Developing Digital Learning Practices and Career Technical Education

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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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Part 2:

Introduction

If you're a teacher in a 21st-century classroom and you're looking for modules to put in your curriculum, digital citizenship is, perhaps, a good subject on which to focus. It's gaining popularity in lesson plans nationwide. According to the Common Sense Census, digital citizenship is now one of ISTE's standards for students - and 60% of educators teach some kind of skill relating to digital citizenship every month (Vega and Robb, 2019).

With all of this interest, it's clear that digital citizenship as a subject matter is here to stay. However, that's not a very compelling reason to teach it in your classroom. What is digital citizenship, and why is it so important? If you're going to help your students become competent digital citizens, how should you incorporate lessons into their day-to-day?

In this course, we'll go over the elements of digital citizenship as well as its importance for your students. Then, in Part Two, we'll discuss the different practical pieces of knowledge you'll need to impart, as well as strategies for doing so in your classroom.

Section 1: What Digital Citizenship Is, and Why It Matters

What Is Digital Citizenship?

Let's start with a definition of regular citizenship. If you're a citizen of a country or a city, such as the United States or your hometown, you may have an idea that being a 'good citizen' refers to being a good member of your community.

As such, citizenship is far more than simply a matter of belonging. To be a good citizen, you need an in-depth knowledge of the history of your community as well as your community's traditions, ethics, and normal interactions. You'll use all of that information to inform the way that you respond to others within that community.

Digital citizenship is at heart no different. However, since some members of the online community may be more or less invisible, and because the online community is more diverse and of greater magnitude than the one you might interact with in person, some different aspects of that basic definition come into play. Experts at TeachThought, an online resource for educators, define digital citizenship as "the self-monitored habits that sustain and improve the digital communities you enjoy or depend on" (Heick, 2020).

Some Classic Examples of Digital Citizenship At Work

When your students have become reliable, competent digital citizens, you'll be able to tell because they'll be enabled to:

- Confidently use a mouse, type accurately, and utilize computers with ease

- Avoid hateful or harassing speech while they're talking to others on the internet

- Help others practice smart and respectful internet practices, such as avoiding plagiarizing, illegal downloads, or other harmful habits (Waterford, 2019).

Why is Digital Citizenship Important?

As teachers, it might seem strange that we're now being asked to help guide students through internet literacy. After all, that's not a traditional academic subject. In many cases, our students can seem far more literate with new apps and the internet than we are, anyway!

However, that doesn't mean that we don't have an avenue for helping children improve their lives and others with digital citizenship.

Modern life is moving increasingly toward models where most communication is conducted online. There are new apps, websites, and online services being invented and marketed every day. Being able to navigate new technology, communicate with ease and finesse online, and make the most of the vast amounts of information online without getting distracted or duped are all crucial skills for modern students.

Equipping students with the tools of digital citizenship ensures that they have the resources to succeed in modern life. It will also help them engage with others in safe and constructive ways, and to have a positive and meaningful impact on the safety and efficacy of the internet.

There are five specific reasons that digital citizenship is extremely important for today's students:

1. **Information Literacy:** The internet abounds with helpful tools and services to help you find the answer to any question you could ever ask. Whether you're in need of a dictionary, a thesaurus, or any other type of reference material, there will always be more answers then you need on the internet. Today's students need to be able to sift through this information with confidence. They need to know how to use reliable tools quickly, and how to discern a source they can trust from one that is trying to sell

them something. With internet literacy and digital citizenship, students are empowered to have the understanding and skills to use the information on the internet to their advantage, as well as to the benefit of others. These skills may be second nature to those who have grown up with the internet, but this should never be assumed. Appropriate discernment usually needs to be taught; and simply assuming that children know how to find reliable answers to their questions usually results in mass ignorance and confusion.

2. **Cyberbullying Prevention:** In order to reduce currently distressing rates of cyberbullying, students need to learn the necessity of engaging respectfully with others online. Understanding that the same rules that guide polite, productive conversations in person generally extend to the internet may not be an intuitive leap for many. Reinforcing the idea that online communication and etiquette are not optional but necessary for your students will help them become better citizens of the internet - and will, in turn, make the internet a safer place for anyone who wishes to surf. As you're helping your students learn to be better digital citizens, you can also help them be aware of the dangers of cyberbullying. By learning to address, call out, and prevent all instances of cyberbullying whenever students see it, students can directly contribute to their own mental health and the well-being of their peers.

3. **Online Safety:** The internet can seem like a fun and fascinating place at first glance. It's true that it can be the source of a lot of help and entertainment for modern life. However, it can also be a place where students fall victim to threats from strangers. When you're teaching your students how to be good digital citizens, you need to ensure that they know how to protect themselves as well as their identities. Teach your students that it's best to stay away from some types of websites, that they shouldn't post overly personal information about themselves, and that if something doesn't feel right, it probably isn't! If your students are able to hone these skills, their digital citizenship might very well help protect their personal safety.

4. **Digital Responsibility:** With the advent of the internet came the potential for each of us, our students included, to have a relatively large audience. With a single click, we can disseminate information that reaches hundreds or thousands of people. Your students need to know that this is a responsibility. Part of digital citizenship is an awareness of threats like piracy, viruses, plagiarizing, and hacking. Your students need to be aware that these internet-related threats can result in real-world consequences, and that what they post matters. Helping your students set protective boundaries and

realize what is appropriate and safe (and what isn't) can set your students up for a lifetime of safe, responsible use of the internet.

5. **The Digital World and Wellness Online:** Once your students have moved past simply learning about what can go wrong with internet usage, they can start to understand how using the internet can be a way to increase the quality of their lives - or, of course, how it can be detrimental to their well-being. The internet can sometimes be addictive. Recent studies have shown that overuse of technology has been linked to eye problems, mental stress, low physical fitness, and other chronic problems. Your students need to be aware that just as they're going to need boundaries surrounding how they act online, they'll also need boundaries limiting how much time they're staring at a screen. Understanding that this is not a punitive or random measure and instead is very much meant for their wellness is a crucial step. Learning to balance time spent online or viewing digital or social media with time spent with friends, pursuing physical activity, or other real-world events is a vital part of digital citizenship (W., 2019).

Why Should Every Classroom Teach Digital Citizenship?

It can be tempting to wonder why teachers must specifically go out of their way to add digital citizenship to their curricula. It could seem that many of the tenets of digital citizenship might be successfully woven into other subjects. However, there are several good reasons that teachers should place a special emphasis on this topic:

- There is a very real gap between traditional curricula and ever-evolving technology. In fact, technology is changing so quickly that teachers could never quite hope to keep up with each fad. However, the fact of the matter is that students need to be equipped to handle each new wave of technology. There are certain constants that prevail as tech gets faster and more ubiquitous; and there are ways that teachers can help students prepare themselves for an increasingly digital age. To ignore technology completely, at this point, or to focus on outmoded apps would be foolhardy. Therefore, even though we as teachers can't focus on the complexities of each new social media platform, we have a duty to help students understand the overarching themes of comporting themselves on the internet with grace.

- Digital footprints are very real. These days, prospective employers and colleges will trace an applicant's internet history back for years. The way with which your students will be perceived by their online activities will make a very real impact on their lives. Even though this is a (relatively) well-known fact, many students don't think about the

fact that persons other than their immediate circle of friends will be viewing their posts online. Anything inappropriate will be seen by many. This makes basic awareness of digital citizenship essential in today's world.

- You need to meet your students where they are. Like it or not, your students are living on social media apps these days. In order for your lessons to be helpful and relevant for them, you need to be teaching them the skills that will help them in their milieus of choice. Right now - and, based on trends and speculation, in the future - that involves needing to know how to be a good citizen in an online environment.

- Your students need to be able to sift through the overwhelming amount of information on the internet with confidence. If they don't have proper tools for discernment, they could easily be led astray by a stranger who yells too loudly on any given website. Helping your students learn to develop a sense of curating reliable sources and sussing out suspicious content will set them up for a lifetime of using the internet well—instead of dangerously (Barnwell, 2019).

We've discussed why modern students need to be introduced to digital citizenship. In short, it will help them be successful and safe as they navigate their lives in the information age.

Now, we'll turn to the what of digital citizenship. When you're introducing these concepts to your students, what are you going to be discussing? We'll go into techniques for classroom immersion later, but next, we'll quickly discuss the elements that constitute the heart of digital citizenship.

What are the Elements of Digital Citizenship?

Many of your students have likely had technology in their lives for years. However, this doesn't mean that they're innately good at using it. In order to go from simply using the internet to using it well, students need to prioritize three basic categories of being a good digital citizen.

1. **Respect.** Your students need to learn how to respect themselves and others across the internet. This can be broken down into three discrete principles:

   - **Digital Access:** All persons need to have equal rights in digital spaces. This starts with equal access to the internet.

- **Digital Etiquette:** All people who use the internet need to go beyond just following rules to ensure appropriate behavior, and start learning how to promote polite, respectful communication online.

- **Digital Law:** Everyone's content belongs to them and them alone. All who use the internet need to know how to share information and digital properties appropriately.

2. **Educate.** Your students need to be aware that the information they post online reaches a lot of people. Three principles logically follow:

- **Digital Communication:** There are myriad different ways to communicate online. Your students need to build comfortability with the various options they have and learn to choose the right method based on what they want to say.

- **Digital Literacy:** With all the information available on the internet, students need to know how to evaluate the accuracy of sources and cite resources when they are used.

- **Digital Commerce:** When your students make purchases online, they need to know who they are supporting and how to be an effective consumer.

3. **Protect.** Whether it's their own identity or property belonging to another, protecting privacy is a huge concern in the internet age. Your students will need to learn about three basic priorities in order to protect themselves and others well:

- **Digital Rights and Responsibilities:** Every user on the internet should know their basic rights, including privacy and freedom of speech. These rights bring along with them specific responsibilities.

- **Digital Safety and Security:** People who are knowledgeable digital citizens are able to protect their own data and information through the appropriate use of privacy.

- **Digital Health and Wellness:** Your students need to learn when it's time to get off the internet! Part of being good digital citizens involves knowing that a healthy life prioritizes balance (Ribble, 2020).

As we've discussed, being a digital citizen on the internet is not that different from being a conscientious citizen in real-life communities. Being a sensible member of either sphere is dependent upon adherence to an agreed-upon moral code. Remembering that

you and your students need to know how to respect, educate, and protect themselves and others online is a good place to start in your group efforts to become digital citizens.

As a teacher, you have a specific role in helping your students become the good internet users that they need to be. We've discussed what a good digital citizen is; now, how do you help someone else become one? We'll delve into strategies for helping your students become digital citizens in the next section.

Section 2: Digital Citizenship and Leadership in Your Classroom

We're living through the Internet Age. It's vital that the students in your classroom learn to become good citizens on the world wide web. However, it's also important to note that your classroom is likely filled with 'digital natives.' A digital native is very simply someone who has never known a world without technology (NetRef, 2019).

Because many of your students are younger and maybe more naturally familiar with technology and internet use (particularly with of-the-moment applications), it could be easy to assume that they know how to use the internet well. This is not the case. Like many skills, it may come easily to some, but for the most part it very much still needs to be taught.

How can You Teach Digital Citizenship in Your Classroom?

We've discussed the importance of digital citizenship. As a teacher, it's also important that you understand how to pass on this vital skill to your students. We'll discuss five simple ways that you can incorporate digital citizenship in your classroom next.

One good way to frame lessons in digital citizenship is to pair digital citizenship skills with ethical or moral lessons that your students have already likely learned. This will help it seem to your students that they're not learning something new (and therefore potentially overwhelming); they're just learning a new way to apply something they've known for a very long time. We'll follow that format in the below lesson prompts:

1. **Teach your students to know the difference between right and wrong on the internet.** Just as your students can likely tell, viscerally and on their own, if something feels okay or if something feels off in real life, they can learn to hone their sense of 'okay-ness' or 'off-ness' on the internet. A practical way to help your students garner this skill involves teaching them the rules of proper 'netiquette'. We'll go more into

the rules of netiquette later, but, to start, just giving your students the idea that the internet is a place that has its own rules, expectations, and permanent repercussions will place them miles ahead of many others.

2. **Make sure your students understand that there are consequences for acting poorly on the internet.** Because conversing with other people on the internet can feel ephemeral and impermanent, or because posting a status or a picture can be done so easily, students can think that their actions don't have consequences. Introduce your students to the idea of a digital footprint to ensure that they know that the decisions they make online could affect how they can be perceived for years to come - including in the far-flung future when they want to get into a good school or apply for their dream job.

3. **Teach your students that stranger danger extends to the internet, too.** Many of your students were likely taught from a young age to avoid talking to strangers. Even though the internet makes those strangers much more accessible, it's important that your students know that they're no less dangerous. Talking with your students about the protective nature of strong passwords, two-step authentication processes, and other safe and secure practices, can help bring it home that a focus on online safety is paramount for your students' very real safety.

4. **Start telling your students now that playing fair is always the way to go, and lead this thought into a practical conversation about plagiarism.** Plagiarism is very seriously policed and punished at every academic level, from grade school through university and beyond. However, the specifics aren't always communicated very well, especially to students who are young. As a result, accidental plagiarism is very common—and it's often punished just as severely as very intentional copying. As part of your work with your students on digital citizenship, go over copyright, plagiarism, and the different permissions and citations that your students will need to obtain and use as they go throughout their life. Help the students navigate safe sites for image sourcing, interpretation of copyright rules, and the various ways to cite resources for any borrowed, paraphrased, or otherwise 'found and used' work (NetRef, 2019).

5. **Stress to your students the importance of choosing their friends with care.** On the internet, people can tend to feel much freer to treat others poorly or bully people indiscriminately, perhaps because they don't feel that they're interacting with real persons. In other cases, people feel freer to bully online because it can feel easier to say and do things in the cyber world that instigators would never do in real life. Bullying online is called 'cyberbullying', and it's a huge problem for teens - it may lead

to serious depression in middle and high-school students (University of Miami, 2020). Help your students get a sense of what cyberbullying is, teach them to recognize it when it's happening, and help them put together a strategy for stopping it (whether it's happening to them or another). We'll discuss specific actions that a student can take when they see cyberbullying in action in the next section (NetRef, 2019).

How Students Can Help Stop Cyberbullying in Its Tracks

Bullying doesn't always happen in school playgrounds or hallways. Whether your students see it happening in real life or on the internet, they should know that they have a responsibility to stop it from happening - to protect themselves and others. Here are a few ways that your students can be good digital citizens by stopping cyberbullying safely whenever they see that it's a problem:

- **Students need to know that cyberbullying is not their fault if they simply see it happening.** Merely viewing someone else being treated poorly is enough to make some sensitive children feel guilt-stricken - which in turn can lead to them turning a blind eye. If your students see cyberbullying happening, they need to know that they're not responsible. They do have a responsibility to do all they can to stop it from happening, however. Likewise, when students are victims of cyberbullying, they may have been manipulated to believe that they're at fault. If they are experiencing cruel treatment, they need to feel empowered to seek help - not participate in their own victimization.

- **Whether your students see cyberbullying happening to another or are experiencing it themselves, they need to be careful to avoid direct retaliation as they step in to help resolve the situation.** First of all, this can be dangerous. Secondly, that's often exactly what aggressors are looking for. Thirdly, more bullying never resolves bullying in the first place! Teach your students not to respond or retaliate to cyberbullying. That dignifies it. That helps perpetuate it. If your students become victims, tell them that they can walk away: minimize the messenger app, turn off their phone, log out of the website, and simply stop. Then, once they've gotten a clear head, they can seek help from an adult or another authority to end the cyberbullying actions more permanently.

- **Teach your students to take advantage of the permanence of the internet.** One of the only benefits that there is to cyber-bullying when compared to more traditional actions of playground bullies is that everything is documented. When your students realize that cyberbullying is happening, whether they're a victim or a bystander, have

your students capture screenshots or otherwise save evidence of what's occurring. That way, it'll be much easier to help stop it from happening ever again. Additionally, in the event that the cyberbullying escalates or the instigator tries to turn the blame onto the victim, evidence will make it much harder for the instigator to get away without justice.

- **When it's time to stop cyberbullying from happening, teach your students that sometimes the simplest course of action is also the most effective.** It takes a lot of courage to stand up to a bully, and if your students don't feel comfortable doing so, they shouldn't - they should find an adult to intervene instead. However, if your student is able to stand up and tell the bully to stop, making it completely clear that such treatment will not be tolerated, that will send a very concise message. Tell your student that it's best to state your case and then leave quickly, so the bully doesn't have a chance to grandstand or make a rebuttal. In many cases, simply relieving a bully of the audience will make bullying far less attractive. Standing up to bullies does take practice, so roleplaying a scenario in which a student can stand up to a bully may help.

- **Teach your students that asking for help is not only okay, it's preferred.** A cyberbully can make it very difficult for a victim to feel okay getting an adult involved, whether it's through bribery or guilt or coercion. Because of this, victims might not always say anything. If your student notices that one student is bullying another, make it clear that you (and other adults, such as parents or other teachers) will always be a helpful, empathetic resource when it comes to stopping cyberbullying.

- **Let your students know that there are many tools that technology has given them to reduce unwanted online encounters.** Because cyberbullying has become such a large problem, many social media apps (and other online services) have made it very easy to block, report, or unfollow people with whom you (or your students) no longer wish to engage. Teach your students about these options. If your student is experiencing harassment, your student always has the option to block or report the other user. However, make it clear that this might not fix the problem. Particularly if your student is receiving physical threats, simply tuning the perpetrator out may not make the harm go away. Encourage your students to gather evidence, make sure an adult is aware of the situation and that due precautions are taken to ensure that no harm will come their way, and then block or tune the person out so that the student no longer has to see or hear harassing statements.

- **Impress upon your students the necessity of keeping their accounts secure.** Teenagers often share many things that should be kept relatively private as a show of trust and unity. In many cases, this is a wonderful way to bond and make friendships stronger. Passwords to online accounts, phones, or computers should never make it into those categories. Make sure that your students are aware of the dangers of identity theft and other ramifications of shared or leaked passwords (ConnectSafely, 2018).

What Is Digital Leadership? How Can You Help Students Become Digital Leaders?

Once your students have successfully become digital citizens (or are well on their way to being ones), it's time to start thinking about what's next. Just as in real life, after students are able to comport themselves successfully in their environments, we encourage them to take on leadership positions. Digital leading then becomes the natural step following digital citizenship.

What does this step entail? How can we help students make this defining transition? We'll talk about this in the next section. In short, when we can shine a light on the benefits of technology and how it enables us to reach and help more people, we are pointing the way for our students to take ownership of their goals and help make the internet (and culture itself) much happier and healthier.

Helping Students Transition from Digital Citizenship to Digital Leadership

Being a digital leader could simply be defined as taking digital citizenship one step further. Instead of coexisting peacefully and professionally with the other citizens of the online world, a digital leader steps up to make changes where they are needed.

For example, digital leaders:

- Make sure to use social media and other online platforms to empower their audiences and share ideas worth sharing

- Prioritize the process of collaboration and connection in order to learn more about the world in which they live

- Are not afraid of healthy vulnerability, of showing their work, and of being creative in order to promote the greater good

- Have an open mind when it comes to arguments on the internet, and show respect for others in every response

Whereas digital citizenship can typically be taught, because much of it has to do with the rules of netiquette and other expected polite and professional practices, leadership needs to be owned by the students themselves. One way to help students along, however, is very simple. As a teacher, you need to model digital leadership yourself in your day to day instruction and interactions.

As a teacher, you can help your students by telling them about how you use the internet as a leader. You can relate examples of how you've handled online arguments, how you've posted to praise and support others, and how you've learned more about the world by having an open mind and reading varied sources to learn the different aspects of nuanced stories.

You can assign your students projects to help them develop these necessary leadership skills. Alternatively, you can simply make it clear to your students that you are open to hearing and helping when they want to 'run with' a project, support another student, learn more about a subject, or otherwise do a deep-dive into something that really matters to them.

From a strictly utilitarian point of view, future colleges and employers love to see stories of students taking the initiative to do good in their communities. However, in a much more real sense, by giving your students the tools to become digital leaders, you're helping them become the people they need to be—and helping influence even larger groups of people, through them, to try to do their part to make the world a slightly better place (Plemmons, 2019).

The Rules of Netiquette

If your students are going to become good citizens of the internet, that involves learning and following the distinct rules that can make the web a safe and enjoyable place to be. These rules - or 'internet etiquette', often shortened to 'netiquette' - are often summarized as follows:

1. **Think carefully about the tone of your words.** When we speak, we're able to pretty naturally modulate how something sounds, which has a direct impact on how our words are perceived. On the internet, with the exception of videos, everything is text-based. It can be much more difficult to make a joke or show emotion safely because the subtext and nuance that can make those more complicated communications

possible is often lost on people on the other side of the screen. In many cases, jokes are often taken as rude, and simple statements are perceived as subtle threats. To alleviate this wherever possible, teach your students to think twice (and very carefully) about capitalization, italics, and other modes of differentiating text. An innocuous statement interpreted poorly can make the difference between a helpful conversation online and a horrendous argument waiting to happen.

2. **Prioritize accuracy whenever you're making statements online.** The internet is a vast place that is full of incredible amounts of information. There is also a lot of misinformation to be found. If your student has found a piece of information that seems suspect, he or she has a responsibility not to share it, thereby amplifying the number of people who are being misinformed. Teach your students to do their own research, and to be very sure of the factual nature of anything they plan to post online. There are usually very simple ways to fact-check any data that your students plan to use, but they do need to be aware of these methods and the importance of using them. Part of being a good digital citizen is not leading other people astray with badly chosen facts. Help your students have the means to choose well whenever they post online.

3. **As a rule, impress upon your students the importance of searching for their own data and answers online before posting a question to social media.** This is secondary to the previous point, but bears mentioning! Almost everyone uses or has access to the internet. Each user has a different history, educational experience, bias, and familiarity with any topic that you'd be interested in knowing more about. Throwing a question out into the void of the internet, therefore, can bring back incredibly diverse and perhaps only marginally helpful answers. Before students decide to do this, it's a good idea to have them ask a teacher or parent for an answer, or specifically to do research in reliable, trustworthy online databases.

4. **It's a good idea to be as polite as you are in person when you're communicating online.** (Imagine how many social media comment wars would be very different if we all followed this rule!) Teach your students to remember that individuals on the internet are real people behind computers or phones, and to treat them as such. They shouldn't say anything to an online avatar that they wouldn't be comfortable saying to someone's face. This principle alone would likely greatly reduce the amount of cyberbullying that many students face, so make sure to reiterate it when you're going over digital citizenship with your students.

5. **When your students are writing online, they should always use proper grammar and punctuation to convey their thoughts and comments most efficiently.** As the saying goes, you need to learn the rules before you can break them - so students need to learn how to communicate properly online before they can (or should) start using abbreviations, emoticons, and gifs. Regardless of what students do in their spare time, it's a good idea to enforce completely correct punctuation and grammar in all school-related online communications. To influence what your students do on the internet when off-campus, remind your students that good punctuation and grammar vastly improve their online perception. When students use English correctly, they're seen as smart, reliable, trustworthy, and professional. (It can also help to show your students that correct use of text does not have to be mutually exclusive with humor or wit).

6. **Stress to your students the importance of staying on topic.** If there's a discussion happening on a social media post or in an email chain, one of the least helpful ways to derail the productivity of that conversation is to bring up a different topic. Make sure that whenever your students post a comment, they're using that opportunity to bring something helpful and relevant to the conversation. It'll be that much more helpful for the original poster, and it'll help your students become better conversationalists both on- and off-line.

7. **It's very important that your students remember that there is no such thing as privacy on the internet!** The second your students post something, it's going to be around for a long time. They need to know that even if they delete posts, there may still be a record of them somewhere - and, regardless, they won't know if someone saw a post and took a picture of it before it went down! Because of this, your students need to develop a little bit of perspective or foresight about what is permissible to be posted - and what won't be helpful for their future selves. It's impossible to look into the future, so a good rule of thumb for your students is to steer clear of anything that might be rude or inappropriate when posting.

8. **That said, when your students begin interacting with others on the internet, they should be aware that they need to afford other people as much privacy as they can.** Even though your students may have access to the personal information of others (such as whereabouts, social media handles, pictures, or email addresses), they shouldn't share any of that with another person without explicit permission. It may feel like a very safe interaction - for example, just sharing a picture with a friend, or passing a student's contact information to another teacher - but students always need

to respect that other people have the right to moderate access to this type of personal data. Teach your students to always ask for permission before distributing any information online that involves another person.

9. **Finally, just as your students need to respect the privacy of others, they also need to learn to respect other people's opinions online.** Your students may have already encountered the fact that they will not always agree with other people in real life. They may have developed a system for acting polite in a face to face situation, even if they strongly feel that another person is wrong. Because the internet offers relative anonymity and ease of communication, your students may not have a similar system for respecting different opinions online. Teach your students that they can disagree with others but respect their right to express themselves at the same time. It's a trite saying, but the old 'if you can't say anything nice, say nothing' may be a good rule of thumb to follow on the internet (UOTP Marketing, 2020).

Conclusion

Becoming and being a good digital citizen and leader may not seem like the most academic of pursuits. However, the reality of modern life reflects the fact that the internet is here to stay - and, increasingly, schools and businesses are conducting their day-to-day tasks and communications online.

In addition, your students likely spend a good amount of time navigating social media and other online resources. Giving your students the tools to wade through the vast amount of information on the internet isn't an optional extra in your classroom; it's necessary assistance to ensure that your student is able to go through modern life with ease. Strategizing with your students to ensure that they're able to contribute to the online discourse, support causes about which they are passionate, and keep themselves and others safe, is certainly a priority for every 21st-century classroom.

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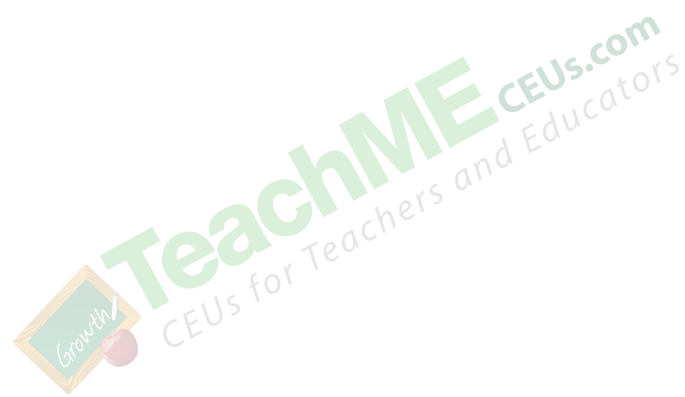
Part 3:

Introduction

Schools across America are learning to embrace Career and Technical Education—or CTE. In a CTE program, a student in middle or high school learns practical, specific, and highly marketable skills that can be applicable to a wide array of industries that need reliable talent. CTE programs are often available, as well, in post-secondary institutions; however, CTE programs that serve middle and high-school students are often more cost-effective and efficient.

In a CTE program, students have the chance to personalize their own educational pathways based on the types of careers they wish to pursue—as well as their own unique learning needs. CTE programs can also help provide a relevant, real-world context for students' academic experiences and help them learn real-world skills such as communication, teamwork, digital literacy, and time management.

Section 1: The Importance of Career and Technical Education

CTE has long been seen as a secondary choice for many who are more familiar with the school-college-career model. Today, CTE is not only an option that a majority of young students are choosing, but it is also a path that can result in high-value, long-lasting careers. What is this type of education, and how can we incorporate it into our curriculums or school programs in an accessible way? To delve into these questions, we'll begin by offering a working definition of Career and Technical Education.

What is Career and Technical Education (or, as it's known, CTE)?

In a sentence, CTE consists of courses or classwork that directly prepares students for work, a job, or a specific career. While a common goal of every type of academic endeavor is for a child to be able to pursue a career when the time comes, CTE is particularly useful in fulfilling this aim. Such programs strive to teach students very practical, marketable, and often technical skills that translate immediately to an in-demand career (Gewertz, 2018).

In the past, CTE has often been seen as a college alternative. Today, it still has that utility, but it has also become a new type of pathway to or through college. CTE is also frequently categorized with vocational education—or practical education for careers that can be embarked upon without a college degree (e.g., welding, cosmetology, plumbing,

or child care.) In many ways, CTE is very similar. However, it's also different in some key ways. For one, many CTE programs provide a focused, extremely practical approach to a career that might traditionally have been associated with a bachelor's degree (e.g., business or engineering). In addition, CTE is often framed as a way to study after high school to attain a higher-value career. To this end, modern CTE courses also tend to be more rigorous than vocational education courses were in the past (Gewertz, 2018).

How many students are opting to pursue CTE pathways after high school?

As far as current trends in education go, CTE is a big one. In the 2016-2017 school year, approximately 8.3 million high school students enrolled in at least one CTE course. This number represents nearly half of the population of students enrolled in United States high schools. Recently, the government invested in CTE programs in the United States by re-authorizing the Carl D. Perkins Career and Technical Education Act, which boosted funding for this type of education (Gewertz, 2018).

This particular investment has gone a long way toward closing the gap in access or matriculation in high-quality education for many students. In the past, vocational schools or programs that led to careers in areas such as plumbing and cosmetology have been largely associated with low-income or minority students. Now that CTE is becoming an increasingly valuable and attainable option, students are able to enter professions that would have likely been inaccessible to them in the past. For example, those who may have not been able to afford the type of education that would lead to a career in the medical field, are able to work—in an efficient way—toward entry-level jobs in this and other previously-guarded industries (Gewertz, 2018).

This does not mean that CTE is a route enjoyed by a necessarily diverse population. Although the hope is that this will change in the near future, studies have noted that students who enroll in CTE courses still tend to come from minority and low-income households (Gewertz, 2018).

CTE is neither a college nor a high school substitute. In many cases, it operates as an amalgamation of both: Many CTE students will take courses to prepare themselves for a chosen field while still in high school, and then go on to matriculate in a program after high school that either incorporates an associate's or bachelor's degree or includes some type of rigorous postsecondary training (e.g., a cybersecurity certification). Many CTE programs, especially those built for high school students, seek to ensure that all CTE students have a way to move from CTE to a more traditional four-year college

experience if that's what they want. In the meantime, CTE often focuses on helping students navigate situations that allow them to apply academic concepts to real-world situations (Gewertz, 2018).

What can CTE students expect to do in their career with a CTE education?

The answer, as you might expect, depends a great deal on which field students decide to pursue—and which CTE cluster they matriculate into. There are fields in which the highest earning potential is difficult to attain without a four-year education. However, there are also careers where a student with a two-year certification can expect to make at least as much as someone who was in school for a much longer time. In either case, modern CTE programs strive to place an emphasis on leaving the door open for college attendance or additional education for those students who wish to complete further schooling or training prior to pursuing a career (Gewertz, 2018).

In the second section of this course, we'll dive into the different career pathways that most CTE programs are currently geared to support.

Why are CTE programs important for modern American schools?

Many experts believe that CTE is more than just *important* - in fact it should be one of the most vital components of the education system in modern-day America. Why? Completing CTE tracks has been proven to be an excellent method for preparing students to achieve success in a wide array of incredibly high-demand careers. Additionally, CTE programs provide numerous benefits to assist students in their overall academic goals and endeavors, while incorporating applied learning across disciplines, and helping students see the relevance of their studies.

CTE programs have been associated with (Zook, 2019):

- Higher high school graduation rates (around 95%)

- A pipeline to high career demand

- Better grades

- Satisfied students

- Increased confidence and happiness with a student's chosen direction in life

- Extremely low investments for schools

- Increased benefits for the communities in which CTE programs are located

A more in-depth look at each of these assertions recognizes the following advantages of CTE programs (Zook, 2019):

1. An average of 95% of students who enroll in CTE programs graduate high school. (The national average for all students is lower, at 85%). How does this happen? Students who take a different educational pathway and choose to work for CTE credits have often reported a more enjoyable and engaging learning experience. It's theorized that this higher engagement leads to a reduced number of students 'falling through the cracks' and failing to make it to their graduation day. It's also postulated that students who struggle in traditional classroom settings, but who are willing to try CTE programs, may be more likely to find a scholastic track that works better for them. It should also be noted that CTE graduates don't necessarily embark on CTE careers such as health care, business, technology, construction trades, human services, agriculture, manufacturing, hospitality, and so on immediately after high school graduation—a very high percentage matriculate into higher education before starting their careers.

2. CTE programs help students find careers that are incredibly in-demand. In fact, over an eight-year period, the United States had over *fifty and a half million* job openings that could be filled by someone with a CTE certification. Many of these jobs are new, which means that they're recently-created jobs that have been established to address current needs that people or professions have—e.g., cybersecurity or health management. This type of career demand is incredibly high, and such demand can lead to increased awareness of the value of CTE programs. Additionally, these careers are often high-paying and provide ongoing job security for employees. CTE graduates typically have similar types of income opportunities as do their peers who have a more traditional education.

3. CTE programs benefit students while they're still in school by helping them boost their academic performances and deficiencies. When surveyed, the vast majority - 70% - of CTE students reported that their involvement in the CTE program helped them work toward better grades. This is *extremely* important because it helps debunk the long-held theory that CTE students are less motivated or intelligent than their peers. When compared with the total number of students who matriculate in American schools, the fact that 70% of CTE students experience better grades means that the American CTE program has helped 11.3% of all high school students achieve their educational goals.

4. CTE students enjoy their education, reporting satisfaction with both the program and their career prospects. When surveyed, 80% of CTE students reported this contentment—compared with 45% of more traditionally-educated students when asked a similar question. Importantly, a large percentage of CTE students do go on to pursue college—and, if these statistics are to be believed, CTE may do a better job (at least for some) to prepare students for that end than more traditional high school programs.

5. CTE helps students find direction in their lives. Many high school students, when surveyed, report that they're not really sure what they plan to do after school or for their careers. CTE students respond differently. In one study, over 80% of CTE students reported that they felt they knew where their education was leading them, and where they were going professionally. As one of the goals of school is to help students figure this out, it seems that CTE programs at least do well in this specific regard.

6. CTE programs don't cost much for schools to implement. With the versatility and all-encompassing components of CTE programs, it's often assumed that such programs are very expensive. This does not actually seem to be the case. Thanks to stipulated government funding of CTE programs, such as the financing from the Carl D. Perkins Act, schools may not have to pay much (or anything) to run their CTE programs. This would categorize CTE education as a high-yield, low-cost investment—particularly when considering the numerous benefits and ways in which CTE programs give back to their communities.

7. CTE programs make the country a better place. The high-demand careers that often follow a CTE education are exactly the careers that the country needs qualified people to fill. One study found that for every dollar of government funding in CTE programs, the country realized over a $12 benefit—a 1200% return on interest.

With all of the advantages for students and communities alike that are associated with CTE programs, it's easy to see that it's a good investment for many schools. We'll talk in a later section about the specific types of CTE instruction and the different careers that CTE programs can prepare students for. Now, we'll briefly discuss the components and key elements of high-quality Career Technical Education.

What are the components and key elements of high-quality Career Technical Education?

In order for a CTE program to deliver all of these benefits to its students, it needs to be an exceptional program that is academically oriented and student-focused. To help schools ensure that their CTE programs are poised to deliver the greatest advantages, they need to realize that successful CTE programs concentrate their resources on (Reimers, 2021):

- Delivering student-centered services that point to all pathways involved in the CTE program. This will include the emphasis on multiple and varied ways to get involved in CTE, different ways to move through CTE, and various ways students can exit CTE programs.

- Promoting equity in terms of access to CTE programs. Schools must work to eliminate any barriers that may stand in the way of students hoping to matriculate in these programs, including working to reduce the achievement gap so that all students have the opportunity to realize their career goals through accessible, high-quality education.

- Ensuring that the systems that support CTE programs are aligned across the state —e.g., that all programming, common terminologies, central data repositories, and document sharing systems are up-to-date and easily usable so that system administrators and teachers are best poised to support their students.

- Working toward continuous improvement for a school system's CTE education, and, in particular making progress to expand the capacity at all levels of a system's CTE education so that a school can continually offer high-quality CTE instruction to increasing numbers of students.

These are the guiding principles of a great CTE program from the administrative point of view. However, when looking at essential elements of a CTE program from the student's point of view, a slightly different set of elements becomes clear. The following student-focused elements of a favorable CTE program include the above values (e.g., student-centered services, equity, and accessibility) as well as (Reimers, 2021):

- Aligned leadership at each level of the CTE's organization: All students need to be able to utilize and understand all systems across the CTE platforms, which requires flawlessly implemented and led integration. This will not happen if people don't

work together well, which requires top-tier CTE system administration and leadership.

- High-Quality Curriculum (and Integrated Instruction): One might say that one of the largest selling points of CTE is its ability to teach students real-life skills in extremely practical ways. Informed by student interest and current industry trends, schools should figure out ways to provide relevant learning opportunities that are work-based and reflective of real-world engagement. These programs should be rigorous and aligned with what students might expect to do once they enter the workforce. To that end, any work-based learning opportunities that utilize external resources—such as apprenticeships or internships—should be included. This can extend to dual enrollment or dual credit partnerships with nearby community colleges. As an additional perk, this can help ensure that students do not have to repeat courses as they shift from high school to college.

- Skilled, Informed Instruction: The faculty members assisting in a CTE program need to be academic and professional leaders—ones who will facilitate an environment of entrepreneurship and innovation among their students.

- Student Support and Career Exploration: CTE programs need to have the support and connections in place to help students identify both careers that they may be interested in as well as the courses, education, and training that will help them be competitive in their chosen fields. This will include having information about industry trends and in-demand jobs as well as the flexibility to create different student pathways based on where a student plans to specialize. Students need to be able to speak with job counselors about their prospects; they should also have individualized support to help them get through their education, even if (or especially if) they have significant barriers to education standing in their way (including the need for financial aid, child care, transportation, lingual support, part-time education, or support for special needs education).

- Informed Outreach, Intentional Marketing, and High-Quality Recruitment: Neither the students nor the faculty involved in CTE programs should either have a hard time finding CTE programs or feel like their CTE programs represent secondary or somehow less preferable options. As such, schools need to use the tools available to them to create messaging that attracts students to their CTE programs, to make consistent positive messaging available to stakeholders, and to recruit high-quality faculty to assist with its educational content.

- Strong Industry Partnerships: As CTE programs are very career-driven, it's crucial to build relationships with potential employers—and to ensure that the education offered in a CTE program is relevant to current industry standards. Industry partners should consistently review the curriculum in a CTE program to ensure that it reflects the current demands in the real workforce, and to make sure that CTE students are sufficiently prepared for the real-world demands they will encounter.

This is a tall list of requests for the typical school. The state of California has found that the following working norms can help a CTE program foster these principles and elements, both internally and externally (Reimers, 2021):

- Frequent communication that is open and intentional between the school administration, partnering industries, teachers, and students

- The prioritization of interdependency between a CTE program and nearby community workplaces—making the best use of public funds and an available workforce

- Constant effort on the part of a school's administration to look for new opportunities for students and build more effective practices to benefit from new industry trends

- A commitment to the sustainability and stability of a school's CTE program

If a school is able to concentrate on these elements, it stands a good chance of creating a meaningful and successful CTE program for its students (Reimers, 2021). Moreover, a highly effective CTE program is mutually advantageous for students, schools, and communities as it provides an opportunity to engage with the businesses and industries in the school's area. This in turn leads to everyone being able to realize the benefits of the CTE program.

What benefits does CTE bring to the table? What improvements could be made?

For a long time now, many people involved with and surrounding educational communities have realized that traditional middle and high school education is not always the right answer for every child. CTE programs present a useful alternative that can offer more practical, hands-on, and comprehensive educational opportunities for

students who have a good idea of what they want to do with their futures (Niehoff, 2018).

Modern CTE programs, as an upgraded version of the more streamlined vocational schools of the past, tend to offer a wide array of in-demand skills that will likely translate to stable, well-paying careers. By following this line of thinking, there are many things that CTE programs 'get right'—and that they bring to the table for today's students. These benefits include (Niehoff, 2018):

- **An emphasis on student choice.** By leveraging students' areas of interest and helping them figure out how to match a career with something they may already be good at, we're empowering our students to take responsibility and increase enjoyment in their education.

- **Strong cohorts of students, working together.** CTE programs often group students into cohorts, which are groups of students that take courses together and tackle projects as a unit. This fosters community, enables the learning of good communication skills, and can set the groundwork for long-lasting professional relationships.

- **Skills-focused scholarship.** CTE programs tend to focus less on theory and more on technical and soft skills. CTE students should graduate knowing how to solve problems, with the confidence to attack real-world projects, and with the ability to begin making an impact in the field of their choice.

- **Community partnerships.** CTE students often work with mentors in their community or take on internships with local industries. This helps these students learn more about their fields of interest in a real-world setting—and it also helps local community members work on their priorities and initiatives. It's a win-win situation.

Of course, CTE programs as they currently stand are not perfect. Critics of CTE programs often state that the following improvements are needed (Niehoff, 2018):

- **Professional development for CTE teachers.** Often, CTE teachers come directly from the industry they represent. They have rich experience, but do not have any training in education specifically. Other times, CTE teachers are more traditional instructors who are looking to serve their students with a CTE experience—and these teachers may know how to teach well, but they don't have specific

knowledge of the CTE career track they are trying to enrich. Figuring out how to balance these two extremes will make CTE much more effective in the future.

- **More integration with technology.** As more and more academic programs go remote, there is a push for CTE to do so as well—and this will require a widespread embrace of technology. Even for students who are local and learning in person, CTE programs need to be equipped to use the technology unique to their pathway or industry (something many already do well) as well as more typical educational software such as Google applications, video chat, and other types of communicative and presentational software.

- **More of a focus on public work and portfolios.** Because CTE instruction and experiences depend so strongly on hands-on training, many CTE students graduate from their programs with a good amount of high-quality work. However, they often don't have an effective way of showing this or proving it! CTE representatives need to learn that in order to make their students truly competitive in the workforce, all tracks, even those that are less technologically inclined, need to support their students with portfolio websites or similar tools to display their accomplishments.

- **Preparation for the future of work.** The way people are working is changing. Today, workers often are their own bosses or they embrace the gig economy instead of choosing a more traditional nine-to-five workday. In addition, there are several emerging industries that will be extremely in-demand over the next decades—from climate-related industries to new energy options, along with developments in artificial intelligence, and more. CTE has a unique opportunity and foundation to help students be prepared for tomorrow's careers—as long as today's CTE instructors have the foresight and flexibility to incorporate these new themes into their curricula.

Section 1: Reflection Questions

- What types of benefits does my school's CTE program (if applicable) bring to my students?

- Are there local community resources we could be using but haven't yet leveraged?

- Are there ways we could enhance our CTE program to focus more on the future of work?

Section 1: Summary

CTE programs have a unique opportunity to meet students where they are and prepare them for practical, satisfying careers. They benefit students, schools, communities, and even our country. However, CTE programs can fail to take advantage of existing resources to the greatest extent possible. A successful CTE program, one that provides real benefits to its students, also requires a good deal of time, communication, thought, and investment.

In the next section, we'll go into a little more detail regarding the types of career clusters (or tracks, or pathways) that CTE programs offer.

Section 2: The Different Types of CTE Instruction

From an external perspective, it's easy to lump many different types of targeted CTE instruction together. However, the numerous career paths that one can follow after a high-quality CTE education are extremely varied—making it vitally important that teachers understand how important CTE is (and what it can offer to their students). In this next section, we'll go over the career clusters that CTE programs typically cover.

What career clusters are covered in CTE?

In order to support the increasingly diverse and technical workforce opportunities as we move further into the twenty-first century, CTE programs tend to cover career clusters that can be applied to a variety of high-demand careers. CTE programs are unique in the way that they present information and in their goals for the use of this particular information. Such programs exist to help students become competitive for immediate placement and performance in necessary jobs. This means that most of the education featured in these programs will be focused on skills and getting tasks done efficiently and effectively—instead of focusing more on theory, as is often the case in more traditional modes of education (Stauffer, 2020).

This is not to say that CTE programs do not include theory—every field, in fact, will require some background so that students know how best to apply the skills that they're quickly learning. However, the bulk of time spent in a CTE program will be spent on information directly relating to skills and performance. After an introductory module that covers some background and relevant information, CTE students will spend most of their educational time practicing their newfound skills, gaining hands-on experience through internships and partnerships within their community, and taking tests that show

they are understanding the application of the knowledge they're gleaning (Stauffer, 2020).

Why is this important? Many of the in-demand careers that CTE programs directly feed into require a decent amount of experience before a student gets that first job. CTE programs circumvent this common first-time-applicant issue by infusing a student's training with many hours of experience (Stauffer, 2020).

This makes sense because many of the careers that CTE students later embrace are vital and even life-saving. CTE students go into construction, agriculture, health science, and even law; all professions in which their performance could have a direct effect on the safety and health of other people. To this end, in CTE courses students will spend less time studying from textbooks and more time talking about how to apply their skills in various realistic situations—or simply applying their skills through a supervised real-world project (Stauffer, 2020).

Another myth surrounding CTE concerns its appropriateness for different age ranges. Perhaps because it is so

focused on career readiness, there is a misplaced belief that only older students (e.g., those in high school) should think about this type of coursework. This is not the case. Very young students, including those in middle school, can learn the overarching themes of many different career clusters. They can begin to practice the types of essential skills that will fuel many of these careers. Since this is the case, many schools are starting to offer CTE tracks that are available in these earlier years. This also allows students to get many of the more generalized CTE courses out of the way early on before concentrating on earning in-demand certifications just prior to graduation (Stauffer, 2020).

What are the 16 career tracks featured in many CTE programs in America?

It's important to remember that CTE programs are both highly specific and highly versatile. Furthermore, just because students may elect to pursue specific tracks of CTE training, this does not mean that they must pursue those careers for the rest of their lives!

CTE programs also tend to do a good job of making clear to students which tracks may be more poised to lead to long-lasting careers, depending on how the economy and culture are trending, as well as which might require further post-secondary education or certifications. Additionally, CTE tracks in a good program will also be flexible, and will

change based on advancements in technology, decisions by the government, and other influencing factors (Stauffer, 2020). The following career clusters are recognized across the United States in middle schools, high schools, community and technical colleges, and the workforce (Stauffer, 2020):

1. **Health Science.** This CTE track is very popular because it fills a growing and diverse need. There are more people living on the planet now than there have been at any other point in human history. Those people are living longer than ever, and they tend to have more chronic illnesses than their ancestors. In addition, current United States university and higher education programs are very popular and competitive, particularly in the medical sciences, which has created a large pool of current and future doctors. Health support roles are crucial but tend to receive less of a focus in the traditional education system. Students who take classes in a Health Science CTE track could earn qualifications that they could later use as nurses, certified medical assistants, or patient care technicians. These types of jobs have a great deal of security, as the need for them will not likely diminish over time. Other certifications under this cluster could include becoming a medical administrative assistant, a phlebotomy technician, or a medical or nursing assistant. Importantly, these types of in-demand and well-paid positions show students that they don't necessarily need several years of postsecondary education to make a large, helpful impact in a medical service role. In addition, this type of direct medical experience can be useful if a CTE student does, later on, wish to pursue higher education in the medical field.

2. **Business, Administration, and Management.** If a CTE student wishes one day to work in Human Resources, Business Management, or Data Entry, this track might be a good one to consider. It's one of the more popular CTE areas because it is extremely versatile. This track can enable students to be well on their way toward many careers. The types of certifications that a CTE student can pick up through these modules include the Project Management Professional certification, the Certified Scrum Master designation, the Six Sigma Green Belt certification, and a certification as a Microsoft Office Specialist. In virtually every field, these certifications will be seen as an asset. Therefore, this CTE track is often recommended to students who may not have a more specific idea of what they want from their CTE experience.

3. **Sales, Marketing, and Service.** This CTE track leads to many popular careers, including those of Data Analysts, Sales Representatives, and Marketing Specialists.

Service, sales, and marketing are the lifeblood of the American economy, and these types of specialists are often the ones who help these professions run smoothly. By easing the various parts of the customer experience, they can help companies grow in a critical way. This CTE track helps students build the skills they need to ensure customer success later in their careers—which will make them invaluable to any company they choose to work for.

4. **Finance.** In the past, students have had to pursue a degree in mathematics or business to achieve a successful career in the finance sector. Now, a CTE track in finance can lead to a stable and satisfying career as a Controller, an Accountant, or a specialist in Accounts Receivable. In this track, a student might learn how to handle accounting and bookkeeping on a large scale. If students wish to learn more about revenue, cash flow, expenditures, profit margins, and the other nuts and bolts of how to ensure that a company manages its money responsibly, this is the track for them. Finance is an essential component of every company in America and will continue to be going forward—likely enabling hard-working finance CTE students to enjoy a long and stable career. The Finance CTE track effectively prepares students for either an introductory position or for further investment in their own education.

5. **Information Technology, or IT Services.** This CTE track can easily lead to careers like a Site Reliability Engineer, a Network Specialist, or an expert in more generalized Information Technology Solutions. Every company in the world will need at least one expert, and more likely an entire team, of people in this field— and CTE programs can prepare a student for success in this field with direct experience. While in the IT track, CTE students learn what is needed in order to bring companies up to date with technology in a safe and secure way. This involves managing equipment maintenance, figuring out networking setup, and optimizing the performance of local servers. The field of IT is one of the most in-demand job markets globally. A student with an IT certification can, in theory, get a job anywhere—from a global corporation to a tiny local business down the street. As we move further into remote working, IT professionals will be even more crucial to assist with the shift to internet and cloud-based work solutions.

6. **STEM (or Science, Technology, Engineering, and Mathematics) Careers.** Students frequently believe that they need higher education degrees to become professionals in one of these more technological, data- or science-heavy careers, but this simply isn't the case. CTE STEM graduates can earn high salaries with

their CTE coursework in any of many different careers, from becoming a Computer Aided Drafting (CAD) specialist to a mechanic, or working as an expert in Engineering Technologies.

7. **Manufacturing.** There are small companies—particularly in the Midwestern states—who are maintaining manufacturing facilities that produce American-made products. If a student wishes to get involved in this process, a great way to do so is through the Manufacturing CTE track. Through this track, students can learn the basics of manufacturing, including all protocols, processes, and materials involved in mass production. In the end, they will obtain certifications and experience that can lead to any of an array of popular careers, including Production Specialist, Materials Acquisition Expert, and Materials Manager.

8. **Logistics, Distribution & Transportation.** If a student wishes to be a Transportations Analyst, a Distribution Manager, or a Logistics Planner, this is the ideal CTE track. Our world's economy is built on accurate and efficient distribution and logistics processes. Students with a keen eye for detail and an innate knack for organization can hone their skills and gain industry knowledge that will make them very competitive in today's (and tomorrow's) logistics industry. This CTE track holds many different specialties and sub-disciplines under its umbrella, including storage logistics, shipping, and trucking. Students will learn to track inventory, schedule orders, manage identification technologies, and more to help companies run consistently and smoothly.

9. **Tourism and Hospitality.** Throughout our nation, entire cities and states depend on a thriving tourism industry in order to stay afloat. This CTE track can help a student learn how to manage seasonal visitors with expertise and help communities exist on that revenue throughout the year. Careers associated with this track include that of Guest Experience Specialist, Reception Manager, Hotel Director, and more. If a student wants to learn how to manage motels, hotels, tourist attractions, and bed-and-breakfasts, this track will offer targeted training. This is also an excellent track for young people who wish to travel for a time after they're done with school, as the hospitality and tourism industries are particularly valuable in popular tourist destinations. On the other hand, if students wish to stay put in the place they've lived their entire lives, they can use their expertise to become excellent resources for their town's visitors.

10. **Public Administration & Government.** Today's CTE students learn all about local governments when they enroll in the government track. This can include

everything from information regarding the creation of parks to budgeting, being on councils, and managing taxes. Through this track, a CTE student can prepare for a career as a Zoning Specialist, an Administrative Assistant, or a Project Manager. Students getting involved in this career cluster should know that there can be a good, reliable income associated with government work—but it can also result in significant stress. This track is a good one for students who are looking for a quick launch into government work.

11. **Public Safety, Security, and Law.** A CTE student who goes through this type of track can look forward to a career as a Criminal Justice Expert, a Paralegal, or as an officer within Law Enforcement. This track is one of the ones best-known for being associated with a potentially profitable career. A student who becomes a paralegal or a legal bookkeeper after this track can expect high job security and a competitive income. This track is also a good option for students who want to go into further law or criminal justice careers, or for students who wish to join their local police jurisdiction. Students will learn how to perform and manage clerical work, understand legal language, and respond to security concerns.

12. **Natural Resources, Food, & Agriculture.** If a student wishes to learn more about how the human race has learned to sustain itself, this may be an appropriate career track. Graduates of this CTE speciality will have the experience and background necessary for pursuing a wide range of fields, including careers such as Agriculture Inspector, Wildlife Administrator, Agronomist, and more. Students can also go on to become farmers, lab technicians, and researchers that support our country's natural output and economy. Agriculture is an enormous field that will only be growing in the future, particularly as the plant-based food industry continues to skyrocket. Students do not need to wish for a primarily outdoor-oriented career, but this could be a perk of the type of job an agriculture CTE track might prepare them for.

13. **Human Services.** From Social Workers and Rehabilitation Experts to Social Services Assistants and more—if a student goes through the Human Services CTA track, they will surely have the skills necessary to embark on any of many careers that focus on the health and happiness of individual people. This is distinct from the type of health work performed by medical professionals but is often just as important. While some careers within this field may require higher, further, or more specialized education, this is certainly a high-demand field that attracts students who are drawn to a helping profession.

14. **Construction & Architecture.** A student who has gone through the Construction CTE track can work toward a career as a Project Estimator, a Construction Inspector, or an expert in Construction Technology. It's important to note that this track does not qualify or certify individuals for immediate work as contractors or architects, but it can help them gain the experience necessary to achieve an entry-level job working with these professionals and thereby put them on that career path. These are growing and in-demand industries. As one expert put it, the cities of tomorrow are going to need to be designed and built. This CTE career track can help students be involved in these processes.

15. **Training & Education.** If students wish to teach others the skills and processes that they've learned, there's no better track than that of education and training. This track alone won't certify a student to become a teacher directly, but it provides experience and training to go into recruitment, training, or for becoming support staff—and if students decide to pursue higher education in order to become teachers, they'll be able to fall back on the foundational skills they learned in CTE. This track will also enable a student to pursue a more immediate career as a training consultant, a teaching assistant, or a safety specialist—among other options.

16. **Audio-Visual Technology, Communications, and Arts.** This diverse track could prepare a student to go into a wide variety of careers, including becoming an Audio Engineer, a Lighting Technician, or an A/V Technician. If students wish to go into the entertainment industry as support or staff members, this track could help them learn the skills that are vitally important for creating entertainment and media. Students could build upon their CTE formation with further audio engineering or lighting education, but their CTE education alone could help them get a job in a concert hall or stadium.

Implementing CTE Programs-Where can students find such programs?

CTE programs are implemented most in post-secondary academic institutions that specifically cater to students looking for career schools and hands-on experience prior to launching into a career. As of late, CTE programs are more frequently emerging in middle and high schools, as more and more school districts are realizing how beneficial these programs and skills are for all students—even those who wish to pursue traditional collegiate coursework after their high school graduation (Stauffer, 2020).

Most schools and CTE programs don't offer all 16 career paths or clusters that we described above. The most popular one, found in the vast majority of CTE programs, is the health science pathway. This is partially because healthcare is a rapidly expanding field right now, and students can usually find a good job very easily with a CTE certification or degree—or use their CTE experience to bolster further education as they work toward a higher medical degree. The rapid expansion of the healthcare field is not expected to slow down anytime soon, as more of the United States population begins to shift towards retirement age (Stauffer, 2020).

The second most common CTE program is the business track, as the type of classes and experience that a student can glean from this track is so versatile. A student who graduates with a CTE certification or degree in the business career cluster can go on to get a desirable job in a variety of industries, so it's seen as a high-value option (Stauffer, 2020).

Whether CTE programs offer any of the other 14 career clusters depends on many factors, such as the school's location. For example, if a school with a CTE program happens to be near a community that is rich in farmland and that supports agricultural manufacturing businesses, there's a higher chance that this particular CTE program will have the agriculture career pathway. Unfortunately, this may limit some CTE students' opportunities if they were looking for a specific and less-offered CTE career track; however, more and more schools are increasing their CTE offerings, which will make it easier for students to find what they want to study (Stauffer, 2020).

What does CTE look like when it's taught at a middle school level?

When younger students choose to enroll in CTE courses, it does look a little different than it may look for their older peers. First of all, middle schools offer CTE as an elective; very few schools in America require middle school students to include a career track in their required educational experience. The types of tracks that are made available to middle school students tend to be relatively selective; for example, a school might offer only computer application coursework, or a more universal career readiness track that teaches very general workplace skills. When a student graduates from middle school and matriculates in the higher grades, the CTE experience becomes much more expansive and targeted (Stauffer, 2020).

How does CTE change when students move from middle school to high school?

For the most part, schools continue to offer CTE as an elective, unless the student goes to one of the few American schools that requires its students to choose a career track. As mentioned above, health science and business are very common across CTE tracks in this country (Stauffer, 2020).

What does CTE look like in post-secondary institutions?

While this course is primarily focused on CTE offerings for middle and highschool aged students, another valuable component of CTE is that which is extended to older students. Post-secondary CTE programs tend to include very tangible choices for students, such as certifications that they can use to immediately start their careers. At post-secondary institutions, CTE programs will tend to guide students from the introduction to their career cluster of choice all the way through to employment (as opposed to the more measured, elective approach seen in middle and high schools). These CTE programs may be layered more with internships, as post-secondary CTE students may have a more flexible schedule than a typical high school student. However, taking a CTE track at a specific designated CTE institution will likely cost more for the student than simply taking similar or equivalent coursework while still in high school (Stauffer, 2020).

What qualifications do teachers need in order to teach CTE?

Unfortunately, a shortage of CTE teachers exists today, and in addition to this, many current CTE teachers are expected to leave the teaching profession in the near future for various reasons. Although it is becoming abundantly clear that CTE programs are worthwhile, effective, and are here to stay, teachers may be unsure about the qualifications required in order to teach in a CTE program or they may face difficulty in meeting credential requirements Each state is currently working to expand its own policy regarding CTE, and each state may have different pathways toward becoming a CTE educator. Because of that, it's best to look at the licensure and certification requirements for CTE education positions within your state (Kelly, T and Perez Jr., Z, 2020).

In general, there are five requirement areas that a prospective CTE instructor must gain experience or certifications in prior to becoming a CTE instructor. These five areas include (Kelly, T and Perez Jr., Z, 2020):

- **Appropriate education.** A CTE teacher must have a high school diploma (or a GED, or an equivalent), as well as a post-secondary degree or the completion of post-secondary coursework in the education field.

- **Targeted experience.** If CTE teachers wish to contribute to a specific career cluster or pathway, they should have some number of hours (or more) of experience within that industry or field.

- **Certifications and licensure.** Prospective CTE teachers must have all of the qualifications necessary to teach in their geographic location; and, if they wish to teach within a more technical pathway, they should have licenses that are recognized within that field.

- **Assessments.** CTE teachers will have to complete a series of tests in the CTE pathway they would like to teach. These tests may cover both content in the teacher's stated area of expertise as well as other more general work-preparedness information.

- **CTE-specific training.** A prospective CTE teacher will have to attend professional development seminars or complete a mentorship experience with another CTE teacher in order to learn how best to serve CTE students.

Various states will have different approaches to which of these requirements are truly necessary. There are some states that modulate which requirements a prospective CTE teacher must have based on the candidate's own level of education. For example, in Maryland, a candidate could have a bachelor's degree, some higher professional education, or simply an associate's degree with two years of experience and some targeted CTE training prior to employment (Kelly, T and Perez Jr., Z, 2020).

Section 2: Reflection Questions

- In my community, what resources do we have that could be used for a CTE track?

- What CTE tracks do I think my students would be most interested in?

- If I (or one of my colleagues) were to want to become a CTE teacher (or invest in our professional development as a CTE teacher), would we be able to find the resources to do so?

Section 2: Summary

The 16 career tracks that American schools offer provide a wide variety of training and target future careers for American students. However, every school doesn't offer all 16 tracks. As we'll discuss in the following section, this could indicate a need to bring some aspects of CTE education online. For now, it's good to remember that many CTE tracks are location-based, or are more or less available based on current (or projected) market trends.

If you're a CTE teacher or would like to be, it's also key to know how to implement, bolster, and invest in your educational style to support your students in the best way possible.

Section 3: Incorporating a Robust CTE Curriculum for Your Students

CTE, much like any other type of education, requires strategic implementation and ongoing investments. However, it's also different from many types of education in its innate practicality. How should CTE teachers go about providing the best education possible to their students? We'll discuss this question in detail in this section.

What's the best way to teach CTE courses?

While there are as many ways to teach CTE effectively as there are teachers (and students), the uniquely pre-professional, practical, problem-solving nature of most CTE tracks invites a similarly practical learning method. Many experts believe that the best way to approach CTE teaching involves a concept known as 'blended learning' (Stauffer, 2020).

When using a blended learning education strategy, instructors incorporate many different teaching methods into their didactic style. Each day or lesson might feature a completely different instructional tactic. This works to keep students interested, involved and intrigued—and it also helps appeal to students who simply learn in different ways. As many students who opt for CTE may have experienced frustration with a less interactive, more presentation-based educational style with their other coursework, emphasizing blended learning structures can be the strategy they need for success (Stauffer, 2020).

Blended learning principles involve several different strategies. These strategies include (Stauffer, 2020):

- As mentioned above, simply using a wide variety of materials and methods when approaching instruction for students

- Reinforcing points made in presentation-style educational sessions with technology (e.g., applications, websites, podcasts, or videos that a student can access on their own and rewatch as necessary)

- Integrating new teaching techniques on a regular basis, or varying one's go-to instructional style periodically

- Modifying the assessment style that the students experience (e.g., implementing pop quizzes and tests, but also sitting down and having discussions with students, asking them to prepare their own presentations and projects, having students assess each other, and other methods of learning how much a student has learned from their experience)

- Having your students work independently, as well as in partnerships, small groups, and larger groups. In CTE programs, this will also help students learn how to work with others, practice team leadership skills, sharpen communication skills, and more.

Because CTE career clusters often lend themselves well to very practical projects and problem-solving, it can be easier to incorporate blended learning educational strategies than it is for more traditional general education coursework (Stauffer, 2020).

How to teach work preparedness to younger students and teens

If you're a middle school teacher, educating a student within a more technical or specific CTE cluster may simply not be constructive or realistic. However, students at both the middle and high school levels in CTE programs (as well as those outside of specific CTE tracks) will need to learn work preparedness skills. These types of skills include 'soft skills' such as time management, self-motivation, communication, and delegation. These skills can be difficult to teach; they can also require some outside-of-the-box educational strategies (Mulvahill, 2021).

If you're looking for ways to include work preparedness aims into your instruction, here are some practical tips to do so in as effective (and fun!) a manner as possible (Mulvahill, 2021):

1. **Listening and recapping.** Knowing how to understand others and communicate well is one of the most important skills that a student can have—and it's definitely a skill that is often under-used in many workplaces, causing constant frustration for adults. Sometimes miscommunication can even lead to costly or vital mistakes. A simple way that you can help students practice these skills involves, very simply, having them take turns listening and recapping what they have said. Start by having your students pair up. Give them a topic; this can be a good time to double-up on course aims, or, alternatively, it can be more natural just to let students talk about their days. The person talking should concentrate on providing detailed information in an easy-to-understand manner (talking at a good pace, not being repetitive, providing logical statements), but the focus isn't really on the content of what the person is saying. The listener should focus on what the person is saying without thinking about other aspects of the topic and without considering a response. When the person speaking is done (after a minute or two of speaking), the listener should provide a brief recap of what the person has said. This recap should not contain a rebuttal or any injected opinions, but rather a summary. Then, the two should switch places. This is an exercise that can easily be adapted to socially distanced or remote learning. Through this exercise, students will learn to be respectful of one another while working on communication, listening, and interpersonal skills.

2. **Team-building activities.** Playing fun games or having your students perform activities that will naturally help them come together as a team will help increase their communication skills as well. Whether you put together a human marble run, have your students take care of eggs, have your students navigate a human knot, stack cups together, or figure out how to solve a hypothetical challenge such as an island-survival-scenario together, these activities will help your students learn to function as a team. These activities, whether you conduct them over a Zoom call or in your classroom, will help students build patience and negotiation skills (and enhanced communication).

3. **Time-management challenges.** Even competent adults have difficulty figuring out how to manage their time well. We can give our students a huge boost, later in life, if we help them learn how to sort their agendas now. Give your students a list of hypothetical tasks (the zanier, the better); or, if you're able to work in person, give your students a list of in-person tasks or exercises (e.g., performing 25 jumping jacks). Give each task a point value and then divide the students into groups and give them a set amount of time in which to get as many points as

possible. They will have the freedom to choose which tasks are necessary or which will give the highest return on points with the constraints they are given.

How to incorporate a high-quality CTE curriculum at your school

If you're learning about the benefits of CTE programs and want to consider implementing one at your school—or take action to improve the robustness of the CTE curriculum that you are currently using—there are steps that you can take. This can feel like a very large project to take on, but—as with every large undertaking—launching a CTE program can be broken down into discrete, achievable steps (Stone, 2017).

Focus on solidifying these steps to increase the efficacy of your current CTE program or take action toward starting one (Stone, 2017):

1. **Make sure that you have an articulated purpose for doing so.** As we've learned, CTE instruction is unique, practical, and purpose-driven. That sense of purpose needs to permeate the entire program; not just the industry-driven purpose of each cluster's focus, but an overall sense of targeted motivation that will provide cohesion to the entire program. From the start, identify why you want a CTE program at your school. In which specific ways do you hope your students will benefit? Are you hoping to reduce or prevent dropouts? Do you want to provide support for a specific local industry? Are you passionate about providing students with choices for their post-secondary education? There is no absolute right or wrong answer for why you wish to implement a CTE program, but you need to know what that answer is prior to getting started.

2. **Decide which career clusters and courses your CTE program will offer.** CTE programs are varied and versatile, and, as we discussed in the second module, their inner workings can be inspired by your students and the location and needs of the community. Use your stated purpose and your logistical constraints to decide which of the 16 CTE clusters would be the best fit for your school and your student population. You should also decide how you'll implement CTE into your existing curriculum: Will you teach job preparedness to middle schoolers, or keep CTE as an elective track for older students?

3. **Think about the resources that you already have on hand.** Are there already teachers in your district who have targeted expertise in the career tracks that you'd like to provide? Will your school district allow you to hire additional teachers to cover any gaps in your existing knowledge base? Will you be able to access online courses or external training to offer your students additional

resources beyond traditional education? Are there companies or businesses in your community that could offer internships or resources to assist with your initiative? Because CTE programs specifically offer so much practical support to their students, it's key that you focus on the logistics behind providing that support early on in the brainstorming process.

4. **Consider whether professional development for your existing staff is an option.** The faculty members at your school are going to be the ones who bring your CTE program to life, so they need to be the ones who have the greatest knowledge about what they're doing. Having ongoing training opportunities for your faculty members can be a cost-effective way to offer more programs for your students and to invest in your teaching staff. It's vital that CTE staff know about the goals and benefits of CTE programs and have all of the knowledge and resources that they need in order to help students in the best way possible. If you're able to invest in your own staff in this manner, you may be able to reduce the cost of implementing a CTE program because you could avoid having to bring in additional staff.

5. **Ascertain where your funding is coming from.** You're going to need to understand how you're going to fund your CTE program or its enhancements—even if you're doing as much as possible to keep the overall cost low. Fortunately, there are national funding options for CTE programs such as federal Perkins grants. If you're able to do research on the matter, you may also be able to find specific grants for career clusters—agriculture, technical education, healthcare—that are in demand in your area or nationally. You'll have to spend time managing paperwork and applications in order to qualify for these programs, but the results can be well worth it.

6. **Invest in your community partnerships.** You'll find that you can reduce the bill for your CTE program and a good deal of the work involved if you spend time creating connections with real-life industry partners in your community. You'll also be able to increase networking experiences for your students and demonstrate the in-demand potential of their training and future careers. Do some research to see which companies in your area may need more help, and then propose internships. Try to set up ongoing site visits or visits from staff members at those companies as in-class speakers. Ask local experts if they'd like to be project mentors for CTE students. If positioned in the right way, these types of partnerships can reflect a true win-win situation.

7. **Set up a plan to evaluate your CTE program growth incrementally and over the long term.** Investing in a CTE program involves flexibility and response to industry conditions and market trends. Whether you're starting a new CTE program, a new chapter of growth for your CTE program, or simply a new career cluster, create a metric or rubric for determining the success of your endeavor and any other steps needed for continued growth as time goes on. These can involve student surveys, data from student assessment, parent surveys, discussions with your industry partners, and even just keeping an eye on the national and local news to stay ahead of trends that could affect your program.

What are some differentiated instruction strategies for teaching CTE to a wide array of students who have different learning modalities?

Every student is different—yet all of the students in a specific career cluster or track are going to need to be able to learn similar skills at a similar pace. How is this going to happen?

Blended learning strategies, as mentioned above, will likely be a vital part of your approach going forward. However, these can be difficult to practically implement in your current methods of instruction. Here, we'll present several discrete strategies for helping your class of students as individually and effectively as possible (Stauffer, 2020).

1. **Accept the fact that not all of your students learn the same way.** This isn't necessarily a strategy; it's more a prerequisite for supporting your students as they need it. However, you're going to experience much less frustration in your role as an effective instructor if you truly realize the ramifications of this simple fact. Your students may not respond to lectures and they may need more than information from a textbook. You may have students who require remediation techniques—and they may be sitting right next to students who are ready to learn from textbooks and traditional presentations. Finding ways to reach all of these students where they are can be very frustrating and time-consuming—and you need to be able to perform at your finest to support your students. Creative solutions will be necessary in order for you to do your job well.

2. **Divide your students into groups based on how much they know about the topic at hand.** This may feel odd, but it's practical. In many CTE programs that don't embrace differentiated learning techniques, many students are simply left behind. By grouping your students flexibly based on the ways they learn, their

previous experience, or even just their interests and planned specialties, you can meet each group where they need the most support—and you may even be able to take advantage of each group's talents (e.g., leveraging a student who may learn well by discussing or presenting with a student who may wish to learn from presentations or discussions). For example, a group of students that work well by themselves can easily be set on a long-term project that they can present to the other groups at the end of the week or month. This will allow you the bandwidth necessary to support other groups in the ways they need it most. You can apply this strategy by completing a simple review or assessment at the beginning of each semester or by assigning a module to see how much material each student is comfortable with. Consider these groupings flexible as the weeks go by; if a student needs to move to another group, that should be able to happen relatively easily.

3. **Create learning 'pods', and assign student captains.** If, during your initial assessment at the beginning of the semester, you learn that you have a few standout students who may have an abundance of previous experiences and expertise, you can assign them other students to teach in a more personalized manner. This will help the student captains as much as the students they work with, because we all know that teaching a subject is often the best way to learn it yourself! If you're able to work in person, we recommend actually reconfiguring the chairs in your classroom into groups or circles, each with a student captain or two, so that group members can focus in their own space. Then, you can ask student captains to initiate or manage conversations, or you can assign group work and encourage struggling students to reach out to a student captain first before they reach out to you.

4. **Embrace a tiered learning style.** CTE attracts a diverse array of students with many different levels of expertise and varied types of learning styles. When you're creating your curriculum for a specific subject, see if you can create tiers for each lesson or unit that can be catered to students of different academic and experience levels. Make it clear to your students that achievement of the highest tier is not necessary for passing your class— students will simply be required to complete the tier most appropriate for their learning modalities, level of experience, or future plans in their industries of choice. For example, if you're teaching a module on merchandising, assign three semester-long projects. One will involve building a website, the other will require creating a recurring order mockup, and the third will include developing a detailed sales report. Expect only

a small number to be able to complete all three projects without help from you in a reasonable period of time.

5. **Rely on detailed handouts for your students.** In the real world, students are often responsible for figuring out processes on their own with documentation to guide them through confusing and frustrating projects. In school, the idea is to be substantially more available to help your students succeed—but you can still help them cultivate those needed skills through practice that will help you, too. Putting together a comprehensive handout that contains the answers to questions that students commonly ask will help your students feel more secure in your classroom. These resources can also help students assist each other, which will make your job as a CTE teacher much easier. On a similar note, you can also simply provide your students with more study guides, worksheets, and printed notes to help them follow along in class and take their own notes.

6. **Prioritize hands-on projects and interactive activities.** We've included this point before, but it's a good one to remember. These types of activities can keep an entire group of students busy and engaged while teaching fundamental skills in an often more memorable way than a lecture or a presentation. Start with small projects that help illustrate larger, more overarching points, and build your way up to more complex, self-driven projects that are more aligned with what individuals might actually do in a career related to their CTE track.

7. **Consider utilizing flipped learning strategies.** In a flipped learning classroom, students do most of the theoretical work at home by reading material or watching videos that paint an overall picture of a concept that they're learning. Then, in class, you have the time and bandwidth to build on that concept or theory, instead of spending valuable class time essentially reading the textbook aloud. Start small. Instead of asking your students to read an entire chapter of a book in the evening (particularly if you're aware that your students might have other responsibilities outside of their CTE program), give them easy-to-incorporate resources such as videos or podcasts and ask that they come prepared for a general discussion, one with little pressure to perform in front of a group. As you invest more into flipped learning strategies, you can figure out how to check work done at home, expand the types of work students are doing at home, and more to best utilize the time you have together in class.

8. **Consider implementing the think-pair-share method of learning.** This three-pronged approach is an excellent way to help students with different learning

modalities process brand-new information in a relatively short period of time. This is partially because it centers on helping students connect with each other, and can really leverage the different ways that people learn and feel comfortable sharing. With the think-pair-share method, you as the instructor begin by introducing the new topic to your students. Allow them a moment to think about what you have said. Then, you'll have the students consider a question or a discussion prompt that relates to that topic and discuss that question or prompt with the person next to them. After the students have a moment to confer, ask if anyone has anything that they wish to share—and initiate a classroom discussion.

Can CTE programs be taught online?

It may seem contrary to the purposes and goals of career technical education to teach the modules online; after all, isn't the entire idea that students have the opportunity to get hands-on experience that prepares them for a career?

Consider this: Many careers are going remote. Many schools are, as well. Launching remote or online CTE programs can also make resources available to students who need to stay at home or don't have a CTE career cluster in their geographical area that they'd like to specialize in (Castelo, 2020).

Of course, there are some components of a well-rounded CTE program that require hands-on tutelage. However, much of the theory work that is included in the modules can be communicated through calls, videos, and other methods of remote instruction. The remaining in-person requirements that will better prepare students for their careers can occur through site visits or can be spread out at convenient times throughout the year in order to make a student's educational experience more possible, if their circumstances merit it (Castelo, 2020).

CTE educators may need to prepare for unique challenges if they are going to attempt a blended or entirely remote learning structure. Rethinking course delivery and strategic, creative uses of available technology will be necessary in order to provide a helpful education for your students (Castelo, 2020).

While this may be a difficult endeavor, benefits of of bringing technical education online include the following (Castelo, 2020):

- **Flexibility.** If students can learn from anywhere and are able to learn at their own pace, this can reduce the likelihood that they will have to drop out of their programs due to necessity or major life changes. Students who have additional

constraints on their time, such as family, work, or other school obligations, may be able to continue in their CTE coursework more easily, as they'll be able to work on their modules at night or on the weekends.

- **Responsibility.** If students are responsible for finding ways to solve problems or incorporate projects based on materials they have at home or by working with industry partners they have in their own, remote communities, they will realize that they have ownership over their careers in a very material way.

- **Digital Literacy.** Increasingly (and particularly in the aftermath of the COVID-19 pandemic), tomorrow's workers are going to need to be innately familiar with technological tools, online communication and presentation, and other 21st-century skills that will be—going forward—absolutely necessary. Some fields, such as tech support or cybersecurity, may even benefit from being online because by completing the program remotely, participants will reinforce needed skills.

- **Cost Efficacy.** Although there will be an investment associated with initially bringing the program online, after the remote CTE program is launched the cost of onboarding additional students will be minimal. For districts that are strapped for resources, this can be a legitimate option for cutting costs and making academic investments last for a very long time.

It's clear that there are benefits associated with teaching CTE programs online; however, how is a teacher to do so in an effective manner? Next, we'll present some tips that should make this easier going forward (Castelo, 2020).

1. Embrace a wide array of online tools such as videoconferencing, pre-recorded video and audio, and online resources to help students launch their projects at home. An effective online CTE program will need to take advantage of as many different and creative uses of available technology as possible. You will need to find digital ways to present new concepts, allow students to practice those concepts, and prepare students for their certification exams. There are some instances in which educators have been able to leverage virtual reality and augmented reality solutions for healthcare and technical practice. There are also tools (such as IBM's Open P-TECH platform) that allow students to train in technologies such as cloud computing and artificial intelligence from the comfort of their homes. Coding and digital media manipulation can, similarly, be taught through online modules.

2. Ensure that students have the technology they need. If a program is going to require a specific type of technology, you're going to need to make sure that students have devices that can support that technology. This is another arena in which adequate amounts of funding can make a large difference in the student experience. If your school is able to allocate funds strategically to provide assistance for students who need devices in order to learn, that may be worth considering.

3. Provide strategies and resources for students to find their own locally-based mentors and industry partners. If your students are in an agriculture track, they may need to partner with a local farmer or similar entity in order to gain the experience they need. If part of your time as a teacher involves helping your students learn basic networking skills or helping them find the local connections they need, that may need to happen—but it's also an investment in that student's work readiness and future networking skills, so it may be a good use of your time.

Section 3: Reflection Questions

- Does your school have the infrastructure and tools necessary to support your CTE students? What about bringing your CTE program (at least partially) online?

- Would a blended or flipped learning strategy work well within your educational style?

- How would you go about tiering a subject you already teach with practical projects and accessible aims?

Course summary and conclusion

CTE programs can provide immense practical benefits for our students. Through these targeted educational experiences, students can gain skills that will make them incredibly competitive for the rest of their lives—ensuring that they can have a stable career and contribute in a positive way to their communities for years to come. However, CTE is also changing—as is education, in addition to the industries that CTE programs often support. CTE programs are also shifting to be more accessible from every part of the nation, as well as online. Today's teachers need to realize this and update and enhance existing CTE programs to support students through these fluctuating trends. CTE programs will also be constantly changing to meet the needs of a workforce that is growing and progressing. We can support our students best if we meet the challenge of evolving with

the needs before us. By ensuring that we're teaching future-proofed skills, immersing our students in digital literacy and workplace preparedness, relying on our communities, and finding ways to serve our students where they are, we can use CTE programs to create more comprehensive and fulfilling educational options for today's students.

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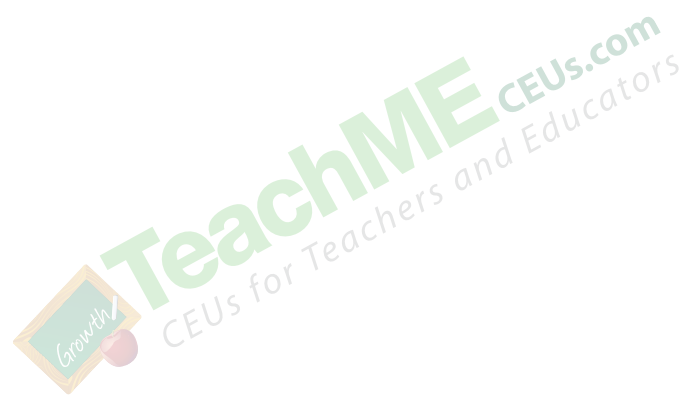
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Part 4:

Introduction

The Department of Education encourages educational technology developers to take the needs of English learners and their educators into consideration in their technology design. As of the 2015–16 school year, there were over five million English learners, about 10 percent of all K–12 students. Many teachers, including those in small and rural districts, instruct one or more English learners—or soon will. Teachers often use technology designed for general education students when instructing their students who are English learners, so any educational technology you design will likely be used by English learners.

This toolkit provides guidance for educational technology developers on:

○ The needs of English learners and their educators;

○ Supports to consider including with your product that may be especially useful for English learners;

○ Ways to communicate about products with districts and educators of English learners to facilitate adoption of your products; and

○ The types of professional development and training activities that educators find most valuable.

This toolkit and a companion Educator's Toolkit are based on insights from the findings of the **National Study of English Learners and Digital Learning Resources** conducted by the U.S. Department of Education, Policy and Program Studies Service, on behalf of the Office of English Language Acquisition and the Office of Educational Technology. Both toolkits focus on software or "digital learning resources," that is, the apps, programs, or websites that engage students in learning activities and support students' learning goals. The toolkits do not focus on hardware (e.g., laptops, computers, tablets, or other devices), although you may find that some insights are applicable to the design and use of hardware devices.

The study provides the first national data on how educators across the country are using educational technology in instructing English learners. The study conducted surveys, case studies, and meetings with experts in the field, including educational technology publishers, researchers, and educators. To learn more about the study and the toolkits, you can read a brief description on page 20.

The study's final report describes how districts and teachers identify and use technology in instructing English learners, as well as related supports and barriers. This toolkit builds awareness of the role technology can play for English learners and notes areas where technology developers can improve their offerings for English learners, based on needs suggested by the study.

Understand what English learners and their educators need

The design of educational technology, especially for students who are English learners, requires designing for a diversity of educators, students, and instructional needs. Educators have differing roles but share responsibility for their students' success in learning both language and academic content. English learners have a wide range of backgrounds and use educational technology for a variety of instructional tasks. By identifying the needs of educators and students, you will be able to develop and design more effective products.

What to know

A variety of educators use and evaluate the usefulness of educational technologies, including:

○ English learner specialists, such as English as a Second Language or bilingual classroom teachers;

○ Classroom teachers who instruct English learners together with English-proficient students; and

○ District administrators and/or school technology coordinators who recommend and support educational technology use.

English learners from kindergarten through grade 12 (K–12) come from a variety of language and cultural backgrounds and have a wide range of needs related to academic readiness. For example, English learners who will use educational technology may:

○ Have had very different experiences before coming into their K–12 classrooms. Many will have been born in the United States, but others will have just entered the United States for the first time, perhaps after difficult experiences as refugees;

○ Have grade-level skills and knowledge based on a high-quality education in their country of origin but not yet have proficiency in English;

- Have had little or no formal education, or some years of interrupted education, prior to entering schools in the United States;

- Appear proficient in English based on their fluency in everyday conversations but not yet have the level of academic English proficiency they will need to succeed in learning academic content;

- Differ in their level of acquisition and use of their home language, and some may not be literate in that language. This has implications for their path to English literacy;

- Have had little or no experience using technology and so may not understand many of the basics about using computers or navigating in a website or software program;

- Come from cultures with very different norms and expectations around education. For example, some may expect collaboration to be the norm, while others may expect that students work alone; and

- Have disabilities, and some may require the use of assistive technology, including software to support their accessibility needs.

Educators have identified gaps in the educational technology available to address the needs of English learners and their teachers. For example, they see gaps in:

- Support for learning all academic content—currently much of the educational technology for English learners focuses on English language acquisition;

- Resources that reflect students' different languages, cultures, and experiences;

- Support for students in communicating and collaborating with their teachers and fellow students as active participants in learning activities;

- Support in allowing parents to communicate with teachers to become more involved in their child's education; and

- Materials that fit the needs of older beginner English learners while providing grade-level content and design that is appropriate for them as middle and high school students (i.e., not childish or simplistic in their activities and images).

Different forms of educational technology address different needs, and supports should be tailored to the specific educational technology being designed. A categorization of educational technology that may be useful is

found in the **[Digital Learning Resources Matrix](#)** (page 22). It shows three categories:

- ○ **Digital Academic Content Tools,** which offer academic content resources and/or engage students in activities to learn academic content or skills.

- ○ **Digital Productivity Tools**, which offer resources to plan, document, organize, and analyze content. They do not contain academic content.

- ○ **Digital Communication Tools,** which offer resources to communicate, collaborate, network, or share information. They do not contain academic content.

What to do

- ☐ **Identify your customers.** Who are the educators and English learners who will use and evaluate your product? What are their characteristics and needs?

- ☐ **Partner with teachers, schools, or districts to find design partners.** Involve target users in design to better understand their needs in serving English learners and possible solutions to meet those needs. These partners should be chosen carefully, as different feedback may be provided by teachers who actively integrate new forms of technology into their instruction as compared with teachers who are less comfortable with using technology in instruction.

- ☐ **Develop a set of scenarios (or "personas" or "use cases") to describe your users and their needs.** The scenarios below describe common situations for English learners and their teachers, highlighting their needs. An understanding of customer needs can be used as the basis for developing products. You can take these as a starting point but should develop your own based on the specifics of your technology and customer. By creating partnerships with districts or schools, you can create your own scenarios and learn how your materials can be improved to better meet the needs of your customers.

1

Maria is a middle school English learner who excelled in school in her country of origin and is at grade level in math and science achievement. She needs to learn new mathematics concepts, such as the relationship between slope and unit rate, while learning how to speak, read, and write English. Her math teacher is working with her English learner specialist, Mr. Kenny, to find ways to help Maria keep pace in her math learning as a beginning level English learner.

Mr. Kenny noted that Maria may benefit from interactive visual representations such as a mathematics-specific, digital academic content tool that offers dynamic graphs and motion simulations. These can help Maria learn the concepts, and the needed vocabulary can be introduced through features directly related to the visual representations. In addition, Maria can manipulate the representations to communicate her own ideas, allowing a richer form of communication than possible when using spoken or written English.

2

Malika is a high school student in Mr. Reilly's social studies class. She is a long-term English learner who is reading several levels below her grade. The class has been assigned a reading on the emergence of the industrial society, and Mr. Reilly has identified an alternate digital academic content resource for Malika that offers sets of texts on the topics they are studying, written at her fourth-grade reading level. Malika finds the resource child-like, both in content and in visual format, and is embarrassed to be using it. Mr. Reilly is frustrated that the resource does not address grade-level standards about this topic.

Malika may benefit from tools that offer simpler versions of the English language text on the same grade-level content and include multimodal support features such as visual

representations for understanding the academic terms and vocabulary. A resource that maintains a high school look-and-feel, while addressing high school standards, can better meet the needs of Malika and Mr. Reilly. This resource can also provide markup tools that allow Malika to make notes and possibly even submit assignments in a way that allows Malika to build academic English skills while learning the content.

Josef is an elementary school student in Ms. Lee's class, where they are studying plant structures. He is learning English and has missed two years of formal education due to years spent in a refugee camp, but he is eager to learn and work with others. Ms. Lee wants to be sure that Josef can collaborate with his peers as they learn about plant structures for reproduction and how these structures function. She also wants Josef to be able to contribute as the students put together group presentations to show what they've learned.

Josef may benefit from working with a digital storytelling or other template provided by a productivity tool as he learns about plant structures and contributes to the group project. This template can include ways for Josef to pull in images to convey key information. Josef may also benefit from a video-creation productivity tool that will allow him to review and revise his statements to the group (e.g., recording, replaying, and revising his statements before sharing them with others). These tools can allow Josef to engage with others and contribute to the group presentation.

What to ask

○ How do my current and target customers describe their roles and needs?

○ What do my customers report as the current contexts of use for my tool, how can they be supported in these different contexts, and what other contexts would they like to see supported?

○ What educator roles, student roles, and instructional context should I use to create a set of scenarios that can help me better understand my customers and how to support them?

Resources

○ For general advice on developing educational technology, see the *Ed Tech Developer's Guide.*

○ For an outline of educational technology categories and types, see the **Digital Learning Resources Matrix** (page 22). This matrix was used in the study as a summary overview of the types of resources available to educators.

Design by leveraging research and best practices

When designing and refining educational technology, decisions should be consistent with best practices relevant to your specific educational technology product. The Department of Education encourages developers to familiarize themselves with the research on instructional practices that help English learners gain proficiency in English and build understanding in the different content areas.

What to know

○ Understand what is known about promising and effective practices for instructing English learners. A recent summary of what we know from the research, *Promoting the Educational Success of Children and Youth Learning English: Promising Futures*, was developed by a committee of experts in the field. It includes an overview of instructional practices for English learners in grades Pre-K to 12, and is a free resource as a pdf.

○ The National Clearinghouse for English Language Acquisition (NCELA) is another resource. NCELA collects, coordinates, and shares a broad range of research and resources in support of high-quality education for English learners and includes a resource library.

○ The *Universal Design for Learning (UDL)* framework provides guidelines to improve and optimize teaching and learning for all people based on scientific insights into how humans learn. The guidelines were initially developed as a way to design technology for students with a wide variety of learning needs, including needs related to a student's disability, and many of the guidelines may be particularly effective for English learners, including English learners with disabilities. UDL is based on the premise that all students benefit when provided flexible learning environments that can

accommodate individual learning differences. These guidelines recommend providing:

- Multiple means of engagement;
- Multiple means of representation; and
- Multiple means of action and expression.

For example, technology that enables students to engage with content through auditory modes as well as visual modes can help many to learn new content. English learners can benefit from hearing text read to them when they are not yet fluent readers, and students with impaired vision can also benefit from a text-to-speech option in learning new material.

What to do

☐ **Base decisions on research.** Use the research on effective and promising practices for English learners to guide the design of your specific educational technology resource so that it can engage and support the English learners who work with your product.

☐ **Use existing guidelines relevant to your educational technology design.** Refer to frameworks such as UDL and others so that your product design is informed by what is currently known about research and best practices relevant to educational materials design generally and to technology solutions specifically.

☐ **Create designs that specifically address the users you have identified and their needs.** For example, ensure that the product design elements reflect promising practices that are appropriate to your targeted English learner students' age, accessibility and/or disability related needs, and/or grade level.

☐ **Inform sales and marketing of the research you are integrating into your product.** When you leverage research, let others in your product group know. Educators often will want to know the research basis of the resources they are considering. Make sure that your sales and marketing teams are aware of how your product is based on research, and how it meets the needs of your target customers.

What to ask

○ What is the research on promising and effective practices that most aligns with my product and will my product lead to strong solutions for the specific English learners and contexts we're targeting?

○ What are the changes I can make to my product that can better align it with best practices according to existing research and design guidelines?

Resources

○ The Universal Design for Learning (UDL) framework is widely used, and districts may request or require that technology providers show how UDL was used in the design of their product.

○ For more on the design and development of educational technology resources generally, see the U.S. Department of Education, *Reimagining the Role of Technology in Education: 2017 National Education Technology Plan Update*. Note the discussion of Universal Design to meet the needs of all students including students with disabilities on pages 21-23.

○ The website for the *Promoting the Educational Success of Children and Youth Learning English: Promising Futures* includes additional resources, such as blogposts and webinars on several key topics. Scroll down to the list of "Resources at a Glance" to view the offerings. There is also an Online Toolkit - Promoting the Educational Success of Children and Youth Learning English. In this resource, the National Academies of Sciences, Engineering, and Medicine provide additional information related to the committee's report, including short videos from experts.

○ The National Clearinghouse for English Language Acquisition (NCELA), publishes *NCELA Nexus*, a semimonthly e-newsletter, to share new resources, upcoming events, and other announcements. It provides links to opportunities for jobs, education, and funding related to the education of English learners. Nexus subscribers may also receive occasional, time-sensitive announcements from the U.S. Department of Education's Office of English Language Acquisition and NCELA.

Include support features for English learners

Educational technologies can support learners in ways that go well beyond digitizing textbooks and worksheets. By embedding well-considered supports for English learners, your educational technology may stand out in the marketplace.

What to know

○ The field has identified several types of embedded supports that are applicable to different technologies and use cases. See a list of categories and types of supports identified thus far in the **Digital Support Features Matrix** (page 23).

○ The list of digital support features is meant to provide inspiration. As you dive deeply into your own technology, users, and product design framework, you may identify new innovative features that can better serve all English learners, including those with disabilities, and other students.

○ Developing software with text embedded in the code or with text embedded in images will make it very hard to provide many of the supports that are known to be effective for English learners. All user-facing text (including text associated with controls and images) should be in external resources that can be modified without modifying your code base. This will make it easier to add new languages to support a broader range of English learners.

What to do

☐ **Provide visual supports.** Visual support can take many forms, from providing simple images to sophisticated interactive visual displays. Different levels of visual support can be used depending on student needs, and traditional text can be faded in as students become more fluent. Visual supports can also be used to aid students in expressing themselves, for instance, by allowing them to use visualizations in addition to, or instead of, using text.

☐ **Increase access to content through interactive representations.** Interactive graphics can engage students in scientific experimentation and

simulations. Dynamic mathematics environments can allow students to interact directly with mathematical objects without the need for textual mediation. Social studies timelines and graphic displays can provide insights without the need for extensive text interpretation. By tracking student interaction with these representations, technology developers can better capture what students know and also provide students with a mode of communication other than traditional text.

☐ **Provide audio supports.** Text-to-speech or "read-aloud" supports are valuable because many English learners can comprehend the spoken word better than the written word. For many students, the combination of spoken and written words is particularly useful. In addition, technology can allow students to modify the speed at which speech plays, allowing for students to play text at a speed comfortable to them. Audio can also provide spoken translation or an audio clip of a sound that helps explain a vocabulary word or a phrase. Developers should be aware of the capabilities built into the hardware or operating system they are running. They should ensure that their technology can take advantage of these capabilities and/or be interoperable with supports enabled by assistive hardware a student might use.

☐ **Provide written text support.** Text support can include the ability for students to highlight, mark up, and annotate text. This can be used to scaffold understanding, as well as to allow students to demonstrate what they know.

☐ **Expand the languages your product supports.** While a wide variety of materials is available in Spanish, English learners come from many language backgrounds other than Spanish and can benefit from supports in their home language. For example, Arabic, Chinese, and Vietnamese are the next most common language backgrounds of English learners in public schools in the United States. The major English learner groups can be very different within an individual state or school district, so developers should determine the language backgrounds of English learners in their target schools and districts. Supporting languages beyond Spanish can open the marketplace to new schools and districts. Teachers and students can benefit from the broader range of supports for classroom instruction, and students may be able to receive additional support at home.

☐ **Allow students of all reading levels access to grade-level content.** Educational technology can provide simpler text in reading passages and introduce grade-level vocabulary just-in-time and in a way that relates to the specific content and context of the passages. This can provide English

learners who are not reading at grade level access to grade-level social studies, science, or math content.

☐ **Allow students multiple modes of expression.** To communicate in the different content areas, students must not only experience language generated by others but also have opportunities to produce language. The ability for students to record and play back their voices, possibly with guidance on how they could improve their language or pronunciation, is a common teacher request. Recording and playing back the sound gives English learners opportunities to practice and listen to their own speaking while being supported in a nonjudgmental manner.

☐ **Provide support for collaboration.** Providing opportunities for joint student work and discussion is an increasingly important part of academic content standards. For English learners, peer interactions also are opportunities to use language in meaningful ways and to make gains in English language proficiency. Teachers are looking to educational technology to provide supports for student-student and student-teacher collaboration.

☐ **Ensure that all supports are also accessible to and usable by students with disabilities.** Also, keep in mind that your supports should be interoperable with any assistive technology that students with disabilities may be using.

What to ask

○ How is my product used, and what supports can enhance that use for English learners?

○ Are there supports listed in the Digital Support Features Matrix that I can directly apply to my product?

○ Have I considered the need for general accessibility features in the design of the product?

○ How can I go beyond the digital support features listed in this toolkit when creating supports for English learners?

Resources

○ For a matrix that identifies an initial set of categories and types of support features, see the **Digital Support Features Matrix** (page 23).

Communicate with educators to increase product adoption to support the instruction of English learners

Developers should communicate how the use of their technology can have a positive impact on instruction, how the features found in their educational technology are beneficial to the instruction of English learners, how the educational technology is based on research, and what appropriate implementation looks like.

What to know

○ When determining what educational technology to use, many educators look for independent evidence of effectiveness, as well as an indication that specific features are based on the research literature.

○ Educators typically find recommendations for technology use from a wide variety of sources, and they oftentimes value the opinions of other educators in making decisions about educational technology.

○ Districts use a variety of ways to make decisions about purchases of educational technology, and some may have funding sources dedicated to purchasing resources primarily for use by English learners.

○ Many teachers are too busy to fully analyze all the software they use, and so they often don't know what support features are available in their technology resources. They may occasionally ask for a feature to support their English learners that is already present in a resource (a clear indication that you are not appropriately communicating your feature set to your customers).

○ While educators want to monitor individual student progress, they also have privacy concerns and want a better understanding of how student information is being protected.

What to do

☐ **Communicate the evidence base for your technology.** If evidence for the effectiveness of your technology exists, make it clear to educators and administrators. If it does not exist, consider options for generating such evidence, such as partnering with school districts, a university, or an independent research organization.

☐ **Ensure that you understand and support the district review and purchasing process.** Districts have different purchasing requirements, and some have funding sources specifically for technology or for resources for English learners or students with disabilities. Investigate the different sources that schools and districts can use to purchase your resources, understand the approval process, and make it as easy as possible for educators to prepare required documentation.

☐ **Listen to what educators are saying.** Talk directly to a sample of educators, and look for product reviews written by educators. Authentic, honest input is invaluable in the product development and improvement process.

☐ **Review current or previous district requests for proposals.** Districts, especially large districts, often make clear what their current English language support requirements are in formal requests for proposals (RFPs). Even if you are not responding to a district RFP, reviewing a set of recent RFPs can provide insight into current district expectations and terminology.

☐ **Ensure that educators and students can readily find and use your embedded support features.** If your product's feature set is not easily discoverable or easy to use, educators may turn to alternative products whose features are more obvious and accessible. User tests with educators can provide information about how they find and describe your features.

☐ **Make your embedded support features publicly known.** Ensure that your website and other materials clearly describe the accessibility and support features you've included in your product, and inform your sales and marketing team of these support features. Administrators and teachers will look for these when considering what technology to use.

☐ **Ensure that your product adequately protects student data.** Review your product's operation to make sure that you only collect data that are required to achieve the sought-after benefits, and that there are strong protections in place for these data. The Future of Privacy Forum and the Software & Information Industry Association (SIIA) have introduced a student privacy pledge that is a good starting place for thinking about

student privacy. The U.S. Department of Education has a [website describing best practices for protecting student privacy,](#) has a [site that includes confidentiality provisions for children with disabilities](#) under the Individuals with Disabilities Education Act (IDEA), and has created the [Privacy Technical Assistance Center (PTAC)](#).

What to ask

○ Does my product information clearly communicate the evidence that demonstrates its effectiveness with particular groups of students and particularly English learners?

○ Do I know the purchasing requirements and processes of my target customers? Is there publicly available information, such as RFPs, that I can review to gain insight into current purchasing requirements?

○ Are there common sets of feature descriptions that I (and other developers or publishers) can provide to educators to simplify the district review processes for them? Before naming a feature or type of support, have I looked at other products to determine if there is already a name that is commonly in use?

○ How can I work with others in the field, such as education technology associations, to provide a common language for the embedded supports provided in products? Could we communicate these more clearly with educators and other stakeholders that are looking to support English learners?

○ Do I provide clear and simple explanations of the student data the product collects, and of how these data are protected?

○ If my product is collecting student data, is the student data privacy policy clear and easy to find? Are there ways my product marketing and feature design can help educators and districts understand the benefits they gain from these data being collected?

Offer instruction-focused professional development

Teachers reported that vendor-provided professional development often did not meet their needs. Existing professional development often focuses on how to use technology features, but many teachers want to know how the features and content can improve their classroom instruction in meeting the needs of their English learners.

What to know

○ Many technology providers have a training model in which they train teachers how to use product features. However, teachers want to use educational technology to improve their classroom practice, and they do not want a "how to" guide that only describes product features.

○ To truly improve teacher practice, ongoing professional development is required. However, teachers have limited time and budget, and so they may be looking for non-traditional forms of professional development. These may include embedded video clips showing classroom examples of effective technology use to support English learners, short online modules, or online communities where they can share their successes and difficulties.

What to do

☐ **Gather teacher input on your professional development and training.** Teachers are the best judge of the usefulness of professional development sessions.

☐ **Have teachers help design and deliver your professional development whenever possible.** Teachers find professional development sessions run by educators to be most effective, especially when the sessions focus on ways that technology can improve their practice.

- [ ] **Have varied forms of professional development materials available, including embedded professional development.** Teachers are looking for video and other embedded resources to give them a better understanding of how classroom use of the technology can support their English learners.

- [ ] **Provide opportunities for teachers to learn from each other.** Teachers want to learn from other teachers, so consider structuring community forums or other collaborative spaces that enable teachers to share successes and difficulties with one another.

What to ask

- Once teachers have completed our professional development courses, can they immediately apply what they have learned to their classroom instruction?

- Does the professional development associated with my product make clear the improvement in instruction for English learners that will come from its use?

- Do I provide follow-up professional development that allows teachers to come back and ask questions about their classroom experiences in using my technology with English learners?

Learn About the Study

The **National Study of English Learners and Digital Learning Resources** is a national descriptive study conducted in the 2016–17 school year by the U.S. Department of Education, Policy and Program Studies Service, on behalf of the Office of English Language Acquisition and the Office of Educational Technology under contract number ED-PEP-11-0-0088/TO27. The study included a nationally representative survey of districts, a survey of teachers, and six case studies, and meetings with experts to examine what digital learning resources are used in instructing English learners and how they are used. **The study provided findings that describe the use of digital learning resources in instructing English learners in grades K–12 in U.S. public schools.**

The study provided descriptive data to identify current uses of digital learning resources, needs for additional information and/or supports in their uses, professional development on use of technology in instructing English learners, and areas in which educators wished to see improvements in the digital learning resources available to them for instructing English learners.

The full study report will be posted to the Department's website at:
http://www2.ed.gov/about/offices/list/opepd/ppss/reports.html.

Disclaimer

Examples Are Not Endorsements

This document contains examples and resource materials that are provided for the user's convenience. The inclusion of any material is not intended to reflect its importance, nor is it intended to endorse any views expressed, or products or services offered. These materials may contain the views and recommendations of various subject matter experts as well as hypertext links, contact addresses, and websites to information created and maintained by other public and private organizations. The opinions expressed in any of these materials do not necessarily reflect the positions or policies of the U.S. Department of Education. The U.S. Department of Education does not control or guarantee the accuracy, relevance, timeliness, or completeness of any outside information included in these materials. **Mentions of specific programs or products in these examples are designed to provide clearer understanding and are not meant as endorsements.**

MATRIX 1: Digital Learning Resources

The term **Digital Learning Resources (DLRs)** refers to digital resources such as applications *(apps)*, software, programs, or websites that engage students in learning activities and support students' learning goals. There are three categories of DLRs: digital academic content tools, digital productivity tools, and digital communication tools. DLRs as defined here do not include the hardware or infrastructure needed to use the digital resources.

DLR Category	Definition	Category	Types and Examples
Digital Academic Content Tools	Software, applications *(apps)*, programs, or websites that offer academic content resources and/or engage students in activities to learn academic content or skills, including, but not limited to, language and literacy content or skills.	**Designed learning activities**	• *Interactive tutorials or lessons (adaptive and other)* that guide students in learning and demonstrating new content or skills, such as an interactive lesson on the life cycle of a butterfly or a math tutorial on fractions. • *Practice and assessment tools that provide activities to review concepts and skills,* such as a math app that provides multiple opportunities to practice addition skills. • *Dynamic modeling or simulation tools,* such as a physics simulation that lets students manipulate virtual equipment, change parameters, and see the results. • *Virtual worlds* that immerse a student in a fully interactive environment, such as one that allows a student to roam in a period of past history or explore a desert environment.
		References/ resources	• *Dictionaries, encyclopedias, e-books, topic blogs, and/or topic-focused websites* that serve as information resources, such as an online encyclopedia that offers students pictures, facts, and videos about mammals or a digital dictionary. • *Visual and auditory topic-related resources* such as a *YouTube* video on earthquakes and plate tectonics.
		Language resource tools	• *Translation tools* that assist students by providing a translation to another language. • *Articulation tools* that assist a student to accurate production of a language, such as by showing images of how a sound should be produced and/or by letting a student record and listen to his/her own voice to compare with the model.
Digital Productivity Tools	Software, applications *(apps),* programs, or websites that students use to plan, document, organize, and analyze content. They do not contain academic content.	**Presentation tools**	• *Presentation and publication tools* that allow students to demonstrate what they have learned about a topic or to publish a digital story about a memorable day. These may include music, images, and/or video.
		Word processing tools	• *Word or text processing tools* that enable students to create, edit, and print documents such as in creating a newspaper based on topics from history class or reporting on a field trip.
		Information analysis tools	• *Spreadsheet and data analysis tools* that allow students to organize and analyze information, such as tracking local rainfall over time or analyzing and summarizing factors that led to the migration from the American Dust Bowl to the West in the 1930s.
		Information organization tools	• *Concept-mapping tools* that let students visually represent relationships among sets of information, such as creating a mindmap of the American Revolution or a concept map for the causes of the Civil War. • *Story templates* that assist students to communicate a narrative using text and/or images, as in retelling a story they have heard.
Digital Communication Tools	Software, applications *(apps),* programs, or websites that students use to communicate, collaborate, network, or present information. They do not contain academic content.	**Asynchronous/ synchronous text communications**	• *Discussion boards or forums* that provide platforms for students to post reactions and/or comments and share perspectives, such as in providing analyses of a novel they have read and sharing feedback on their peers' analyses. • *Emails, text messaging, chats*, for example, using a chat function to share peer feedback on a report.
		Reflection tools	• *Blogs or student journals* that allow students opportunities to share and/or reflect on their learning experiences, such as a student who uses a journal entry to reflect on her understanding of particular math concepts.
		Videoconferencing/ meeting tools	• *Videoconferencing or meeting tools that* provide a remote means of seeing and speaking with others in real time, such as in enabling a science class to see and talk with NASA experts, or allowing students in a Spanish dual-language class to see and share a geography game with Spanish-speaking peers in Mexico.
		Project collaboration tools	• *Document or project-sharing tools* that provide an online platform where students can work on products together, as in jointly editing a shared book report.

↓ Multiple individual DLRs can be combined in an Integrated DLR Set ↓

Integrated DLR Sets	A structured combination of individual DLRs to provide a complete core or supplemental curriculum. Often, DLR sets are licensed as a package by a school district.	***Core Curriculum Integrated DLR Set***	For example, a math program for grades 6–8 that combines visual lessons with embedded assessments, productivity tools, and flexible class management tools into one package.
		Supplemental Integrated DLR Set	For example, a math intervention for at-risk students in grades 6–12 that provides tutorials, practice activities, and progress monitoring tools to inform instruction.

Note: This summary matrix was adapted from Zehler, Annette M., Yilmazel-Sahin, Yesim, Massoud, Lindsey, Moore, Sarah C., Yin, Chengbin, and Kramer, Kat. (2012, April). *Technology-based resources in instruction of English learner students*. Poster presentation at the Annual Meeting of the American Educational Research Association, Vancouver, British Columbia.

Source: U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service. (2018). *National Study of English Learners and Digital Learning Resources.* Washington, DC: Author.

MATRIX 2: Digital Support Features

Digital Support Features are specific embedded features in digital learning resources (DLRs) that assist students in understanding or communicating the content and/or activities provided in the DLR. This is a preliminary list to prompt further discussion among developers and educators.

Support Feature Category	Definition	Category	Examples
Visual Support Features	Provide visual images or other visual supports to assist a student in understanding and/or communicating a concept or idea.	**Visual definition**	Links to a video or image(s) providing a visual definition of a concept or word.
		Interactive visual features	Manipulable visual representation of a concept, such a graphing calculator feature integrated into a DLR, providing representations of concepts based upon information that a student enters.
		Closed captioning	Text shown on the video screen provides print as well as audio that is useful for English learners still developing their ability to understand spoken English.
Auditory Support Features	Provide speech or other use of sound to assist a student in understanding and/or communicating a concept or idea.	**Auditory definition**	Allows students to click on a word to hear a definition of a concept or word.
		Text-to-speech for text selection	Reads aloud text such as a selection on academic content, a story, directions for a lab experiment, or math questions; might include options to play, pause, adjust the volume, and/or control the speed at which the text is read. The language used may be English or another language, depending on the materials used.
		Text-to-speech for highlighted word	Allows readers to hear an individual word or phrase.
		Record and replay voice	Enables students to record their voice; replay it so that they can hear their own voice, perhaps make adjustments to and/or practice pronunciation, practice their part in a presentation, or save for sharing with others.
Translation Support Features	Provide embedded functions to translate from one language to the other, in either speech or print, and for either a word or limited text.	**Spoken word translation**	Enables a student to hear a spoken translation in his/her home language of an unfamiliar English word.
		Printed word translation	Enables a student to view a written translation in his/her home language of an unfamiliar English word.
		Spoken text translation	Enables a student to hear spoken statements in one language as spoken in another language.
		Printed text translation	Enables a student to view a section of text in one language as written in another language.
Collaboration Support Features	Embedded functions that students use to communicate, collaborate, work, or share information about academic content.	**Document sharing**	Allows multiple students to share a digital document and use annotation tools to add notes or comments.
		Collaboration based on proficiency level	Allows students to collaborate with peers according to their proficiency levels (e.g., peers at the same Lexile reading comprehension level).

Note: This matrix is a preliminary summary of supports created for the toolkits based on insights gained through the NSELD research.

Source: U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service. (2018). *National Study of English Learners and Digital Learning Resources.* Washington, DC: Author.

Contents

Introduction

U.S. Department of Education data show that English learners in grades K–12 in U.S. public schools in the 2015–16 school year numbered over five million students—about 10 percent of all enrolled students—and that roughly three-fourths of public school districts included students who are English learners. Many teachers, including those in small and rural districts, have one or more English learners in their classrooms—or soon will—and these teachers often use technology when instructing their English learners.

This toolkit is for all educators—including teachers and administrators—who want to use technology to help their English learners gain proficiency in English and meet academic goals. In choosing to use technology, educators should recognize the supports offered and the constraints of any technology in the context of their own students and their needs. The toolkit offers five guiding principles for educators to apply in exploring new ways of working with and supporting their English learners through technology, starting with recognizing their students' unique needs and thinking through to the best technologies to help meet those needs.

This toolkit and a companion Developer's Toolkit are based on insights from the findings of the **National Study of English Learners and Digital Learning Resources** conducted by the U.S. Department of Education, Policy and Program Studies Service, on behalf of the Office of English Language Acquisition and the Office of Educational Technology. Both toolkits focus on use of technology that is software or "digital learning resources," that is, the apps, programs, or websites that engage students in learning activities and support students' learning goals. The toolkits do not focus on the use of hardware (such as laptops, computers, tablets, or other devices).

The study provides the first national data on how districts and teachers of English learners (including general education teachers and English learner specialists) use educational technology in instructing English learners. The study conducted surveys, case studies, and meetings with experts in the field, including educational technology publishers, researchers, and educators. To learn more about the study and the toolkits, you can read a brief description on page 22.

The study's final report describes how districts and teachers identify and use technology in instructing English learners as well as related supports and barriers. This toolkit builds awareness of the role technology can play and notes areas where educators can improve the use of technology and related supports for their English learners, based on needs suggested by the study.

GUIDING PRINCIPLES FOR EDUCATORS

1. Understand what educational technology offers for instructing English learners

2. Discover the types of educational technology available

3. Maximize the supports that educational technology offers English learners

4. Seek out hands-on, instruction-focused professional development

5. Learn more about English learners and educational technology

Understand what educational technology offers for instructing English learners

As we've entered the 21st century, the landscape for students in kindergarten through grade 12 (K–12) has changed, and developments in the world of instruction and instructional resources continue. Key changes for educators in many schools and classrooms include enrollments of new English learners and rapid increases in educational technology use. The technology offers important new ways for English learners to access learning academic content and language.

What to know

English learners bring significant assets of language and culture to enrich their classrooms and schools, and their backgrounds and experiences will inform different instructional needs. For example, English learners who will use educational technology may:

○ Have had very different experiences before coming into their K–12 classrooms. Many will have been born in the United States, but others will have just entered the United States for the first time, perhaps after difficult experiences as refugees;

○ Have grade-level skills and knowledge based on a high-quality education in their country of origin but not yet have proficiency in English;

○ Have had little or no formal education, or some years of interrupted education, prior to entering schools in the United States;

○ Appear proficient in English based on their fluency in everyday conversations but not yet have the level of academic English proficiency they will need to succeed in learning academic content;

○ Differ in their level of acquisition and use of their home language, and some may not be literate in that language. This has implications for their path to English literacy;

○ Have had little or no experience using technology, and may not understand many of the basics about using computers or navigating in a website or software program;

○ Come from cultures with very different norms and expectations around education. For example, some may expect collaboration to be the norm, while others may expect that students work alone; and

○ Have disabilities, and some may require the use of assistive technology, including software to support their accessibility needs.

Educational technology opens up a new breadth and depth of resources for instruction and learning. These resources can be particularly valuable for supporting English learners' engagement in instruction and access to content in many ways. For example, technology resources can:

○ Offer multi-modal means of presenting information. Visual images, short videos, and interactive features can expand English learners' ability to understand academic content.

○ Present examples and images of events, daily life, and other cultural information from many countries and population groups. These can help students share languages, cultures, and experiences to understand one another's backgrounds.

○ Offer important supports to assist students to more fully participate in learning activities. Embedded support features, such as short videos or images used to define new vocabulary, can assist English learner (and other) students in understanding content. In addition to these supports, there are audio recordings and translation functions that can help English learners in communicating content as they collaborate with their peers. When such embedded support features comply with accessibility requirements, English learners with disabilities also may be able to benefit from these supports in addition to, or in conjunction with, any assistive technologies, including accessible software, that they may use.

○ Offer instruction that is differentiated to the English learner's level of proficiency and academic learning needs.

Many educators are using educational technology in their classrooms, but they are really just beginning to understand how best to use these new resources effectively with English learners.

What to do

☐ **Consider the needs of your English learners.** What are the instructional goals necessary to meet each student's needs? You'll want your choices of technology to always be based on these.

☐ **Learn about the range of English learners, their acquisition of a second language, and what we know about promising and effective instructional practices for English learners.** A recent summary developed by a committee of experts can guide you to understanding what we know thus far: *Promoting the Educational Success of Children and Youth Learning English: Promising Futures* (*https://www.nap.edu/catalog/24677/promoting-the-educational-success-of-children-and-youth-learning-english*). The summary includes an overview of what the field knows about promising and effective instructional practices for English learners in grades Pre-K to 12. Note that you don't need to purchase the book: You can read the whole book online or download a free pdf. Also, scroll down to the list of "Resources at a Glance," which includes blogposts and webinars on several key topics.

☐ **Explore visions for the future of educational technology in instruction, such as through the National Educational Technology Plan.** See: *Reimagining the Role of Technology in Education: National Educational Technology Plan* (*https://tech.ed.gov/netp/*). The plan includes discussions on several aspects of technology use that educators will find of interest and applicable to instructing all students, including English learners. Note that pages 21-23 focus on ways in which technology can support all learners, addressing their different needs, through a Universal Design for Learning (UDL) approach to designing new resources. While UDL initially focused on designing for accessibility for students with disabilities, it applies to resources for all students and their needs (e.g., see the box on page 23). This includes English learners, for whom multiple modes of understanding and communicating offer important supports.

What to ask

How can educational technology:

○ Help me engage and support English learners in learning grade-level academic content and academic language skills? In what ways does it assist in scaffolding language learning?

○ Assist English learners to collaborate and work with their peers, including English-proficient peers?

○ Help differentiate instruction to better meet English learners' needs?

○ How can our selection of educational technology resources best support English learners in learning academic content and making gains in English language proficiency?

○ What will best support our teachers in planning for and using educational technology in instructing English learners?

Resources

○ **Online Toolkit - Promoting the Educational Success of Children and Youth Learning English.** In this resource, the National Academies of Sciences, Engineering, and Medicine site provide additional information related to the committee's report, including short videos from experts and a number of webinars on the findings: http://sites.nationalacademies.org/dbasse/bcyf/educational-success-of-children-and-youth-learning-english/index.htm.

Discover the types of educational technology available

There are thousands of educational technology options. As an educator, you will want to know where to begin in determining which resources best fit your English learners' needs and your instructional goals for students.

What to know

Whether a teacher or an administrator, the challenge is the same: How do you begin to choose the right educational technology for your English learners from among the thousands available? To help you make those choices, it may help to first think about the following broad categories of technology resources available and to explore the different types within each.

○ **Digital Academic Content Tools** offer academic content resources or engage students in activities to learn academic content or skills including, but not limited to, language and literacy content or skills. Examples are a tutorial on a new math skill, a simulation of a physics concept, or visual resources such as a short video that describes a geographic formation.

○ **Digital Productivity Tools** offer resources to help students plan, document, organize, and analyze content. These tools don't contain academic content; examples include a slide presentation tool, a timeline tool, or a concept-mapping tool.

○ **Digital Communication Tools** offer resources students can use to communicate, collaborate, network, or share information. These tools don't contain academic content; examples include document-sharing tools to support joint work, or a journal or blog tool.

What to do

☐ **Explore the different types of educational technology within each of the three categories of resources.** These are outlined in the **Digital Learning Resources Matrix** (page 24), a summary matrix showing three categories

and types of technology resources that was developed for the study. Are you aware of the wide range of resources available?

☐ **Consider new types of resources to try with your English learners to meet their language and content goals.** Reflect on how you might use them in the future as part of your lesson plans to help English learners—as well as other students—meet their learning goals.

☐ **Share the Digital Learning Resources Matrix in discussions with other teachers.** Can the categories and types be useful as a common reference for talking about the technology resources you use?

☐ **Explore a wide range of educational technology.** Look online to sites that offer collections of educational technology and examine the reviews many offer, talk with other teachers, and look at publishers' websites.

☐ **Find examples of educational technology** that will help your individual English learners to gain English proficiency, learn grade-level academic content, and collaborate with peers on academic tasks. Consider whether these tools provide content and images that reflect your English learners' languages, backgrounds, and experiences.

☐ **Be alert to protecting student information, especially when you are selecting tools that help you tailor instruction to individual students.** Be aware of the individual student information that the resource gathers and ensure that it adequately protects students' personally identifiable information. You can learn more at: https://studentprivacy.ed.gov/Apps and at: https://www2.ed.gov/policy/gen/guid/ptac/pdf/idea-ferpa.pdf.

What to ask

As you explore the types of educational resources in the Digital Learning Resources Matrix, ask yourself the following questions:

GENERAL EDUCATION TEACHERS

○ Are English learners able to fully participate when the class uses educational technology during academic instruction?

○ Are there digital resources that will help my English learners gain English proficiency while working on academic content with their English learner and English-proficient peers?

○ Are there types of educational technology that my English learners don't use but I should explore? What might these offer for them?

○ When I discuss educational technology with general education teachers, do we discuss ways we can use technology to support English learners in learning content and in using language to communicate about grade-level content?

○ Do our English learners use and benefit from the educational technology provided by the district? In what ways? How do we know?

○ Are there other types of educational technology that our district doesn't provide but could consider using to better support our English learners?

PRINCIPLE IN ACTION

1

*Mr. Ruiz, a high school math teacher, wants to be sure that all of his students, including his four English learners, understand 2D and 3D geometry concepts. To find the right resource for his lesson plan, he talks with other math teachers, who suggest various **digital academic content tools**. Mr. Ruiz goes online to check out the fit of the suggestions with his plan and searches technology sites he knows. He looks at what several tools offer and reads online reviews. He wants his students to understand the relationship between the 2D planes that result from different cuts through 3D objects. Realizing that his students will "get it" better if they can actively engage with a number of examples, he selects an open source **dynamic modeling geometry app** (e.g., GeoGebra, Geometer's Sketchpad).*

The day of the lesson, Mr. Ruiz begins non-digitally, showing a shoebox, first whole, and then cut through at an angle, showing the resulting 2D shapes. Next, he uses the app to show cuts through a cylinder, using different angles, and does the same with other 3D shapes, such as rectangular and triangular pyramids. Later, as they work in groups, all of the students, including the English learners, look fully

engaged as they predict and confirm the resulting 2D shapes.

__Ms. Shore's kindergarten class__ includes English learners from many different language backgrounds. She wants to plan a lesson where they talk about and retell a story they are reading. Her local English learner specialist helps with the lesson plan, suggesting that using __digital productivity tools__ such as slides or videos could give the students chances to practice and improve their English. As they discuss, Ms. Shore also notes that students can use __digital communication tools__ such as shared portfolios or workspaces to let one another know what they created.

In circle time, students make predictions as the teacher reads the story and they talk together about it. They are excited as they break into groups to draw pictures of the story: each group draws the first, middle, or last part. When they finish, Ms. Shore creates new groups of three to include students from all three story parts. The groups create __digital videos__, with each student in the group telling his or her part of the story, holding a drawing to illustrate. The groups view and redo their videos. They save the videos in __digital portfolios__ (e.g., Seesaw, FreshGrade) and share with each other. Ms. Shore shares the videos with the students' families.

Resources

○ The **Digital Learning Resources Matrix** (page 24) describes three categories of resources and lists several types of educational technology within each. You may find it useful as a tool for thinking about different types of technology or for organizing your thinking about technology you might use in instructing your English learners.

○ There are online sites that offer links to many different technology resources, and many offer the ability to filter for resources, for example, in specific subject areas or for English learners or other students. Two examples of sites that offer collections of educational technology are:

Common Sense Education (https://www.commonsense.org/education/), where you can navigate to the "EdTech Reviews and Resources" page and search for resources; and

The **EdSurge Product Index** (https://www.edsurge.com/), where you can scroll down to "Opportunities" and their EdTech Product Index.

○ For further information on protecting student privacy, you can access several webinars at: https://studentprivacy.ed.gov/content/recorded-webinars.

Maximize the supports that educational technology offers English learners

In the digital world, teachers and students have access to a range and number of supports that can mean important new opportunities for English learners in engaging with academic content.

What to know

Digital Support Features are specific embedded features in educational technology that assist students in understanding or communicating the content and/or activities presented in a resource. There are many types of Digital Supports, and you can see examples listed in the **Digital Support Features Matrix** at the end of this document (page 25). It includes four categories of support features that can be important for English learners in particular.

- ○ **Visual Support Features** provide visual images or other visual support to assist a student in understanding and/or communicating a concept or idea. The visual content replaces or lessens the language proficiency that would otherwise be required. Examples are images, graphics, or short videos to explain a concept to students.

- ○ **Auditory Support Features** provide speech and/or other use of sound to assist a student in understanding or communicating a concept or idea. Examples are a text-to-speech or "read-aloud" function and a record and playback function. These features allow students to hear text or hear their own speech played back to them for review before sharing the recording.

- ○ **Translation Support Features** provide embedded functions to translate from one language to provide a word, phrase, or longer text in another language, either spoken or in print. For example, an embedded translation function could let a student hear the Spanish version of a sentence in English.

○ **Collaboration Support Features** provide functions to help students communicate, collaborate, work, or share information about academic content. For example, collaboration support features might offer students functions that assist them in sharing and jointly working on a document or presentation.

What to do

☐ **Look for embedded support features in resources.** Determine if resources include supports to assist your English learners when you review any educational technology for possible use or purchase.

☐ **Ask vendors to provide information on the types of digital support features a resource includes that may be particularly helpful for English learners.** For example, does the resource include auditory supports such as text-to-speech ("read aloud") functions? Does it offer visual tutorials to help explain concepts?

☐ **Assess how easily students can access and use specific support features.** Keep in mind, some English learners may be just learning to use computers. For example, observe whether they have difficulty in following the navigational steps needed to access the features.

☐ **Plan how you will guide your students in using support features.** Plan ways to facilitate students' use of the support features so that they can use them productively—especially if they are working on their own.

What to ask

GENERAL EDUCATION TEACHERS AND ENGLISH LEARNER SPECIALISTS

○ What support features are there in the resources I already use? Are there any that I was not aware of but that may help my English learners to more fully participate in and benefit from instruction?

○ What languages do the resources I use offer? How well do these match with the languages of my English learners?

○ Are the supports such as those that provide images, content, or other examples appropriate to my English learners' backgrounds and experiences?

○ Can my English learners easily access and make use of the support features in the educational technology we use in class? Do they use the features productively and appropriately?

○ What support features does our district (or school) look for when we make educational technology purchase decisions? Do we consider our English learners, including those with disabilities, when we review the support features available?

○ Do we consider the languages, backgrounds, and experiences of our English learners as we review the supports provided?

○ Are the teachers in our district (or school) familiar with the support features in the resources they are using, and are they comfortable in using them in instructing English learners? Do we provide professional development to assist teachers in using and facilitating students' use of support features? Does the resource provide implementation support for teachers—perhaps as embedded modules on how to access and use the supports in instruction?

PRINCIPLE IN ACTION

1

Ms. Sayed's seventh-grade earth science class is studying geologic processes and learning about plate tectonics, earthquakes, and volcanoes. She assigns groups of students to research an earthquake or volcanic eruption that has occurred in the past 30 years, and to provide their explanation of factors leading to the event they have chosen. One group includes Monica, an English learner from a Spanish language background, who is a high beginner English learner. Ms. Sayed encourages Monica to make use of the support features in the research resource they use, which she introduced to Monica earlier.

*As the students do their research, Monica does her part, too, working with her English-proficient peers to search within an online science curriculum resource their class uses. She joins them in identifying information about the earthquake they have selected. She finds and clicks on an **embedded video tutorial** that accompanies the text they are reading to understand the event overall. The text about the earthquake is still a bit difficult for her, and so when she returns to reading it, she sometimes accesses the **translation feature***

*that shows her the Spanish word or definition of an English term she doesn't recognize. As the group works, they use an **embedded document-sharing function**, and she and the other students edit and mark up the group product.*

2

*__Mr. Sato__ is eager to give his third-grade English learners more independence in reading about their social studies topics. He finds an academic content resource that includes digital texts on several topics aligned with the curriculum. He is glad to see several support features that his English learners can use. There are **definitions** of key terms that are both **visual** and **in text**, so that the students can understand visually and connect with the new terms. There is an **auditory, text-to-speech feature** that lets them hear the new vocabulary so they can connect the sounds with the written words and phrases. This will help them to build their reading skills. When he introduces the resource, he shows students how the features can work and gives guidelines for using them.*

In the lesson, the English learners read in pairs and look engaged as they access the supports. But Mr. Sato also notices that some who are new to working with computers are having trouble with the multi-step navigation needed to use the support features. The students keep losing their place. Mr. Sato plans to work more individually to guide them in using the supports. He makes a mental note to look for resources with more direct interfaces for his students.

Resources

- The **Digital Support Features Matrix** (page 25) describes the four categories of supports: visual, auditory, translation, and collaboration supports. It also lists and describes examples of the different types of supports within each category.

Seek out hands-on, instruction-focused professional development

You'll want to be sure that professional development leads to appropriate choices of educational technology and that it helps to build capacity to use technology in instructing English learners as well as other students.

What to know

○ Many teachers—English learner specialists in particular—receive very little professional development (PD) related to educational technology.

○ Teachers request PD that shows them examples of instructional practice with English learners and not just the descriptions of the "nuts and bolts" of a resource.

○ Teachers often turn to local *technology leaders*—that is, other teachers whom they view as experts in technology and who are willing to share what they know. Teachers value these *technology leaders* because they are embedded in the local context and so they give very practical suggestions that fit the teachers' goals and their students' needs.

○ Both formal and informal collaboration are important to teachers in learning how to use educational technology. Collaboration gives ongoing support in trying new resources and practices.

What to do

GENERAL EDUCATION TEACHERS AND ENGLISH LEARNER SPECIALISTS

☐ **Request PD sessions on educational technology** that are hands-on and relevant to your classroom instruction.

☐ **Let administrators know that you want to receive information on all PD on educational technology that the district offers.** This may be especially important if you are an English learner specialist.

- ☐ **Ask about embedded supports for English learners and how to use them effectively** whenever you participate in PD on a specific resource. For example, ask what **visual** or **auditory** supports are located within the resource that will assist English learners. Are these appropriate to the languages, cultures, and experiences of your students? Ask whether it includes **translation supports** in the languages of your students and/or if there are other functions that will help English learners to **collaborate** in their work.

- ☐ **Reach out to other teachers.** Work as a pair with another teacher and/or work with a group of teachers. Meet face to face with others in your school, or collaborate remotely with teachers in other schools or districts. Share with one another examples of how you are using educational technology with your English learners.

- ☐ **Join online communities of practice that can connect you with a wide range of other teachers of English learners.** Use social media to find other teachers who are using technology outside of your local community. Share your approach to identifying and using technology and learn from their experiences. Online communities of practice can bring you in contact with many teachers and opportunities that will align with your interests and challenges.

- ☐ **Be sure to connect with other teachers who work with your same English learners.** It is particularly important for general education teachers and English learner specialists of the same English learners to collaborate on instruction and the use of technology.

<div style="background-color:#2d3b55; color:white; padding:4px; display:inline-block;">**ADMINISTRATORS**</div>

- ☐ **Provide support for *all* teachers of English learners to collaborate** in discussing their planning, selection, and use of educational technology in instructional activities with their students.

- ☐ **When providing PD on specific technology resources, ensure that it goes beyond the "nuts and bolts."** Teachers want guidance on instructional use and best practices for English learners, as well as opportunities for ongoing support for using the technology with their English learners.

- ☐ **Be aware of the local *technology leaders* to whom teachers turn for guidance.** However, recognize that these technology leaders—whether formally designated technology specialists or teachers recognized by their peers as having technology expertise—may not be aware of English

learners' needs. It will be important to ensure that they receive ongoing PD on promising and effective practices for English learners.

What to ask

○ Do I talk with other teachers to share what we've learned in using technology with our English learners?

○ Have I explored connecting with teachers in online communities of practice to draw upon the experiences of participants from other regions and with similar challenges and goals?

○ When I participate in PD on a specific technology resource, do I ask about how it can contribute to supporting my English learners?

○ Are teachers receiving PD that will guide them in using technology so that their English learners participate in and benefit from instruction?

○ Do I ensure that English learner specialists, including those who are itinerant across schools, receive information about and participate in PD on using educational technology?

Resources

○ You can find information on online communities of practice on the U.S. Department of Education, Office of Educational Technology (OET) website: https://tech.ed.gov/futureready/professional-learning/future-ready-district/.

Learn more about English learners and educational technology

Educators can visit a number of online resource sites to learn more about English learners and the use of educational technology in instruction—and to find educational technology for instructing their English learners. Explore these sites to learn more.

What to know

○ **The National Clearinghouse on English Language Acquisition (NCELA) disseminates information on education of English learner students.** NCELA disseminates data on the numbers and language backgrounds of English learners nationally and by state. It also provides links to information and publications on English learners published through the U.S. Department of Education, Office of English Language Acquisition, and maintains a resource library of over 20,000 items on English learners. For example, searching on the term "digital" will pull up documents that describe use of digital technology relevant to English learners.

○ **There are several online sites that offer collections of educational technology.** Many include descriptions and reviews of resources by teachers and/or site reviewers. In several of these sites, there is a filtering function that allows users to search by keywords, including terms such as *English learner* and *English language learner*. (However, note that the sites may vary in how the site defines and manages criteria for search keywords and for English learner-related keywords.) You may also be able to search by content area and/or grade levels, depending on the site.

What to do

☐ **Explore online sites** that offer descriptions of educational technology products and resources, and try out searches for those that will meet your English learners' needs. Be aware, however, that these resources may vary in their value for your English learners.

☐ **Read reviews of specific educational technology products** and look for discussions of actual instructional practice using these with English learners.

What to ask

○ Am I keeping the needs of English learners in mind as I seek out and explore educational technology, including searches focused on resources for general education instruction? For example, do I ask whether the resource will support the specific languages of my English learners or their levels of English language proficiency? Are the resources culturally appropriate?

Resources for Searches of Educational Technology

There are a number of educational technology collection sites to explore. The list below includes the two sites presented earlier and some additional sites. All provide access to many different resources. Several include Open Educational Resources (OER), which are free, openly licensed resources that you can use, reuse, adapt, and share. Some offer user and/or expert reviews. The lists provide collections of available resources and are not lists of research-based resources. Also, they offer a wide range of resources that are not specific to English learners.

The sites vary in how users are able to search. Some allow several different filters; others have less functionality. As you use the filters to search, be aware that the criteria for meeting the definition of a resource that is for English learners will vary.

○ **Common Sense Education**
https://www.commonsense.org/education/

The Common Sense Education product review site allows browsing of educational technology products, using filters to sort by grade level, subject, platform, and more. In-depth editorial reviews by educators provide detailed information on educational apps and teaching tips to help educators decide what is best for their students.

○ **My Digital Chalkboard**
https://www.mydigitalchalkboard.org/

My Digital Chalkboard is an interactive online environment that allows educators to search for teaching resources and participate in an online community of teaching professionals.

○ **OER Commons**
https://www.oercommons.org/

OER Commons is a public digital library of open educational resources. It is a site where educators from around the world explore, create, and collaborate. The site provides curated collections of technology, and users can search by keywords and refine the search results with filters.

○ **The EdSurge Product Index (by EdSurge)**
https://www.edsurge.com/

EdSurge is "an independent information resource and community for everyone involved in education technology." The EdSurge Product Index site lists and organizes a number of educational technology products from various sources, and provides users with a means of searching for needed educational technology. Educators can select subcategories and browse through the options currently listed, filtering by age and learner, curriculum type, tech and requirements, cost, and usage.

Resources for General Information

○ **The National Clearinghouse for English Language Acquisition (NCELA) website** (https://ncela.ed.gov) provides a range of resources, including current demographic data on English learners, and information on federal grant programs and policy. NCELA also publishes *NCELA Nexus* (https://ncela.ed.gov/ncela-nexus), a semimonthly e-newsletter. It shares new resources, upcoming events, and other announcements, and provides links to opportunities for jobs, education, and funding related to the education of English learners. Nexus subscribers may also receive occasional, time-sensitive announcements from OELA and NCELA.

○ **The Office of Educational Technology (OET) website** (https://tech.ed.gov/) provides links to recent reports on professional development and instructional practices using educational technology, among other resources. Explore the website for additional information that, while not specific to English learners, can inform your thinking about technology use.