Digital Learning in the Classroom

Introduction

Education has always centered upon the good of the student. Perhaps the one constant in teaching over the centuries has been the passing on of knowledge so that students could succeed in their contemporaneous environments. As our environment has shifted over the past centuries, decades, and even recent years due to wild advances in technology as well as the psychology of learning, so too must the methods underlying effective education also change.

As students are being prepared ever more for successful careers within an Internet age, it makes sense that their education is increasingly digital. This can make certain aspects of teaching far easier. It can allow the students to experience all of history and the entire world as their classroom, and it can permit distance and remote learning to ensure that no child does not have access to a good education. However, there are also disadvantages and new problems to be worked out as we learn how best to teach with technology at our side—especially through paradigms in which every student has a technological device, and we are tasked with connecting with students (in some cases) primarily over the Internet.

In this course, we'll discuss the benefits and disadvantages of 1-1 computing as an educational paradigm. We'll walk through the implementation of a successful 1-1 computing initiative, talk about strategies for maximizing in-classroom time both on and off personal computers, and discuss methods for ensuring that education continues to be effective and engaging for each individual student as we move into a more digital educational age.

Case Studies

Case Study #1

In one case study, a school operating out of a rural Illinois school district opted to start a 1-1 computing program for their junior high students. After months of implementation and careful support on the behalf of all administrators, parents, teachers, and the community as a whole, a smaller program of about a couple hundred students were able to procure Chromebooks and embark on a semester of 1-1 computing. Careful evaluations were followed to ensure that each of the students felt supported during this time, and the teachers were all enrolled in stringent training courses to ensure that they were ready and indeed were able to deploy the system to its fullest and most creative extent. While the school district did not intend to measure this system only by the grades achieved by the students in the program, a baseline standardized test was administered. At the end of a semester, multiple evaluations and anonymous surveys showed that the students

and teachers alike were both happy with the situation, and the final standardized test showed that test scores actually were raised as a result of the program.

Case Study #2

Another school district (this one in Marshall, MO) wanted to start a 1-1 computing program in their schools, but an initial examination of the investment required for such a venture found that they did not have anything close to the funds which would be required. However, they were sufficiently intrigued by the noted benefits of 1-1 computing, and wanted to find a way to make it happen within their school district.

They polled the parents and did some research and found that a BYOD or Bring Your Own Device program could likely be implemented for a fraction of the cost of a full 1-1 computing program. They invited any students who had laptops or tablets to bring them into school to use for digital learning techniques, and used the funds they had raised to purchase school devices to loan out to students who were not so lucky. Their program launch was not without its hitches, but they did find a way to implement more digital learning techniques without spending too much money.

Case Study #3

A small town in Iowa had its school year threatened after a strong thunderstorm damaged most of the roof structure, leaving the school's physical building unsound. Administrators, in meetings the next week, asked the contractors how long repairs would take—and were met with an estimate of at least twelve weeks for damage of that amount, and at that scale.

Faced with the possibility of having to deal with satellite or displaced schooling for three months in the middle of their school year, the administrators were suddenly deeply grateful that they had implemented a 1-1 computing program just the year before. "This isn't ideal, of course," said one parent. "But it does seem like they put up a framework that allows for academic resilience just in time." The fact that the school was able to merge to remote learning because of the digital infrastructure in which the administrators had invested allowed them to save time, money, and headaches—and allowed each student enrolled in that school to proceed to the next grade in the fall without delay.

Takeaways from Case Studies

As we can see in these case studies, digital learning often means that no student is left behind—because each can have equal access to learning materials and discussions or online experiences, especially in a 1-1 computing scenario. On the other hand, it can become all too easy for students and teachers alike to rely

overly much on digital learning techniques while losing the art of in-person communication and the benefits of hands-on learning experiences—especially for those students who do not learn best by staring at screens.

While educational techniques move ever onward to mesh with digital technologies in increasingly seamless ways, it's important that we ensure that each student is able to have meaningful, effective educational experiences. In this course, we'll discuss the benefits of 1-1 computing and other tech-forward educational strategies and demonstrate a few ways to alleviate the potentially negative side effects of new digital paradigms within education.

Section 1: Benefits of 1-1 Computing and Digital Learning in Modern Classrooms

Several states in America have begun an initiative to ensure that all students have devices which can connect them to their education and differing teacher-led online experiences, while remotely or even in-classroom. This is referred to as the 1-1 computing movement, and it is growing in popularity.

What is 1-1 computing?

- 1-1 computing is a movement that seeks to harness the benefits of increasingly accessible personal technology and put it to work enriching educational experiences for more and more students.
- It is based on recent studies that have been completed and show that of the ~60 million K-12 students in the United States, at least 10% already have a personal computing device. These students have access to myriad educational and communication resources simply because of the equipment they use on a daily basis.
- The argument has been made that teaching a student to get the most out of his/her personal devices instead of passively taking in lecture-and-homework-based coursework instills in each student the skills of creative and critical thinking, collaboration when using communication apps, and can expand a student's ability to take the initiative on research projects.
- The 1-1 computing movement, therefore, seeks to put a personal computing device in the hands of every student and then move a significant portion of teaching and educational frameworks online so that they can be accessed by the students wherever they are. Based, as it is, on the end goals of preparing students for 21st-century roles and getting an education to the students instead of asking students to be present for it, the 1-1 computing movement can be thought of as even more student-centric than educational techniques of the past.

What are the benefits of 1-1 computing?

- 1-1 computing offers a more efficient experience for students taking a full load of classes. If they just have one device with which they are familiar to take between classes, they don't have to load up a new system and figure out myriad logins; they can just sit, boot up their own system within moments, and be ready to learn.
- On a similar note, students will be able to spend more time on their education and on assignments rather than wasting time waiting for a communal device to become available.
- Because of this, teachers can feel free to assign their students digital resources (including reading, activities, discussion forums, etc) that further enhance the student's learning experience. Students will be able to access the resources more frequently and be able to self-teach on their own time, which can free up classroom time for teacher-led interactive activities.
- Teachers may be able to customize the experiences of different students based on need, interest, and ability. Instead of offering a universal educational curriculum, teachers can give a general overview or work with interactive activities in class, and push differing articles, assignments, or follow-ups to student's personal devices.
- School districts often find that the cash savings of 1-1 computing environments work out in their favor over the long term. While there is the initial investment of purchasing a device for every student—a practice which can be alleviated by BYOD, or Bring Your Own Device programs—this investment goes down each year, and completely obliterates the past recurring investment in new textbooks for students.

What are the benefits of using technology in the classroom?

Some of the benefits of students' immersion in educational technology we have already spoken of—for example, the fact that teachers will be better able to customize the learning experience for students with different learning preferences and modalities. Teachers will also be better equipped to vary their instructive techniques—certainly a boon for both teacher and student learning fatigue!—on a day-to-day basis, if applicable.

However, there are definite benefits that daily immersion in technology can bring to students on an individual level. These may include:

- *Quick Access to a World of Knowledge:* The answer to any question, the most precise statistic or definition or formula—these are only a few deft strokes of the keyboard away from being known, at all times. There are those who bemoan this fact, saying that education is often in the journey toward truth. Insofar as that is the case, it will be up to the teacher to ensure that students have activities and

discussions that circumvent the Internet—an excellent example of good use of in-class time. However, it is most often the case that simple inaccuracies, the inability to remember or quickly find facts and formulas, and other frustrations which an Internet search would easily allay stand in the way of education—they don't strengthen it. One of the goals of good teaching is to impart on students the tools and necessity for perseverance when confronted with an obstacle. This necessarily means that students might not have impressive levels of fortitude while still quite young! The ability to quickly resolve stress, confusion, and other negative emotions triggered by the absence of easily-found knowledge in a project or lesson will help students enjoy their studies more. It can also impart in each student a sense of responsibility and confidence that they can find the answers to questions and problems on their own, if they are given the right tools.

- *Students prefer to have digital learning techniques in the classroom*. At home, for better or for worse, technology often represents the thing or activity attained in free time, used for fun. Harnessing the predilection that many children naturally seem to have for working with technology certainly can't hurt. That innate enthusiasm may have—directly or indirectly—resulted in the higher grades, test scores, and other observable benefits we've seen from schools that have implemented digital learning techniques.

- *Digital learning supports teachers*. While benefiting the teacher may not be seen to be a direct good thing for the student, remember that a student who is learning from an overworked, harried, frustrated, or stressed teacher is going to receive an education which is hurried, disjointed, or worse. With digital learning techniques, a teacher does not have to start lesson planning from scratch. Instead, teachers have access to lesson templates, activities, videos, interactive lessons, ready-made flashcards, and more—which means that teachers are able to spend less time reinventing the wheel, and more time working with students and varying educational content. This results in a better experience for all involved.

- As an offshoot of the previous benefit, it should be noted that digital learning techniques also allow for the possibility that students are enjoying more standardized lessons in terms of content, teaching style, and direction. This can help students in different classes relate to each other, as well as assist the transition between grades with more uniformity.

- For STEM or STEAM students, it's been noted that working with computers and tablets allow for almost instant visualization of data. From taking pictures to creating graphs with apps and more, tablets and laptops can help with cultivating scientific skills. However, this is not a benefit that pertains only to those in scientific fields. Students in a variety of disciplines can and should benefit from the advantages of immediacy and automation inherent with laptops and tablets.

Wouldn't students be more distracted and prone to getting lost on the Internet with their own devices in front of them all day?

- Studies that have probed the efficacy of the 1-1 computing movement have sought to answer one of the main objections to the 1-1 computing movement: that is, that students are likely to get distracted by the vastness of the Internet and pay less attention to their studies.
- Whether it is because of very effective geo-based site whitelisting (some sites, including social media sites, just aren't accessible while on certain school grounds) or because giving the students back some responsibility over their education has motivated them to do more, initial studies are showing that 1-1 computing systems reflect higher student motivation, activity, and overall performance—not less.
- In fact, because students have cutting-edge tools at their fingertips, schools that have invested in 1-1 computing systems report higher levels of creativity and output among their students. No longer restricted to the video lecture and the essay, students are making films of their own, recording podcasts, collaborating with other students across the globe, and more to show their interaction and retention of their lesson materials.

What does 1-1 computing do to interpersonal relationships between students and between teachers and students in person? Doesn't the screen get in the way of that?

- Schools with 1-1 computing showed that teacher-student relationships were actually improved as a result of the near-constant availability of technology. Whether through text communications, through video calls, or the leaving of audio or voice files for verbal feedback, studies found that students were able to get more feedback, not less, for their work—which strengthened the students' relationships with their teachers, for the most part. Students found that they were able to collaborate more with their peers, and designated no-screen times at schools helped ensure that students were still enjoying face-to-face discussion time. Enrollment in tactile courses, such as pottery and PE, also grew as students were interested in having a mindful, screen-free alternative to their computers.
- It should be noted that the ability to message their teachers gave students who might not always be the most inclined to speak up in class the ability to reach out privately. Through the digital interface, it could be said that each student got more attention—including those who might have gotten less in face-to-face scenarios. Of course, because (in most cases) digital learning techniques will exist simultaneously with in-class instruction, there will be many opportunities for teachers and students to speak with each other in person if need be.

Are there any negative aspects of 1-1 computing or more immersive digital learning techniques?

There is no such thing as a perfect learning system, and so it stands to reason that 1-1 computing and digital learning have their faults—even more so because they are newer platforms, which both students, teachers, and administration are still learning how best to implement.

Let's take a moment to go through a few identified drawbacks of 1-1 computing. They may not apply to your school, but they're still good to be aware of so that (if applicable) you can modify your school's application or rollout of 1-1 computing to better serve your students.

1. One big complaint against 1-1 computing and digital learning platforms is very simply that they will be replacing more analog learning methods. There will always be a certain romance to reading physical books that cannot be replaced, and there are those who believe that physically holding a book in one's hand and flipping its pages is an integral step of education. While this cannot be proven one way or the other, it is true that it would be a shame to see paper books taken entirely out of circulation (despite the undoubted sustainable effects of doing so). However, that is unlikely to happen anytime soon, and simply moving student's textbooks and other often-used resources to a digital format is unlikely to put a huge dent in the overall literary industry (or in a child's likelihood to be interested in reading a 'real' book from time to time).

2. A secondary noted downfall of digital learning techniques and 1-1 computing is that it could reduce the amount of physical activity that students in these schools are able to experience. While this is, of course, a valid critique, it is not fair to assume that students have been getting incredible amounts of physical activity up until the implementation of a 1-1 computing program, with lecture-based systems in place at school or desk-based worksheet-centric homework methods at home. It will be the duty of each student, teacher, and parent—as it always has been!—to find creative ways to invest in physical activity, both at home and at school. Indeed, it would seem that because teachers will be able to prioritize movement and interactivity in classroom time, that if carefully strategized, the amount of activity will be able to go up—not down.

3. The third most prevalent critique when it comes to one-to-one computing regards its potential redundancy, particularly in districts and schools which serve students who may already have personal computers. On the other hand, it is feared that the one-to-one computing program may cause financial stress on those students who do not have devices and suddenly have to procure them.

This last point can potentially be solved with BYOD, or Bring Your Own Device programs. In a BYOD program, students with devices are asked to use them for

school purposes, and students who do not have personal devices are loaned school-issued laptops for 1-1 computing use.

All effort is made, when implementing a 1-1 computing program, to ensure that no individual family or student will bear the brunt of technology-related expenses. In the thoroughly-researched and meticulously-implemented model 1-1 computing system, the school district will make every effort to ensure that students are able to have a device to use as well as accessible Internet to use it with, as free of charge as is possible per the school district's financial situation.

What are the pros and cons of BYOD (Bring Your Own Device) programs?

As a specific offshoot of 1-1 computing programs in which students who have devices use them for schoolwork to offset the administrative costs of providing students who do not have devices with an academic device, BYOD programs can be thought of as one response to a common critique of 1-1 computing programs (that is, that they are prohibitively expensive).

However, just as every specific program has its own strengths and weaknesses, even programs that are specifically designed to answer the problems of another will have weaknesses of their own. Let's look at the pros and cons of BYOD systems; some may be similar to 1-1 computing, but others belong to BYOD systems alone.

The Pros of BYOD Systems

- Students are more likely to be engaged in the lesson ahead of them if they are using their own devices. This is for two reasons: Firstly, the novel features of a new device may make it difficult for them to be excited about anything other than the new platform in front of them. Secondly—and similarly, if students aren't able to figure out the ins and outs of a new device, they'll either spend valuable academic time troubleshooting their connection or they'll get frustrated and give up. Both problems are completely averted when the students are requested to use a device with which they are already familiar.
- With a BYOD system, you can get more technology to more students. Instead of paying for expensive and overused computer labs, instead of using the school's technology budget to pay for a laptop for every student (assuming for a moment that that is even financially possible), a non-negligible percentage of the student body will already have access to digital learning platforms and technology— without much investment from the school. This can allow the school to re-direct its technology budget to other, more pressing matters; or, simply, creating a pool of school-owned devices to loan to the other half of the student body which does not have a personal device.

- The fact that BYOD learning will by necessity mean that many different operating systems and levels of technology will be used in each classroom can be seen as a pro and a con. We'll get into possible negative ramifications of this fact in the next section, but right now we'll talk about its benefits. Very simply, teachers will have to get creative with figuring out lesson plans and digital resources that can work for a vast array of devices; or, alternatively, teachers will have to personalize learning for different students based on what their devices can handle, technologically speaking. Allowing teachers to personalize learning to each student can allow the teacher to use methods that will specifically work with any learning modalities or preferences that will work best for that student, resulting in more optimal learning outcomes.
- As a final pro, BYOD programs can be easier to implement than full-scale 1-1 computing systems. One major reason for this is the financial incentive of allowing students who already have devices to bring them in; another is that full-scale digital orientation programs can be shorter, or eliminated altogether, for students who are using technology with which they are familiar. If your school district is on the fence for any reason concerning the implementation of a 1-1 computing program, a BYOD program can be seen as an attractive middle-ground or soft-start solution.

The Cons of BYOD programs

- Having to immediately support the needs of a wide variety and much-increased number of digital devices can completely overtax your school's current Internet, electrical, or technological framework. In order to support your increased technological needs, you will likely need to hire an extra phalanx of IT professionals well-versed in many different operating systems and digital platforms, and you'll likely need to upgrade your WiFi servers and other electronics. However, there is a good chance that this type of upgrade will be required shortly regardless of 1-1 computing or BYOD programs simply to keep up with modern teaching trends. Either way, these resources will represent an extra cost that must be considered when you're thinking about introducing a BYOD program.
- With 1-1 computing, it's often possible to add software to each computer in order to protect every student from malware, viruses, phishing, and other attacks upon the integrity and safety of each individual student. When each student is bringing in a device from home, this process gets significantly more challenging. Within a BYOD framework even under the best circumstances, some argue, a school is laying itself open for cyberattacks and other infringements on student's (and the school's) digital security.
- When you're depending on hundreds of different operating systems on technological devices of varying ages to power up, connect seamlessly, be incredibly safe, work with the resources you ask that the students access, and do this all without losing power or draining the battery, you're necessarily counting

on several (hundred) systems to work correctly each and every school day. This introduces many occasions at which the student or the school can experience a lack of connectivity, which could in turn negatively impact the student (or the school's) ability to complete their educational activities on that specific day. It is not necessarily in the best interest of effective education, so say critics of BYOD programs, to allow the entire possibility of education to ride upon a tenuous or fragile system made up of multiple moving parts. Critics who take this line of thinking envision students being frustrated with improperly working devices or Internet connections and then being forced to waste their time waiting for the connections to be troubleshot. As an alternative, these critics posit, opening a book takes no technology at all and can hardly be expected to be problematic in any way.

Each of these are valid concerns that will have to be addressed if a school is serious about adopting a BYOD program. They also point out the very real fact that BYOD may save money and time over a full 1-1 computing program, but it is by no means easy or free. In order to reap the advantages of a BYOD program, schools still need to be committed to making the required investments in order to make the program work as smoothly as is possible.

Section 1 Summary

According to studies on 1-1 computing programs, students who are educated in this way are happier, more engaged, and are showing more creativity with their work. However, 1-1 computing can be expensive and taxing on a school's infrastructure. BYOD programs can mitigate some of this extra strain, but they are not in and of themselves without imperfections. Any 1-1 computing program will have to be implemented carefully in order to make sure it succeeds well.

Section 1 Key Concepts

1-1 computing: A program in which every student has a digital device to help enrich his/her learning experience.

Bring Your Own Device: A variant of 1-1 computing in which those students who have personal devices use them at school for official educational purposes.

Section 2: The Implementation of Long-Lasting, Effective 1-1 Computing Programs in Modern School Districts

As we move into the twenty-first century, it's becoming increasingly clear that technological or digital literacy is more than just an asset for students graduating

and entering the workforce—it's a necessity. By increasing and investing in the ways we teach students how to work with technology, we're helping them build the skillsets that will help them become better citizens of the world after the education we provide them is completed.

However, there are critiques of the increasingly tech-oriented classroom. Some say that students are becoming jaded because of the amount of screen time; others say that there is nothing that can replace reading a book, or working with a qualified teacher in person.

What are the concrete benefits of technology in the classroom—whether as infrastructure support, or as part of the lesson itself? Conversely, what are the drawbacks? We'll go more into detail in this section so you can support your classroom, no matter which direction you take.

How have schools successfully implemented 1-1 computing systems?

It's easy to think that purchasing a Chromebook or iPad for every student is the only real step in implementing a 1-1 computing system. However, in order to reap the benefits described above, the process must be much more intentional than that!

Let's walk through the steps of a successful implementation of a 1-1 computing system:

- Most successful 1-1 computing systems started with a school district identifying that it had a distinct instructional shortcoming in the way that it was engaging with its students. 1-1 programs were seen as a carefully considered response to that situation, instead of an interesting experiment to launch.
- The 1-1 program was pitched to stakeholders at the school long before launch day. It was ensured that the school board, the leaders of the district, and most especially the parents and teachers were all on board.
- After this, the main proponents of the 1-1 program put together a comprehensive proposal as to how they were planning to model out the program, with studies as to the effective behaviors involved. With all of this data about digital learning ready to present, they took it to administrators to ensure that not only was everyone on board, but funding, support, and logistics were in place to make the 1-1 program happen.
- The 1-1 program began small. Studies were implemented, and after observation and conclusions as to which grade levels, teachers, and courses could be most easily migrated over to 1-1 computing, just those courses were merged with

more digital learning techniques. After it was shown that these courses were improved, they moved on to others.

- To support ramping up the 1-1 program, they made sure to increase the framework of their internet and other digital networks. They hired additional IT staff to better meet a large anticipated demand in working wireless and computing devices.
- They invested in intense and comprehensive support and training for all students and teachers who would be using the programs to help forestall any frustrating or successful situations that would arise in the future.
- The administration planning to launch the 1-1 program invested in the creation of specific digital curricula for all classes which would be part of the initial 1-1 rollout. These were designed to be used for actual strategies regarding classroom management and education, and also to be handed out to all parents and students who would be experiencing the courses to allay all confusion and help manage expectations.
- To help reduce startup costs and base the foundations of their rollouts in trusted technology, these schools opted to invest in universal communication, productivity, and collaboration tools such as Google for Education.
- After all of the centralized tools were put into place, these administrators sought to find solutions at each of the student's homes to ensure that every student would have access to the internet. These benefits to every student were one of the reasons the communities piloting 1-1 programs were eager to sign up, and so the program made sure that this was prioritized.
- After this, before the launch, these school systems ensured that funding would be in place in an ongoing way to support the continuance of 1-1 programs, not just a flashy launch.
- Careful thought was put into place regarding the nature of the devices chosen for the student body. Popular options were Chromebooks and iPads.
- Policies were planned and put into place seeking to balance the expected and logical increase in their students' screen times with in-person, face-to-face, interactive activities as well as time spent outside.
- They launched the 1-1 program with internet responsibility education for all students, teaching them that the internet is forever and helping to establish best practices for communication.
- As the program matured, the administrators carefully watched for signs of weakness as well as success and put any and all observations into their ongoing strategic plan.
- Finally, they asked students enrolled in these programs as well as teachers to give their feedback. They weighed this personal feedback much more highly than they rated the resulting standardized test scores after the end of the evaluation period.

As you can see, much more goes into a successful rollout of a digital learning or 1-1 platform than simply purchasing computers for students! However, with these steps (or similar ones) followed, your district, too, can look into an effective and engaging launch for a 1-1 computing program.

Are iPads or Chromebooks better suited for 1-1 computing techniques? Are there pros and cons of either that might work best for my classroom?

In terms of actual hardware most often used for true 1-1 computing programs, the iPad from Apple (and, often, associated keyboards and styluses) or the Chromebook from Google have been the most prevalently used. Each is good for certain specific uses. What are the benefits? What are the drawbacks? We'll explore these questions further in the following section.

What are the specific benefits and drawbacks of iPads used for classroom instruction and individual student use?

- iPads do have Bluetooth connectivity, and can be used with wireless keyboards. However, these keyboards do not usually come with the tablets, and must be purchased at an additional cost. This can be seen as a drawback if typing is an activity that students will routinely have to perform. There are some groups of students, on the other hand—such as the very young—for whom typing is not an immediate concern. Voice-to-text apps make keyboards redundant as well, in many cases. In any case, iPads may not be the best tool in and of themselves for consistent typing.
- In many cases, iPads are highly functional without an Internet connection. They have a hard drive to which files can be saved (unlike Chromebooks) and many apps allow for downloading of lessons and videos usually streamed over the Internet.
- The Apple App Store has a large amount of applications geared towards education. We'll go over the most popular of these in a later section. While there are good apps for many platforms and the Google Play Store is growing, the Apple pantheon of apps tends to be a little more comprehensive at this time— allowing for more and more options for digital learning experiences at the teacher level.
- Because iPads are touch screens, they offer a level of responsiveness and immersion which students find highly attractive. This also means, from a sustainability point of view, that iPads may be able to more completely replace paperwork in a variety of disciplines.
- With an iPad 1-1 computing program, each student will be assigned a profile with a password. This profile will be backed up automatically (and constantly) to the Cloud, with accessibility from any device. This would make it easy to use not

only a student's personal iPad for learning, studying, or projects, but a student's documents and files would be accessible from any device. This could be extremely convenient for evaluations, collaborations, and more.

- The Handouts and Schoolwork frameworks that Apple has put in place for education make accessing homework and resources easy for students.

- Because of the accessibility settings that Apple has prioritized for years and are built-in to every iPad (or other devices across the iOS system), iPads are a great tool to make learning more accessible for students with special needs. Every iPad comes equipped with options to ease learning for those with challenged motor skills, challenges with poor eyesight, or no eyesight at all, among other solutions creative schools can use to be there for all students in the way needed.

- The main drawback of iPads for 1-1 computing is often cited as the price. Even though Apple has released several different versions of the iPad, Chromebooks tend to come in as much cheaper. The iPad does not include a physical external keyboard as part of the price, as well, which means that if students are going to be doing much typing with an iPad, an additional investment for a Bluetooth keyboard may be required.

What are the specific benefits and drawbacks of Chromebooks when used as the main hardware in a uniform 1-1 computing program?

- Because Chromebooks (as opposed to iPads) come with a physical keyboard already attached to the main screen, they can be seen as better systems for people who will need to be typing a lot (which encompasses most students in grades 5-12). However, for younger children or students for whom large amounts of typing is not necessary, the keyboard may be considered to be redundant.

- The cost of ownership for a Chromebook can be rather low when compared to more higher-powered laptops or tablets such as iPads.

- Chromebooks require an internet connection to get much work done. Offline modes are available for many applications, but without an Internet connection, Chromebooks aren't able to be very functional.

- Similar to the above point, Chromebooks don't have much hard drive space to save files to; any memory on a Chromebook is typically devoted to temporary cache files and browsing history. Therefore, any documents which need to be saved are saved to an online cloud drive. This is good for accessibility across multiple devices, but it can result in frustration if a student does not have a continuous Internet connection to work with.

Of course, in many ways, iPads and Chromebooks exhibit very similar benefits. They both offer **long battery life, quick start-up procedures and booting up protocols, dependence of devices (very few cords or other accessories needed)**, except for a keyboard in the case of the iPad if needed, and **the ability**

to run general productivity apps from the Cloud for secure note-taking, time-keeping, and streaming of audio and video lessons and presentations. One key benefit that these products both exhibited was simply the fact that they both **auto-update**, allowing for relatively seamless use at the student level.

Ultimately, the type of product that your school chooses will depend upon the type of activities and resources that your students will need to be able to access. Either iPads or Chromebooks tend to be a good choice for a variety of needs.

How will 1-1 computing and the selection of different technological platforms (such as Google OS or iOS) impact the teachers, administrators, and IT staff at my school?

When working to select a framework for 1-1 computing, one of the first considerations is the hardware your program will feature (unless you're targeting a Bring Your Own Device program). Whether you choose iOS or Chromebooks or another device, you should also be aware of the support these platforms have in place for teachers as well as the ease with which your school's infrastructure and support will be able to deal with these devices. This is not a selfish consideration. Of course, the primary consideration will be the students' experience, but as the teachers, IT staff, and other administrators will be using the technology as well, it's important that that experience is an easy one. Saddling teachers and IT administrators with an unduly complex system is a recipe for disaster in terms of their support of the student's welfare.

With that in mind, let's break down the benefits of each platform specifically with regard to how they will impact teachers and the IT staff at your school.

iPads and Chromebooks: What Each Offers Teachers

iPads

- Apple has incredible apps and resources for teachers (including applications such as Cell Structure, DragonBox Algebra, and the WWF Together app) that you can naturally use across a wide spectrum of academic disciplines to make learning more engaging, interactive, and entertaining. Not only can you access these apps, but if you give your students access to them, you can lead interactive activities where the whole class can explore (for example) the interior of a biological cell in exquisite detail.
- Because iPads are able to connect with smart TVs and other interactive panels, you can easily pan what you (and your students) are seeing on their personal devices or on your device viewable for the full class. Annotating and using that

image can eliminate past concerns over students at various places in the room being able to see and understand what's on the board.

- Because Apple executives are aware that their products are being used for 1-1 computing platforms, they have engineered two educational platforms, Schoolwork and Handouts, to streamline modern life as a teacher or a student. With these platforms, you can easily connect with your students, create and monitor assignments, organize and publish a class schedule, send out resources from pdfs to links and more, and do all kinds of things that previously would have had to happen across multiple different applications.

Chromebooks

- When you choose to use Chromebooks for 1-1 computing programs, you also receive access to software known as G Suite for Education. We'll go more into what G Suite can offer in a later Resources section, but the most popular app included in Google's educational suite is Google Classroom. This offers teachers an organized way to send and manage assignments, post resources, create schedules, and more. It also comes integrated with educational apps from the Google Play store to encourage interactive learning experiences accessible from the Chromebook of every student in your classroom.

- With the Chromebook 1-1 computing program, teachers can also enjoy the benefit of full access to all education-specific data on their student's laptops, allowing them to measure progress in real-time. Because of this complete transparency, a teacher will be able to see immediately if a student is behind on or struggling with a specific assignment. This, in turn, allows the teacher to provide more detailed help or support if a student requires it—often without a student having to show the initiative to reach out and ask for help.

- A Chromebook does have the form of a classic laptop, which has its benefits and disadvantages; it's more stationary than a tablet, but it does make it easy to type without having to attach a separate keyboard. However, the Bluetooth and Wifi capability of each Chromebook does make it easy for each device to connect to smart boards and other pieces of technology if required.

iPads and Chromebooks: What They Each Offer IT Professionals in Educational Settings

iPads

- As Apple professionals know that their iPads are being used as widespread 1-1 computing devices, they've put together a way to help safely and securely maintain large numbers of them at once for educational systems. Apple School Manager allows you to deploy mass numbers of iPads easily, and helps for the mass organization and maintenance of individualized school profiles for each

student. AppleCare is available at all times and is highly responsive to any education-specific calls.

- As a potential negative, because iPads don't come with any removable components, if a hardware issue arises, you will likely have to obtain that unit and send it to Apple for service—as opposed to a PC or other device which an IT professional may be able to troubleshoot in-house. Because of this, Apple recommends having a few extra iPads on hand which can easily be set to take the profile of a damaged device. However, this may not be cost-efficient, and there are IT professionals who would rather be able to solve issues when they arise instead of having to outsource all repairs.

Chromebooks

- For IT administrators at your school, it doesn't appear that there's much in terms of needed in-house support. Chromebooks rarely experience hardware issues, as there simply isn't much hardware housed in a typical Chromebook. As each student has a profile and all teachers and administrators have access to G Suite, all profiles can be accessed from any device. If a device is having difficulties or if online access to the Google Drive system is giving anyone trouble, the best solution is generally to contact Google's 24/7 assistance staff.

If you're choosing to start a 1-1 computing program at your school, it'll be necessary to choose hardware to support that system (or to proactively invite students to participate in a Bring Your Own Device platform). Apple's iPad and Google's Chromebook are the two most popular devices currently used in schools that have adopted 1-1 computing programs. Which will work best for you depends mainly on what you need? They both offer similar apps and levels of immersion as well as support for both teachers and IT administration.

If implementing a Bring Your Own Device 1-1 computing platform, is it possible to work with technology in such a way that a teacher is able to unify the experiences of students working on a variety of different devices?

One of the benefits of a Bring Your Own Device platform is that—at least in theory—every student is bringing in a device with which he/she is familiar. This means that you as a teacher may not have to spend as much time onboarding your students onto their devices; instead, you should just be able to meet them each where they are at.

However, this does not account for the teacher's ease of use. As a teacher who is running a Bring Your Own Device platform, it can be overwhelming when faced

with several different types of devices running different operating systems and being asked to create lessons and resources that can easily be accessed with each.

As a teacher, you likely want to bring each student the best tools and apps to help create the most entertaining and engaging education to each, but learning the specific niches of each device is likely not something you have time for! In this case, choosing a specific educational framework — such as Google Classroom, for example — and sticking with it is a good idea. Picking a platform that everyone can reach by browser is key (which is why Google Classroom might be a better idea than Apple's more app-based educational software).

Once my school district has successfully launched a 1-1 computing initiative, what are the main things that we need to focus on in the early months (and beyond) to ensure its success?

The successful launch of a 1-1 computing program entails a lot of work on the parts of many people, but it is not enough to launch it and then expect that everything will go well from there. If you've launched your 1-1 computing program with care, you likely have an IT team attending to support needs, your teachers are all trained, your administrators are on board and you have funding. That's an excellent start—but you're going to have to have concrete next steps to implement to help your program sustain and grow.

Finally, if you hope to secure more funding for your 1-1 computing initiative over the course of its life, you're going to need to show administrators and investors that you have a solid plan for growth. Here, we'll go over just a few of the ongoing factors you should consider in the early months of a 1-1 computing launch.

1. *Policy:* When your 1-1 computing program was launched, there was likely a lot of paperwork about it! A policy draft containing clear expectations and a framework for the implementation of your program was drafted, reviewed, signed by relevant administrators, and kept on file. As your 1-1 computing program grows, it's time to revisit that draft. It's nearly impossible to predict with 100% accuracy what you and your students will need with a new program; as you start teaching with it, give yourself the time necessary to step back and evaluate what's happening. This will take a clear head, but it's crucial to be as objective as possible. As you take in the minor successes and pitfalls of every launch, it's time to go back to the policy draft and see if it needs to be updated to tailor it for ongoing accuracy and best practices. This might include changes in the following areas:

- *Long-Term Funding Sources:* The excitement of starting a 1-1 computing program might have led to an increase in one-time discretionary donations. That might have been exactly what you needed to launch the program, but once the program has shown success, more dependable funding will be needed. Take the time to find a long-term sponsor or sponsors for the program, citing exactly what went well in the launch and what you hope to do for your students with ongoing financial support. This will lessen stress on the system and reduce the chances of your running out of capital just as your program begins to pick up speed.
- *Communications:* Figure out a way to streamline and schedule routine updates reflecting the status of the program and recent decisions made by teachers, IT, and administration. This will help keep everyone informed—an especial necessity for anyone contributing financially.
- *Expansion of the Program, Including Site Readiness:* Whether you launched a comprehensive or small pilot program for your 1-1 computing initiative, people will want to see rapid growth: it's part of what makes us human. Outlining the steps you took to get your initial site or population of students ready for 1-1 computing and extrapolating just how you're going to make that happen for the next site will help when it's time for that to happen.
- *Metrics and Reporting:* In order to please your funders and parents, you're going to have to think of concrete, data-driven ways to show that your program is working. To do this, think about specific numbers or metrics you can pull on a weekly, monthly, or quarterly basis—to be visualized and sent out with regular communications for total transparency. This could involve data on student safety, on financial costs, on regular assessments, and even anonymous surveys posted to the teacher and student body.
- *Security and Privacy:* As one of the main critiques of 1-1 computing programs is consistently in regards to student's online safety and protection of the information of all involved, as your program grows, one of the main things you'll have to think about is how to make those protections ironclad. To do this, consider answers to the following questions, and ensure that they're added to all policy and paperwork.
  - Are the 1-1 computing devices going to stay at the school, or go home with students? When and how often?
  - If the devices get lost or damaged, who will be responsible for them?
  - In case of theft, will you be able to lock or erase the contents of the device remotely?
  - Have you enabled the academic equivalent of parental controls or safe searches on all devices?
  - Have parameters been put in place for the data on each student that is accessible by IT staff, administrators, and educators?

2. *Professional Development:* To launch the program, you likely rolled out training for all teachers to help them through the first chapter of their 1-1 computing teaching experience. It's important to offer educators ongoing education on recent updates to technology, new apps or educational platforms available to them, and on teaching methods that utilize the 1-1 computing technology to its fullest extent while also giving students a chance to go offline and give their eyes a chance to relax. Offering ongoing training modules will also lend confidence to funders in your program in the likely success of the initiative.

3. *Curriculum:* As the teachers begin to plan how they're going to teach their students with 1-1 computing, they should be noting down everything they teach and submitting it to administration. These lesson plans can be implemented into a more standardized 1-1 computing curriculum to make onboarding of new teachers and new sites into the program much easier in the future.

4. *Devices:* If a change in the device or a shift to a BYOD structure is necessary, that needs to be spelled out in a document. The rationale for the switch must be documented and compelling. Alternatively, if it seems like the device of choice for the initial program is working, it's time to note that and then make plans for getting more devices.

   - *Classroom management:* Even though 1-1 computing is as much a benefit for teachers as students in that teachers should be able to have far more control over their classrooms, this needs to be studied and proven. 1-1 computing will only be successful if teachers feel completely comfortable with their classroom environments. Much will have changed in the wake of a 1-1 computing launch, and teachers are the ones best poised to assess how the students are handling the change (aside from the students themselves). Make sure that when these policies are being solidified to augment program growth, teachers are invited to have input into the update process. Their take on classroom management and whether additional strategies will be required is a necessary filter on the success of the program.

Section 2 Summary

Implementing a 1-1 computing program is about far more than simply purchasing a device for each student! From making sure funding is in place to decide the correct devices to use, every step must be taken with care.

Section 3: Practical Applications and Resources For Digital Learning in Well-Rounded 1-1 Computing Classrooms

As much as technology and digital learning is a good thing, we don't want our students to spend too much time in front of screens or feel cut off from real-world

experiences. In this section, we'll discuss a few ways to support the balance of the advantages of digital learning and interactive, in-person learning experiences.

We'll also flesh out the 'implementation' focuses we began in the previous section and discuss some of the most frequently used resources enabling truly great teaching and learning styles in classrooms today.

What are some different yet practical ways to take advantage of digital learning in my classroom?

Because every student learns differently, it's a good idea to utilize digital learning to provide varying learning experiences for your students. If you have 1-1 computing or accessible digital platforms, varying your presentations can become easier. Here are 8 different ways you could present new lessons in your classroom with the use of digital learning or 1-1 computing platforms:

- *Whole Group Instruction:* You don't have to stop giving formal lectures in a traditional, full-class way just because of the rise of 1-1 computing. You can further immerse your students in the topic by sending the presentation materials straight to their devices, so they can take notes right on your slides. You can also take questions anonymously this way, which might empower students to ask questions they don't want to be ridiculed for asking. Playing fun quiz games with interactivity from the students also becomes an option when you're working with whole group instruction enhanced by digital learning.
- *Small-Group Instruction:* When you're working with online media, you can easily present your students with personalized lessons geared towards smaller groups of children. You can also parcel out your time better this way! For example, you could set half of the students to work their way independently through an online video or lesson problem set, and spend time with the other half going through interactive learning stations. At the midway point of the lesson (or the next day, or whenever you see fit), you can simply swap the groups. This will allow you to give parts of the class more individualized attention as if you were able to work with a smaller class size, while still educating the same number of students and being there for every member of your class.
- *Flipped Classrooms:* If you haven't yet heard of the flipped classroom trend that's working its way through K-12 classrooms in America, now's your chance: In flipped classroom setups, students are expected to complete traditional assignments regarding the learning of new material at home, leaving valuable classroom time for interactive activities which can deepen or clarify the knowledge pursued at home. If you're working with digital media, you can easily assign online or self-paced lessons with accompanying problem sets. When your students are in class, then, you'll just need to have an activity ready for them which relates back to the information they learned on their own. As an added

bonus, having all of your students work through the required material independently can give them a shared reference point outside of your classroom.

- *Homework Assignments:* If you've ever thought that all of the paperwork involved with getting students to complete worksheets and send them in (even if this was done by email or other online submission methods!) was a lot, you're likely right. With digital learning opportunities, you can likely find other ways for children to spend their 'homework' time aside from yet another worksheet! You may be able to find online activities, lessons, and projects for them to complete at home. For example, if you're teaching an astronomy class, you could have your students watch a short video about constellations in the night sky, and then ask them to go look at the sky for a few minutes. In this example, note that you're able to have a teaching opportunity (that of helping guide your students through the night sky) that would have been extremely difficult to do with worksheets or just in-classroom experience!

- *Test Prep or Review:* When an exam is coming up, you can assist your students in their preparations by sending them links to reviews, deeper learning, and any online tools you may have put together for them such as flashcards, podcasts, presentations, and more! Self-directed learning for test prep may be more helpful for students anyway, as they can cater their study towards the areas they most need help in prior to the next test. If you put the presentations up online in addition to more learning resources, you can use the time you're saving to make yourself available to the students for questions prior to exams—whether in-person or in the form of Q&A sessions online!

- *Advanced Learning:* If you have students in your classroom who whiz through the content the class is learning at record speed, it may currently be beyond your means to figure out how best to serve them while also helping the rest of the class. In the past, you might have only had the recourse to suggest that they take another, more advanced class. With personalized, digitized learning experiences enabled by 1-1 computing, you can push more advanced links and resources for further study to those students who seem interested in pursuing your subject further—and you can do this without overwhelming any students who may need to spend more time focusing on the lesson plan at hand.

- *Makeup Work:* If you're able to use online lessons, that means that your students don't necessarily have to be in your classroom to benefit. While it is, of course, preferable that everyone gather for learning in the same space (for community and socialization, if for nothing else), being able to access learning materials remotely may reduce the need for frustrating makeup work when a student is forced to be absent from your class. Similarly, if you as the teacher find that you'll need to be absent, with online learning, a substitute teacher can often easily facilitate preplanned activities and online lessons—meaning that there will be fewer abrupt transitions for the students, and less makeup work for you as well.

- *Holidays and Snow Days:* Building off the point above, digital learning can ease the transitions and times of forgetfulness which often pop up over holidays and even over discrete snow days. Regression over holidays is quite common, and of course, if you have planned activities for days which are suddenly canceled—for snow, for example, or for unforeseen circumstances or sickness—merging your class's educational strategies to allow lessons to happen at home can be a good recourse if this occurs.

Regardless of which specific method you choose to use in order to invest in digital learning in your classroom, regardless of the way you take advantage of the 1-1 computing system, it bears acknowledging that it can save time, it can help you personalize learning to every student, and it can help you take more advantage of precious in-classroom time.

However, there are parts of 1-1 computing and digital classroom interfacing which are much less beneficial for the students. We'll look at potential negatives of the systems next, just so that you can be aware of what might happen when you begin to bring technology more fully into the classroom.

What are some specific tools or platforms that would be good to use for digital learning or 1-1 computing programs?

Of course, there is one caveat that must be noted before any recommendations are given, and that is simply that all technology is evolving very quickly. This means that, almost by definition, any digital apps or platforms which are recommended are potentially outdated by the time that they are mentioned!

This is not always the case, and there are certainly better-designed, better-funded apps and platforms which are more geared to stand the test of time than others. We have done our best to recommend those evergreen options here. The very best course of action, however, will be to talk to peers and do searches oneself in order to find the very latest and greatest on the market. There is always the question, too, of which apps and programs are best for you specifically, which is something that only one with an intimate knowledge of your situation will best be able to tell.

With those disclaimers in place, let's look at some of the best current digital tools to be best used with digital learning and 1-1 computing paradigms.

Platforms for Safely Sharing Content
- *Google Classroom:* This platform offers ways to upload resources and send homework assignments to every student. While it was geared to work specifically well with Chromebooks, it can be used by anyone with an Internet connection.

- *PowerSchool Learning:* This platform can work by itself or on top of Google Classroom to give you more options and tools, such as an integrated grade book and the specific compatibility with a lot of different devices—making it great for a BYOD framework.
- *Sophia for Teachers:* This is a lesser-known content management system that purports to help you track student progress with built-in analytics—and also helps you teach with student grouping and quizzing features.

Tools for Screen-Casting and Sharing

For any kind of remote learning situation or even just for the proper documentation of 1-1 computing classes early on, it's a good idea to learn how to record your lectures and presentations effectively. Taking a high-quality screencast of what you're projecting before the students can assist with efforts to standardize curricula and can also give students a resource to work with from home prior to an assessment. Here are some good screen-casting and sharing tools:

- *Screencast-O-Matic:* With a free version and an affordably-priced upgrade with a few extra editing features, this tool connects directly to Dropbox for easy cloud saving.
- *Screencastify:* This is one of the most popular and widely-used screencasting devices. It's free, it can be used when offline, and it works with Google's highly popular Chrome internet browser very well.
- *Explain Everything:* If you're in a discipline where working problems out on whiteboards are integral to your teaching style (for example: physics, chemistry, or math), then this might be a good option for you. This screencasting tool is optimized to follow sketching and compartmentalized steps in a logical, easy-to-comprehend way.
- *Suivl:* This one isn't an app so much as an innovative piece of tech: It's an automated tripod that you can use for your iOS or Android phone. It will track your motion and follow you around the room, so you can present and lecture without having to worry about standing in one location. This results in more organic lectures and much more dynamic lesson recordings. It's also often used by teachers to evaluate their own teaching methods.

Tools for Cloud Syncing

To make sure that your resources are accessible to the most people in the most convenient way and to ensure that your profile is accessible from any device, you're going to want to choose a cloud syncing method and stick with it. As an added benefit, this also adds a layer of security, in case a device that you're working on gets lost, broken, or stolen. All of your work itself will remain intact and secure.

- *Dropbox:* This is a good choice for anyone who will be shooting and sharing video, as it has a good amount of space available. It's also easy to use across platforms.
- *OneDrive:* Even though this only works with Word, Excel, and Powerpoint, it's a very accessible tool for those three ubiquitous tools.
- *Google Drive:* This will likely be a tool you have access to even if you don't realize it, as it's the tech that underlies Google Classroom. It's invaluable, and everyone should use it!

Expression

We'll turn now to tools that help augment student's experiences of 1-1 computing. When properly done, giving students more access to technology should give them a whole new world of opportunity for creative expression. Here are a few tools that teachers have employed to do just that:

- *VoiceThread:* This is a voice-to-text tool that is reliable and very well programmed. It's helpful for giving even young creators a tool with which to create a portfolio.
- *Write About This and Tell About This:* These are apps with prompt-based writing sessions and recording sessions to help kids of all ages find a way to use their imaginations.
- *Dragon:* This text editor and speech recognition program has an app for virtually every platform, and easily allows for copying and pasting into other apps and programs for nearly universal usage.

Assistance for Students with Special Needs

- The Chrome web browser comes equipped with several extensions that should assist students with special needs. These include the Dyslexia Reader, the Speech Recognition add-on, and Google Voice Typing.

Tools for Presentations

- *Haiku Deck* is great for younger kids who would like to create presentations, as it comes with a link to Creative Commons and free stock photos.
- *Prezi* is a completely online tool that makes mind-map inspired dynamic presentations. It's intuitive, and very interesting to both use and look at once completed!
- *SlideShare:* This tool is great for creating presentations for you to later display or embed in a class resources list, or on a class website.

Tools for Digital Note-Taking

There are those who say that there simply isn't any alternative for handwritten notes; and they may be right. Fortunately, with the advent of incredibly responsive

touch screens and apps that are good at digitizing even the messiest of handwriting, the benefits of written notes can have the same convenience of typed ones! Here's a roundup of top-tier digital note-taking apps.

- *Evernote:* There's a free version that supports basic note-taking as well as a more premium version which can be bought as a school-wide plan. Evernote recognizes scanned notes as well as handwritten ones.
- *Google Keep:* As another app in the Google family, the Keep app supports quick notes-on-the-go as well as more detailed reports with pictures and bullets supported.

Tools for Basic Graphic Design and Infographics

Not every project turned in needs to be beautiful, of course; however, the earlier students learn that good presentation and design works, the better! You can also use these tools to customize worksheets or resources to make them more colorful, helpful, and interesting.

Particularly if any of your students are young artists in the making, they may be interested in the following:

- *Canva:* An online, easy-to-use, free design program, Canva helps you create posters for school promotions, beautiful presentations, and more.
- *Visme*, *Piktochart*, *Infogram*, and *Ease.ly*: Any of these would be a great choice for easy-to-make yet good-looking infographics.
- *Storyboard That:* Want to make some simple cartoons for your class, or help any budding filmmakers indulge in their dreams? This is a very simple tool to use to put together short storyboards.
- *Classtools.net:* This is a free teacher site that has a vast library of creator-friendly resources, from the ability to make custom video games, quizzes, and even fake Facebook and Twitter profiles for historical figures or characters for your courses.
- *Paletton:* For a primer on basic color theory as well as the ability to make color palettes that look good together, this is a great first step.

Tools for Formative Assessments

One thing will never really change about learning techniques! No matter how you're teaching your students, you'll need to find a way to assess what they're doing. Periodic traditional tests and quizzes will never go out of style, but with the ongoing data available in a 1-1 computing setting, it might be possible to get even more of-the-moment detail about how your students are doing. This can give you the ability to send help when it's needed--not just after the next test.

- *Edpuzzle:* On this platform, you can place videos directly next to questions, so you can quiz your students in a timely fashion as they're taking in the targeted information.
- *Socrative:* As an ongoing tool for understanding student engagement through on-the-fly assessments, this tool works wonders. It's sleek and well-maintained, and their support features are incredibly responsive.
- *Formative:* With this tool, you can see students working through their math problems live.
- *Kahoot:* With this tool, you can create fast-paced games out of questions you have for your students.
- *SmartLab:* If you have SmartLab running on your teacher computer, you can project it to the front of the room and let students chime in on their own devices for quiz games, activities, and more.

Tools for Link Sharing

As much of 1-1 computing and BYOD learning will depend on shared resources, it's good to make sure that you have a dependable way to do just that. Here are some favored link-sharing tools to make even the simplest steps of online teaching easier:

- *LessonPaths:* This site offers educational playlists for students to enjoy.
- *Symbaloo:* If you're looking for a good 'home page' to designate for your K-12 students, this is a good option. It offers buttons that can take students to educational sites very easily.
- *Diigo:* This is a great tool for older students who might be doing research in groups. It offers a shared bookmarking platform--and it offers it for free, which is a great perk!
- *Google Spreadsheets:* While all of the Google Drive apps are great for shared work, Spreadsheets in particular is great for sharing long organized lists of resources.

Tools for Kinesthetic Learning

Another oft-heard critique of 1-1 computing is that it will supplant any kind of interaction within the classroom, instead of gluing students to their screens. With these apps, even PE teachers have managed to have fulfilling remote and digitally-enabled motion-intensive courses—great for helping students to be more active, and also good for students who naturally learn with a more hands-on modality.

- *ReplayIt:* This is a free extension for Chrome which allows you to set a delay on your video camera, record yourself doing a specific motion, and then share it easily.

- *Fit Radio:* With this app, you select a specific motion or activity that you'd like your students to complete, and the app will select music to match.
- *Team Shake:* If you need an updated solution for picking teams effectively, look no further than this app. It helps you switch up teams, and you can even put in restraints and conditions—for example, if you'd rather place two kids together, or (alternatively) make sure that they're not in the same group.

Section 3 Summary

Once you've implemented a 1-1 computing program, your work is still far from done. It's on you, as a teacher, to find creative ways to make the most of your academic environment. Finding ways to use the Internet and digital media to their fullest extent can help you offer your students a top-tier education. With the resources available to us in modernity, it might even be easy to do so!

However, finding the balance between screen time and in-person time can be difficult—especially when screen time is easier and the students are often more interested in it! Finding a way to use screens in class while, at the same time, using interactive activities to bond with your students is a fantastic recipe for academic success.

Conclusion

1-1 computing is the current big trend in education, with school districts all over the country making the leap to a much more digitized in-school (and out-of-school) experience. Relying more on technology and digital resources in the classroom has many benefits for students. It allows them to be more independent, it helps them take responsibility for their learning, and it can offer them more virtual experiences to deepen their academic learning than any analog resources could in the past.

However, in order for 1-1 computing to be a viable solution, it does take quite a bit of background work (as well as ongoing maintenance). Teachers need to be educated, administrators and parents need to be on board, and policies need to be clearly delineated.

Once this is done, 1-1 computing can represent a way to enable your students to learn remotely if need be; it can help appeal to myriad types of learners, and can certainly be a fantastic way to utilize the latest in technology to support an excellent education for your students.

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