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# Introductory Strategies for Evaluating Digital Technology Viability in Contemporary Classrooms

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Introductory Strategies for Evaluating Digital Technology Viability in Contemporary  
Classrooms

By

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A thesis submitted to the Department of Education and Human Development of The College at  
Brockport, State University of New York, in partial fulfillment of the requirements for the degree  
of Master of Science in Education.

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Chapter One: Introduction:

### **Problem Statement-**

Today's teachers are facing increasingly daunting challenges when trying to incorporate technology in the classroom. Such challenges include district availability of resources, teacher proficiency and understanding of the tools, and viability of a piece of technology as a meaningful learning tool for students.

As technology advances rapidly in the world around us, so too is it evolving in the classrooms. Additionally, much like any product around the globe can be used nefariously, despite its creators' best intentions, technological applications in the classroom can go awry if not used properly. Most notably, the obstacles that teachers face in regard to this problem aren't confined to the minutes that students are engaged with the tools. No, the challenges are tiered.

One of the first hurdles to clear is the hurdle of accessibility. It's no secret that districts across the country are tightening their budgets, and educational technology is often on the chopping block. Teachers and other school professionals don't have unlimited access to gadgets for their instruction. The price of many programs is prohibitive for their use. Even free trials run out, and so educators need to have systems in place to navigate district-level expectations without jeopardizing other resources or even their own colleagues.

Teachers also need to address their own needs from a piece of software when considering its implementation in class. They need to make sure they're not just making a digital version of pen and paper assignments. Rather, teachers need to make sure that the products are bringing

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innovation into the classroom. Instruction should be revolutionized in a way that increases teacher productivity and decreases banal, busy work on the part of the teacher. While doing those things, it should also deliver the specific types of instruction desired by the instructor, whether it is memorization, critical thinking, or evaluation and adjustment of previous work.

Most importantly, student use of technology should be deliberate and appropriate. Too many students are inundated with technology that provides valueless or even negative-value consumption of time and energy. Students should spend less time as empty consumers on social media platforms or being exposed to a revolving door of digital instruments that require more time to be taught their use than they are actually used.

In short, school-based professionals need a way to evaluate district, classroom, and self-needs before committing to the implementation of a new educational instrument. It is my hope that this text can investigate the ways that tech is being used, how to evaluate it from a multitude of perspectives, and eventually offer a solution for instructors to implement.

### **Significance of the Problem-**

In order to best invest our time and assets, teachers need to understand the factors that are important to deciding what to bring into the classroom. Just as we would evaluate textbooks, field trips, or state-wide learning standards, so too should we measure educational technology by a defined set of criteria. Without appropriate standards, we're doomed to a cavalcade of new applications. The best thing for all parties involved is to standardize the methods for utilizing new technology, which will mitigate financial waste at the district level, increase teacher effectiveness, and decrease gaps in student achievement.

### **The Purpose-**

The purpose of my work is to illustrate the current observed effects of technology in the classroom as a means of justifying its inclusion in all teachers' courses. As a product of that review of current literature, it has also become apparent that teachers require something akin to a checklist when deciding whether or not to bring a new element into their classrooms. Therefore, the ultimate purpose of my work is to provide an elementary checklist that allows teachers to measure and score any given item on a sliding scale of usability.

### **The Rationale-**

I have decided to pursue this particular avenue of research as a result of my own teaching. As a younger teacher, my colleagues often turn to me for technological advice, and I admittedly enjoy that role. Unfortunately, with new flashes of brilliance popping up in application and device stores every day, it can be difficult to separate the style from the substance. Moreover, aside from my own tribulations with technology, my colleagues, especially veterans, often have little experience with classroom technology and need to be able to calibrate these new options for themselves when the opportunities arise. At the very least, I think that it will lend credence in my own evaluation of a site or program if I have an objective set of standards that I can pass on for my coworkers to leaf through and read for themselves.

### **Definition of Terms-**

1. Devices- a mechanical or electronic piece of equipment created for a specific purpose
2. Software- the programs and other intangible elements used within devices

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3. Technology- here: educational technology. Any digital or electronic tool, hardware or software, used for instruction in any way.
4. Text- generally regarded as any written material, but can be used in reference to a source that drives classroom curriculum (e.g. a film or audio clip)
5. Media- plural of medium: methods of transmitting something, especially information
6. English/ Language Arts- terms for the humanities classes with focus on English language acquisition skills via reading and writing of a variety of texts
7. Literacy/Literacies- a collection of cultural and communicative practices shared among members of particular groups
8. Integrating- incorporating or putting together previously foreign parts to create a cohesive classroom
9. Logistical- relating to the organization or planning of events or activities
10. Conceptual- relating to philosophical, often abstract thoughts and ideas.
11. Professional Development- learning or received training of teachers that contribute to a greater effectiveness in the classroom
12. Seat Time- the amount of time students are sitting and learning in the classroom environment, specifically via direct instruction
13. Instructional Time- the amount of time teachers are delivering content and curriculum to their students during their workday

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14. 21st Century Information- the knowledge and skills necessary for students to become successful and independent in their post-secondary college and career goals.
15. Real-Time Linkup- simultaneous with the present. Occurring at the same time.
16. Higher-Order Thinking- thought, by students, that requires reasoning and critical thinking, not just basic recall functions or memorization.
17. Collaboration/Cooperation- effective and efficient work with other learners or instructors, regardless of cultural or other differences.
18. Generative-the active integration of new ideas with the learner's existing schemata. The main idea of generative learning is that, in order to learn with understanding, a learner has to construct meaning actively
19. Nongenerative- the basic recall of facts and other information without higher-level thought.
20. Basic Recall Functions- the acts of remembering something that was committed to memory
21. Reasoning-the generation or evaluation of claims in relation to their supporting arguments and evidence. The ability to reason has a fundamental impact on one's ability to learn from new information and experiences because reasoning skills determine how people comprehend, evaluate, and accept claims and arguments
22. Differentiated Instruction-the way in which a teacher anticipates and responds to a variety of students' needs in the classroom. To meet students' needs, teachers differentiate by

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modifying the content (what is being taught), the process (how it is taught) and the product (how students demonstrate their learning).

23. Scaffolding- refers to a variety of instructional techniques used to move students progressively toward stronger understanding and, ultimately, greater independence in the learning process.

## Chapter 2

### I. Current Scope and Practices

The antique smell from a cracked-open library book. Yellow-edged stories staring out from a crisp, white spine. The page-by-page notice of a person's journey through a novel as marked by the sound of turning leaves of paper. Few academic areas are marked by such visceral interactions with their materials, and fewer areas still are filled with professionals who feel that the more technology is introduced to their subjects, the further it has regressed as a discipline. As such, the contemporary Language Arts teacher poses a substantial danger to student development if he or she is a stalwart defender of traditional classrooms and opponent of classroom technology.

In order to adequately address the topic of technology in the classroom, we have to recognize the gravity of new technological motives. New devices in our classroom no longer mark simply a movie day or single-lesson span of innovation. No, "these technologies aren't just changing our lived conditions, they are changing the way that we think" (Swenson, et al., 352). Our technology has ceased to serve the same role with a new sheen. The content available to our students currently is allowing them a broader world view, with access to content previously unavailable to their predecessors— text, digitally, or otherwise. These revolutionary media "are change agents whose effects are so pervasive they influence our thinking and ideologies, it is easy to understand the trepidation many of us feel when thinking about why, when, and how we will introduce their study in our English education courses" (Swenson, et al., 352). Students in classrooms today have broader, more globally aware, and globally interconnected experiences than all generations prior. Their literacies, of all kinds (including social, economic, emotional,

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academic, and more) are expanding and evolving by the second. Why, then, with such opportunity for international collaboration and growth, coupled with humane and cosmopolitan ideas, would we not dive, headlong, into the electronic world? It's big, scary, and a multi-tiered problem.

Integrating effective new technology is troublesome because of the logistical and conceptual barriers it presents for itself. While the same old trends of education will leave our students unprepared for a more diverse world, attempting technological integration can be nearly as damning an endeavor. It's easy to overlook the fact that "English educators need release time, as well as access to newer technologies and to high quality professional development in order to critically and productively evaluate the potential of these technologies and literacies for their students" (Swenson, et al., 366). Beyond convincing educators to change their ways, willingly, there are hurdles to overcome. Educators that agree to be at the forefront of new advances in technology are then forced to decide between, or succumb to, a litany of daunting expectations. In order to learn the new material, many teachers need to find time when this new training may occur. Teachers' schedules are packed as it is, so forcing administrators to muscle in time for these tasks can be intimidating, if not insulting to the already over-worked administrators. That, of course, only follows once a teacher has decided to give up classroom time in order to gain this professional edge. Gaining 21<sup>st</sup> century information is great, but if it comes at the expense of seat and instructional time with the students you're hoping to help, you're doubly unfortunate. Then, if scheduling is rearranged and approved, districts need to be able to locate and access devices for the educators to use. Finally, once all those other pieces have fallen into place, a district needs to offer or access high-quality and relevant professional development for its teachers. The prospect of navigating through each of those steps each time a new digital tool is sought to be

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evaluated is daunting enough without acknowledging the fact that many times, new equipment or software is presented and evaluated by teachers just to end up denied and deemed less valuable than is worth its use. Taking this trek routinely, in the hopes of finding valuable and practical technology can undoubtedly take a toll on a district's acutely finite resources. If money grew on trees, the field of education would not be much of an arborist's dream. It doesn't have much of it, and it relieves itself of any amounts left in the coffers with relative expedience. Assuming, though, that all of those aforementioned hoops were able to be traversed, it's important to look at advantages and disadvantages once you've invited a new, digital realm into the classroom.

In a society that is growing rampantly more interdependent, technology offers tiered and structured opportunities to conduct a global classroom. When establishing such a task, we must recognize that "designing a global collaborative experience involves transcending the obvious real-time linkup, fostering higher-order thinking and providing opportunities for cultural understanding, while usually making a product that impacts others in a positive way" (Lindsay). Students are able to pool resources in constructing a product across a variety of obstacles. This allows students to problem solve a variety of issues while still maintaining focus on a shared goal. Learners are also encouraged to follow higher-order thinking in order to achieve their goal with partners who were raised and may currently live in conditions very different from their own, with processing methods and understandings that may be unfamiliar to them. These differences between the two parties during their collaboration will permanently alter each's understanding of the world and culture of the other's. Our world is facing universal issues now more than ever, and allowing our classrooms to be a stepping stone to collaborations between citizens of the world and patriots of all mankind may be a step in the direction of preserving our planet for more generations of cooperative learners.

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Just as remarkable as a network of collaborating students is the network of hardworking educators who work jointly to offer these opportunities to students. While the task can seem overwhelming, “newcomers to global collaboration may find it easier to join an existing project or implementation that already has experienced educators leading the collaboration” (Lindsay). Teachers who are fresh to the community have expertise, materials, and guidance available for their consumption and implementation in class. They are able to navigate pre-made lessons as they whet their appetites for global classrooms. Once comfortably situated in the community, “those wanting to design, run and manage their own global collaborations [are given resources and plans by] the Online Global Collaboration Taxonomy” (Lindsay). Welcoming these occasions available thanks to technology is fairly fail-safe, with systems set to support and progress professionals at any stage of their plan.

Many educators, with leagues of parents and medical professionals at their flanks, have legitimate concerns regarding the potential overuse of electronics in their children’s daily lives. One concern raised is related to memory and understanding in typed work versus work written out in longhand. Many studies typically find that devices used in class decrease performance because of the distractions available on those devices (Mueller & Oppenheimer 1159). That in itself is a legitimate concern for many people, especially since the modern English classroom is rich with research in which access to resources beyond a simple word processor is necessary. What, though, should be made of the use of electronics for more rote activities, with potential distraction eliminated? Then would technology be a valuable tool for students in the classroom? It seems the answer is not so simple.

Notetaking in class utilizes two theoretical methods: encoding and external storage. In studies that attempted to isolate the activity of notetaking and measure its effects on encoding,

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longhand notes win, time after time, over typed notes. It seems that, “even when distractions are controlled for, laptop use might impair performance by affecting the manner and quality of in-class note taking (Mueller & Oppenheimer 1159). In other words, the authors of the article suggest that individuals who type their notes instead of writing them out by hand are more likely to partake in poor note-taking behaviors. These behaviors primarily revolve around “generative (e.g., summarizing, paraphrasing, concept mapping) or nongenerative (i.e., verbatim copying)” notes (Mueller & Oppenheimer 1160). Generative notetaking contributed to significantly higher retention of material from notes than nongenerative notetaking, and, unsurprisingly, students who typed were more likely to take nongenerative notes, while handwritten notetakers were more likely to take generative notes. Even in studies that explicitly instructed students to avoid verbatim notes resulted in poor retention (Mueller & Oppenheimer 1163). The reason for that result, though, was not because students changed their notetaking style but typing still condemned them to poor retention, but because the directive resulted in no measurable change in verbatim content.

Perhaps, like any content we expect students to learn, we need to model and develop the appropriate skills we expect from our scholars. Students simply seem to need to know how to utilize the strengths available to them as a product of their devices. Mueller and Oppenheimer’s studies showed that students were able to do more work, more quickly with devices, leaving them more likely to use their speed to record lectures verbatim. It should also be mentioned that retention and performance were mostly impacted negatively when dealing with conceptual topics or tasks, while factual recall was still comparably high when typing (including verbatim). Therefore topics like vocabulary, grammar, or other basic recall functions that lay important groundwork in the English curriculum are aptly suited for typewriting. While it seems reasoning

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needs a bit more growth as a product of notes taken on word processors, it's more the style of notes than the means of production that needs tweaking. These results paint an optimistic future for technology in classrooms, especially since the participants of the studies were members of the college community at the University of California, Los Angeles. The benefits of technologies in class are compounded when addressing the writing skills of students with disabilities in the contemporary ELA classroom.

Students with disabilities, especially those disabilities which affect writing skills, are offered more opportunities as a result of educational technology in their English classes. Advances in classroom technologies have “provided new opportunities for these students [with disabilities] to maximize their powers of expression, even to the point where they can find as much enjoyment in writing as their counterparts” (Zhang 1). Word processing software and other analogous equipment has allowed this demographic, often plagued by self-consciousness and discouragement, to find new strength in the former enemy territory of English classes. Studies have shown that “frequency of revision, rethinking, and rewriting were shown...to correlate more closely with students who used word processing as the writing tool, as compared with students who wrote with paper and pencil” (Zhang 1). The author of the text argues that “we have seen more evidence showing that purposefully designed computer programs can help students with learning disabilities become better writers after repeated practice” (Zhang 6). Not only do targeted, specific software programs offer less judgmental arenas for skills practice, they also provide a platform to overcome non-academic impediments to their success, such as those relating to “poor frustration tolerance, poor task persistence, and concomitant low self-esteem” (Zhang 6). Those benefits are seen in only a specific example of word processing software,

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though, so with handfuls of other examples of technology, students with disabilities (or not!) have more opportunities to grow.

Differentiated instruction is an additional byproduct of educational technology that serves students with and without disabilities equally, by definition. Differentiated instruction involves “providing materials and tasks at varied levels of difficulty with varying degrees of scaffolding, through multiple instruction groups” (RTEC 1). Features of some digital products such as “Talking Text,” “Digital Text,” “Word Features,” “Enhanced Text,” “Portable Devices,” and “Graphic Organizers” each allow students to modify their needs in terms of “content, channels of input, and means of output” (RTEC 1). In the modern English classroom, some students may be auditory learners while others are visual learners. Both of those learners could use technology to either listen to an audiobook to satisfy their learning needs, or read the text while supplementing it with relevant illustrations. Also, times requiring different instruction, such as when some students need focus on vocabulary development while others need practice with grammar skills, technology can allow educators to present their students with the materials necessary for their independent success. With the presentation of information from cyberspace, could it ever substitute the need for a human body at the front of the classroom?

Online portals offer student learning without a dedicated teacher at the helm. With programs which are developing adaptive technology that adjust instruction and assessment in concert with participants progress, and click-and-drop activities online that show promise for student achievement, is there any possibility that teachers will become irrelevant? A school in Colorado has people thinking so, after the district “cut three foreign-language teaching positions and relace[d] them with online instruction” (Quillen 1). While it’s different from corporate images of mechanical arms screwing and soldering in the stead of former factory workers,

there's potential for real concern about the demise of the American Teacher. While there is still currently "feedback from a live—albeit remotely located—teacher," it's important to monitor the trending absence of a face and project what the next steps may be for today's educators in a possibly redundant tomorrow (Quillen 5). Perhaps the day may come, or has come, when we teachers are no longer the fountain of information at the front of the classroom, producing the knowledge that the students must receive. Perhaps, rather, we have become facilitators of learning—ones who deliver the *soft skills* of life alongside the traditional learning—a role that seems so similar, yet so far, from the Language Arts teachers of yesteryear.

English is a content area with a rich and subtly stubborn past. Sometimes regarded as the ancient in hallways around the country, English is facing a renaissance with the growth of educational technology. There are legitimate concerns and hopes alike when addressing the role of technology in 21<sup>st</sup> century classrooms, and it's important to register the benefits and drawbacks of communities, districts, instructors, and, most importantly, students, when deciding when and what is appropriate for districts, teachers, and, most importantly, students in Language Arts classes.

## **II. Aversions to Technology**

Despite abundant advances in technology, and applications that can serve nearly any need, there are still aversions to the adoption of different technological tools within any classroom, especially the English Language Arts classroom. While the previous section spoke well to introduce the general practices and their obstacles, it is also important to evaluate the objective and material factors prohibiting digital technology from being readily established—and much like the headaches of the previous section, the prohibitive factors are multiplicitous.

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The first issue to investigate is why technology might not flourish because of district-level inhibitions. One of the greatest impediments for district-level implementation and rollout is the cost of these programs. According to an article that looked at the funding steps taken by districts executing extensive technology initiatives, “Officials in [Mooresville Graded School District], which ranked almost last in the state in per-student spending, knew rolling laptops out to all students in grades three through 12 would be an expensive undertaking. They knew the initial outlay would be followed by maintenance, professional development, and replacement costs. And they knew that finding the right funding formula would require changing the status quo. It would also require sacrifice” (Rhor). Districts, including this district, are acutely aware of the fact that any attempts at meaningful adjustments in curriculum or administration of curriculum mean that there will be long-term and even cyclical costs for training and maintaining the new tools. As a result, many districts are wary to take on these initiatives. It can be especially daunting for a district to broach the subject when predecessors have had to sacrifice manpower for machines. Mooreseville, after “a hard look at finances” decided on “the elimination of more than 35 teaching positions” in order to budget for one-to-one devices for every student in the district. Garnering collective support for the firing of teachers isn’t a great way to start a years-long journey, although fiscal responsibility may be a good start. Even with fiscal awareness at the forefront, though, schools have plenty to be wary of.

Pinching pennies or not, it can leave educators in a squeeze when technology programs hit their rooms. From the moment the Los Angeles Unified School District (LAUSD) began their technology initiative, it “was crippled by problems. The preloaded Pearson curriculum was full of glitches. Students hacked into the devices. The Wi-Fi infrastructure was inadequate. And, perhaps most critically, there was a dire lack of teacher training” (Walker). Districts using new

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technologies are not implementing these novelties in a vacuum: they need to make sure that the program is vetted and reputable, that the buildings and networks are sufficient to house the projects, and, most importantly, that teachers (and students!) are involved in the decision-making process and prepared for the rollout. Districts are finding that personnel are one of the primary cruxes of any policy change— but they need to find ways to entice and retain them.

Teachers themselves rest along a spectrum of interest in new educational technology. They all have different needs and current abilities when it comes to electronic learning appliances on their desktops. Typically, according to Marc Prensky in an article published on *edutopia*, teachers who are willing to take on some new technology tend to proceed through four steps: “Dabbling, Doing old things in old ways, Doing old things in new ways, and Doing new things in new ways” (Prensky). While it’s great to scaffold our professional exposure to relevant programs, those very steps may prevent teachers from following through on their use. Dabbling, according to Prensky, is mostly just attempting to utilize technology that happens to be in your environment with a sort of haphazard guessing. There is very little intention or structure to it. Unfortunately, for the color-coded, sticky-note-tabbed-binder teachers among us, that could be more intimidation than it seems to be worth. Without guidance or reason for using a new contrivance, some teachers may pass the opportunity for dabbling in favor of tried-and-true methods of the past. Suppose, though, that a teacher makes it past dabbling and begins using electronics with intention, the second phase of adoption is still only doing “doing old things in old ways” (Prensky). Making it to that phase is nothing to scoff at, surely, but to the skeptics among teachers, that phase is the very thing that makes all educational technology a ridicule among professionals. To some, this step in the process is nothing more than a hyper-expensive bulletin board. Without awareness of the context of the steps toward mastery, teachers could fall

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short because of the redundancy this step appears to offer. This frame of reference can be seen in the goals of the Los Angeles Unified School District. When they began their technology proposal, the gameplan was simple. “The goal? To “revolutionize” learning, of course” (Walker). It’s tough to fault a district with aiming high, but by pursuing the revolution of learning as an immediacy, they short-sold the skills-acquisition process, and ultimately failed. Sure, the reports paint a bleak picture from several angles, the point remains that people who are aggressively ambitious with their technology visions may crash and burn before they’re able to get off the ground. That sort of issue could halt many an educator who could potentially affect positive change in the conversation about classroom technology. One would have to reach the third of four steps in this process before they begin to experience any substantial, non-marginal innovation in their instruction, and that may be of too much time and instruction for some.

One of the most important factions in a technology plan is the students, but their perspective on, or at least their received impact from, the use of these tools is invaluable in finding out the tools’ worth. Unsurprisingly, students share many of the same concerns with cyber learning as adult critics of the pedagogical shift. Even considering all of the advantages of this new style of learning, “many students also saw drawbacks to the increased use of technology in schools. In particular, students worry about the distractions and temptations of ‘self-paced learning,’ something many advocates of digital education have touted as a way to get away from one-size-fits-all education to a more personalized experience” (Garland). It seems, then, that even students can be hesitant to commit, headlong, to the greater autonomy of technology. Students still require management and supervision during their learning in order to avoid pitfalls available to everyone— even adults. That safekeeping isn’t just to manage time, either. One student expressed “frustration with school iPads and concern about her teacher’s naivete about

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what students are doing” (Heitner), suggesting that students require more dutiful supervision than even one set of classroom eyes. Furthermore, students may need some guardianship from each other or themselves. Though she leaves it vague, one of Garland’s participants concedes that “there’s some give and take” in the kinds of social interactions available in cyber classes, students “do know how to handle [themselves] in a cyber world,” which “they all agreed, was something they would need to know how to do in their future careers” (Garland). It is left unsaid how those students learn those skills though. It would take dedicated and direct instruction by a teacher, and an almost hawk-like awareness of the class goings-on to be sure that students know how, and are, interacting in a way that is acceptable and appropriate. Students seem aware of the importance of interacting, they’re just also aware of the opportunities, both positive and negative, that may be a product of it.

Being blinded by the brilliance of new trends in education can be easy, but it’s important to be aware of the potential pitfalls of these fads if we want them to stay as prominent fixtures in schools. Educational technology is no different. Districts-level administration, teachers, and students all have different expectations, standards, and concerns for the implementation of classroom technology, many of which are warranted. In order to have a smooth, successful implementation, everyone must work together to mitigate and eliminate those glitches, before the software ever runs a line of code.

### Chapter 3

#### Keeping Pace in the Cyberspace Race:

##### Solutions for Implementing & Evaluating Digital Technology in Contemporary Classrooms

Anecdotes from across the country offer validity to concerns about this new world of technology that's sweeping the nation, but there is also a wealth of information out there to help combat those worries. As we trek further and further into the technological world, it's important that we, as a whole, begin to generate techniques and strategies that offer the opportunity to alleviate the potential predicaments of cyber interactions while also maximizing the benefits of opportunities that those machines offer. In order to generate 21st Century learners in our schools, we, too, must take on and master the realm ourselves.

The budgetary concerns of districts are sensible, but assuaging economic naysayers isn't necessarily the first issue that top-level administrators should be tackling. In order to foster a successful technology program in a district, school leadership has an important role to play. For example, "the superintendent needs to know what technology is available and already installed. Staff and teachers need to know they have support to solve issues when IT problems arise. They also need support to learn a program, get over the "new technology hump" and stick with it, even if the first attempt has a problem" ("A Small District Superintendent's Guide to Technology Integration" 2017). This element is two-fold, because it requires the district leader to be aware of both technology and personnel. Superintendents should know what programs exist in the cyber-sphere, what they're capable of, and what services are already being provided to the children and staff, and then, beyond that, they need to be aware of the capabilities of their own staff. Once the

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administrators are cognizant of both of those aspects, then the district can move forward in the rollout of educational technology.

While issues of viability of classroom technology continue to bloom and blossom throughout the educational world, there are many steps that can be taken to avoid the pitfalls that have plagued previous generations of innovators. As we continue to look at the needs and desires of educators, the students they serve, and the districts that they function in, we must also reflect on the successes and tribulations of their predecessors. While it's tough to say that any one experience is wholly and completely representative of any other experience, we would be remiss to think that those districts who dabbled in our field before us lack relevance to the current educational technology paradigm in which we function today. Therefore, to satisfy our hope for a solution, we will look at the perspective of districts, teachers, and students, and at the implementation of new classroom technologies from such specific lenses such as fiscal, security, and universality. Hopefully, through this approach, we can better evaluate everyone's needs prior to implantation and, therefore, yield more productive and effective results from these resources.

### **A. District-Level Solutions**

One hurdle— and frequently the most powerful hurdle that requires overcoming in the quest for classroom technology— is that of the district level administration. District administrators are not always seen as the heroes of districts, but they do play an important role in finding and implementing classroom technology under their supervision. As our administrators, they're responsible for finding, approving, funding, maintaining, and providing training for all the tools that are acquired by the district. While that seems like a flatly impossible task, I will lay out steps that can be taken by districts and their administration in order to tackle these issues

before they even arise. It should be noted that, while many of these issues are universal, any issue should be addressed on an individual basis, and any person or persons evaluating these solutions should consider the specific needs of their school community before moving forward with any of the proposals covered here.

### ***I. Finding Tools***

The beginning of the journey of technological integration in the classroom often begins with the discovery of technological tools that apply to the population of students being served. People may not realize that administration actually plays an important role in finding those tools. In this section we will discuss different ways that district level personnel can contribute positively to the discovery of an investigation into digital tools available to teachers across grade levels.

The first method available to a district in order to discover new digital tools is to attend conferences. While this method may seem like a regressive, luddite approach to field that prides itself on constant innovation and looks down upon stagnancy, regardless of how marked its brevity is, it is none the less a valuable and effective method of engaging with new and interesting technology in the company of like-minded peers and colleagues in a focused and engaged environment. Besides the appeal of these direct interactions to traditionalists in education, conferences are also a responsible choice for those who are new to technology who might enjoy conferences that offer exposure to innovative technology for classrooms, and which run the gamut in almost every sense.

You may find large, national conferences that suit your needs, but you may also look for, and find, smaller, local conventions that address the needs of your school community without travelling too far from home. There are even international bodies, like the International Society

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for Technology in Education — or more commonly known as ISTE— that work with educators around the world to find engaging new methods of technological integration in the classroom. ISTE has a yearly conference that confronts and advances current trends in digital-friendly classrooms and shares them with everyone.

If that seems overwhelming, districts can also approach smaller, statewide conferences like the slightly misnomered NYSCATE conference— a conference hosted by the New York State Association for Computers and Technology in Education— which also offers a yearly conference that is chock-full of educators and tech enthusiasts who want nothing more than to bring the best new cyber products to eager young learners. Aside from actual practitioners of classroom technology, there are also producers of it. Companies that manufacture and create hardware and software are frequently seen at the annual NYSCATE conference (and many other conferences), which means that the attendees to the event and other events like it are given immediate access to tools and the creators of them. Even more remarkable than the accessibility of people who could provide troubleshooting for their own products that you may use is the fact that these vendors often offer the first access to new products at these conferences. That means that those in attendance aren't just at the forefront of their school because they're interested in cyber resources— they are actually, potentially, at the forefront of all digitally literate teachers because of their advanced access to state-of-the-art, cutting-edge resources. That type of opportunity, and other opportunities like it, make attending state, national, or international conferences on technology that much more lucrative for anyone interested, but if that sort of commotion and commercialism seems like a daunting element to approach, then you may find local-level conferences that still expose you to the kinds of new technology that you're hoping will elevate the achievement potential of your school's students.

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Local conferences range in scope and effect, so one should be judicious when deciding which events are worth attending, but district or regional-level conferences are still available for administrators to attend and discover new electronic elements to introduce into classrooms. Events like EdCamps or even unsponsored, in-district gatherings allow district to see what tools are available and typically already being used. This is particularly advantageous because when one's own district or just districts within a limited geographical radius are participating in an event like this, general demographics between the districts— like ethnic and lingual composition, academic performance, socio-economic profiles, and per capita resources— tend to group nearer to each other than the polarity that may be seen at national or even international conferences. In the Greater Rochester Area, I have been lucky enough to have attended, and even presented at, several different local conferences and can verify their validity and helpfulness in the exposure and transmission of new digital information to curious educators, and all of the experiences were positive ones. The first conference of this type that I attended was being hosted by the district I was working at and allowed teachers within the district to present information to their colleagues, including the administrators of the buildings and the district as a whole. Several of my supervisors mentioned to me that, during the course of the day, they were able to discover new and interesting digital tools that they were previously unaware of. They had new resources revealed to them despite being in these people's classrooms frequently throughout the year and having conversations with those colleagues about their classroom resources. This effect is compounded when there are two or three other districts involved, like at EdCamps.

Administrators attending EdCamps, which occur across the country, and have been seen in districts across New York, are submerged in the world of fellow educators, but are given the opportunity to choose the topics they learn about. This means that district-rank personnel can

arrive at a conference and request a session's discussion be focused around growing trends or new opportunities in cyber implements being used, and that will happen. These sessions are especially helpful for district personnel to attend because the presenters are typically educators who are actually using the applications themselves, and the attendees, by and large, are other teachers who may be able, and are even strongly encouraged, to weigh in on the topic and any claims about it as well.

As you can see, opportunities for detection of classroom electronics are frequent and varied. Though districts have different reasons and chances for accessing these tools, the options are there, regardless. It's invaluable for administrators who are typically only seen in the context of their centralized offices to be seen as leaders in the search of interesting new ways of engaging and enhancing students across grade and content levels. Without their power at the helm, progress is not possible.

## ***II. Tool Acquisition***

Districts that encounter tools which may catch their fancy are subsequently faced with a new, and almost equally daunting, task. Though the process of uncovering new options in the technological realm can be an overwhelming process in and of itself, it can be equally intimidating for officials in the district to figure out ways to bring those options into the classrooms of their teachers. Luckily, there are plenty of options available almost exclusively, or at least more readily, to the higher-ups of administration within the school community. If a school locality is well underway with their search of tools, and there are choices of applications of interest on the metaphorical table, those localities can begin to sift through options of

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purchase-free tools, trial periods, and budgetary options available to help navigate the acquisition of the desired resources.

The first option that a district can take to proceed toward the receipt of interesting new programs would be to find whether or not the software in question is even a software that charges for the service that is provided. There are a remarkable amount of tools being sought by districts that offer their services for free. There are Learning Management Softwares (LMS) offered by Google— Google Classroom— and other developers in the field— such as Schoology— for free. Some of these products, albeit, may be limited versions of a pay-to-utilize full-sized versions of the same resources, but the free options are there, regardless. It should also be mentioned that starting out with the free, though limited, version of a product may sometimes be advantageous to schools or teachers who are just beginning to familiarize themselves with this new cyber world of education. The restricted availability of implements may allow teachers to ease into the fresh-faced interface of the product without becoming too immediately overwhelmed.

Schools may also turn, for less immense projects, to inherently free assets offered as add-ons to other technologies. One shining example of this is the webstore offered by Google. Administrators who venture into the Chrome-based webstore can find add-ons and extensions galore that may address the specific needs of their overall communities, many of them for free. For example, a district struggling with professional interactions between its employees and members of the community may look to a resource like Grammarly to foster high-quality interactions. Grammarly is a free tool from the web store that monitors grammar and usage of language in a user and signals the need for modification as it's being used. The webstore is a

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great location for additional tools, because all that is needed is the free browser, Chrome. There is nearly no limit to the types of add-ons and extensions available to districts through this site.

Districts that may already have certain, specific tools besides the average desktop or laptop may have even more options for free resources. For example, some districts have their own arsenal of iPads and other Apple products, which allows them access to the Apple App Store—a collection of software applications that offer similarly multiplicitous access to resources as Chrome’s Web Store. There may even be districts which function within the realm of Android or Amazon based “web stores.” Even those platforms offer districts quick and easy access, and most importantly, often for free, to the tools of their choosing. The convenience of those stores of applications don’t stop there either.

The leaders of a district may fall in love with the services offered by one type of program, but may find the cost of the program to be prohibitive. Luckily, there are, more times than not and in my personal experience, programs and services on these app stores or elsewhere that offer the same end-user experience as the first-found program for a fraction, or absence, of the cost. My very own district handled an in-house issue with this strategy. We initially fell in love with a website called Vocabulary.com. After working with the site, and even getting a trial period (which I will address shortly), we received a quote on a subscription to the service. That service, however, was unaffordable for our district considering the usage and scope of our current practice, and the district informed its teachers that we would be unable to take advantage of that resource and would need to look elsewhere to satisfy that element of our curriculum. Teachers and administrators alike each took to the Chrome Web Store and to the internet at large to find a replacement. Fortunately, the search payed off, and the district found an array of vocabulary tools that, together, addressed most of the needs that were previously expected to be satisfied by

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Vocabulary.com. That turn of fortune brings us back to the trial period that I previously mentioned, because we wouldn't have known exactly what features we needed to look for in our replacements if we hadn't worked with the developers and representatives at Vocabulary.com to negotiate that initial trial period.

Districts that are just beginning to break into the cyberspace race have a smattering of choices available to them to ease their dabbling entry into the sometimes choppy waters, including working with personnel at the helm of their software manufacturers of choice. As I mentioned above, paid services are happy, regularly, to work with districts, especially those of a notable size. It works for the development company as a sort of marketing scheme, showing the people who use the site all the bells and whistles it has to offer. At the same time, users are able to engage with the products they're interested in for the purpose of evaluating them and finding whether or not the contraption at hand is appropriate for their needs. If an agreement doesn't work out after the trial period has ended, users can take their experiences from that dry run and use it to fuel their search for a new tool of their liking. If necessary, districts can even work with new vendors to try to implement desired features from old products into new acquisitions. There is also something to be said of the soft spot that many corporations have for the apparently-altruistic field of education. Sure, districts offer large contracts to these corporations many times, which benefit the business, but anecdotal experience has suggested that those companies are willing to bend far more to the needs of an educational agency than they might for an individual or for-profit venture bring the same issues to them.

Sometimes cost-cutting measures are unavoidable, and companies need to be paid, or districts just need additional funds to cover final costs after discounts have been applied to the products and services being provided. When that happens, districts have two options to turn to.

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Firstly, a district may pursue grants to subsidize or complete cover the costs of the implementation of the new items. Government funding is often available for these types of pursuits. New York State offered the “Smart Schools Bond Act” to contribute nearly two billion dollars to schools making attempts to integrate their buildings with educational technology. Many districts in the Upstate-New-York area applied for, and several received, this grant, which propelled their digital integration far beyond what it was prior. Some districts used that money to launch one-to-one device programs. In these programs, students in the district each receive their very own device, such as a Chromebook, other notebook computer, laptop, tablet, or similar device. This allows students much more expanded access to resources than simple paper-and-pen assignments previously could. Bringing home and toting around an individual device is fantastic from a pedagogical perspective, but the fiscally aware among us may realize that those factors are accompanied by supplemental costs of maintenance, repair, training, and insurance for students, which means a need for more funds if grant funds have run out.

An option for some districts who don’t qualify for or have interest in these grants is simply budgeting. While many of the preceding choices of being able to attain the desired commodity are preferable, there are certain times when using one’s own district funds is necessary or preferable. During those times, it’s important for a district to evaluate current spending practices in order to hopefully find a surplus or a place that could have its costs adjusted. It’s valuable to keep in mind that shifting to a more electronic-friendly method of day-to-day function has some environmentally and financially friendly repercussions that may not have been anticipated. Costs of shredding services and disposal for hard copy documents will likely decrease, as well as budgets for classroom supplies like pens, pencils, paper, sharpeners, highlighters, and other tools that fall under the new digital umbrella. While these costs are

unlikely to cover the entirety of a technological rollout, they can ease the financial burden and avoid highly undesirable situations like increasing school taxes drastically or limiting the rehiring of positions that are lost to events such as retirement or resignation.

The people who staff the executive offices of districts are doing almost anything but smoothly sailing through the collection of Silicon-Valley era of education. However, once these powerhouses of the academic institutions are able to find tools they prefer for the school community, the options for obtaining them abound. Superintendents and their supporting professionals can find free tools, get cost-free access to paid tools, or manage and procure budgetary funds for these tools. Any way it's viewed, districts have an undeniably immense position in the way schools gain access to the technological tools of tomorrow.

### ***III. Teacher training***

The modern school district has several hurdles to clear in the quest for new classroom technology. That quest, however, is not complete once the district is in possession of those technologies, though. In order to have a seamless and satisfying transition from analog materials to digital replacements, districts need to offer serious and careful consideration for how they'll offer training to the educators in the district. Without training, even the best digital resources could fall to the wayside and be left unused. For that reason, as districts begin to hone in on release dates for tech tools in their schools, administrative staff members should consider facilitating in-district professional development, capitalizing on cooperative education service trainers from places like BOCES, investigating organizational learning opportunities from local, state, or national associations, or even simply employing the informal services of an in-house professional.

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Districts have a responsibility to provide assistance in the process of becoming familiar with new tools, and one of those options is offering in-district professional development. Larger districts may have a dedicated coordinator or developer of professional development for the employees, which is great. If a district does not have such a position, it may behoove the administration and the school community to appoint a teacher to a special assignment of providing professional development specific to the electronic products that have been acquired. Having that dedicated deliverer of training will allow consistent focus and intention to the development and aid of a district's educational professionals, especially when there is an influx of new resources and expectation that also happen to accompany them.

If there is no opportunity for an individual within the district to offer their support to the teachers, BOCES or similar regional collective may be a good alternative. A benefit of BOCES is that they have a slew of trainers and presenters who have a fixed breadth of topics they are experts in, and so specific needs can be addressed by a highly qualified presenter. Of course, the need for presenters sometime arises outside of the times that they are scheduled to be there, but a proactive strategy to providing the training is key to successfully utilizing their skills.

Beyond serving one's own district, trainings are available for all sorts of skills and programs. Conference organizing entities like ISTE and NYSCATE have regular opportunities for professional development. These offers are scattered across the regions they represent, and they also cover a wide variety of topics, both digital and otherwise. Districts can offer to send their employees to trainings to earn Google Educator Certification, learn tricks in Schoology, learn about virtual classrooms, or even gain qualifications as a security expert at these offerings. There are frequently offshoots of the conference organizations where vendors from those conferences independently offer comprehensive trainings on their own products. That way,

people who want to learn about a topic can get that information from those who created and can continue to adjust the product to the needs of the people receiving the training. Trainings on these topics may even be offered in the form of a webinar, which allows a teacher to learn the material of interest without having to step a foot outside of home. Options for finding professional learning opportunities abound.

Districts have a responsibility to not only welcome in new technology for their districts, but to guarantee their proper use. With building-based, travel-requiring, and distance learning opportunities for professional development, it's difficult to defend against districts with under-equipped or -informed staff. As long as a district is making attempts to expand their professional learning network, then the faculty are sure to gain ground in their understandings of fresh educational technology.

## ***B. Teacher-Focused Solutions***

Teachers are just as valuable as a superintendent of schools, if not more so, in the hunt for educational technology. The end goal for each party is likely the same: to find accessible, appropriate, and engaging tools to bring into the classroom and help foster new, 21st century learning among the students being served. Despite that same destination, though, teachers have different opportunities and motivations available to them than the higher ranking among us. As such, teachers have to take an independent approach to the uncovering of and exposure to the rousing but intimidating arena of classroom-based educational technology.

### ***I. Finding Tools***

As I previously mentioned during the discovery phase of the district subsection above, finding new technology that suits students is a tall order. Luckily teachers have, at their disposal,

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a decently wide assortment of options specific to their careers, or at the very least options that capitalize on the nature of their careers comment even if the specific arena of discovery is the same as may be seen from a district-level official's perspective. While districts have statistics and data to backup their large-scale need for new resources, teachers are perusing these options with an immediate and visceral understanding of their population as individuals with marked, character-specific needs. These options of perusal include, but are not limited to, attending conferences, browsing blogs, collaborating with other teaching professionals, and sometimes even using student relationships and interactions.

The first type of access to new educational technology mimics the same access available to administrators: attending conferences. It is worth noting, however, that the approach taken by teachers at conferences and the context of exposure at conferences can be and is— based on my experience— different than a similar encounter by a district administrator. You see, at conferences like NYSCATE and ISTE, a passing glance at the tables of pamphlets and ensconced placards might belie a setting that appeals to all members of the educational community equally. The truth is, these conferences are made for and made by classroom teachers. Many of the vendors originated from outside the world of Education, but they are looking for classroom teachers to verify what they presumed to be they're high-quality product. That is not to mention the fact that most organizers of such conferences, especially local or Regional conferences, are not full time organizational officers, but rather our classroom teachers. That means that their invitation to those vendors are sourced from a very genuine and earnest desire to satisfy the distinct and definite needs of classroom educators, with other parties typically being included as an extended courtesy rather than a primary recipient of their professional advances. The same philosophy is generally applicable to many facets of

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education— anyone can access and benefit from published information, but the target audience is almost always going to be classroom teachers.

That level of focus isn't a terrible thing though, because the unintentional courtesy extends beyond face-to-face exposure and, appropriately, into the cyber world. Blogs are a popular means of transmitting trending information from passionate spokespeople to curious followers in all venues of contemporary culture. There are blogs that span from cooking to internal medicine, and targeted to people in their infancy or through late geriatric stages. Educational blogs are no exception, and there are more than a handful of such blogs that are proud of the exclusivity of their focus on technology available to classroom teachers. On these websites and similar blogs, teachers can sort through technology that the blogger has either personally tested or has done research on in order to validate their place on his or her site. There is a dependability to the recommendations made by popular bloggers in their archives because they stand to lose followers— to lose clout in the community— if the contents of the blog don't hold up in users' real-life classrooms. This is a benefit that is less readily observed at conferences because of the potential for commercial gains on the parts of the vendors who you are typically interacting with one-on-one. Even if organizers of a conference support a product because it does function x magnificently, vendors could say that it also has record-breaking potential with functions a and b, and that y and z are worth a few extra bucks to subscribe to— although only one of those claims is the reason the company was invited, and there are immediate benefits to that company to stretch the truth of the quality of their products towards the positive. That is not so with blogs— we are getting verification, product by product, on the items we're viewing. To an extent, the more popular the blog or blogger, the more reliable the information you're receiving, but it's understandable to still be skeptical of some reviews.

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Taking information from complete strangers doesn't come without risk, so if you'd like to uncover cyber tools in a less stranger-danger environment, you have options.

Teachers are regularly appraised as the most valuable assets in any given district. Yes, I'm likely talking about you, and yes, I truly believe this statement, but I also believe this statement applies to all the teachers that you teach with, too. Every school building has a professional scaffold—a network—of innovators and integrators who lead the cyber charge to claim the web for the good of everyone. Unfortunately, sometimes we, as educators, become so consumed with that march and with knocking down metaphorical walls of oppression that we forget about the literal walls that separate us from our coworkers who want the same thing. That issue is still very real, and very tough to mount an affront against, but teachers around the country are finding ways to transcend their physical isolation and come together in physical, virtual communities. Some teachers have taken it upon themselves to start lunch crews to foster discussions of new tech they're using in their classrooms. A Finger-Lakes-Region district near me has tried to pair their discussions with the school menu, calling their mini-symposium “Tacos and Tech” (or as I like to call it: Techos). Other teachers, spanning far and wide, are taking to pineapples to signal a welcome to passerby teachers. Rumor has it that pineapples are the equivalent of “Welcome” sign in many coastal regions. Teachers have adopted this symbol of openness as a way to alert passerby teachers in the hall to the opportunity for professional, practical learning. Teachers who have lessons going on in their own classrooms that they're proud of or think could help inform their fellow teachers tape a picture of a pineapple outside of their door. Teachers passing through the halls can see this and know that they are welcome to enter the room at any point so they can circulate, observe, and absorb what's going on. The goings on can cover a wide range of pedagogical methods, but teachers who want to learn about

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technology would be wise to linger around the rooms of their colleagues who are generally known to be teacher techies. There are boatloads of teachers who have unique digital weapons in their teaching arsenals, so it's important for everyone to help foster open communication in one's own building.

Sometimes the people we serve, serve us. As teachers, our lives are dedicated to the youths who enter our room every school day for ten months a year. The routine becomes so ingrained in us that we almost forgot they are even there, let alone that they should be actively engaged in the learning process. Losing sight of students as collaborators in learning and just viewing them as recipients of knowledge is a detriment to them, but also a detriment to ourselves as educators. The reason for this is because students are able to offer a plethora of resources to teachers that teachers were likely to have been unaware of without the students. Younger generations are almost always the first ones to gain access to ultramodern and the most advanced supplies. Ignoring students as a resource is unwise, to say the least, and could even pose a detriment to a teacher's electronic reputation. Teachers have several courses of action from which to choose when it comes to learning from their students. First, they could talk to their students about what education technology they might use in other classes. Many times, in my own classroom, I'll stumble upon some of my favorite sites because students mention to me that another teacher is using it. More often than not, the student will, in reality, mention the site in passing, as if unintended for me. Our scholars are usually unaware of the treasures they have inside of them, so it's important to be vigilant and to be inquisitive about the things we hear from our students—we just might unearth our favorite activity. Even if students aren't revealing the tools of other teachers' classroom trades, we can still learn a lot, digitally, from the students. There are opportunities to take the cultural canon of our school-aged kids and reappropriate that

canon for our instructional purposes. A fantastic example of this came from stories told by Foreign Language teachers in my area. The teachers said that the students spent so much time during class browsing and conversing about memes that the instructors decided to adopt the memes themselves. A short time later, they were regularly having students create memes relevant to their foreign language unit at the time. The kids loved the web-based manipulation of the images, and the teachers loved having engaged students that felt personal investment in the content they were creating for the class.

Access to classroom commodities varies from teacher to teacher, but almost all educators have some means of finding new tools to use. In the age of the internet, it's a disservice to instruction to rely solely on the methods of yesteryear. Whether it's fighting fire with fire via cybertools found online, or just picking up some new tricks from casual conversations with teachers and students, your classroom, your school, and your students will be better because of it.

## ***II. Training the Educators***

Just because someone can gain access to a resource doesn't mean they know how to use it. One of the most daunting aspects of discovering new applications, however, is the process of actually applying that application to the lessons you deliver. That process is not one that needs to be tackled alone or without guidance. Teachers beginning their acclimation to new tools can choose to participate in pilot programs, receive models of how to use their new tech and transition toward higher levels of digital adoption, and especially how to monitor one's students using the newly adopted tools— all of which offer increased likelihood of sticking with the tool.

Pilot programs are a great way to either get ahead of the curve on new tools or to provide a sounding board for hesitant newcomers who need reassurance. A pilot program, typically,

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consists of a small team of people who, prior to the general population receiving access to a resource, are given advanced access to navigate its features and report back on wants and needs related to the resource. It could be considered a “beta test” of sorts— a small rollout of a tool so that a diverse group of teachers can see what works with their classes and their kids and what doesn’t. For members who are part of the pilot program, the earlier access allows them more time to become familiar with all of the new features— the bells and whistles of the product. They can also have time to see behind the flashy facade of the tool and find out what legitimate provides benefit to people and what elements raise concern or need improvement. For those teachers who have donned themselves as being the luddites of their grade levels and think they would never fit into a technology-based pilot program: think again. While it’s definitely helpful to have members of the team who are digitally literate to an advanced degree, it’s just as helpful to have those who are under-versed in tech also joining the ranks of pilot programs. Pilot programs are best when the members are representative of the population that they are piloting tools for, which means that, if your school is like any I’ve ever seen, the pilot program members need to range in skills from none to extensive.

If joining a pilot program doesn’t sound like it will fit with your style or schedule, you can still benefit from the existence of a pilot program. Teachers who participate in the program may take the time to offer presentations or trainings to their peers. Those opportunities for professional development can be beneficial, but only if the teachers who would benefit from them attend. Aside from presentations, pilot programs can be helpful because there are now a handful of experts in a certain, specific, mildly technical field that teachers can reach out to with questions. Those resources can be a peak behind the curtain of new software— a glimpse, a

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snapshot, a quick word— telling us it's high- and lowlights without having to parse them out ourselves.

One of the things that teachers can learn from pilot programs, or from anyone, really, is that technology integration can, and does, occur in gradations. Therefore, teachers would benefit from pursuing training that helps them walk through different layers of digital conversion in order to ease the transition. For the hesitant beginners, using technology to parrot the same types of activities that they would do with their pre-transition-to-electronics classroom materials. This could be seen in examples such as using a SmartBoard to project a copy of notes instead of an overhead projector with translucent slides. After much practice and acclimation to that slight transition, the teacher can then move onto another phase more comfortably. Too many teachers feel overwhelmed with the introduction of educational technology and abandon attempts at mastery because they feel like they have to abandon their old ways of delivering instruction and start from scratch with the new methods. That, of course, is not the case at all. Teachers should be using the technology to improve their practice and to perfect their craft, not to become frustrated and annoyed. To arrive at that state of mind, though, they'll need guidance and support— via intentional training— from the onset.

Once teachers feel a level of mastery for their own use of new tools, it's also important to provide deliberate directions on how to manage student use of the new resource. At the very least, teachers should be taught how students will be navigating and manipulating the elements in the program. Many resources meant for the classroom come with different options— different user interfaces— for teachers and students, which means that just because a teacher can use a tool doesn't mean they can teach students how to use a tool. Beyond the basic necessities of transmitting usefulness of a new device or program is the assurance that students are properly

utilizing the resource they've been given. It's no secret that students have a reputation for pushing boundaries and attempting to pull the wool over an instructor's eyes, so anyone running a classroom should keep that in mind when unrolling the carpet to welcome in a new program. As great as it is to encourage positive learning opportunities, so too is great to make sure that students are maturely and respectfully engaged with it. We spent generations knowing the hallmarks of a note being passed, and spent years honing our ability to spot a student texting in his or her lap, so it should be an easy adjustment to figure out ways to curb misbehavior in the ever-changing technological world— we might just require some help to guarantee that we have it all covered.

Teachers are a resilient group, but they can't take on every journey alone. That's why, when tackling a project as immense and impactful as inviting new educational technology into the classroom, devices need to be accompanied by supplemental opportunities for instruction and tutelage from peers. Whether those opportunities are in the form of pilot programs, small-group collectives, or just instructional coaching from a colleague, the inclusion of some training elements are an undeniably essential piece of the cyber revolution in our schools.

### ***C. Student Solutions***

#### ***I. Training***

Students tend to have fewer responsibilities when it comes to general educational technology tasks like finding new products and figuring out how to fund or otherwise secure possession of the products. However, the absence of those responsibilities from the student-level of the process does not preclude them from other responsibilities associated with digital classroom tools. Some factors that are worth keeping in mind for full student achievement potential are changes to their understanding of responsibility and time management,

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introductions to more facets of digital citizenship, and associations with potential employment opportunities.

Among the list of unexpected byproducts of the ushering in of new technology is the increased autonomy offered to students. Teachers, rightly so, realize now that students have almost unlimited access to information, and so they have reined themselves in, so they're stepping out of the limelight of the front of the classroom and letting students do their role in the adventure. However, that autonomy is a stark contrast to over a century of educational precedence, and certainly a departure from those students way of learning for as long as they've been in school. There used to be relatively few options for distraction during things like note taking or quick completing, other than staring blankly into space or counting the number of letters in a single questions. Now, though, kids can have their Google Doc of notes open on one tab, sports highlights from last night on another, a new game on yet another, and so on to a seemingly infinite degree. Skills that were previously only beneficial have become absolute necessities in order to maintain a properly functioning classroom with focused, engaged students. That is why students now need additional instruction in individual responsibility and time management. These skillsets are less focused on what students are doing when they interact online, and more honed in on their real-life behavior that precedes their activities on the web. Once they can maturely handle their newfound access point to unlimited information and entertainment, we can proceed to the next element of the instruction needed for them to become proper inhabitants of this alternate world: digital citizenship.

Student behavior that is expressed face-to-face can look radically different than their behaviors online. There are also encounters that occur online that don't offer the same safeguards as would be available to students in real life. A child that runs into an unfamiliar child on a

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playground would likely have no issues playing with that child, right? Well, a child who bumps into a child online might think the same thing, but there is no guaranteed verification that the person on the other end of the screen is the person he or she alleges. Situations like these, and many others, are at the forefront of the push for instruction on digital citizenship. Digital citizenship has different specific qualities based on where you are and who you're asking, but the general consensus is that digital citizenship is the state of being a positive and ethical consumer and creator of digital media available on the web. Some districts have decided to create their own curriculum that tackles certain issues of digital citizenship each year of a student's public education. Other schools are more hands off. Some teachers rely on web-based resources to teach their kids how to be the best kind of internet users. No matter how students are given this support, the providers can find handfuls of websites and more to enhance their curriculum and deliver high quality information to the students.

Delivering high quality information to our students during their time with us now is important because these skills are ones that they'll be using, hopefully, for the rest of their lives. Students sometimes report feeling like new technology being introduced to them is just for the sake of introducing something new. They don't see or understand the reasoning that we, as educators, have for inviting these tools into our classrooms. Without that understanding or awareness, the output will not be able to reach the level that the people on either side of the proverbial chalkboard were anticipating. For that reason, it's of the utmost importance to discuss the long-term relevance of the tools we bring into the classroom. Students should know that and when certain tools will help them if they go into accounting or graphic design, or marketing, or any other career. Providing scope to our current practices allow them to become real, and allow students to attach themselves to them in a more personalized, custom way. For example, I always

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explain to my own students why citations matter and that, if they ever want to tell the world about anything, they will inevitably need to tell people where they got their “starting point” information from, and so citation generators are the way to go for that reason. My coteachers and I are always sure to also report back to students who question needing to create a video for an assignment or project instead of just delivering their information in a speech in front of the class by saying that sometimes information needs to last longer or go further than we as individuals can do, and so we need to record and manufacture our story, because our stories are important. Once students have scope to their assignments, especially flashy ones or new ones, they seem much more willing to engage in the process and pursue earnest learning.

Students, much of the time, are seen as the recipients of schooling. Some steps of the classroom technology introduction process are certainly outside the purview of our children, but that certain doesn't inhibit the need for their involvement in the use of those tools. As much as these digital tools are newfangled gizmos or wiry contraptions to some educators, so, too, can they be foreign and unfamiliar to our students. However, if we show them how to use them responsibly, manage their work on them, and allow them to maturely interact with the world with them, there's nearly no limit to the positive possibilities they may someday contribute.

## Chapter 4

### Recommendations for More Research

While the extent of my research was satisfactory for the needs and level of this inquiry, there are so many factors to investigate to continue to gain a fuller understanding of the introduction of educational technologies into schools that were previously void of such technologies. Some of the topics I covered could use more extensive research to help flesh out their role in the implementation of educational technology. There are also some outside elements of the implementation of these technologies that would have interesting contributions to my research. Lending a critical eye to those factors would help bolster the inclusion of digital tools.

An initial inquest into the hopeful outcomes of digital citizenship would help clarify the reason for the goals that have been established. For example, many schools establish a hallmark of digital citizenship being ethical use of sourced material, but there is a remarkable amount subjectivity to that mark. Even if that is a high-quality measure, it would be wise to add examples of how that may look both now and in post-secondary life so that students are able to identify that behavior as they are partaking in it and also synthesize the genre of behavior to their college- or career-based work. Adding an extra element of objectivity is important to being able to adequately measure the outcomes of this work down the road.

Additional research into developing digital citizenship would also be advantageous to the advancement of digital principles. Most of the information that has been generated on that topic so far is largely anecdotal or has some investment in a biased source. Many districts in different geographical locales have produced matrices of digital citizenship goals that they have independently decided were important, but there doesn't seem to be much in defense of those

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goals. It would be a valuable assistant to the cause if we had some sort of confirmation that our actions now and definitive results down the road.

My research also only investigated the perspective of district-level administration, teachers, and students, but there is a much broader network associated with these products than just those three levels. I would be very interested in doing some more research based on family systems theories to observe the effects on parents, guardians, siblings, and other members of the household community of each student. A primary concern for years has been the accessibility for students outside of their schools. There could also be research that investigates the role of Boards of Education prior to the commit of a district to any particular tool, or a study which follows the behavior of students at home after technological integration. It would also interest me to see how parents need to modify their resources at home, or accommodate budgets, to welcome the increased access to information that typically accompanies device rollouts. Studies could also focus on sibling relationships and whether face-to-face time, without screens or software, between siblings increases or decreases as a result of increased educational technology. More options include evaluating whether the presence of a device in a household for only one student in multi-student houses has any different effect on the collective academic progress of the group compared to multi-student houses that possess devices for each student. Even looking at career trajectory changes between device possessing and non-device possessing households would be valuable and contributive research.

If we want to look at effects of these devices from a more removed perspective, analysis of product vendors and marketplaces would be a great place to start. Figuring out what specific device or software needs trend in certain directions would be an illuminating process. Beyond

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that, experimenters could look at what goods or topics have the best experimental outcome from their research.

While the research that currently exists provided a substantial foundation for the current review of educational technology, there is no shortage of options to test and examine. Both macro- and microscopic aspects of technological integration remains unexamined, and as such, leaves questions regarding the viability of these sometimes massive programs. Hopefully members of the field can help us confirm or deny the benefits we have seen and continue to predict. Contributions are always valuable.

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## **Abstract-**

This project looks at relevant research and opinions regarding Educational Technology in the classroom. District, teacher, and student perspectives are all taken into account regarding the qualifications a digital instrument should possess in order to be considered appropriate for classroom implementation. The author, after looking at the effects and understandings of many current applications of Educational Technology, finishes the work by aggregating the concerns and providing multiple options for solutions for each. Additional research is suggested to examine familial and corporate effects of the current trends in addition to policies recommended as solutions.

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