical strategies in a new era in education. Due to today’s emphasis on test scores and quantitative measures of learning, our teachers are increasingly bound to the bureaucratic nature of traditional schooling through control; those who clamor for lowering the cost of public education only reinforce this, leading to larger classes sizes and questions such as “Why not give a student an iPad and iTunes U?” Again, this completely misses the importance of a communicative learning environment where the emphasis is on engagement with each individual student, thus reinforcing the importance of the teacher-student relationship. Ultimately, it is the strength of this relationship that will determine the success of our educational system, not an iPad, blog, or wiki.

I am afraid that by releasing the “technology horse” prior to in-depth reflection on teaching and learning, we have created an “educational technology beast” that could very well be impeding the pedagogical potential of new, innovative instructional technologies. Essentially, the question of which apps to use only reinforces the bureaucratic nature of instruction. For teachers to leverage new technology to liberate student voices, it is essential that educators make a constant effort to refuse to be bureaucratized, for it is bureaucracy that annihilates creativity, silences our students, and transforms our teachers into mere repeaters of clichés. (Freire and Friere)

To conclude, I feel education is indeed at a crossroads, one that is not spoken of much in the popular press or colleges of education, for that matter. If we do not leverage technology in our schools to embolden our students to find their own educational voices, we will continue the patchwork of educational reform that aesthetically looks technologically relevant, but has not shifted much since 1900.

* This is my pedagogical assumption, if one has a standardized, control, discipline educational philosophy... well, that is an article for another day.

WORKS CITED
Last December, I had the fine pleasure of attending the NAIS People of Color Conference in Atlanta, Georgia. As a black female southerner working at a Jewish day school, I was excited by the conference’s timely theme, “Advancing Human and Civil Rights: Fulfilling the Dream Together.” With my personal combination of culture, skill, and experience, I felt I had much to contribute. Also, I was eager to volunteer for ATLIS at the conference. Though I admit I did not know exactly what I was volunteering for, I knew ATLIS supported tech leaders, and I was in, period. At the ATLIS booth, I met volunteers who were approachable and engaging in their red aprons bearing the phrase, “Keep Calm and ________.” I immediately filled in my blank with “create change.” I consider myself a change agent who tries to live up to the slogan, “be the change you want to see in the world.” At our Tech Spotlight hub, we crowdsourced information by striking up great conversations about technology with conference attendees. We encouraged them to add to our board the technologies they use at their school to promote diversity, inclusion, and equity. Here are some responses from participants:

- I am not racist...am I? eLearning Program (notracistmovie.com);
- Engaged middle schoolers with Instagram;
- MeetUp to help break out of social silos (meetup.com);
- GoodWall — positive social networking for high-schoolers (goodwall.org);
- Be My Eyes— sighted users help visually impaired users (bemyeyes.org);
- Quizlet Live (quizletlive.com);
- Use Twitter to tweet to CNN correspondents related to programs/issues of race;
- GitHub — work together on projects (github.com);
- Student social media hashtag projects that foster equity and inclusion (#whatdoyoustandfor).
A positive atmosphere charged the conference. Participants came to seek new understanding of race in response to recent strife both before and after last fall’s presidential election. Established social norms coded into our culture and disseminated to children of color in our classrooms were challenged. I saw people not of color seeking real answers about our experiences as professional independent school colleagues and heard them reaching out for suggestions as we all strive to help our students of color.

My experience at the conference was deeply affected by my family, especially my uncle and aunt, both former educators, who are the heart and soul of everything I do. Even before the conference began, my uncle, a retired principal, came to the convention center with me so that I could pick up my badge and avoid the long lines at registration. As I approached the booth to receive my name tag, I caught a glimpse of my uncle looking at me as if I were on stage receiving a blue ribbon. He told me how proud he and my aunt were of my accomplishments. He thought my involvement in a forum like the PoCC was astounding. As we walked around the convention center, watching the booths being assembled, I could see the fascination in his face and the tears welling up in his eyes. When I asked a passerby to take our picture, my uncle shared his experiences as a black man working through many civil rights challenges (“Negro Principal Fired in S.C.”) to help pave the way to gatherings like the one before us. He concluded, “I remember a time when all we could do was be proud that we were allowed to come inside to clean a building like this.” And the tears fell…from both of us.

I am very grateful to NAIS for its vision that allows educators to come together for a conference such as PoCC. Together, we can have very authentic conversations and make connections that will allow us to unify our students and world. As a sponsor of the conference, ATLIS plays an important role in promoting diversity and understanding through technology.

When technology first began to transform education, I immediately saw it as a catalyst for change. Finally, we had achieved access to new ways of learning and teaching that could add to the wealth of knowledge shared by everyone. Granted, technology has its social implications, but it has also opened doors for new learning modalities. Today, in our virtual society, all media experience is educational. Through leaps of fiber and bountiful bandwidth, we are all learning more about one another from state to country to continent. We can share cultural differences by using solutions such as Skype in the Classroom, Padlet, ePals, or Twitter. Students can elevate their awareness by connecting with other students who have different lifestyles, traditions, and languages. Technology is remapping tolerance for diversity in our communities, societies, and the world.

WORKS CITED
Design thinking seems to be everywhere these days, in workshops, conference sessions, and blog posts. The combination of design thinking and making is a natural marriage of two trends in many independent schools. Our students are busy conducting empathy interviews, brainstorming, and testing prototypes for 3D designs, robotics, or maybe cardboard creations. John Spencer and A.J. Juliani wrote LAUNCH to encourage educators to think beyond design and ideation with students and move to “the power of a LAUNCH.” There’s much for independent school makers and teachers to consider in this brief, yet compelling read.

In LAUNCH, Spencer and Juliani put forward the idea that innovation and creativity are most powerful when they are the result of a disciplined process. Spencer and Juliana write that creating is a skill that can be taught and honed rather than an ability one does or doesn’t have. Therefore, they believe that developing frameworks for inquiry serves to push students to more active learning rather than to limit them.

Teachers and technology integrationists who prefer some structure in a learning environment may find that LAUNCH is an appropriate book for a small group to study and discuss in conjunction with conversations around interdisciplinary curricular goals such as critical thinking or deeper learning. For example, the chapter on teaching students to ask better questions would be ideal for an inquiry group focused on building students’ skills in active questioning.

The LAUNCH cycle (Spencer and Juliani) includes six steps, based on the acronym:

- Look, listen, and learn.
- Ask tons of questions.
- Understand the process or problem.
- Navigate ideas.
- Create a prototype.
- Highlight and fix.
- Launch to the audience.

The authors walk readers through the steps, giving examples and case studies of what the LAUNCH method looks like when implemented in real schools with real classrooms, teachers, and students. The schools highlighted represent diverse geographic locations, settings, and populations, and independent school faculty will find common ground with many of the teachers featured.

Independent schools at the vanguard of building innovative curricula will appreciate the chapters on remaking research into a flexible process. Too often schools teach research as a rigid series of steps that are “disassociated from curiosity,” say Spencer and Juliana. This approach limits students and
leads to “end of year” research projects that often culminate in frustration. The LAUNCH process encourages rethinking all aspects of research, from timelines and methods to exploring a wider array of sources. The discussion of what constitutes a valid and reputable research source is an area that may be of particular interest to independent school librarians.

Another concept of particular importance is that of navigating ideas. Spencer and Juliana write that “I don’t have any ideas” is code for “I don’t know if my ideas are any good” and offer steps for teachers to use to engage all students in brainstorming, iterating, and revising ideas. Their strategies encompass a variety of disciplines and ages, something that makes LAUNCH a good read for independent schools with more than one division.

LAUNCH’s authors acknowledge that creating can (and maybe should) be a stressful, exhausting, scary, and difficult process at times. However, creating is, nonetheless, essential to the human experience. The authors share strategies that teachers and makers can implement to guide students to grow in confidence as they become creators. They discuss common challenges and propose solutions that are actionable. In fact, they cite limitations as being a positive in terms of driving creativity—scant resources mean that students have to reinvent the purposes of the supplies they have on hand.

The book closes with extensive detailed descriptions of successful classrooms already engaged in the kind of work LAUNCH describes, along with comprehensive suggestions for projects that can be adopted, modified, or used as inspiration. The authors invite readers to join in the conversation via their website, http://thelaunchcycle.com/, where they keep up-to-date resource lists, sample projects, and more.

LAUNCH is a short but inspirational read that has potential to serve as a resource for educators looking to lead a study group. It may be particularly appropriate for independent school leaders looking to engage their communities in conversations about the “why” of making, design thinking, or makerspaces.

WORKS CITED

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During my early years as an English teacher, my encounters with technology were spotty. Some were delightful, magical discoveries, such as when -- and I know this dates me -- I encountered hyperlinks for the first time. (“Wow,” I thought, “this changes everything.”) But my experiences with technology were just as likely to be anxiety ridden and, I’ll admit, not my best moments, such as when grades were due and my desktop crashed. (“Make this work now!” I’d spit through gritted teeth.) But this is the moment that sticks in my memory the most, and it breaks my teacher heart.

“Susan, do not touch computer,” our IT guy lectured. “Computer is delicate instrument.”

Fortunately, I didn’t listen. I was lucky enough to make connections with enlightened colleagues and IT professionals who saw the value of empowering teachers to explore the transforming powers of technology for learning. So, what I hope to share here is that putting the magic wands of technology in those teachers’ hands to deliver to their students is not enough. We must build better relationships between technologists and teachers in order to make the magic of learning through technology happen.

So here is some advice for working with the teachers who are ultimately your connection to the learning that happens in the classroom.

**Encourage Teachers to Touch the Computers**

Take time to empower your teachers to do basic troubleshooting. Yes, sometimes you, or members of your team, may need to step in and make the projector work at a critical moment in a lesson, but sometimes you also need to be a teacher yourself. Come back later and let the teacher walk through the steps you took to solve the problem. Be patient if he or she needs to write everything down (it’s how he or she learns, after all), but also let the teacher’s hands touch the keys, fiddle with the wires, and move the cursor across the screen. I know this takes time, but you are building trust here, and, even more critically, you are encouraging the teacher not to be afraid of technology.

**Meet Teachers Where They Are**

We know what we know, and we don’t know what we don’t know. But we are all different in that sense. When working with students, teachers realize that some come to our lessons with essential skills intact, while others have to learn and relearn again. Some have been taught well and some have been taught badly. Some come to us with serious baggage about education or reading or their home lives, and some have a burning fire for learning about the world that cannot be quenched, no matter what. The same goes for teachers and technology. Get to know your teachers, listen to their stories, and learn from them their own desires for using technology to transform their kids’ learning; listen to and take seriously their concerns and fears as well. You are in this together, remember, and maybe you are just the person who can help make it happen.
to help the teacher take a crucial step towards the future.

**KNOW YOUR AUDIENCE**

Don’t geek out too much, but don’t be condescending either. Respect teachers for what they know about their profession, for their passions, and for their desire to help kids learn. They wouldn’t be doing this right now if they didn’t care enough to spend way too much of their lives trying to help kids learn. Sometimes technologists can be over-eager to share all they know. Too much information, especially if it is delivered in geek, can be overwhelming and even off-putting, despite your good intentions. At the same time, just because we don’t know what you know doesn’t mean we can’t learn, if you are patient. Ask us what we understand and determine what we need to know. Share just a little more, just for the sake of learning -- perhaps by using metaphors to explain. That’s the sweet spot. Then the more we connect about how technology works from your end and what we need in the classroom, the more success we will all have together.

**OPEN YOUR DOORS**

Make the teachers you work with welcome in your own techy space. If you have boxes and wires leftover from the last century piled like tumbleweed on your desk (or on your staff’s), perhaps along with last week’s undigested lunch, consider the message that you may be sending to your teaching colleagues. That you are too busy with more important matters to be bothered? That you don’t even think about clearing out the detritus of your techy life to make room for humans? Just as teachers are thinking about how to create more inviting learning spaces for their students, you might think about how you might design more enticing spaces for you to connect with teachers. If your teachers come to you and have to sit on an old laptop cart to have a conversation with you, the learning space is not exactly ideal.

**WATCH THE MAGIC OF LEARNING AS IT HAPPENS**

Make time to visit the classes where you have helped a teacher access technology in new ways. Not only will you have a chance to build on the partnership you have established with that teacher, but you will see the end point, the raison d’etre, for what we do. When a kid’s face lights up with learning, you will see that you have made an impact on someone’s life. You’ll have a greater appreciation of the teacher’s role. Perhaps you’ll even be inspired to collaborate in ways you hadn’t dreamed of.

If I’ve learned anything about education, I’ve learned that it’s about relationships -- top to bottom. And those relationships are critical to the learning -- whether it lives or dies in the classroom, whether teachers improve their practice, whether technology can change lives. It’s not really about magic. It’s about kindness and respect. It’s about reaching out, listening, and empathy. It’s about a human connection.
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