



The Digital Curriculum

A conceptual framework of technology integration for a 1:1 school.

The Digital Curriculum gives educators a common vision, definition, and guiding principles to help structure their school.

By Evan Abbey

<http://eabbey.blogspot.com>

Heartland Area Education Agency 11
6500 Corporate Dr. Johnston, IA

One Student's Day

Jane arrives at school early and immediately goes to one of the learning pod areas, where she hops on her educational ning online. Here, she collaborates with a student in Texas, Kentucky, Nevada, Alberta, Sydney, and Nottingham. The group is extremely interested in crickets, and together they are discovering all they can about the insects. They share resources they have found on the internet with each other and pose different thoughts that they have. Bill, the student from Nevada, recently posed the challenge to the group to discover what conditions are ideal for the growth of crickets, and since the research the group conflicts, each person is experimenting with their variables at the local level.

After catching up on an update from those overseas, she goes to her first hour class, social studies. In class, the teacher is introducing a new concept (the Articles of Confederation), but wants to see what students already know. Every student has their laptop ready and they hop on Survey Monkey to take a quick pre-survey of the material. The teacher then displays the results, which show a couple students are quite knowledgeable on the concept. He turns the class over to them, and they discuss what they remember. While they say this, the teacher pulls up the class wiki and enters, as close to verbatim as he can type, what the students say as the initial entry on the wiki for the Articles of Confederation. After the students finish what they recall, the teacher has the students look online to verify the information and add to the wiki, or to branch off and make new entries based on topics that have arrived. Jane split her time between adding more on to the Continental Army, which the Articles gave some direction to, and putting together a new entry for federalists.

Second hour has her in family/consumer science today. The class puts their laptops on the work area next to the kitchenette. Today, Jane's group is to create a chicken entree given the ingredients that are found in their refrigerator and cabinet. They do a meta-search, given the ingredients, and find a recipe for a casserole. As they create the activity, they are to take a digital photo at each stage and upload that to their Flickr account. They also will take a temperature probe when the entree is finished and that data



will be loaded in their classroom database record. Finally, they will portion up the entree, and each student in class will travel around and sample them. They will log in on their own computers and score the entree on a four-point scale of how it tastes. The teacher will use the digital images, hard data, and student feedback together to give summative assessment on student proficiency.

Third hour is physical education. Jane has already downloaded her playlist into her mp3 player for the day... she has picked her upbeat music since she is doing aerobics. Like always, Jane gets her Polar Fitness monitor, which will monitor her breathing rate and pulse to assess the exertion. Once again, Jane is doing well to stay in her zone. Like the rest of the class, she is given the last 5 minutes of class to download the data and write a 2-sentence blog on how she is progressing to her physical fitness goal (to reduce her "fitness" age and beat her previous best in the mile by 45 seconds).

Fourth hour is English. Students hop on their blog immediately to give their reflections to the question that was recently posted by a student in class. Each day, a student posts a question to trigger free-writing in a connection to what they are reading. Once students are finished with their blog, they shift into free reading of the book, until the teacher has had a chance to peruse the answers. The teacher then gathers a couple of quotes to share with the class for some further discussion. Then, the students are given an essay topic to write about, and they log into their Google Docs account to start the process of composition. With 10 minutes left in the class, Jane "invites" her editing partner Sarah to her essay, and vice versa. Jane looks

over Sarah's writing, knowing she has to give 3 suggestions, be it thoughts to develop the essay, sentences to help the structure, or words to build meaning and style.

Okay, you get the idea. You might be noticing quite a few things when reading about Jane's day. You are noticing her learning is continuously tied to digital technologies that help her interact with the curriculum. You are noticing that she has an active role in her learning, making decisions, reflecting on her own progress, networking with other students and teachers from afar. And you are probably noticing Jane's day looks very different than your students' days.

Jane's school is actively using the conceptual framework **The Digital Curriculum** to help guide their school's learning, a framework that actively targets the digital tools available and uses them to radically revolutionize the school day.

Jane's Not Alone

There are many schools out there that feature a digital curriculum. For a list of some schools, see <http://movingforward.wikispaces.com>.

One of the most notable schools is Philadelphia's Science Leadership Academy (<http://www.scienceleadership.org/drupaled/>). The school opened in September 2006 with the mission to "provide a rigorous, college-preparatory curriculum with a focus on science, technology, mathematics and entrepreneurship". The school, under the direction of principal Chris Lehmann, has been recognized by ASCD and many other associations for its excellence with inquiry-based learning and college preparation. Not only does SLA have a 1:1 laptop initiative, but they emphasize Individualized Learning Plans for all students. SLA utilizes online learning and internships, including the successful "Franklin Institute Museum Experience", working directly with museum staff on various projects.

Another notable school is Napa, CA's New Technology High School (<http://www.newtechhigh.org>). The school started when local businesses were "frustrated" by the lack of skilled employees available for

hire. The resulting school features immersive technology with devotion to project-based learning. Like SLA, New Tech High has a flexible schedule, partnerships and internships with the local community, and cross-curricular teaching and learning. Students not only create portfolios of their work and develop senior projects, they demonstrate that work to community and local business members for authentic audiences.

A school in the Midwest is the School of Environmental Studies (SES) in Eagan, MN (<http://www.district196.org/ses/>). SES serves students from the four high schools in Minnesota's ISD 196, and is situated at the Minnesota Zoo. Just like SLA and New Tech, learning features 1:1 technology and an emphasis on project-based learning. Students conduct individualized inquiry-based, multi-disciplinary research projects in the zoo with the assistance of their classmates, teachers, and zoo employees. SES has been recognized by several institutions as well, including the George Lucas foundation and the Knowledge Works foundation.

The schools, which have striking similarities, are most similar in how different they are from "typical" schools. All emphasize digital tools in 1:1 initiatives. Those tools are seamlessly integrated, as an extension of classroom activity. Students move on and off the use of the digital tools effortlessly, as their projects require them to. The pace of the classroom is fast, and yet students handle the fast pace with aplomb, helping them authentically prepare for the world.

Learning takes place on an individual level, a classroom level, a small group level, and an outside-school level with the presence of mentorships and internships. But the learning is always student-centered; the student is pushing forward the exploration, the connection, the progress on goals, and the assessment of growth. And, there is a constant data collection taking place that is formative, authentic, and accessible for students to draw conclusions.

The Digital Curriculum

So, what is the digital curriculum?

First, it is not a set curriculum that you teach with content and lessons already chosen. It is

not something you can pluck off the shelf and insert into your school. It isn't a pedagogical learning theory, although it relies on learning theories such as constructivism and connectivism. And, it is not a list of technology tools to use, either.

It is rather a conceptual framework. An approach to structuring your school. When schools look to incorporate 1:1 technology, they often struggle with sharing a vision as to how this will fully transform—instead of slightly tweaking—the way they teach. The digital curriculum is aimed to help schools overcome that problem. It gives a school not only a picture of what it looks like, but a common set of definitions and maxims necessary to reach that vision.

By definition, the digital curriculum is to assure that there is a prevailing digital component to every important component of teaching and learning in a school. That the digital component is powerful and transformative, and yet invisible.

While the feature is digital technology, the focus is on creating the ultimate enriching environment for learning. The results are autonomous learners, able to critically think and solve problems, who are creative and innovative, adaptable and agile, who are effective at communication and collaboration, and who have curiosity, imagination, and initiative (Wagner), and who do so in synchronous connection with their community and the larger world.

Digital Curriculum is a Matter of...

- Philosophical belief in the importance of digital technology components to student learning
- Array of digital components in all important aspects of teaching and learning
- Quality (depth) in those components
- Proper disposition of technology to the overall purpose in education
- Structure of other school conventions to maximize those components

Digital Vs. Analog

What are we talking about when we say the digital curriculum? It isn't just synonymous with "computers". The word "digital" serves as both a high-powered metaphor as well as a literal

description of what we are seeking.

Think of the transfer from analog music (cassette tapes) to digital music (iPods). Analog music was static; it was hard to mix, manipulate, or transfer. With the invention of CDs and later iPods, music became digital. You could easily access the whole or any individual part. Songs were now mobile; you could carry an almost infinite amount on a small device. Music could be mixed together easily with other digital tracks, or with video and images. And, iPods allowed music to hold metadata, like pictures of the album cover, length of the song, genre, and the like.

On a literal level, the digital curriculum requires that analog to digital conversion. Every piece of the curriculum at SLA or SES runs through the digital tools. Static textbooks are shelved in favor of up-to-date RSS. Paper and pencil data collection is removed in favor of digital data collection. Student productions and collaborations have a digital interface to them, running through computers.

But on a deeper level, it isn't just the physical conversion... it is the pedagogical conversion. Gone are the days where knowledge is static in a textbook, where information cannot be improved upon or used, just regurgitated. In its place is the digital frame of thinking, where content and information is relevant to each student, where they have the power to manipulate it and transfer it into their own meaning, improving upon that meaning, and then sharing it with the world.

Digital vs. Analog

- | | |
|-----------------|------------------|
| • Dynamic | • Static |
| • Quick | • Slow |
| • Accessible | • Insular |
| • Mashable | • Stand-Alone |
| • Mobile | • Rigid |
| • Multi-layered | • Single-layered |

Transformative, yet Invisible

“Technology should be like oxygen:
Ubiquitous, Necessary, and Invisible.”

-Chris Lehmann

Lehmann’s analogy goes to the heart of the dual role digital tools play in an effective curriculum. In order for technology to be truly invisible, it has to be both everywhere in a school, and necessary to a school. When it isn’t, it stands out.

For most teachers, integration means “use”. The problem is, “use” of technology is peripheral. It’s a side item in the day, a separate chunk of learning circumstances and environment. Like many parents, every day my wife and I ask our kids what they did at school today. My kids answer “Today we had an assembly” or “Today, Johnny brought treats.” One of the answers I get about once a cycle now is “Today, was computer day”.

This *isn’t* integration. The use of technology isn’t seamlessly infused into the learning process. It is an abrupt and conscious shift in it. No student will be unaware when they work on a computer.

This leads to technology being used for technology’s sake, not learning’s sake. David Warlick has phrased this as “getting past the ‘wow’ of technology.” Sure, learning about technology is important, but this practice doesn’t mirror life. When you are at work, do you consciously have “computer time”?

Think of seamless integration this way: a pencil is, for all intents and purposes, a piece of technology. It is used for a great deal of work in school, and that’s a good thing. However, my kids don’t come home and tell me “we used a pencil today.” It’s picked up and used and then put down again with out conscious interruption. That’s where we need to get with computerized technology.

Ubiquitous Access

To get there, the digital curriculum requires 1:1 access, a computerized device for each student. Anything short of a 1:1 creates limits in the

flexibility of the system and the access students have.

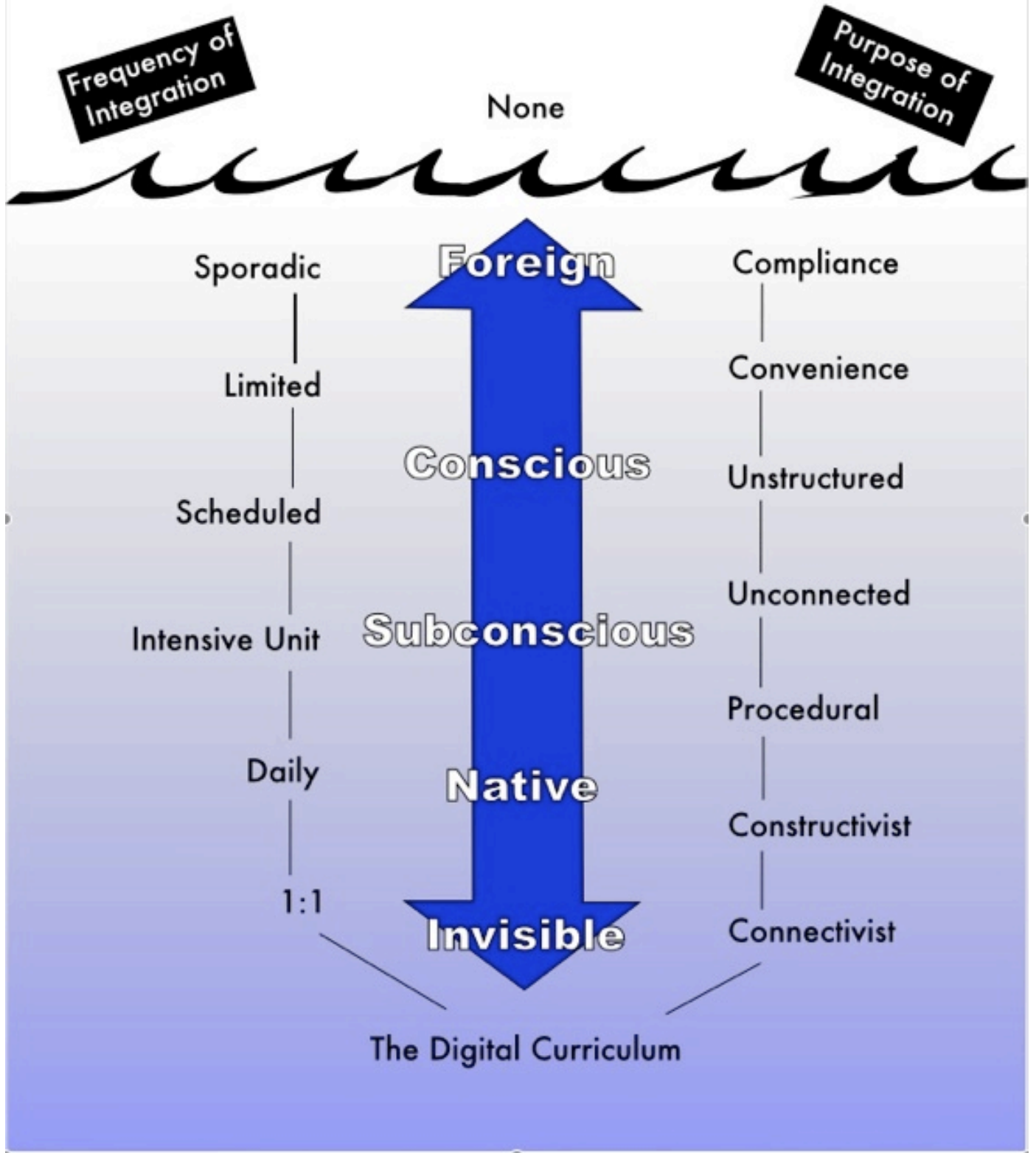
One tool that has powerful implications for teachers is a simple survey tool, like Survey Monkey. The tool can allow teachers to get an understanding of student knowledge prior to and during a lesson, which allows the teacher (or the class themselves) to identify what students are ready to learn, what is already mastered, and what they are not understanding.

The problem is, without 1:1 access, even a simple tool becomes unpractical. For teachers, that would require getting all the students up, go down to the computer lab for a 2-minute survey, and then come back. 10 minutes of time lost in the transportation, another 10 lost in the preparation. Because of this, the teachers won’t use it. I wouldn’t either. Despite its obvious benefits, Survey Monkey is a conscious interruption to the learning process.

The more access you have, however, the more you can seamlessly integrate these tools without conscious disruption. In the graphic on the following page, it shows the spectrum of access that schools have for availability. They include:

- **Sporadic access** - Very occasional use of technology, perhaps a free day in the lab or one-time “research” looking up websites.
- **Limited** - Integration is influenced by factors. Students have to work on assignments at home because computers are not available. Or activities are modified for the one-computer classroom.
- **Scheduled** - Integration happens once a cycle, during scheduled time.
- **Intensive Unit** - Students are not working with technology regularly, but do so intensively during a particular unit (such as three weeks spent making an iMovie).
- **Daily** - Not only intensive, but there is a daily integration to technology. Can be ongoing projects or things as simple as daily student blogging or checking the message board.
- **1:1** - Students are in possession of the device, extending learning beyond the classroom time slots and walls. Integration becomes school-wide instead of classroom-wide.

Depths of Technology Integration



Necessary Integration

Just because a school has 1:1 access doesn't mean they are using technology well. It is not just how much you use technology, but also how well you use it. And, there is a continuum for this also.

- **Compliance** - Integrating only because you are forced to as a teacher. This isn't much deeper than no integration at all.
- **Convenience** - Integration only where it is easier to do the lesson than in the absence of technology. Showing streaming video in the same way you would show analog video is convenient integration. So is using Microsoft Word for word processing. In some districts, Power Point is reaching convenient integration, where the technology is not a tool for learning but rather an easier method to the desired product.
- **Unstructured** - Free "play time" with technology. Can lead to student learning through their own inquisitiveness, or to a waste of time.
- **Unconnected** - Integration that isn't tied to the curriculum. Actually, this could be used as a descriptor for convenience, unstructured, or procedural integration than its own category. While the learning could be deep or shallow, the main feature of this is that it is teaching a tool/doing a project for the sake of experiencing the technology, not for the sake of learning the curriculum.
- **Procedural** - Training integration, where students receive explicit instruction on how to use technology (this can be a pre-cursor to other types of integration, or in the case of computer applications courses, it could be the only model).
- **Constructivist** - Integration is used by students to create products, artifacts, or authentic work, which allows students to construct their own meaning.
- **Connectivist** - Integration is used to connect students to a variety of resources and people,

building their "knowledge net" and their exposure to the infinite number of learning items in the world.

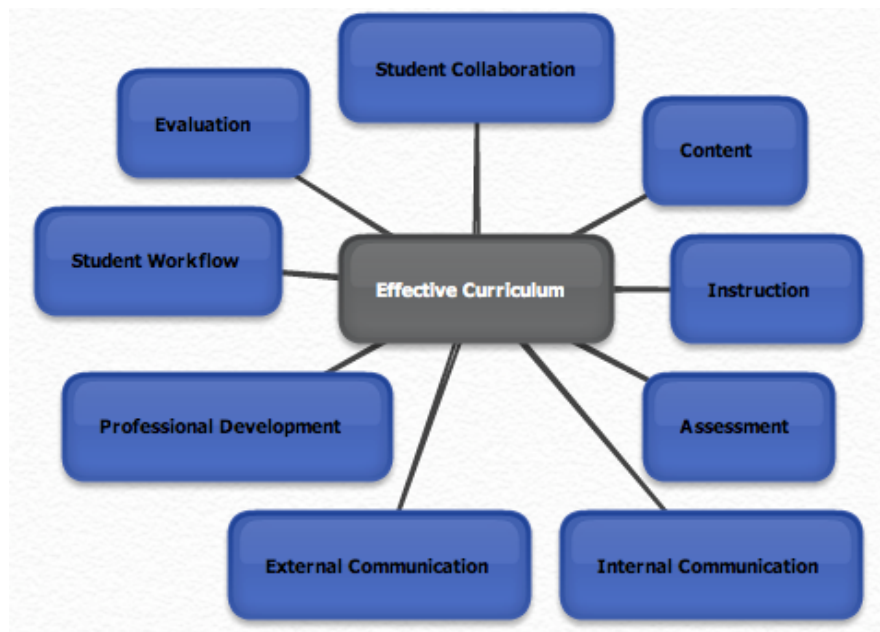
It is important for schools to honestly see where they are. We are not deeply integrating just because we had students look up sites on the Holocaust last Thursday. We are not there even if we have that one great unit where they make a podcast. If they are isolated events in the curriculum, technology use remains foreign for students.

For necessary integration, *the deeper, the better*. To fully reach the Digital Curriculum, one has to go all the way to the bottom. Students must use technology in sound constructivist project-based lessons, connecting with a variety of authentic audiences, and to do so in a continuous, student-centered structure.

When technology is used this often and in this manner, students take their focus off the technology they are using and on the lessons they are learning. It becomes truly invisible.

In All Components

When the digital curriculum requires focus on "every important component in teaching and learning", it goes beyond just using digital tools in instruction. The benefits of being digital—being dynamic, quick, accessible, mobile etc. — are beneficial for all the following areas.



Avoiding the False Start

There have been many schools excited about the potential of digital tools in the classroom. There also has been a lot of excitement fizzle out in poorly designed units and a lack of vision. And, in many cases, integration has not led to improved student achievement.

Educators need to remember that technology is but a tool to get student achievement; it is not the end goal itself. And the easiest way educators can improve student achievement is a simple change in sequence.

Consider 3 attributes: 1) learning how to use the technology, or the tool, 2) finding your overall purpose in your unit, and 3) looking for the specific place in the curriculum where to integrate technology.

"Specific Place" would be the outcome, say learning about double-digit multiplication or the effects of the Civil War. The "Purpose" would be the broader aspects of education, such as enhancing written literacy or developing collaboration.

INSTEAD OF DOING THIS...

With those 3 attributes, most technology professional development follows this sequence:



We start with "This is what a blog is", or "Here's how to operate the new Elmo we got". We probably make a mention of "a blog will help create collaboration" or "a blog is a 21st century way to develop writing skills", and then it is up to the teacher to look at their curricular objectives and "fit" the technology in.

Another typical sequence is:



where the deeper purpose drops out altogether. "Here's podcasting, now go use it in your classroom", without any discussion as to why you'd use it.

No matter the sequence, whatever you start with (whatever is furthest left) will receive the most attention, and then it will diminish as you progress to the right. *In other words, if it starts with the tool in the professional development sequence, it will be all about the tool in the classroom.* And, that's not what you want.

DO THIS...

Shifting the sequence puts the focus where it needs to be:



Start by having the discussions about what we need to do more of, what we need to emphasize, in our classrooms. And, this will be different for different teachers, where in physical education there might be a need to analyze your personal fitness data, in social studies, it might be to utilize visual literacy for meaning.

Then, go to the curriculum. "I teach a unit on cultural awareness, and given that students are visual learners in today's world more and more, I need to incorporate better visual literacy elements during my unit." Find the specific places to target.

Then find the tool. Here's where the tech integrationist can come in and work 1:1 or 1:small group and help them find the tool that is specific to their curricular need.

IN THE DIGITAL CURRICULUM...

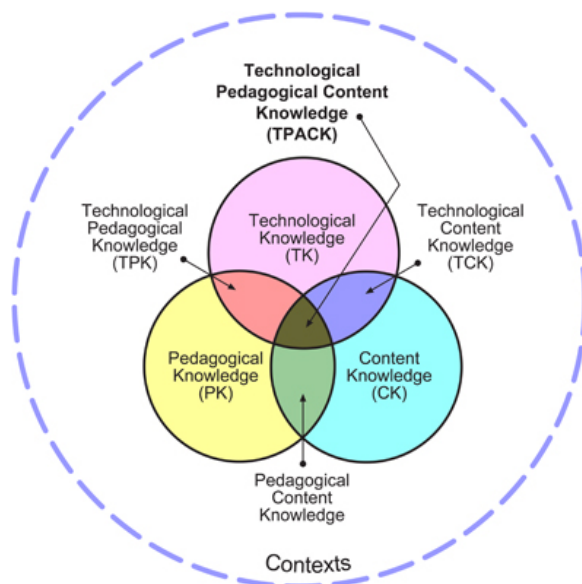
Truly, this approach to technology's relationship to the rest of the teaching process works with all schools, even those not committing to a 1:1 environment. But there is one major difference over traditional schools.

When students are fully immersed in a digital technology environment, one that is student-centered in its approach to education, the students can do the last step on their own.

That is to say, when the teacher identifies the big picture purpose and has set where in the curriculum the class will focus on it, students are able to identify the tool needed to complete the work on their own. This level of autonomy is where traditional schools severely struggle to get to, but a level we must get to in order to meet the needs of today's students.

TPACK

From Punya Mishra and Matthew Koehler, the TPACK framework emphasizes the convergence of Technological, Pedagogical, and Content Knowledge. Their research has shown that effective learning happens at the convergence. Teachers have to have an understanding not just of the tool, but also its appropriateness to the content that they teach and the pedagogical structure that is used. Putting the purpose before the tool is the actualization of Mishra's TPACK framework, as teachers have to first understand the pedagogical-content knowledge conversion, then find the technology that supports the overlap.



Principles of the Digital Curriculum

There are of course many barriers for schools when they are implementing new initiatives, not to mention whole-school reinvention. With any initiative, a strong vision, shared among all of the school's stakeholders, is essential. Many initiatives fail, not because they are faulty, but because the vision isn't shared very well, creating confusion and a lack of understanding.

While the digital curriculum is an organic process with many naturally evolving parts, there are many bedrock principles that make it easy to share and actualize a vision. Starting with the purpose instead of the tool is one of those principles. Others include:

- **Primacy of 21st Century Skills over Solely Core Area Content** – Core content knowledge is important. But what content? And how will it change as the world changes? In the digital curriculum, content gets boiled down to fewer key concepts. The 21st century skills of critical thinking, communication, collaboration, initiative, creativity, adaptability, and data analysis are timeless qualities that help students no matter the situation or the changing times.

- **1:1 Computing Device over Textbooks & Paper** – The power of a computing device allows students to do so much more than analog textbooks and paper, and therefore are a smarter investment. The 1:1 ratio is critical to give student equal access to learning, extend learning beyond the classroom walls, and give students the tools to effectively learn. Meanwhile, using textbooks and paper get minimized.

- **Access over Security** – There is a spectrum in educational technology of how much access vs. how much security is allowed. In many schools, security is the non-negotiable, and access is only given when it doesn't threaten security. Unfortunately, what is labeled "security" is often a codeword for locking down computers and the network to make less work for technicians. The digital curriculum turns this upside down to make access the non-negotiable. Computers and the network are opened up, allowing teachers and students to experiment with different digital tools.

- **Constructivist (or Project-Based) Learning over Traditional Lessons** – Constructivist learning means a focus on the big ideas, narrowing the curriculum to go deeper (instead of a mile wide and an inch deep). It means loosening up the rigidity of the learning environment. It also means demonstrations and projects over written tests.

- **Connectivism over Insular Learning** – George Siemens' learning theory of connectivism states that, given the digital world of today, people learn by building an infinitely diverse network of connected nodes. These nodes are exposures to different thinkers and concepts, and then weigh those against each other. The key is to help students get access to those original thoughts and people by networking them with others outside the building. Mentorships, e-pals, participating in

authentic internships, and long-distance collaborative projects help students expand their knowledge of the world.

• **Ongoing, Authentic Assessment over Traditional Assessment** – With constructivist and connectivist learning, assessments not only need to be project-oriented, but they must exist in the real world. Student work must make an impact and be shared with more than just the teacher. E-portfolios, presentations to community members, and entrepreneurial projects are all used. To help students get ready for the authentic assessment, teachers use digital tools and a variety of data to help students make formative judgments during the planning, creation and revision processes.

• **Student-Driven Learning over Teacher-Driven Learning** – We should hear students say “I’m going to learn about this…” In a traditional classroom, teachers determine the objectives to be learned, the sequence of learning, the activities to learn them, and the assessments to show that learning. In the digital curriculum, students have a much larger say in the sequence, activities, and assessments. The tasks for teachers is to determine how to scaffold skill building to support students in their learning pursuits.

• **Professional Learning Communities (PLCs) over Professional Isolation** – As Richard DuFour has noted, teachers’ professional practice improves when given the opportunity to be learners themselves. PLCs create collaborative teams for teachers to reflect and share ideas. The digital curriculum takes this to a new level, as teachers are actually teaching in teams as well, through cross-curricular projects.

• **Personal Learning Networks (PLNs) over Top-Down Professional Development** – Learning doesn’t just happen with colleagues you work with. With the existence of online communities, teachers can collaborate and learn with other teachers in the world. So much as classrooms are student-centered, professional development is teacher-centered, driven by their professional needs at their time and pace. Digital tools empower them to learn and improve their practice.

• **Leadership at the Forefront over Leadership on the Sidelines** - No one will

question the importance of leadership, but the proof of commitment is in the proverbial pudding. The leader must be a relentless advocate for the vision. They must exhibit the willingness to empower teachers much as teachers must empower students. And they have to be models of the use of digital learning themselves. The International Society for Technology in Education has listed the following standards for Administrators:

NETS Standards for Administrators

1. Visionary Leadership

- *inspire and facilitate* among all stakeholders a shared vision of purposeful change that maximizes use of digital-age resources to meet and exceed learning goals, support effective instructional practice, and maximize performance of district and school leaders.
- engage in an *ongoing process* to develop, implement, and communicate technology-infused strategic plans aligned with a shared vision.
- *advocate* on local, state and national levels for policies, programs, and funding to support implementation of a technology-infused vision and strategic plan.

2. Digital Age Learning Culture

- ensure instructional innovation focused on continuous improvement of digital-age learning.
- *model and promote the frequent and effective use of technology for learning.*
- provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners.
- ensure effective practice in the study of technology and its infusion across the curriculum.
- *promote and participate in local, national, and global learning communities that stimulate innovation, creativity, and digital-age collaboration.*

3. Excellence in Professional Practice

- allocate time, resources, and access to ensure ongoing professional growth in technology fluency and integration.
- facilitate and participate in learning communities that stimulate, nurture and support administrators, faculty, and staff in the study and use of technology.
- *promote and model* effective communication and collaboration among stakeholders using digital-age tools.
- stay abreast of educational research and emerging trends regarding effective use of technology and encourage evaluation of new technologies for their potential to improve student learning.

4. Systemic Improvement

- lead purposeful change to maximize the achievement of learning goals through the appropriate use of technology and media-rich resources.
- *collaborate to establish metrics, collect and analyze data, interpret results, and share findings to improve staff performance and student learning.*
- *recruit and retain highly competent personnel who use technology creatively and proficiently to advance academic and operational goals.*
- establish and leverage strategic partnerships to support systemic improvement.
- establish and maintain a robust infrastructure for technology including integrated, interoperable technology systems to support management, operations, teaching, and learning.

5. Digital Citizenship

- *ensure equitable access to appropriate digital tools and resources to meet the needs of all learners.*
- promote, model and establish policies for safe, legal, and ethical use of digital information and technology.
- promote and model responsible social interactions related to the use of technology and information.
- model and facilitate the development of a shared cultural understanding and involvement in global issues through the use of contemporary communication and collaboration tools.

Re-inventing Your School

The grim reality of the digital curriculum is that it isn't a simple tweak to what you already do. To make a car more fuel efficient, you could use a different fuel, not run the air conditioner, give it a

car wash. But to see radical gains in fuel efficiency, you have to re-design the car.

As we said earlier, implementing a 1:1 initiative well requires you to not just merely tweak the way you teach. To operate by the principles mentioned in the last section, a school needs to re-invent itself. SLA, SES, and New High Tech all had to re-evaluate the conventions by which a traditional school runs to fully unlock the potential of the digital tools.

- How do we structure the school day?
- How do we set up a student workflow to be self-initiated and self-driven?
- How do we create cross-curricular education so that it is the norm?
- What standardized assessments do we use if we are emphasizing the 21st century skills?
- How does grading change if formative assessment and feedback, driven by students, is paramount?
- How do our notions of graduation requirements and Carnegie units change?
- What community partnerships do we need to establish to provide our students with excellent opportunities?
- What role does the media center play in the school?
- What will teacher budgets be spent on?
- How will programs, teachers, and administrators be evaluated (and what are their expectations)?

Resources

Schools:	<ul style="list-style-type: none"> • Science Leadership Academy, Philadelphia, PA. http://www.scienceleadership.org/drupaled/ • New Technology High School, Napa, CA. http://www.newtechhigh.org/ • School for Environmental Science, Eagan, MN. http://www.district196.org/ses/
Digital Curriculum Theorists	<ul style="list-style-type: none"> • Fryer, Wesley. http://www.speedofcreativity.org • Richardson, Will. http://weblogg-ed.com/ • McLeod, Scott. http://www.dangerouslyirrelevant.org
1:1 Research	<ul style="list-style-type: none"> • Anytime, Anywhere Learning Foundation. http://aalf.org • K-12 Computing Blueprint. http://www.k12blueprint.com/k12/blueprint/
TPACK	<ul style="list-style-type: none"> • Mishra, Punya. http://www.tpck.org
PLCs	<ul style="list-style-type: none"> • DuFour, Richard. <i>Revisiting Professional Learning Communities at Work: New Insights for Improving Schools.</i> Bloomington, IN: Solution Tree Press, 2008.
PLNs	<ul style="list-style-type: none"> • Fullen, Michael. "A 21st Century Professional Development Proposal." http://blogs.edweek.org/edweek/LeaderTalk/2009/01/a_21st_century_professional_de.html
Connectivism	<ul style="list-style-type: none"> • Siemens, George. "Connectivism: A Learning Theory for the Digital Age." http://www.elearnspace.org/Articles/connectivism.htm
Constructivism (Project-Based) Learning	<ul style="list-style-type: none"> • George Lucas Educational Foundation. http://www.edutopia.org/ • Project Based Learning Online. http://www.pbl-online.org/
Authentic Assessment	<ul style="list-style-type: none"> • Wiggins, Grant. <i>Understanding By Design, 2nd Edition.</i> New York: Prentice Hall, 2005.
21 st Century Skills	<ul style="list-style-type: none"> • Wagner, Tony. <i>The Global Achievement Gap.</i> New York: Basic Books, 2008. • Partnership for the 21st Century Skills. http://21stcenturyskills.org/