

The K-12 Educational Technology Handbook

Anne Ottenbreit-Leftwich & Royce Kimmons

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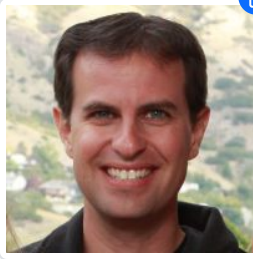
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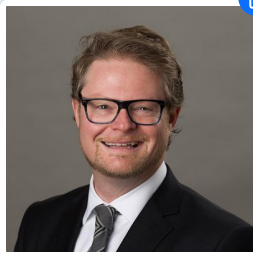
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Drs. Royce Kimmons and Anne Ottenbreit-Leftwich are two of the leaders in the country in the area of technology integration for preservice teachers. This book is designed with these preservice teachers in mind, and as such the writing is clear and jargon-free, and focused on practical, pedagogical, and theoretical tools teachers can use in the classroom. Combined with strong multimedia elements, this is an excellent resource for teaching technology integration.



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This book has been indispensable in my instructional technology courses. Each semester, my students thank me for these high quality resources that they don't have to pay for.



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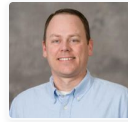
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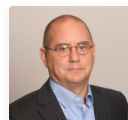
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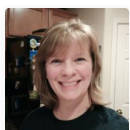
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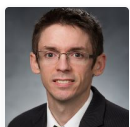
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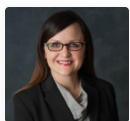
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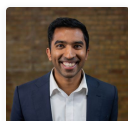
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Part 1

Foundations

The [Teacher Educator Technology Competencies](#) provided by the Society for Information Technology and Teacher Education (SITE) state the following:

Teacher educators will support the development of the knowledge, skills, and attitudes of teacher candidates as related to teaching with technology in their content area.

This section addresses foundational pedagogical and dispositional topics related to technology integration in classroom settings.

Technology Integration
Connectivism
Lifelong Learning
Information Literacy



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Technology Integration

Effectively Integrating Technology in Educational Settings

Royce Kimmons

Technology Integration

PICRAT

TPACK

Learning Theory

SAMR

Learning Objectives

- Develop a foundational understanding of learning theories driving current technology development and adoption for K-12;
- Develop a foundational understanding of prominent technology integration models;
- Consider your own values guiding effective technology integration in the classroom.

Technology Integration in education refers to the meaningful use of technology to achieve learning goals. This chapter seeks to answer the question: what is *effective* technology integration? Though on the surface this may seem like a simple question, it is actually quite difficult to answer, because any answer will be based upon our beliefs and values, how we view learning, and how we view technology's role in the learning process. To approach this question, we will proceed in this chapter by (1) revisiting some common learning theories and how they might influence our perspective of technology's role in learning, (2) exploring the beliefs and values that individuals and institutions might apply when evaluating technology use in the classroom, and (3) providing an overview of some common technology integration models that are used to help teachers better understand the process and goals of technology integration.



[Watch on YouTube](#)

Key Terms

Behaviorism

a learning theory popularized in the mid-20th century, it treats learning as a response to stimulus and it conditions students to properly react to stimuli; the brain's processes are not considered and viewed as a "black box"

Cognitivism

a learning theory that focuses on brain functions and how information is processed, stored, retrieved, and applied

Compliance

legal, ethical, and institutional requirements of technology use (in contrast to their pragmatic use)

Connectivism

a learning theory that believes that learning need not be isolated to the mind, but becoming a learned and capable citizen in a digital society requires learners to become connected with one another in such a way that they can make use of the network as an extension of their own mind and body

Constructionism

a learning theory in which students construct artifacts in the outside world that support and reflect their internal construction of knowledge

Constructivism

a learning theory that considers individual and social factors by holding that learning is constructed by learners on top of previous experience, attitudes, and beliefs

Facility

the ease at which a new technology can be learned, implemented, or managed at the teacher- or student-level

Institutionalization

infrastructural compatibility, cost, lifespan, and management scale of new technologies

Proof

evidence-based efficiency or efficacy of a technology to help improve student learning

RAT

a technology integration model that holds that technology use either Replaces, Amplifies, or Transforms (RAT) pedagogical practices (Hughes, Thomas, & Scharber, 2006)

Technology Integration

the meaningful implementation of technology in educational settings to achieve learning goals

TPACK

a technology integration model that illustrates the complex interplay between Technological Knowledge, Pedagogical Knowledge, and Content Knowledge

Learning Theories

Ever since there have been educators trying to teach students, there have been theories that guide how those educators view the learning process. These learning theories encompass our beliefs about the nature of knowledge and how a

person learns.

Debates surrounding learning theories have existed for millennia, and even in the modern world, there is great diversity in how scientists, psychologists, and educators view learning. Some of the major learning theories that shape modern conversations surrounding technology integration include behaviorism, cognitivism, constructivism, constructionism, and connectivism. Each of these theories has been studied and written about at length, and it is impossible to devote sufficient time and attention to each theory in the limited space provided in this chapter. Rather, all educators should study competing learning theories and develop their own understanding of how people learn. In this chapter, we will merely provide an extremely high level overview of each of these theories, briefly explaining what each entails and what each might mean for teaching and learning with technology.

Behaviorism

Behaviorism was popularized in the mid-20th century as psychologists studied behavior patterns and response systems in humans and other animals. Behaviorism treats learning as a response to stimulus. That is, humans and other animals are trained to respond in certain ways to certain stimuli, such as salivating when a dinner bell rings or repeating a memorized fact to receive some external reward. Teaching and learning, then, is a process of conditioning students to properly react to stimuli, and technology can help facilitate this training by providing incentives to learning, such as games or other rewards, or by providing systems to efficiently develop stimulus-response conditioning, such as drill-and-kill practices.

Cognitivism

Cognitivism arose as an alternative to behaviorism in part because behaviorism treated the processes of the brain as an imperceptible black box, wherein understanding how the brain worked was not considered important for helping people learn. Cognitivism, therefore, dealt with brain functions and how information is processed, stored, retrieved, and applied. By treating humans as thinking machines, rather than as animals to be trained, research in cognitivism for teaching and learning focused on helping people develop efficient teaching and studying strategies that would allow their brains to make meaningful use of presented information. Through this lens, technology can help in providing information and study resources that assist the brain in efficiently storing and retrieving information, such as through the use of mnemonic devices or multiple modalities (e.g., video, audio).

Constructivism

However, both behaviorism and cognitivism tended to treat learning the same for all humans, despite their age, culture, or personal experiences. Recognizing that these factors might influence how learning occurs, **constructivism** arose as a means for understanding how individual and social factors might influence the process of learning for different groups of people and individuals. Constructivism holds that learning is constructed by learners on top of previous experience, attitudes, and beliefs. This means that for learning to occur, new learning experiences must take into consideration these human factors and assist the individual in assimilating new knowledge to their existing knowledge constructs. Thus, if you are teaching students about fractions, you must teach them using language that they will understand and connect their learning to experiences in their own lives that will have meaning for them. Technology can help the constructivist learning process by making abstract concepts and facts more grounded in personal experiences and the values of learners and also by allowing the learning experience to be differentiated for individual learners (e.g., through personalized developmentally-appropriate software).

Constructionism

Believing that knowledge is constructed in the mind, some then took constructivism to the stage of a pedagogical process and called it **constructionism**. From the constructionist viewpoint, the most effective way to teach in a constructivist manner is to have students construct artifacts in the outside world that support and reflect their internal construction of knowledge. For instance, if a student needs to learn about basic engineering concepts, in order to build the internal mind models necessary to understand engineering, students must construct external models, which might

take the form of a bridge or catapult. Technology can support constructionist approaches to teaching and learning by empowering students and teachers to create and construct external models reflecting internal mind models with resources and possibilities not available in the real world. By using a simulation, for instance, students can construct any structure or machine without the need of expensive materials, or they might seek to understand economic principles of supply and demand by creating a simulated community that allows them to influence supply chains in ways that would not be possible in the real world.

Connectivism

Even with these competing theories, some still believed that learning experiences and processes as they actually exist in the real world were not fully represented, and this has become especially obvious now that we live in a society that is heavily networked and connected via electronic and social media. All traditional views about learning had placed knowledge and learning squarely in the mind or body of the student, but modern technologies in particular lead us to consider whether all memory, information processing, and other aspects of learning traditionally ascribed to the mind might not also be distributed with external devices. **Connectivism** holds that the process and goals of learning in a highly networked and connected world is different than learning in the predigital world, because learners are now persistently connected to information sources and other resources through their electronic devices, such as smartphones or laptops. From the connectivist perspective, learning need not be isolated to the mind, but becoming a learned and capable citizen in a digital society requires learners to become connected with one another in such a way that they can make use of the network as an extension of their own mind and body. Thus from a connectivist perspective, the goal of education is to more fully and efficiently connect learners with one another and with information resources in a manner that is persistent and in which learners can make ongoing use of the network to solve problems. From this perspective, technology can be used to improve learning experiences by more fully connecting students with one another and information resources in a persistent manner.

Differing Assumptions

Each of these learning theories views the learner, the learner's relationship with society, and the learner's relationship to technology quite differently. For that reason, when we begin to consider what constitutes effective technology integration, we must acknowledge that different people and groups who have differing assumptions about how students learn will view technology integration very differently. A connectivist would believe that guiding students to use modern technologies to develop networked relationships with peers and experts in the field is an essential element of learning. However, this may require very little information processing and recall to be occurring in the mind of the learner, which would seem dubious to a cognitivist. Similarly, a constructionist would look to an architecturally sound structure created in a physics engine as evidence of understanding of mathematical engineering concepts, while a behaviorist might consider such an artifact useless in determining the student's ability to recite foundational mathematical equations that every engineer should know. In short, the effectiveness of technology integration requires evidence that the integration is effective, but what is believed to be effective for learning will depend upon our view of learning.

Thus, the first step toward defining effective technology integration for yourself is to consider how you define learning and what constitutes evidence of learning. Similarly as teachers work within educational institutions, the criteria by which they and their students are evaluated will rely upon one or more of the learning theories mentioned above. If there is misalignment between how the teacher views learning and how the institution views learning, then misunderstandings will arise, because what the teacher views to be effective technology integration may not be recognized or valued by the institution and vice versa.

As such, teachers need to decide for themselves what learning is to them and also understand what learning means in the institutions in which they operate. So, before you can ask yourself what is effective technology integration, you must first ask yourself the following two questions:

- What are my beliefs about learning and how learning occurs?
- What are my institution's beliefs about learning and how learning occurs?

Learning Check

Which learning theory emphasizes networked thinking?

- ☐ Behaviorism
- ☐ Connectivism
- ☐ Constructivism
- ☐ Cognitivism

Which learning theory emphasizes stimulus and response relationships?

- ☐ Behaviorism
- ☐ Connectivism
- ☐ Constructivism
- ☐ Cognitivism

Which learning theory emphasizes the inner workings of the mind?

- ☐ Behaviorism
- ☐ Connectivism
- ☐ Constructivism
- ☐ Cognitivism

Which learning theory emphasizes prior personal and cultural experiences?

- ☐ Behaviorism
- ☐ Connectivism
- ☐ Constructivism
- ☐ Cognitivism

Beliefs and Values

Once you understand how both you and your institution view the learning process, then you can move to the next step and consider your beliefs and values with regard to technology. Some people might value the acquisition of technical skills for the sake of technical skills to be a good thing, while others might believe that technology should only be used if it is helping students to learn content better or to learn more. Though all students should learn some level of technical skill competency in order to make them suitable for the modern workplace (e.g., productivity software, keyboarding, basic programming), most technologies in education are not focused on this type of learning.

Rather, when we talk about technology integration, we are generally talking about using technology to improve the learning of content knowledge, such as science, math, history, or language arts. When viewed in this way, teachers and institutions need to consider how well new technologies will help them to teach age-old content in better or more efficient ways and what are the opportunity costs associated with a shift to new technologies.



student_ipad_school, Brad Flickinger via Flickr, CC BY 2.0

There is a common myth in education related to technology adoption that older or more experienced teachers are less likely to adopt new technologies and to innovate upon their practice than younger teachers. Though this may sometimes be the case, many people do not stop to consider why this might be happening. Evidence suggests that age ultimately has nothing to do with a person's willingness to innovate, but rather, experience may help people to more quickly identify the transient nature of some changes or that some so-called innovations are actually harmful or ineffective for students.

In the case of technology in education, experienced teachers may have a wealth of understanding of how their students learn and how they can teach in effective ways, whereas new teachers may be eager to try new things and to adopt technologies that they think will help them be effective in the classroom. The problem is that sometimes the most eager teachers are also the least capable of making informed decisions, because they may lack the experiential knowledge necessary to make informed choices about these technologies, how much time to invest in learning them, and what to

expect in terms of student outcomes. In every case, a teacher's beliefs and values will drive how they view technology integration, whether old or young, and their willingness to use technologies in their classrooms.

Similarly, schools and districts have their own beliefs and values about technology, how it should be used, and how it will impact students. For this reason it is important for us to understand each of these groups' beliefs and values, how they may be different, and how this influences the process of technology integration. Though personal beliefs and values are complicated and will vary between different people, we will consider four areas of belief and value that guide teachers and institutions in their technology integration practices. These include: Proof, Facility, Compliance, and Institutionalization.

Proof

First, **proof** deals with the efficiency or efficacy of a technology to help improve student learning. Proof requires some form of discernible or measurable outcome and will be most important to teachers in the classroom or to principals and other administrators who invest time and money into technology and must prove that it is improving student achievement. From a teacher's or principal's perspective, if a technology does not directly improve students' ability to learn in a discernible or measurable way, then the value of that technology will be dubious. Teachers are stressed for time and they do not want to invest the effort necessary to learn and implement new technologies if they are not going to see actual results in how their students are learning. Likewise, principals face financial and other stressors which require them to provide evidence of student learning and that they are being wise stewards of institutional resources.

Proof might be slightly different for teachers and principals, however, due to their level of vision and operation. A teacher will want evidence that a technology works in her classroom through the creation of student artifacts or saved time, while a principal might want evidence that a technology works in all classes, preferring more generalizable research evidence over anecdotal evidence from one or two teachers. This means that teachers and principals might not always see eye-to-eye when it comes to identifying meaningful evidence for technology integration, because a classroom teacher will not care about what the research says if she is not seeing success in her classroom, and a principal might not care what an individual teacher says as long as the evidence from other teachers is strong.

Facility

Second, **facility** (as in *facile* or easy) deals with the ease at which a new technology can be learned, implemented, or managed at the teacher- or student-level. Teachers want to use tools that are easy to learn, and the greater the learning curve associated with a new technology the less likely a teacher will be willing to invest the time and energy necessary to learn it. Similarly, if the technology requires teachers to invest a large amount of time troubleshooting or providing tutorials to students, then they are much less likely to use it. Teachers value technologies that they can pick up, easily use, and put away. Technology support personnel value these technologies as well, because it means that they can provide less support to teachers in learning and troubleshooting them, but principals and other administrators may not believe that facility is very important in comparison to other values, because in their eyes the value of the technology for learning would outweigh the difficulties in terms of time or effort. Thus, a principal might require all teachers to learn a new technology, because she believes that it will drastically improve student learning, even though that technology is very difficult to use and requires high levels of support.

Compliance

Third, **compliance** deals with the legal and ethical requirements of technology use in contrast to their pragmatic use. Those who value compliance will ensure that new technologies meet security requirements or legal requirements regarding student security. Teachers and administrators rarely think about compliance when integrating new technologies, or if they do, they only do so as an afterthought. Rather, strategic technology support personnel deal most heavily with this issue and seek to ensure that technologies that are used in the classroom and across institutions will not pose legal risk to the institution. Thus, the teacher may have students use an online blogging platform without letting school or district personnel know, because those same personnel might tell her to stop, because the platform does not meet mandated security, accessibility, or privacy requirements. Similarly, filtering of web searches is typically

managed at the school or district level to ensure compliance with state and federal regulations, while classroom teachers might complain about how strict filtering systems are or may have little say in determining what is allowed and what is banned. In short, compliance is an essential consideration for schools to ensure safe, legal, and ethical technology use, but it is typically only considered by those in specialized positions, such as technology administrators or those in a disabilities office.

Institutionalization

And fourth, **institutionalization** deals with infrastructural compatibility, cost, lifespan, and management scale of new technologies. When a teacher purchases a new device or set of devices for her classroom she may not think ahead about the long-term costs associated with those devices (e.g., the price of apps or software updates, breakage, replacement), whether or not the devices are compatible with the school's technology infrastructure (e.g., can they access the network?), or the work involved in keeping those devices up-to-date and working. Rather, technology support personnel often understand these issues very well, and this will guide them to prefer certain technologies over others. For instance, technology personnel might want to provide Chromebooks to students (which are easy to manage at scale) instead of iPads (which are not), even though teachers might want iPads. This can create a tension between technology personnel and teachers, where teachers want to use technologies that may be too difficult to support or technology personnel might want to use technologies that have limited classroom value.

Differing Beliefs and Values

Based on these four values, it is easy to see why technology integration in school settings can be so complicated. On the one hand, a principal might value proof by wanting to use technologies that are shown through research to improve student learning, while the teacher may want to use a technology that is easy to learn, and a technology support professional might want to use a technology that is compliant and that can easily be implemented at an institutional level. The problem is that a single technology rarely does all things well, and for that reason, certain groups will gravitate toward certain technologies while others will take a very different view.

Thus, though a classroom teacher might want to purchase iPads, a technology administrator might want to purchase Chromebooks, and a principal might want to purchase PC or Mac laptops. Each person in this scenario has certain values driving why they are picking one technology over another, and if the teacher does not understand the reason why a principal or tech support professional might have a differing view about what technologies to adopt, this can cause problems for integrating technology, because the teacher may not be able to get the technologies that she wants, she may not have the support necessary to manage and support them, or she might be required to use a technology that she does not want to use.

In all cases, the best approach to technology integration involves considering the beliefs and values of everyone involved in the institution and making selections and necessary compromises to best meet their needs. As a teacher, you must understand at least at a basic level the beliefs and values that principals and technology support personnel are working under so that you can understand their perspectives and help to inform technology decision-making with your own. So, you must consider the following:

- What are the most important factors that will guide my own technology integration decision-making?
- How do I communicate and collaborate with others who may have different values?

Learning Check

Which two values would probably be most important to a **classroom teacher**?

- ☐ Proof
- ☐ Facility
- ☐ Compliance
- ☐ Institutionalization

Which two values would probably be most important to a **technology administrator**?

- ☐ Proof
- ☐ Facility
- ☐ Compliance
- ☐ Institutionalization

Which two values would probably be most important to a **principal**?

- ☐ Proof
- ☐ Facility
- ☐ Compliance
- ☐ Institutionalization

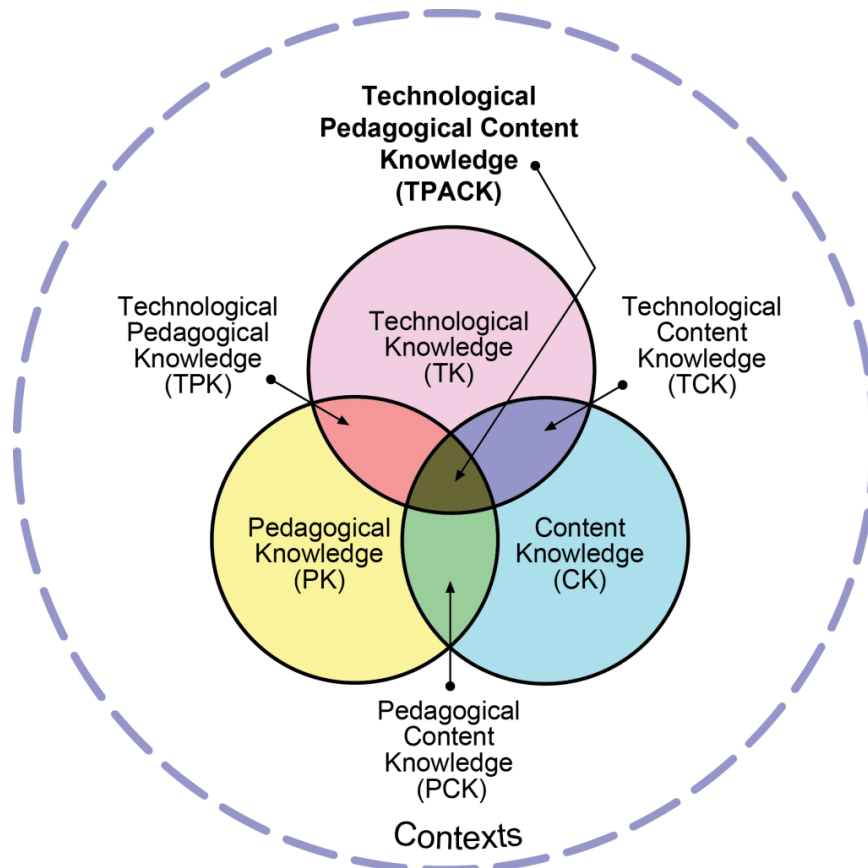
Technology Integration Models

Once you have a basic grasp of your own approach to learning and the beliefs and values that will guide your technology integration, you are ready to begin exploring how to make this happen effectively. Technology integration models are theoretical models that are designed to help teachers, researchers, and others in the education field to think about technology integration in meaningful ways. There are many, many technology integration models that are used by different groups. Some models are very popular while some are only used by very small groups of people, and some are very similar to one another, while others are very unique. Rather than provide an exhausting description of each technology integration model, we will now proceed by providing a brief overview of a few that we believe to be most

widely used or valuable to help you begin thinking about technology integration in your classroom. The models we will explore will include the following: TPACK, RAT, SAMR, and PICRAT.

TPACK

TPACK is the most commonly used technology integration model amongst educational researchers. The goal of TPACK is to provide educators with a framework that is useful for understanding technology's role in the educational process. At its heart, TPACK holds that educators deal with three types of core knowledge on a daily basis: technological knowledge, pedagogical knowledge, and content knowledge. Content knowledge is knowledge of one's content area such as science, math, or social studies. Pedagogical knowledge is knowledge of how to teach. And technological knowledge is knowledge of how to use technology tools.



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The TPACK model

These core knowledge domains, however, interact with and build on each other in important and complicated ways. For instance, if you are going to teach kindergarten mathematics, you must both understand mathematics (i.e. content knowledge) and how to teach (i.e. pedagogical knowledge), but you must also understand the relationship between pedagogy and the content area. That is you must understand how to teach mathematics, which is very different from teaching other subject areas, because the pedagogical strategies you use to teach mathematics will be specific to that content domain. When we merge content knowledge and pedagogical knowledge together, a hybrid domain emerges called pedagogical content knowledge. Pedagogical content knowledge includes knowledge about content and pedagogy, but it also includes the specific knowledge necessary to teach the specified content in a meaningful way.

TPACK goes on to explain that when we try to integrate technology into a classroom setting, we are not merely using technological knowledge, but rather, we are merging technological knowledge with pedagogical content knowledge to produce something new. TPACK or technological pedagogical content knowledge is the domain of knowledge wherein

technology, pedagogy, and content meet to create a meaningful learning experience. From this, educators need to recognize that merely using technology in a classroom is not sufficient to produce truly meaningful technology integration. Rather, teachers must understand how technology, pedagogy, and content knowledge interact with one another to produce a learning experience that is meaningful for students in specific situations.

Learning Check

Knowing how to send an email would be an example of what kind of knowledge?

☐ PK

☐ CK

☐ TK

☐ TPK

Knowing how to teach biology would be an example of what kind of knowledge?

☐ TPK

☐ TCK

☐ PCK

☐ TPACK

Knowing how to use virtual reality headsets to teach about the Renaissance would be an example of what kind of knowledge?

☐ TPK

☐ TCK

☐ PCK

☐ TPACK

How useful does TPACK seem to you?

<input type="checkbox"/>	Not at all useful
<input type="checkbox"/>	Somewhat useful
<input type="checkbox"/>	Useful
<input type="checkbox"/>	Very useful
<input type="checkbox"/>	Extremely useful

RAT and SAMR

RAT and SAMR are very similar technology integration models, though RAT has been used more often by researchers and SAMR has been used more often by teachers. Both of these models assume that the introduction of technology into a learning experience will have some effect on what is happening, and they try to help us understand what this effect is and how we should be using technology in meaningful ways.

RAT is an acronym for replace, amplify, and transform, and the model holds that when technology is used in a teaching setting, technology is either used to replace a traditional approach to teaching (without any discernible difference on student outcomes), to amplify the learning that was occurring, or to transform learning in ways that were not possible without the technology (Hughes, Thomas, & Scharber, 2006). Similarly, **SAMR** is an acronym for substitution, augmentation, modification, and redefinition (Puentedura, 2003). To compare it to RAT, substitution and replacement both deal with technology use that merely substitutes or replaces previous use with no functional improvement on efficiency. Redefinition and transformation both deal with technology use that empowers teachers and students to learn in new, previously impossible ways.



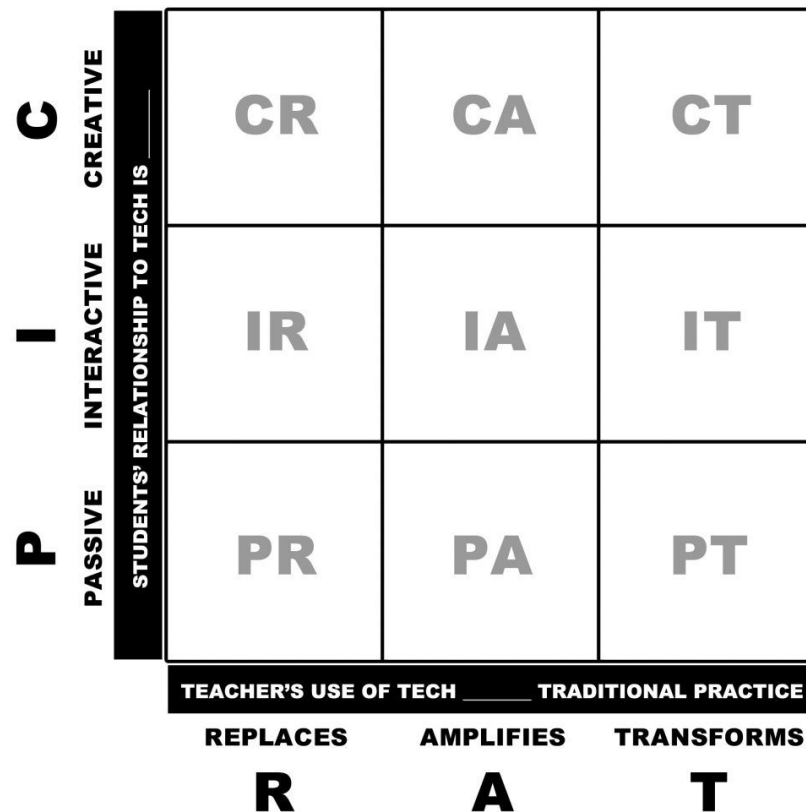
A comparison of the levels of SAMR and RAT

Comparing RAT and SAMR

The difference between these two models rests in the center letters, wherein RAT's amplification is separated into two stages as SAMR's augmentation and modification. All of these stages deal with technology use that functionally improves what is happening in the classroom, but in the SAMR model, augmentation represents a small improvement, and modification represents a large improvement.

Both of these models are helpful for leading educators to consider the question: what effect is using the technology having on my practice? If the technology is merely replacing or substituting previous practice, then it is a less meaningful use of technology. Whereas technology use that transforms or redefines classroom practice is considered to be more valuable.

PICRAT

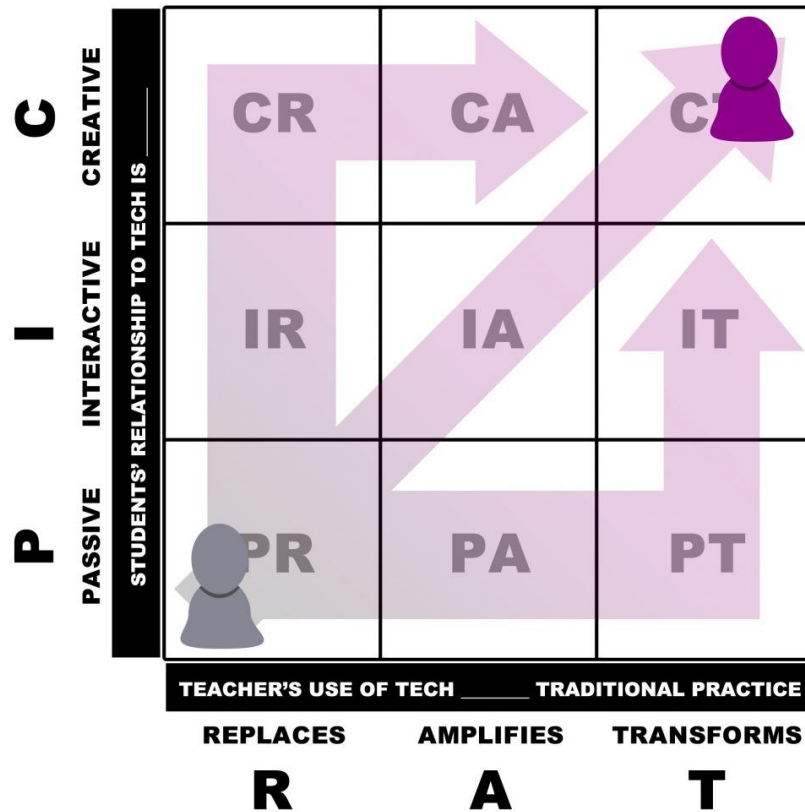


The PICRAT Model

Building off of the ideas presented in the models above, we will now provide one final model that may serve as a helpful starting point for teachers to begin thinking about technology integration. **PICRAT** assumes that there are two foundational questions that a teacher must ask about any technology use in their classrooms. These include:

1. What is the students' relationship to the technology? (PIC: Passive, Interactive, Creative)
2. How is the teacher's use of technology influencing traditional practice? (RAT: Replace, Amplify, Transform; cf. Hughes, Thomas, & Scharber, 2006)

The provided illustration maps these two questions on a two-dimensional grid, and by answering these two questions, teachers can get a sense for where any particular practice falls.



Teachers should seek to move their practice toward the top-right of PICRAT

For instance, if a history teacher shifts from writing class notes on a chalkboard to providing these notes in a PowerPoint presentation, this would likely be categorized in the bottom-left (PR) section of the grid, because the teacher is using the technology to merely replace a traditional practice, and the students are passively taking notes on what they see. In contrast, if an English teacher guides students in developing a creative writing blog, which they use to elicit feedback from peers, parents, and the online community on their short stories, this would likely be categorized in the top-right (CT) section, because the teacher is using the technology to transform her practice to do something that would have been impossible without the technology, and the students are using the technology as a tool for creation.

Experience has shown that as teachers begin using technologies in their classrooms, they will typically begin doing so in a manner that falls closer to the bottom-left of the grid. However, many of the most exciting and valuable uses of technology for teaching rest firmly in the top-most and right-most sections of this grid. For this reason, teachers need to be encouraged to evolve their practice to continually move from the bottom-left (PR) to the top-right (CT) of the grid.

Application

With these foundational understandings, you are now ready to apply your knowledge to real-life scenarios. Here are a few brief descriptions of how teachers might use technology in a classroom setting. As you read each, consider whether these examples exhibit effective technology integration, what more information you might need to make an informed evaluation, and what factors you believe are most important for making this determination:

1. A teacher uses PowerPoint as part of her lecture.
2. Students are asked to keep an online journal in a blog.
3. Students pass a touch-enabled tablet around the room and write a collaborative poem.
4. Students play an online role-playing game about John Smith and Pocahontas.
5. Students write answers to math problems on an interactive whiteboard.
6. Students organize geometric shapes in patterns on an iPad.
7. A teacher creates a video to introduce herself to her students on the first day.
8. Students make an animated video to tell a story.
9. A teacher designs a WebQuest (inquiry-driven online lesson) for students to complete on their own time.
10. A teacher uses Facebook to remind her students about homework.

Learning Check

What does PCK stand for?

- ☐ Passive Content Knowledge
- ☐ Pedagogical Content Knowledge
- ☐ Passive Creative Knowledge
- ☐ Pedagogical Creative Knowledge

What does PIC in PICRAT stand for?

- ☐ Pedagogical, Informational, Constructive
- ☐ Primary, Interactional, Concomitant
- ☐ Practical, Intuitive, Collaborative
- ☐ Passive, Interactive, Creative

What does RAT stand for?

- ☐ Replace, Amplify, Transform
- ☐ Redefinition, Augmentation, Transition
- ☐ Remedial, Acceptable, Transitive
- ☐ Represent, Approximate, Triangulate

How useful does PICRAT seem to you?

☐ Not at all useful

☐ Somewhat useful

☐ Useful

☐ Very useful

☐ Extremely useful

Model Comparison

Which model do you think would be most useful to you in the classroom?

☐ TPACK

☐ SAMR

☐ PICRAT

Conclusion

This chapter has provided a theoretical foundation for considering how we might determine the effectiveness of technology integration in educational settings. As you can probably tell, there are no easy, universal answers for determining whether a particular use of technology is meaningful or effective. Rather, our determination of effectiveness relies heavily upon our own understanding and acceptance of learning theories, our beliefs and values, and the technology integration models that guide our thinking. Thus, as you approach technology integration in your own teaching, you should use these foundational understandings to articulate the value of your decisions and to guide you in making choices that will be beneficial for your students.

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1.2

Connectivism

A Learning Theory for the Digital Age

George Siemens

Lifelong Learning

Connectivism

Learning Theory



Editor's Note

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Learning Objectives

- Recognize assumptions and tensions in historical definitions of learning;
- Consider the concept of Connectivism as an alternative theory describing learning that occurs via networks.

Behaviorism, cognitivism, and constructivism are the three broad learning theories most often utilized in the creation of instructional environments. These theories, however, were developed in a time when learning was not impacted through technology. Over the last twenty years, technology has reorganized how we live, how we communicate, and how we learn. Learning needs and theories that describe learning principles and processes, should be reflective of underlying social environments. Vaill emphasizes that "learning must be a way of being - an ongoing set of attitudes and actions by individuals and groups that they employ to try to keep abreast of the surprising, novel, messy, obtrusive, recurring events..." (1996, p.42).

Learners as little as forty years ago would complete the required schooling and enter a career that would often last a lifetime. Information development was slow. The life of knowledge was measured in decades. Today, these foundational principles have been altered. Knowledge is growing exponentially. In many fields the life of knowledge is now measured in months and years. Gonzalez (2004) describes the challenges of rapidly diminishing knowledge life:

"One of the most persuasive factors is the shrinking half-life of knowledge. The "half-life of knowledge" is the time span from when knowledge is gained to when it becomes obsolete. Half of what is known today was not known 10 years ago. The amount of knowledge in the world has doubled in the past 10 years and is doubling every 18 months according to the American Society of Training and Documentation (ASTD). To combat the shrinking half-life of knowledge, organizations have been forced to develop new methods of deploying instruction."

Some significant trends in learning:

- Many learners will move into a variety of different, possibly unrelated fields over the course of their lifetime.
- Informal learning is a significant aspect of our learning experience. Formal education no longer comprises the majority of our learning. Learning now occurs in a variety of ways – through communities of practice, personal networks, and through completion of work-related tasks.
- Learning is a continual process, lasting for a lifetime. Learning and work related activities are no longer separate. In many situations, they are the same.
- Technology is altering (rewiring) our brains. The tools we use define and shape our thinking.
- The organization and the individual are both learning organisms. Increased attention to knowledge management highlights the need for a theory that attempts to explain the link between individual and organizational learning.
- Many of the processes previously handled by learning theories (especially in cognitive information processing) can now be off-loaded to, or supported by, technology.
- Know-how and know-what is being supplemented with know-where (the understanding of where to find knowledge needed).

Background

Driscoll (2000) defines learning as "a persisting change in human performance or performance potential...[which] must come about as a result of the learner's experience and interaction with the world" (p.11). This definition encompasses many of the attributes commonly associated with behaviorism, cognitivism, and constructivism – namely, learning as a lasting changed state (emotional, mental, physiological (i.e. skills)) brought about as a result of experiences and interactions with content or other people.

Driscoll (2000, p14-17) explores some of the complexities of defining learning. Debate centers on:

- Valid sources of knowledge - Do we gain knowledge through experiences? Is it innate (present at birth)? Do we acquire it through thinking and reasoning?
- Content of knowledge – Is knowledge actually knowable? Is it directly knowable through human experience?
- The final consideration focuses on three epistemological traditions in relation to learning: Objectivism, Pragmatism, and Interpretivism
 - Objectivism (similar to behaviorism) states that reality is external and is objective, and knowledge is gained through experiences.
 - Pragmatism (similar to cognitivism) states that reality is interpreted, and knowledge is negotiated through experience and thinking.
 - Interpretivism (similar to constructivism) states that reality is internal, and knowledge is constructed.

All of these learning theories hold the notion that knowledge is an objective (or a state) that is attainable (if not already innate) through either reasoning or experiences. Behaviorism, cognitivism, and constructivism (built on the epistemological traditions) attempt to address how it is that a person learns.

Behaviorism states that learning is largely unknowable, that is, we can't possibly understand what goes on inside a person (the "black box theory"). Gredler (2001) expresses behaviorism as being comprised of several theories that make three assumptions about learning:

1. Observable behaviour is more important than understanding internal activities
2. Behaviour should be focused on simple elements: specific stimuli and responses
3. Learning is about behaviour change

Cognitivism often takes a computer information processing model. Learning is viewed as a process of inputs, managed in short term memory, and coded for long-term recall. Cindy Buell details this process: "In cognitive theories, knowledge is viewed as symbolic mental constructs in the learner's mind, and the learning process is the means by which these symbolic representations are committed to memory."

Constructivism suggests that learners create knowledge as they attempt to understand their experiences (Driscoll, 2000, p. 376). Behaviorism and cognitivism view knowledge as external to the learner and the learning process as the act of internalizing knowledge. Constructivism assumes that learners are not empty vessels to be filled with knowledge. Instead, learners are actively attempting to create meaning. Learners often select and pursue their own learning. Constructivist principles acknowledge that real-life learning is messy and complex. Classrooms which emulate the "fuzziness" of this learning will be more effective in preparing learners for life-long learning.

Limitations of Behaviorism, Cognitivism, and Constructivism

A central tenet of most learning theories is that learning occurs inside a person. Even social constructivist views, which hold that learning is a socially enacted process, promotes the principality of the individual (and her/his physical presence – i.e. brain-based) in learning. These theories do not address learning that occurs outside of people (i.e. learning that is stored and manipulated by technology). They also fail to describe how learning happens within organizations

Learning theories are concerned with the actual process of learning, not with the value of what is being learned. In a networked world, the very manner of information that we acquire is worth exploring. The need to evaluate the worthiness of learning something is a meta-skill that is applied before learning itself begins. When knowledge is subject to paucity, the process of assessing worthiness is assumed to be intrinsic to learning. When knowledge is abundant, the rapid evaluation of knowledge is important. Additional concerns arise from the rapid increase in information. In today's environment, action is often needed without personal learning – that is, we need to act by drawing information outside of our primary knowledge. The ability to synthesize and recognize connections and patterns is a valuable skill.

Many important questions are raised when established learning theories are seen through technology. The natural attempt of theorists is to continue to revise and evolve theories as conditions change. At some point, however, the underlying conditions have altered so significantly, that further modification is no longer sensible. An entirely new approach is needed.

Some questions to explore in relation to learning theories and the impact of technology and new sciences (chaos and networks) on learning:

- How are learning theories impacted when knowledge is no longer acquired in the linear manner?
- What adjustments need to be made with learning theories when technology performs many of the cognitive operations previously performed by learners (information storage and retrieval).
- How can we continue to stay current in a rapidly evolving information ecology?
- How do learning theories address moments where performance is needed in the absence of complete understanding?
- What is the impact of networks and complexity theories on learning?
- What is the impact of chaos as a complex pattern recognition process on learning?
- With increased recognition of interconnections in differing fields of knowledge, how are systems and ecology theories perceived in light of learning tasks?

An Alternative Theory

Including technology and connection making as learning activities begins to move learning theories into a digital age. We can no longer personally experience and acquire learning that we need to act. We derive our competence from forming connections. Karen Stephenson states:

“Experience has long been considered the best teacher of knowledge. Since we cannot experience everything, other people’s experiences, and hence other people, become the surrogate for knowledge. ‘I store my knowledge in my friends’ is an axiom for collecting knowledge through collecting people (undated).”

Chaos is a new reality for knowledge workers. ScienceWeek (2004) quotes Nigel Calder's definition that chaos is “a cryptic form of order”. Chaos is the breakdown of predictability, evidenced in complicated arrangements that initially defy order. Unlike constructivism, which states that learners attempt to foster understanding by meaning making tasks, chaos states that the meaning exists – the learner's challenge is to recognize the patterns which appear to be hidden. Meaning-making and forming connections between specialized communities are important activities.

Chaos, as a science, recognizes the connection of everything to everything. Gleick (1987) states: “In weather, for example, this translates into what is only half-jokingly known as the Butterfly Effect – the notion that a butterfly stirring the air today in Peking can transform storm systems next month in New York” (p. 8). This analogy highlights a real challenge: “sensitive dependence on initial conditions” profoundly impacts what we learn and how we act based on our learning. Decision making is indicative of this. If the underlying conditions used to make decisions change, the decision itself is no longer as correct as it was at the time it was made. The ability to recognize and adjust to pattern shifts is a key learning task.

Luis Mateus Rocha (1998) defines self-organization as the “spontaneous formation of well organized structures, patterns, or behaviors, from random initial conditions.” (p.3). Learning, as a self-organizing process requires that the system (personal or organizational learning systems) “be informationally open, that is, for it to be able to classify its own interaction with an environment, it must be able to change its structure...” (p.4). Wiley and Edwards acknowledge the importance of self-organization as a learning process: “Jacobs argues that communities self-organize in a manner similar to social insects: instead of thousands of ants crossing each other’s pheromone trails and changing their behavior accordingly, thousands of humans pass each other on the sidewalk and change their behavior accordingly.”. Self-organization on a personal level is a micro-process of the larger self-organizing knowledge constructs created

within corporate or institutional environments. The capacity to form connections between sources of information, and thereby create useful information patterns, is required to learn in our knowledge economy.

Networks, Small Worlds, Weak Ties

A network can simply be defined as connections between entities. Computer networks, power grids, and social networks all function on the simple principle that people, groups, systems, nodes, entities can be connected to create an integrated whole. Alterations within the network have ripple effects on the whole.

Albert-László Barabási states that “nodes always compete for connections because links represent survival in an interconnected world” (2002, p.106). This competition is largely dulled within a personal learning network, but the placing of value on certain nodes over others is a reality. Nodes that successfully acquire greater profile will be more successful at acquiring additional connections. In a learning sense, the likelihood that a concept of learning will be linked depends on how well it is currently linked. Nodes (can be fields, ideas, communities) that specialize and gain recognition for their expertise have greater chances of recognition, thus resulting in cross-pollination of learning communities.

Weak ties are links or bridges that allow short connections between information. Our small world networks are generally populated with people whose interests and knowledge are similar to ours. Finding a new job, as an example, often occurs through weak ties. This principle has great merit in the notion of serendipity, innovation, and creativity. Connections between disparate ideas and fields can create new innovations.

Connectivism

Connectivism is the integration of principles explored by chaos, network, and complexity and self-organization theories. Learning is a process that occurs within nebulous environments of shifting core elements – not entirely under the control of the individual. Learning (defined as actionable knowledge) can reside outside of ourselves (within an organization or a database), is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing.

Connectivism is driven by the understanding that decisions are based on rapidly altering foundations. New information is continually being acquired. The ability to draw distinctions between important and unimportant information is vital. The ability to recognize when new information alters the landscape based on decisions made yesterday is also critical.

Principles of connectivism:

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

Connectivism also addresses the challenges that many corporations face in knowledge management activities. Knowledge that resides in a database needs to be connected with the right people in the right context in order to be classified as learning. Behaviorism, cognitivism, and constructivism do not attempt to address the challenges of organizational knowledge and transference.

Information flow within an organization is an important element in organizational effectiveness. In a knowledge economy, the flow of information is the equivalent of the oil pipe in an industrial economy. Creating, preserving, and utilizing information flow should be a key organizational activity. Knowledge flow can be likened to a river that meanders through the ecology of an organization. In certain areas, the river pools and in other areas it ebbs. The health of the learning ecology of the organization depends on effective nurturing of information flow.

Social network analysis is an additional element in understanding learning models in a digital era. Art Kleiner (2002) explores Karen Stephenson's "quantum theory of trust" which "explains not just how to recognize the collective cognitive capability of an organization, but how to cultivate and increase it". Within social networks, hubs are well-connected people who are able to foster and maintain knowledge flow. Their interdependence results in effective knowledge flow, enabling the personal understanding of the state of activities organizationally.

The starting point of connectivism is the individual. Personal knowledge is comprised of a network, which feeds into organizations and institutions, which in turn feed back into the network, and then continue to provide learning to individual. This cycle of knowledge development (personal to network to organization) allows learners to remain current in their field through the connections they have formed.

Landauer and Dumais (1997) explore the phenomenon that "people have much more knowledge than appears to be present in the information to which they have been exposed". They provide a connectivist focus in stating "the simple notion that some domains of knowledge contain vast numbers of weak interrelations that, if properly exploited, can greatly amplify learning by a process of inference". The value of pattern recognition and connecting our own "small worlds of knowledge" are apparent in the exponential impact provided to our personal learning.

John Seely Brown presents an interesting notion that the internet leverages the small efforts of many with the large efforts of few. The central premise is that connections created with unusual nodes supports and intensifies existing large effort activities. Brown provides the example of a Maricopa County Community College system project that links senior citizens with elementary school students in a mentor program. The children "listen to these "grandparents" better than they do their own parents, the mentoring really helps the teachers...the small efforts of the many- the seniors – complement the large efforts of the few – the teachers." (2002). This amplification of learning, knowledge and understanding through the extension of a personal network is the epitome of connectivism.

Implications

The notion of connectivism has implications in all aspects of life. This paper largely focuses on its impact on learning, but the following aspects are also impacted:

- Management and leadership. The management and marshalling of resources to achieve desired outcomes is a significant challenge. Realizing that complete knowledge cannot exist in the mind of one person requires a different approach to creating an overview of the situation. Diverse teams of varying viewpoints are a critical structure for completely exploring ideas. Innovation is also an additional challenge. Most of the revolutionary ideas of today at one time existed as a fringe element. An organizations ability to foster, nurture, and synthesize the impacts of varying views of information is critical to knowledge economy survival. Speed of "idea to implementation" is also improved in a systems view of learning.
- Media, news, information. This trend is well under way. Mainstream media organizations are being challenged by the open, real-time, two-way information flow of blogging.
- Personal knowledge management in relation to organizational knowledge management
- Design of learning environments

Conclusion

The pipe is more important than the content within the pipe. Our ability to learn what we need for tomorrow is more important than what we know today. A real challenge for any learning theory is to actuate known knowledge at the point of application. When knowledge, however, is needed, but not known, the ability to plug into sources to meet the requirements becomes a vital skill. As knowledge continues to grow and evolve, access to what is needed is more important than what the learner currently possesses.

Connectivism presents a model of learning that acknowledges the tectonic shifts in society where learning is no longer an internal, individualistic activity. How people work and function is altered when new tools are utilized. The field of education has been slow to recognize both the impact of new learning tools and the environmental changes in what it means to learn. Connectivism provides insight into learning skills and tasks needed for learners to flourish in a digital era.

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1.3

Lifelong Learning

Royce Kimmons

Lifelong Learning

Personal Learning Environment

Professional Learning Network (PLN)



Learning Objectives

- Understand the need for lifelong learning;
- Understand strategies for developing a personal learning environment (PLE) and personal learning network (PLN);
- Identify threats to lifelong learning present in modern technologies;
- Choose a lifelong learning strategy that is appropriate.

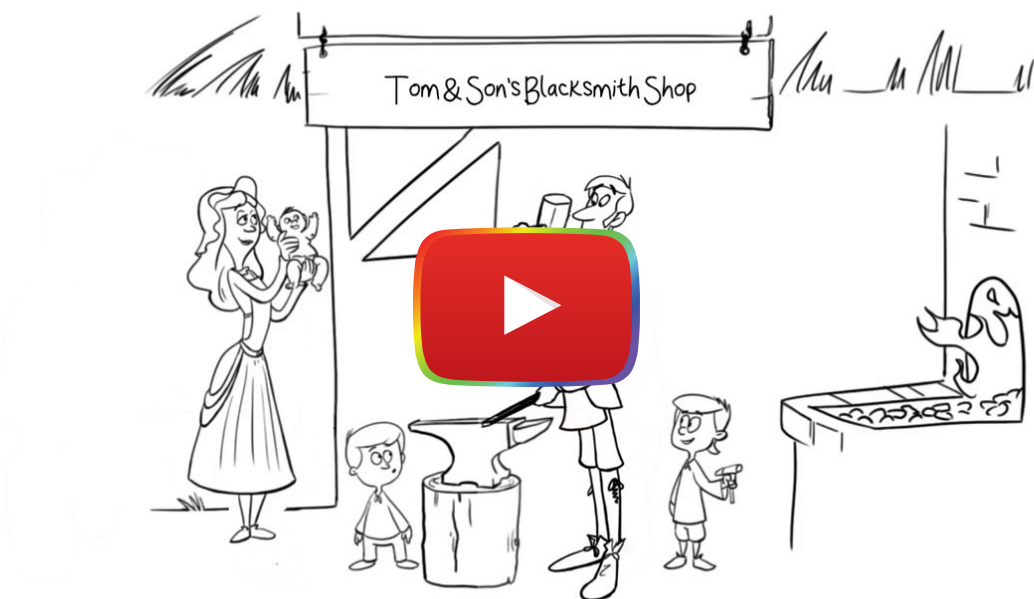
To be the best teacher possible, it is essential to be a lifelong learner. Lifelong learning implies that learning does not end when you leave a classroom or finish a degree. Rather, as you go through life it is essential for you to continually

connect with other professionals to learn, to teach, and to share resources. Unwillingness to connect with others and to engage in the lifelong learning process leads to stagnation in your practice and will prevent you from being the best possible teacher for the children you serve.

In the past, lifelong learning has typically been limited to resources available to you in your institution. If you are a science teacher, and you are in a school with other experienced science teachers this would be great, because you can learn, share, and grow within this community of experts who are all working towards similar goals. However, not every teacher has the luxury of working in a school or department with other teachers that can push them and improve their practice.

Social technologies empower us to connect with others in ways that were previously impossible or inefficient. With social media, such as blogs, social networking sites, discussion forum, image sharing services, and video sharing services, teachers are able to connect with other people and a variety of resources on an ongoing basis to improve their practice.

Technology tools can be leveraged to support lifelong learning in two major ways: personal learning environments (PLE) and professional learning networks (PLN). In this chapter, we will explore these different approaches to lifelong learning, what tools are available to support lifelong learning, and what are some risks that teachers need to be aware of in order to ensure that their lifelong learning is valuable.



[Watch on YouTube](#)

Key Terms

Digital Footprint

the electronic tracks that are left online as users create profiles, share posts, follow others, like content, etc.

Personal Learning Environment (PLE)

an environment that educators create by exposing themselves to information that is always updated and of practical value to their work (e.g., blogs, RSS feeds, news sites, social media feeds, podcasts, and video channels)

Professional Learning Network (PLN)

networks that professionals build around themselves via social media to improve their practice, share resources, and improve morale

Why Lifelong Learning Matters



Unlike previous professions, the jobs of today change rapidly, often evolving multiple times in a person's career.

The world is changing rapidly. Technology is one example that changes so frequently that many of the jobs that people have today did not exist 100, 50, or even 10 years ago. Centuries back, if you learned a trade like blacksmithing or animal husbandry, you would have been able to go forward throughout your career with a fairly stable understanding of what you would be doing and how you would be doing it for the rest of your life.

Once you stop learning, you start dying. (Albert Einstein)

Today however, technologies change how we do our work, what work is possible, and even the nature of the work we do. In the U.S. two centuries ago, farm labor was one of the most common jobs available. Less than a century ago, mass industrialization and the creation of factories and assembly lines drastically changed the work dynamic of the U.S. in terms of what jobs were available and what would make people seeking employment marketable moving forward. Today, advances in computing and information systems have again drastically changed this dynamic so that new jobs are created on a daily basis and existing jobs continue to evolve rapidly, becoming more technical and more collaborative.

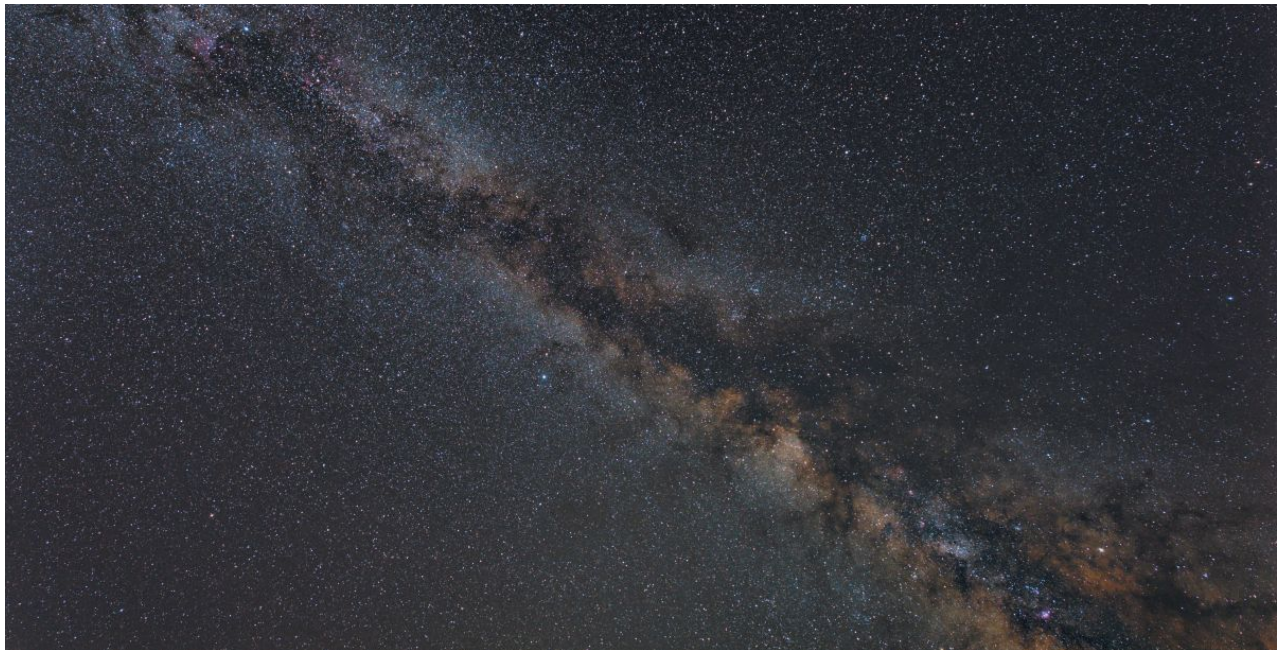
In such a world, failure to become a lifelong learner means failure to adapt and to be marketable throughout one's life. Even in teaching, which is an historically stable profession, because every community needs teachers, things are

changing rapidly. Today, if you went into a job interview for a teaching position and said that you have no interest in using technology in your teaching or learning about how new technologies should be used to improve teaching and learning, it is highly unlikely that a hiring committee would look favorably upon this stance. This is because we live in a time when technology is changing how we can teach, but it is also the case that teachers are expected to teach students technologies that will be applicable for them moving into professional careers of their own. This means that teachers must not only have a positive attitude toward technology and a willingness to use it in their classrooms, but they must also look forward to technologies that do not currently exist and strategically anticipate how their teaching will evolve throughout their careers in response to new shifts in technology capabilities and availabilities.

Beyond technology as a teaching and learning tool, however, most fields are very dynamic themselves and change rapidly. This means that often what was true or accepted as knowledge 20 years ago may now be rejected or no longer be considered cutting-edge.

Education is not preparation for life; education is life itself. (John Dewey)

In astronomy, for instance, improved telescopes, space flight, and robotics allow us to gain insights into our solar system that were impossible just a few years ago. In biology and genomics, the ability to sequence DNA and study the building blocks of life gives us new insight into the world around us, how it is structured, and how we can improve conditions impacting humans and the world itself.



From Cygnus to Sagittarius, Don McCrady via Flickr, CC BY-SA

Merely learning about astronomy or biology in a college class and then leading a 30-year career as a teacher is not sufficient to ensure that your students learn what they need to learn in order to be educated, capable participants in their communities and society at large. As a teacher, one of your primary goals is to model lifelong learning for your students to show them that learning is not contained within a diploma or limited to a classroom. Rather, learning is a lifelong endeavor that should never end, and from a very practical standpoint, the jobs of today and tomorrow require just about everyone to be involved in a meaningful process of lifelong learning to be successful.

Personal Learning Environments (PLE)

Modern technologies, and web technologies in particular, provide us with access to a variety of information and media resources, and the lay internet user today has access to more knowledge than the wealthiest, most-educated researchers that lived just a few decades back. For this reason, it is important for professionals to learn to approach the internet as their own learning tool and to structure their experiences with it in a way that allows them to continually learn and grow.

By following particular blogs, RSS feeds, news sites, social media feeds, podcasts, and video channels, you have the ability to have information pertinent to you constantly streamed to you. As such, each person today has the capacity to construct her or his own Personal Learning Environment (PLE) that is suited to that person's individual tastes and interests. In fact, by just following a few Twitter accounts of people you respect or subscribing to an educational blog or two, you can support your own lifelong learning by exposing yourself to information that is always updated and of practical value to your work as a teacher.

There are various tools that can be used to support the construction of your personal learning environment. A few examples include video sharing services, search engine alerts, personal knowledge managers, and RSS feed aggregators. Each of these examples will now be explained in a bit more detail.

Video Sharing Services

Video sharing services, such as YouTube or Vimeo, allow everyone from major news networks to lay users to upload and share videos with the world. Many modern celebrities first got their start by sharing personal videos on sites like these, and most videos on these popular sites are freely available. Users can also subscribe to channels that are created by users, which might include a constantly updated list of that user's own new videos as well as other videos that they like. For instance, subscribing to a channel on new science discoveries could be a useful tool for science teachers, or subscribing to a channel on mathematics tutorials might be useful for mathematics teachers. By creating an account on these sites, you can also create your own channels and collect existing videos or your own videos into categories for later viewing or sharing with students and colleagues.

Search Engine Alerts

Search engine alerts, such as Google Alerts, are services provided by search engine companies that will send you email notifications when new resources are available on the web that meet your search criteria. For instance, say you are a social studies teacher and you want to be sure that you are aware of any new stories that deal with discrimination. By creating a Google Alerts search criteria with the word "discrimination," you can receive an email notification every time a new story is added to the Google search index that meets those criteria.

Personal Knowledge Managers

Personal knowledge managers, such as Diigo, are tools that allow you to collect, organize, and annotate on information you find on the web. For instance, say you are a music teacher and you want to collect links to sites that provide classical sheet music and performances. With Diigo, you can create collections of these resources, bookmark them, take notes on them, and share your collections with others.

RSS Feed Aggregators

Really Simple Syndication or RSS aggregators use information provided from websites like blogs to create a personal feed of relevant information for you. For instance, say there are a handful of blogs that you are interested in that are maintained by other educators or professionals in the field. By using an RSS aggregator and pointing it to those blogs, you can get a constant feed of recent posts on those blogs that come directly to you. This is useful for staying abreast of what is happening in your field. In most subject areas, there are prolific teachers on the web who keep blogs for posting resources and reflecting on classroom activities. An RSS aggregator helps you from having to track these

sources down every time you want to check to see if something is new and provides a single window from which you can receive up to date information that is relevant to you.

Professional Learning Networks (PLN)

In addition to information, modern web technologies also empower us to connect with other professionals on an unprecedented scale. In a previous age, if you had a question that required expert guidance, you were very limited in your ability to get support. Now, you can regularly find world-class experts on teaching, classroom management, curriculum development, and any number of other issues with a web browser search or two. Similarly, you and other educators can connect with one another via social media and provide supports to one another as you engage in daily processes of teaching and problem solving together.

By selecting and following other educators on a social networking site like Google+, for instance, you can quickly construct a Professional Learning Network (PLN) of colleagues that can be of use to you when you have a question or concern. You can also use this network to provide you with fresh insights on how to improve your practice, share resources, and improve morale in a profession that can sometimes be isolating and lonely.

There are various tools that can be used to support the construction of your personal learning network. A few examples include social networking sites, blogs, and video conferencing tools. Each of these examples will now be explained in a bit more detail.

Social Networking Sites

Social networking sites, such as Facebook, Twitter, Pinterest, and Google+, are commonplace as social spaces for people to connect with friends and family, but they are also useful for connecting professionals together. There are also strictly professional social networking sites, such as LinkedIn, which can be useful for cultivating a polished professional online presence as well as for job seeking. By creating a Twitter or Pinterest account and following the posts of other professionals in your area of interest, you can stay abreast of recent developments and also ask questions of the larger community. By creating your own profile and sharing your own classroom practices in these sites, you can also help others to learn from your experiences in the classroom and to gain value from the resources that you create.

Blogs

Similar to social networking sites, blogs are intended to be online spaces devoted to cataloging the experiences or thoughts of a single person or a small group of people. Common blogging platforms include WordPress, Edublogs, and Blogger. As an educator, you can keep your own blog where you share more information than is typically possible through a social networking site along with resources such as lesson plans, rubrics, and classroom activities descriptions. You can also elicit feedback from the community by allowing for comments on your blog and can read the blogs of others and leave them comments as well. By blogging and reading the blogs of others, you can create professional relationships that expand your teaching potential.

Video Conferencing Tools

Much of the interaction that occurs on the web is done through text-based communication, but the web also allows opportunities for professionals to connect virtually via audio and video communication. Common video conferencing tools such as Skype and Google Hangouts are useful for scheduled conversations with colleagues and might include a monthly chat with other teachers in your region or could be used to invite another teacher or professional to speak to your class remotely. These tools typically are not useful for initiating a professional learning network, because they are not intended to connect you with new people, but they are useful for sustaining and expanding the relationships that you have cultivated with other professionals either offline or through other tools (such as social networking sites).

Threats to Lifelong Learning

If lifelong learning was easy, everyone would be a pro at it. The reality of the situation, though, is that a number of issues make lifelong learning difficult. Some of these issues are universal, while others are unique or magnified for teachers. We will now briefly discuss three threats to lifelong learning along with suggestions for addressing them. These threats include: time constraints, professional considerations, and sheltering of the self.

Time Constraints

Time is one of the biggest constraints that teachers face. Most teachers work long, exhausting hours with students during the day and either devote early mornings or late nights to grading papers, developing curriculum, or fulfilling other duties for the school (e.g., coaching, reviewing, monitoring, driving). Being a good teacher and a contributing member of the school community often requires teachers to strike a precarious balance between professional and personal life, and time devoted to the profession means time taken from somewhere else in a teacher's life. With this backdrop, if a teacher is told that she needs to focus on lifelong learning to become a better professional, one understandable response would be "When do I have time for that?"

The answer is that teachers often do not have time or resources to devote to formal lifelong learning activities, such as professional development courses or conferences, unless their schools give them some reprieve from their demanding schedules. Though formal lifelong learning undoubtedly occurs in school settings, these opportunities are too few and far between to provide all of the lifelong learning necessary for teachers.

One of the benefits of modern technologies is that they can make less formal and microburst-like learning available any time and anywhere (e.g., via a mobile device). This means that lifelong learning can be approached in a more flexible manner, with five minutes here or ten minutes there, rather than trying to carve out an entire day devoted to a formal learning session. This allows teachers to more realistically devote short periods of time to learning in a manner that is sustained from one day to another rather than relying upon infrequent, difficult-to-schedule formal learning opportunities.

For instance, one teacher might devote ten minutes each day to checking an RSS aggregator or some favorite YouTube channels. Another teacher might listen to a favorite podcast on the way to work in the morning, while another might have a 30-minute video conference scheduled every two weeks with other teachers in the region to talk about curricular development or other issues. These microbursts of learning do not altogether replace the more formal, time-intensive experiences that schools should support for their teachers, but they do provide a much-needed supplement and constancy to lifelong learning that is manageable even within a teacher's hectic schedule.

Professional Considerations

As explored in the chapter on online professionalism, the ways that teachers behave online could be subject to employer and public scrutiny, and if teachers are encouraged to use web technologies to promote lifelong learning, then there are some professional considerations that will impact how teachers use these technologies and what benefits they can actually take from them. For instance, before a teacher seeks to construct a PLN on Twitter or Pinterest, she should consider how her activities might be interpreted and whether they meet with standards of professionalism.

The tracks that you leave online are sometimes referred to as digital footprint, and they include your profile information, things you post, what you share, who you follow, what you like, etc. A majority of employers now will do some level of web searching (either via search engines or social media sites) to check on the digital footprints of people they are considering hiring. This means that people will be searching for you, and what they find may have an impact on your professional life.

For this reason, you should take charge of your digital footprint and recognize that you have a role in grooming what is found about you online. There are several ways of doing this.

First, delete or hide old accounts and content and make your social media profile pages as private as possible.

Second, consider creating a professional website, portfolio, or blog. Even though a principal might not thoroughly look at the professional content you put online, doing so allows you to take control of what is available for others to see about you.

Third, consider creating a professional social media account that is public (such as Twitter) and strictly professional. In this public account, be extra careful and thoughtful about what you post. This will be a good sign to your employer that you are not posting things that could be risky or problematic.

Fourth, clearly demarcate between personal and professional uses of social media. Any personal uses should be as private as possible and should only be visible to people close to you that you trust (e.g., family). Professional uses should generally be more public so that you can reveal that you have a public persona of professionalism. Mixing the two can be a bad idea, because it can become very messy and sticky as people within your professional circles start to gain access to aspects of your private life that they may not have the contextual awareness necessary to properly understand.

And finally, get into the habit of regularly searching for yourself online. Review images and videos in your searches to make sure that you are aware of what results will be shown to others. As you look at this content, consider how others might interpret it given the fact that they may not have any contextual awareness of the situations and experiences in your life that may have produced them. Though we might post content online to help people to understand who we are, in this case, the more pressing concern is making sure that people do not *misunderstand* what your digital footprint says about you.

Thus, when constructing your professional learning networks, help to ensure that your footprint is actually *professional* in these networks rather than a difficult-to-decipher mix of personal with professional. If you truly do have a professional footprint online, it will allow you to more easily make connections with other professionals and to more meaningfully share your work and participate with other professionals in meaningful ways.

Sheltering of the Self

Though we have highlighted the positive potentials of modern technologies to make people more connected, informed, and socially-engaged, there are possible situations when these technologies may be turned against themselves to actually promote narrowness of thought and limited exposure to new information and experiences. Web technologies do give us access to a larger society than is possible in face-to-face interaction, but over a century ago, a prominent author pointed out the double-edged nature of big societies as follows:

It is not fashionable to say much nowadays of the advantages of the small community [in comparison to big societies]. There is one advantage, however, in the small state, the city, or the village, which only the wilfully blind can overlook. The man who lives in a small community lives in a much larger world. He knows much more of the fierce varieties and uncompromising divergences of men. A big society exists in order to form cliques. A big society is a society for the promotion of narrowness. It is a machinery for the purpose of guarding the solitary and sensitive individual from all experience of the bitter and bracing human compromises. (G.K. Chesterton)

On the web, technologies that are designed to provide us with only the information that we want may actually serve to limit our worldview and prevent us from having to confront our own biases and misunderstandings. A search engine, for instance, can learn about our interests and attitudes and only return results that solidify us in these ways of thinking (i.e., [filter bubbles](#)). Similarly, by only following like-minded or demographically similar people on a social networking site like Facebook, we might set ourselves up for a situation where everyone we know in the medium supports, acknowledges, and encourages our viewpoint (rather than disagreeing with us and forcing us to grow).

For this reason, professional educators should be thoughtful about how their activities online and approaches to information seeking may help them to critically consider their own biases in an ongoing way. This might include following a diversity of professionals, some of whom disagree with our world view, or counterbalancing information we

find on one site with another site that is biased in an opposing direction (e.g., [Huffington Post](#) vs. [FoxNews](#)). The bottom line is that it is comfortable to place ourselves in situations where we are never challenged or pushed to consider others' viewpoints, and internet technologies are often designed to help us feel content in a digital echo chamber of our own thoughts. As professionals, however, we should surround ourselves with experiences that reflect the diversity of the world we live in so that we can overcome our own limitations and continually grow.

Lifelong Learning Scenarios

To illustrate the concepts presented in this chapter, a series of scenarios will now be provided in narrative form that will illustrate how these principles and concepts might be implemented in real-life settings.

Scenario 1: The Social Learner



Sal is an elementary school teacher and social learner who uses Facebook to stay connected with family and friends but also is connected with other teachers in his school. While using Facebook, he will often share links to news articles that he thinks are interesting and will occasionally post pictures of his growing family. He tries to blend his personal and professional lives together judiciously within Facebook so that he can stay connected with the people that matter to him personally but also gain the benefits of building a PLN with the other teachers at his school.

When he first started connecting with other teachers on Facebook, Sal had to change some of his activities and the things that he posted to be sure that others would not get the wrong idea about him. For instance, he stopped posting overly political comments, because he found that they led to arguments that he did not want to have either with the other teachers in his school, on the one hand, or with his family members, on the other. He now will post cautiously about major family life events and spends most of his time on Facebook reading about what others are doing and sharing links (though not necessarily his thoughts on those links).

Benefits

The main benefit of Sal's approach is that it allows him to bring all of his connections and interactions into one location (Facebook) and not feel overburdened by having to login to multiple sites. He likes being able to share a little bit about himself and his family online but does this with the understanding that others might be viewing his activities through a professional lens and therefore limits or slightly censors some of the things that he might otherwise post.

Limitations

The major professional limitation of Sal's approach is that it prevents him from connecting with a lot of other educators and from sharing his classroom resources with others outside of his small social circle that might benefit from them and provide him with guidance on how to improve. Mixing personal and professional uses of these media together can also cause tensions that prevent Sal from really using Facebook the way he wants (e.g., not posting things that he feels strongly about perhaps because he is worried about how others might react to them). Sal also recognizes that because his network is so small and isolated to people that he knows in real life, he does not have much exposure to people who think differently than he does or who have different life experiences. This doesn't particularly bother him, but he wonders sometimes how much of his use of Facebook is actually helping him to learn and grow and how much of it is simply solidifying his own views of the world.

Scenario 2: The Seeker



Marta is a secondary science teacher who has accounts on various social media sites, including YouTube, Pinterest, and Twitter. On YouTube, she subscribes to channels from [NASA](#), [Popular Science](#), and [Discovery](#), giving her a constant feed of new videos that relate to content area. On Pinterest, she follows boards from other science educators who post ideas for experiments and other class activities. And on Twitter, she follows celebrity scientists like [Bill Nye](#) and [Neil deGrasse Tyson](#), who will often share information about recent discoveries or interesting thoughts. Marta also uses an RSS feed aggregator to pull stories from the science sections of major news sites, feeding them directly into her email inbox and has a couple of Google Alerts set to let her know as new results pop up on the web related to climate change. All of these tools working together represent Marta's PLE, which gives her instant access to up-to-date, pertinent resources. Marta greatly values the resources she finds online, but she generally feels that the work she does is not important or that she has nothing to contribute to other teachers in similar situations.

Benefits

The main benefit of Marta's approach is that it allows her to have access to new, frequently updated information from a variety of sources. By following the recent posts of others, she is able to keep up on recent happenings in her field and to get helpful ideas for teaching her students.

Limitations

The main professional limitation of Marta's approach is that she isn't sharing her own expertise back with the online community, providing resources to other teachers, and becoming a full participant in social media. Marta's behaviors might be classified as "lurking," or as someone who watches others and gains benefit from what they share but who does not share back or help to support the community through her own contributions. Thus, she gains benefits from resources online but gains little social benefit from her activities and may feel undervalued in the work she does.

Scenario 3: The Micro-Celebrity



has a massive PLN.

Rosa is a middle school teacher who keeps an active blog and posts multiple times each day to Twitter, Facebook, and Pinterest. On her blog, Rosa shares classroom activity ideas and writes position pieces about the problems that public education faces in her community, state, and the nation at large. She sometimes stays up late into the evening writing thoughtful blog posts and responding to the many users who comment on her work. On Twitter, Facebook, and Pinterest, Rosa posts provocative snippets of her blog posts along with links to the full articles. The people that read her work in each site are different, but she has amassed a following in the tens of thousands on Twitter and Pinterest, showing that many people are interested in her ideas and work and that she

Because of the nature of the things she posts, she sometimes must moderate her blog comments or respond to people that disagree with her viewpoints, which takes a lot of time and energy. Frustratingly, many of the people she argues with the most are family members and long-time friends who are not educators themselves but who have very different viewpoints about public education than she does. She has been known to respond to these comments on her mobile phone while monitoring students during lunch and sometimes comes back to class frazzled from the experience.

Wanting to continue to push the limits of her work, Rosa has begun placing advertisements on her blog to generate a trickle of revenue to supplement her modest teaching salary. She sometimes wonders if her classroom duties are getting in the way of her ability to be an advocate for things she believes in online. She also wonders if she will be able to continue to produce new content on her blog that will keep people interested, and in class she often finds herself spicing up her activities not for her students but for the blog post she will be able to write about afterward.

Benefits

The main benefit of Rosa's approach is that she is able to connect with a diverse group of people online, to share her expertise with others, and to learn from them through online interactions. The sheer number of followers she has on some of these sites suggests that her work is benefiting other teachers, and if her popularity continues to increase, she may be able to find ways to effectively monetize her work (either through advertisements or selling lesson plans). Also, because of her followers on social media, Rosa feels like she has a powerful voice for change in the world, which she finds quite exhilarating and liberating.

Limitations

The major limitation of Rosa's approach is that it is taxing both in time and energy and may actually have some negative impacts on her teaching, by distracting her from her students and other life duties. Because Rosa has no boundaries between her online professional and personal life, much of her frustration and emotional taxation seems to stem from tensions between her professional attitudes and personal relationships with family and friends.

What do you think?

Which of the three lifelong learning scenarios is most appealing to you?

☐ Scenario 1 - The Social Learner

☐ Scenario 2 - The Seeker

☐ Scenario 3 - The Micro-Celebrity

Conclusion

Lifelong learning is essential for everyone but is especially important for educators who must model lifelong learning skills and dispositions for their students and must operate in a profession that changes in response to new innovations. Modern technologies, particularly web technologies, empower educators to participate in lifelong learning in unprecedented ways by improving access to resources and supporting social connections between professionals at a distance. This chapter has highlighted some of the current technologies that are available to support the creation of a PLE and PLN and has also provided some scenarios that highlight the benefits and limitations of certain professional practices online. With these understandings, teachers should consider for themselves how they will support their own lifelong learning and what role the construction of a PLE and/or PLN plays in this process.





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Information Literacy

Evaluating Online Resources

Royce Kimmons

Social Media

Information Literacy

<https://edtechbooks.org/>

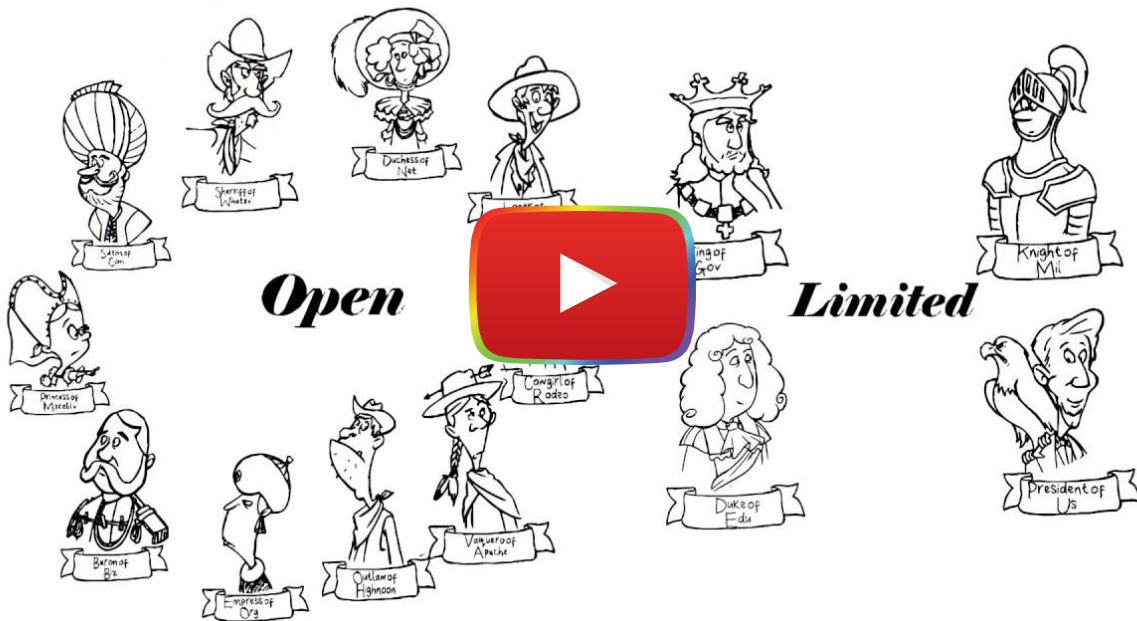
Bias

Digital and Media Literacy

Learning Objectives

- Understand differences between website top-level domains and what they mean;
- Recognize quality indicators in online resources;
- Recognize and navigate bias in online resources.

Media Literacy is the ability to access, evaluate, and create media in a variety of formats, and information literacy is a subset of this that constitutes the ability to accurately interpret and understand information that is presented to you. This chapter will focus primarily on information literacy and how to evaluate online resources. With the advent of the Internet, students and teachers have gained unprecedented access to information resources in a relatively unfettered manner. However, part of the reason that access to these resources has become so fast and easy is because traditional quality assurance and control mechanisms have been removed from the process of information resource creation and sharing. This means that students and teachers are faced with information from a variety of sources online and that they must be able to evaluate these resources in a manner that previous generations may not have needed to.



[Watch on YouTube](#)

Website Domains

Before exploring how to evaluate individual resources, we must begin by understanding how the Internet is structured. If you have ever typed a URL or web address into a web browser, you have used something called a domain. A domain is the primary identifier of a website that is made up of a website name, such as facebook, google, or twitter, followed by a domain type (or top-level domain), such as .com, .edu, or .org. Domains are also often accompanied by subdomains which precede the domain name, the most common of which is www, standing for World Wide Web.

Together, these three identifiers make a fully qualified domain, such as www.google.com, and allow the technologies that connect devices together through the Internet to find the specific resource that a user is looking for. In this way, domains are like physical addresses. Just as you need the correct physical address to send a package to someone, you also need the correct domain in order to access an information resource.

Complete URLs are often very long and included domains followed by a "/" and then additional information. Everything after the "/" points to a specific file or location within that domain. In other words, if the domain is the address, just like a physical address that directs someone to your house, then everything after the "/" directs a user where to go inside your house, such as up the stairs or under the bed.

This is important to understand, because no matter where you go online, you can always tell what location or building you are in by simply looking at the domain and ignoring everything after the "/".

Domain Purposes and Cautions

Just as different buildings serve different purposes in real life, certain domains are intended to serve different purposes on the web. The most popular top-level domain, .com, is intended to be used by commercial entities, but this is not regulated.

For instance, if someone wants to start their own restaurant, they can register a domain name (such as mygreatrestaurant.com or myrestaurant.net) and then no one else can use that domain anymore, because the address

is taken. The thing to remember though is that anyone can register just about any domain name they would like as long as it is not already taken.

So, if your name is John Smith, you could register johnsmith.com for yourself, or even if your name is not John Smith, you could still register that domain name, because no one is going to check and make sure that it accurately reflects who you are or what you are trying to accomplish.

This means that you could start your own encyclopedia, business, online book, church, forum, or organization and register a domain name for that entity with ease as long as the domain name is available. Since there is so little oversight in this regard, you can actually tell very little about a website from its domain name alone. All you know is that someone somewhere decided to adopt that name as their address this does not mean that the domain name accurately reflects the content of the website or suggests any indicator of quality, accuracy, or legitimacy.

One caveat to this, however, is that some top-level domains do require verification for registration. Though anyone can create a .com, .net, .us, or .org site, some top level domains are restricted and carefully maintained. These include .edu, .gov, and .mil sites. Just as in real life there are public or governmental buildings that no one should be able to own or that require restricted access, domains that end in these letters reveal that the site has some legitimacy as either an educational, governmental, or military institution. When accessing these sites, you still need to consider whether the content is accurate, but you can at least know that you are accessing a site that is actually run by the institution that the name suggests.

This becomes important to realize if you ever stumble upon unrestricted domains that masquerade as restricted domains. One example would be federal student loan sites. Though the U.S. government provides information about federal loans on its own websites, which end in .gov, there are many websites that a user might think are legitimate government websites but which are not. Rather, they are actually websites created by businesses to generate ad revenue, to collect personal information, or to sell a product to people who are looking for federal loans. For instance, studentloan.com is a website created by a for-profit company, while studentloans.gov is a federal website that provides information on federal student loans. Though the two domains are almost identical, understanding differences in the top level domain can be essential to ensure that you are finding reliable information.

Educational institutions are similar. To register a .edu domain, a potential website owner must prove that it is a legitimate educational institution. Thus, if you do a search for a specific degree or department and the results provided to you include sites that end in .com, then you can be assured that they are not actually from educational institutions.

Domains in Education

In real life this simple understanding can have drastic influence on students and teachers. For instance, in the early days of the Internet, the official site of the U.S. White House was hosted at whitehouse.gov. However, an adult entertainment website was hosted at whitehouse.com.

As you might imagine, many students and teachers mistakenly accessed this pornographic website when looking for legitimate information about the U.S. presidency, and even a cease-and-desist letter from President Clinton's cabinet in 1997 was not enough to convince the WhiteHouse.com owner to give up the domain, because it was undoubtedly a huge moneymaker. Had teachers understood this issue of top-level domains and taught their students accordingly, many young children likely would not have stumbled into the site unawares.

Another disturbing example may be found in the case of websites dealing with the life and works of Martin Luther King Jr. Though there are many websites created by people with good intent to teach about this historical figure, there are also many that are created for other purposes. The most stark example of this is martinlutherking.org. Though this domain looks like a legitimate resource and might be one of the first websites that a teacher or student might look to for information about Dr. King's life, upon inspection it is clear that this site is owned and maintained by an author with extreme white supremacist ideologies and provides a very different view of Dr. King's life than is found in most reputable resources.

Just because the website has a domain that looks legitimate does not mean that the content is reliable, of high-quality, or free of bias.

Learning Check

Which of the following are restricted top-level domains?

☐ .com

☐ .org

☐ .edu

☐ .gov

When faced with two sites, one that is a .com and one that is a .org, what can we tell about the truthfulness of the sites based upon the top-level domain alone?

☐ they are equally true

☐ the .com is probably more true

☐ the .org is probably more true

☐ you cannot determine truthfulness from this alone

Recognizing Quality

In terms of quality, not all websites or pages within a website are created equally. High-quality online resources include those that provide accurate, up-to-date, thorough information on a given topic. Judging the quality of an online resource can be difficult for teachers and students, especially if they are not content experts in an area.

However, even if you know very little about the content of a website, there are a few questions that you can ask to help you determine whether or not the provided information is likely to be of high quality. These questions may be found in the excerpt below, and we will proceed by discussing the central idea of each question in more detail.

Questions to Identify Quality

1. **External Verification:** How well does the resource provide evidence to its claims by linking to external, reputable resources?
2. **Recent Updates:** Does the resource identify when it was created or last updated, and is it recent enough to trust the ongoing accuracy of the content?
3. **Considerate Acknowledgement of Multiple Perspectives:** How well does the resource represent multiple perspectives on the information?
4. **Multiple Reliable Authors:** Are the authors identifiable and reputable, and is the information authored by one person or many?

External Verification

First, reputable resources are able to substantiate the accuracy of their claims. Even when world leading experts make claims in scholarly papers, they must provide evidence for their claims. Thus, any website that provides information should also provide references and citations to allow you to verify what is being said. Good references and citations will link to external resources that are typically written by different authors or provided by other sites.

Simple or common knowledge claims, such as "Jupiter is a planet" or the equation for the Pythagorean theorem, typically do not need a reference, because there are few that would dispute their accuracy. However, when an author makes an unexpected, new, uncommonly known, or bizarre assertion in an information resource, then that author is obligated to provide sufficient evidence for verifying the accuracy of that assertion.

As an illustration, if you are trying to find biographical information about Eli Whitney and you stumble across biographies on two different websites, one that has references and one that does not, all else being equal you should consider the website with the references to be a more reliable source of information, because it gives you a means to verify the information that you find in the biography.

In addition, if you discover that one website tells a very different, controversial story about Eli Whitney than is found in other resources, then you should be careful to check the evidence provided with the controversial source and consider if the evidence is sufficient to substantiate the uncommon narrative.

Recent Updates

Second, information changes quickly. If you look at a textbook in microbiology or astronomy from even 15 or 20 years ago and compared it to the textbook created today, you would find many differences (e.g., Pluto is no longer classified as a planet).

Like any information resource, websites can grow old or stagnant, and the best web resources make it clear to the reader when they were last updated. Many websites do this either by putting a "last updated" date below the title or at the bottom of the page. With this information, the reader can more accurately determine whether the website provides modern information on the topic or is in need of updating.

Though as a medium the Internet itself is fairly young, there are many, many information resources available online that date back to the mid-90s. This is far too old to represent a modern view on many topics of research interest, and for that reason, readers should take into consideration how long ago a resource was created or updated and how this might influence the accuracy of the content.

Considerate Acknowledgement of Multiple Perspectives

Third, multiple perspectives need to be represented in information resources. In matters that deal with the values, understandings, beliefs, and actions of people and social groups, controversy and disagreement are commonplace, and the same historical occurrence can be praised by one person or group and bemoaned by another.

In these cases, it is common for information resources to make one of two mistakes: they will either ignore alternate or unpopular perspectives or they will dismissively portray those perspectives in a manner that does not give sufficient consideration or interpretive understanding to them.

For instance, a narrative of the bombing of Hiroshima and Nagasaki in World War II might highlight the perceived necessity of the action on the part of the United States public and ignore the compensatory death and destruction suffered by innocent people in Japan. Or it might do the opposite: highlighting Japanese suffering while ignoring the reasons that other nations might have perceived the action to be justified or necessary.

In either case, ignoring or not giving due consideration to competing perspectives suggests that an information resource is not telling the full story and that the information may not be as high quality as another resource that approaches topics in a manner that seeks to openly understand all aspects of the provided information.

Multiple Reliable Authors

And fourth, in many fields, quality assurance of new knowledge is ensured by increasing the number of experts who create, critique, or provide feedback on creative works. Because we recognize that a variety of perspectives is important for portraying information in an accurate and reliable manner, resources that rely upon multiple authors will often be of higher quality than resources that rely upon a single author.

Some online information resources do not provide any information about the author, and others are created by a single author who may not be an expert in the area. These resources should be considered dubious. Furthermore, though a single author may be an expert in an area, even experts have biases or areas of emphasis that will lead them to potentially ignore or distort other important aspects of the information.

For this reason the best information resources represent the totality of multiple experts' perspectives and rely upon many different sets of eyes looking at the information to ensure that it is accurate. For this reason, websites that do not provide detailed information about who authored the content or that rely upon a single author, even if that author is an expert, will typically be of lower quality than those resources that are created by many different respected authors.

Learning Check

An online resource is generally better if it does which of the following?

- ☐ includes references to supporting evidence elsewhere
- ☐ was written by someone with an advanced degree
- ☐ has not been changed recently
- ☐ was written by multiple authors
- ☐ acknowledges multiple perspectives

Recognizing Bias

Even in the case of reputable websites, however, bias is a real concern that educators must seek to recognize and help students to navigate. Bias represents a person's worldview and how it may guide them in presenting information in particular ways. Bias is typically treated as a bad word. That is, we typically use it in a derogatory sense when referring to the problematic biases of others or by trying to delegitimize their perspective.

For instance, a news reporter might claim that a political official has a particular bias that leads them to act in a particular way and might do so in a manner that assumes objectivity. But, the truth of the matter is that everyone is biased, and bias is an expected part of life. Bias is a natural outcome of the fact that people have different experiences, life views, and ideologies. If someone claims to be unbiased, this typically means that they are not aware of their own bias, are unwilling to admit their bias, or perceive the worldviews of others as being illegitimate. Some professionals will seek to reduce their own bias, as in the case of news reporters or scientists, but even in these cases bias directs what professionals do, how they do it, what they say, and how they say it.

Thus, when we approach the world and what other people try to tell us about the world, we need to do so recognizing that any information provided by another person will have bias. This does not mean that it is bad or erroneous but only that we need to understand the bias associated with the source of our information and use that as a lens for understanding and interpreting information.

In the case of the internet, every information source available online is created and shared by someone with some form of bias. This does not mean that information online is illegitimate but rather that if we want to understand and accurately interpret the information we find online, we must understand the biases of those creating and sharing it. To do this, internet users should ask themselves four basic questions when accessing any information resource online. These questions may be found in the excerpt below, and we will proceed by discussing the central idea of each question in more detail.

Questions to Identify Bias

1. **Ownership and Trust:** Who owns, authors, and maintains the information or website, and why should you trust them?
2. **Explicit vs. Implicit Bias:** Is bias explicit or implicit?
3. **Controversy:** Might the content be controversial or subject to interpretation?
4. **Primary Goal:** What is the resource's primary goal, and how might this impact what and how content is presented?

Ownership and Trust

To understand bias, the simplest place to start is to recognize who created the resource. Often, websites created by an organization will provide informational pages devoted to explaining the mission, history, and goals of the organization. These may not always be accurate or fully disclosed, but they are a good place to start.

Because every organization will have its own biases, the purpose for exploring this is not to determine whether or not biases exist but whether you believe the organization is trustworthy enough to believe the information that is presented. Thus, when looking up information about medical treatments, reading informational pages about the Mayo Clinic may lead you to treat it as a more legitimate resource and informational website than one created by an herbalist operating out of his backyard greenhouse.



Typically, more legitimate information resources will provide you with more information about the owner so that you can make informed decisions on whether or not you trust the resource, whereas less legitimate resources will try to hide or ignore traditional indicators of legitimacy, such as institutional standing, credentials, degrees, and so forth, in order to establish their own competing form of legitimacy.

Because the internet gives everyone a potential megaphone by which they may be heard by the world, you need to realize that absolutely anyone can be using that megaphone, no matter how uninformed, malicious, or dismissive they may be. Be careful trusting resources from individuals or groups that claim legitimacy specifically because they contradict reputable institutions and groups, such as self-proclaimed scholars who claim to have the "real" truth about a topic that the academic community is not "ready to hear" or self-proclaimed physicians who lack appropriate medical licensing and credentials for the claims that they make and claim to be "ostracized" by medical institutions.

In short, if a site claims legitimacy by claiming that all other resources are illegitimate, then that site should make a compelling case for doing so that is subject to the same scrutiny and quality assurance measures as the resources it is seeking to delegitimize.

Not every information resource, however, will provide you with background on those who created it. In these cases, you should be especially careful, because if someone is not willing to own the information they provide, then it is not clear why you should trust them. Sometimes websites will try to misrepresent who owns the site such as when a politically polarizing group might create a site through a go-between organization that has a less polarizing name or connotation.

In these cases it can be difficult to determine trustworthiness of that individual resource, but typically good information can be found from a variety of resources, so rather than focusing all of your attention on trying to determine whether a controversial claim provided by a single website is actually legitimate, your time will often be better spent trying to see if that claim is repeated on other websites whose legitimacy and trustworthiness are more easily determined.

Explicit vs. Implicit Bias

Because bias is never eliminated fully, responsible authors and websites should try to make their own bias as explicit as possible to allow their readers to recognize how those biases might influence the information that is presented.

Explicit or visible bias is preferable to implicit or hidden bias because implicit bias typically masquerades as being bias-free. That is if an author is unwilling to tell you their bias that does not mean that they are unbiased but rather that you as the reader now have to not only read what they are saying but also try to figure out what their bias is without them explicitly telling you. Some websites are very clear in their bias. Thus, when researching topics of a political nature, it is important to be able to recognize what political parties and ideologies are behind the information that you are reading. If that bias is not explicit, then it is difficult for you as a reader to determine whether you are reading a legitimate information resource or you are the intended target of propaganda.

Even resources that have very wide exposure in our society may have very extreme biases. News organizations are an easy example. Though reporters and news agencies typically do not express their own biases explicitly, they are quick to accuse other reporters and news agencies of exhibiting bias. Thus, the MSNBC and Huffington Posts of the world will be quick to point out the bias present in Fox News and Drudge Report, and the latter will do the same in reverse, but rarely will they explicitly state their own biases and how this may shape what they report, how they report it, and what they do not report.

As teachers and students, then, we should try to recognize the explicit bias of information resources we use but also recognize that if bias is not explicitly stated, this may be a sign of even greater danger and misunderstanding, because bias is being ignored or hidden.

Controversy

Another issue to consider is whether the information you are accessing might be controversial in nature.

Some topics will be much more controversial than others. For instance, political, ideological, and religious topics can stir up significant controversy, because they deal with issues upon which people might have deep-seated divergent perspectives upon which their worldviews are established.

This means that if you find an information resource that deals with potentially controversial matters without giving sufficient consideration to the perspectives that others might have on the issue, then you should recognize that information source might not give you all that is needed to make an informed decision.

Even sites that have clear ideological viewpoints can provide information in a legitimate and useful way if they do so in a manner that respectfully considers dissenting perspectives. Whenever there are controversial matters, it is easy to find resources that provide a skewed view, leaning either one way or the other. This is fine and expected, because people should take stances on controversial issues, and people and organizations have the right and responsibility to make their stances known in online information resources.

The point here is that teachers and students need to be aware of controversial issues and recognize that if an information resource does not at least recognize the controversial nature of the information it is providing and also address that controversy in a respectful manner, then that information resource is likely suspect, because it does not recognize its own bias and does not provide information in a manner that reflects the complexity of real life.

Primary Goal

And finally, once you have identified the owner of an information resource, recognized implicit or explicit biases, and determined the controversial nature of the information being presented, you should also consider the purpose or goal of the author for creating the information and sharing it to begin with.

Information is shared online for really only one of two reasons: either to make money or to support an ideology. Resource creators make money through information sharing by selling either products, access to resources, or

advertising space.

If you visit a website that requires paid subscription or that presents you with advertisements, you can know with certainty that the website exists to make money. This does not delegitimize the information on that website, but it is important to recognize that the owner will undoubtedly provide information in a manner that favors revenue generation. This might mean sensationalizing content to increase traffic to the website, providing information in a simplistic manner, appealing to a particular target audience and ignoring the perspectives of others, or favoring content quantity over quality.

On the other hand, resources created for ideological purposes vary greatly in terms of the ideologies they operate on and also how this influences the type of information that is provided. A nonprofit organization like Wikimedia Foundation, for instance, might exist for the sole purpose of providing accessible information to all, whereas a political campaign might provide information resources to get a person elected.

In these two cases, the ideology of the organization will dictate what information is provided and how it is presented and maintained. Just as everyone has a bias, every site has a goal, and you need to understand the goal of the website in order to be able to meaningfully evaluate provided information.

Learning Check

Which of these resources are unbiased?

- ☐ Wikipedia
- ☐ Fox News
- ☐ Huffington Post
- ☐ New York Times
- ☐ [none of the above]

According to the chapter, which of the following statements are true?

- ☐ We should be more careful about bias when interpreting information on more-controversial topics (e.g., abortion) than on less-controversial topics.
- ☐ Explicit bias is preferable to implicit bias.
- ☐ An author's background and motives should not be considered when evaluating the veracity of the information they provide.

Conclusion

In this chapter, we have explored some of the primary considerations for evaluating online resources. Teachers and students today are constant consumers of online information, but we must strive to ensure that they are informed consumers. By understanding the significance of domain names, teachers and students can determine whether a website represents a legitimate governmental or educational institution, and by employing the guidelines provided regarding quality and bias, teachers and students can more effectively navigate the vast array of information resources available online and make informed decisions about their accuracy and value.



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Part 2

Classroom Applications

The [Teacher Educator Technology Competencies](#) provided by the Society for Information Technology and Teacher Education (SITE) state the following:

Teacher educators will design instruction that utilizes content-specific technologies to enhance teaching and learning.

This section provides subject-area and tool-specific guidance on using technologies in the classroom that enhance teaching and learning.

Blogging
Coding
Computational Thinking
English Language Learning
Foreign Language Teaching, Part 1
Foreign Language Teaching, Part 2
Gamification
iPad Learning Centers
Open Educational Resources
STEAM Mindset



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2.1

Blogging

Blogging for teachers and students

Rachelle Dené Poth, Angelo Fernando, Ruth Okoye, & Mike Karlin

Social Media



Learning Objectives

- Identify the basic technology skills needed to start and maintain a blog;
- Explore topics for blog posts and characteristics for good blog posts;
- Recognize dangers and establish guidelines for safe blog use;
- Understand motivational factors and benefits of blogging with students.

If you have ever thought of starting a blog, but wondered about its benefits, and what it would take to sustain one, you are not alone. Many of us who began blogging went through these stages at the beginning. We wrestled with the questions we cover in this chapter. Likely the questions that you may have yourself. The goal of this chapter is to give you the courage to start your own blog and offer some helpful information and skills to get started on your own.

Additionally, bringing blogging into your classroom can bring unique challenges in regard to student safety and digital citizenship. We will discuss best-practice strategies for getting your students engaged in blogging and more importantly, blogging safely.

Overall, blogging for both teachers and students can be beneficial because expressing one's thoughts, especially when it is in a personal area of interest can be uncomfortable for some. With blogging, teachers and students have a platform where they can put down their ideas, their questions, set personal goals, innovate, and use their space as a guide for continued personal development. It becomes a tremendous resource for students to learn to reflect and to see their growth along the way, with the support of teachers in the process. Blogging is a safe space where students can simply write, reflect, and learn in more personalized and meaningful ways.

Key Terms

blog, blog_post, blogging_platform, digital_citizenship

Blogging for Teachers

Think of a blog like an online journal. They are the perfect place to share ideas, post reflections, discuss upcoming lesson possibilities, and connect with other teachers, administrators, and K-12 stakeholders.

Benefits of Blogging for Teachers

- Sharing your resources with others
- Reflecting on your lessons, classroom, school, etc.
- Staying on top of trends in your subject area
- Sharing student work
- Directing your own professional development

Questions to Ask Before Blogging

Will a blog be part of a school website? If so, what are some considerations to keep in mind? Do I need to use images/photographs that conform to the district or school policy? Do I need to use a specific writing style? Will my posts need to be approved by a school or district administrator?

Starting your own 'independent' blog outside of your school. How much leeway do you have in terms of using the school logo or digital material created in school or your class? Can you reference your school or classroom or do you need to keep your posts more anonymous?

Purpose of the Blog

It's important to think about why you're starting this blog, who the audience will be, what you hope to accomplish, etc. It's usually best to start with one or two main goals for your blog, and always keep a specific audience in mind. This will help you keep your focus narrow, and you can always expand from there!

Linking to Social Media

If you are an independent blogger, would your school let your posts be shared to their social media sites? How can you tell the story of your school in the most effective way? Conversely, how much approval would you need to link to (or embed) media created by your school/district?

Platform for the Blog

Choosing a platform is just as important as deciding who your audience will be. Some options to consider are listed below:

Platform	Price	Features	Tutorials	Example Blog
Weebly	\$0 - \$25 /month	Feature List	Beginner's Guide to Weebly	Edtechroundup
Wordpress	\$0 - \$25 /month	Feature List	Wordpress Blog Tutorial for Beginners	Rdene915

Technology Skills for Blogging

In general, you won't need a lot of advanced technology skills for creating and maintaining a blog. Most blogging platforms are designed to be user-friendly so that even people who aren't as comfortable with technology can still create a blog. As long as you're comfortable with basic text editing features like changing fonts, inserting links, and things along those lines, you should be fine for most blogging tasks.

Plus, if there's ever anything you run into that you're not familiar with, YouTube has tons of wonderful tutorials. For example, this [blog tutorial](#) provides a great introduction to blogging and covers a lot of the basic terminology you might want to become familiar with. Overall though, don't let blogging be intimidating, even if you don't consider yourself a technology whiz!

Managing the Time Commitment for Teacher Blogging

One of the biggest concerns teachers can understandably have when starting a blog is the time commitment. Teachers are already pressed for time, and adding a new task (especially if it's your first time blogging) can seem like an overwhelming task.

However, once you get your blog set up and become familiar with the posting process, blogging rarely takes more time than it takes to write your post. In other words, as long as you have the time to write, you have the time to blog! Plus, as mentioned above, becoming a regular blogger can lead to all sorts of wonderful benefits that can help improve your classroom and your teaching practice.

For example, research suggests that reflecting on teaching practice can lead to improved lesson and learning quality within the classroom. Blog posts offer an excellent place to reflect on lessons, discuss what worked and what didn't, and to share these reflections with colleagues and peers. Plus, teachers can then get feedback on the lesson from others who have tried similar lessons or who might have ideas for improvement.

One tip that works well for some is to have a document open throughout the week, and as you have ideas (or a few free minutes) jot them down in the document. After a week of thinking about a particular idea, you'll likely have a solid start to a post, and only need a short amount of time to clean it up and finalize it.

It also helps to write about what you know. If you want to post about a lesson you recently implemented, or a new classroom management strategy you're trying, writing these types of topics will usually come easily and quickly since you're already deeply familiar with them from implementing those ideas in your own classroom. We'll talk about this more in the Content Creation section below.

In short, blogging can take as little or as much time as you'd like. Set a goal for how many posts you'd like to create over a week or a month, and go from there. Plus, like anything else, blogging will get easier and faster the more you do it, so stick with it!

Content Creation for Teacher Blogging

Getting started with a blog sometimes brings many questions to mind such as: *What should I blog about? How do I come up with ideas? What do people look for in a blog? How often should I post and how long should my posts be?*

Teachers have many ideas and experiences that can be shared in their educational community, and these experiences are beneficial to other educators looking for new ideas, strategies, or tools to use in their classroom. For example, Richard Byrne's blog, [Free Technology for Teachers](#) is an excellent place where teachers can explore new resources, ideas, and experiences that they could implement within their own classroom!

Getting started with a blog is the most difficult part. Where exactly do you begin coming up with content? Some recommendations are to simply think about some of the activities that you have been doing in your classroom that have been successful or perhaps even some which have not gone so well. Writing about either of these would make a great blog post because you are sharing your experiences which can always provide helpful information to others considering similar strategies or tools, or for someone who has tried to do the same thing you did, but didn't have the same result.

For preservice teachers, you could blog about a field experience you had, a lesson plan you designed, a book review you wrote, or discuss ideas for future classroom management plans. Any topic that you are interested, or that you cover in a class would be perfect for writing a blog post.

As educators, we are constantly learning and we benefit by sharing our experiences so that we can learn from each other and continue to grow. By opening up about our experiences, our successes, and even our failures, we help one another and we provide a good model for our students in the classroom.

As part of teaching, we have to be reflective in our practice and that can be done after each class that is taught, at the end of the school day, the end of a week, or even on a completely random basis. Reflecting over our practice helps us better understand what went well, and where improvements can be made moving forward. However, these reflections make great content for blog posts. People read blogs because they are looking for new ideas, trying to find someone who has the same questions, or folks who had a similar experience or a frustration. Authentic experiences that are shared, with examples or suggestions of how to move forward, to make changes, or to get started with something new are always welcome themes in blog posts.

Example Teacher Blogs

- Kindergarten Teacher [Ms. Cassidy's Classroom](#)
- [Vicki Davis](#)
- 5th Grade Focus - [Life in the fifth grade](#)
- [Two Techie Teachers](#)
- [Teaching to Inspire with Jennifer Findley](#)

Blogging with Students

There are endless benefits to having students blog in the classroom. Blogging is a great way to encourage students to express their ideas, be creative, develop confidence in writing, to communicate and collaborate with peers and the teacher. Blogging helps students to work on their online presence and become reflective in their learning as well.

Getting students started with blogging can sometimes be a challenge, as it may seem like a scary experience, or something totally different than simply writing on a piece of paper. However, once you share the purpose behind the use of blogs, how students will be assessed and reassure them that it is just a different manner of conveying information

that can be done anywhere, using their device, students tend to feel more comfortable and look forward to the experience.

Getting Started with Student Blogging

In order to get started, look at the various platforms available for blogging. There are some options that integrate with different learning management systems and other tools which have blogging features as part of their platform. Find one that will meet your students' level, content area, and especially their needs. Some possible options are Seesaw, Google Suite Blogger, Edublogs, and Kidblog. Depending on your choice, there may be additional features available that will open up additional learning opportunities for your students. For example, integrating the blogs into a digital portfolio to track student growth over time.

Once you decide on the blogging platform, first set up the class blog page. Personalize the page by selecting a unique theme, perhaps even involve students in deciding on the theme for the class. Spend time familiarizing yourself with the settings and specific features offered in the platform, learn how to access student blogs and their account information, and how students will create their accounts and log in. One other idea is to set up a student account for yourself so that you better understand the student experience and will be prepared to answer any questions the students may have when they are starting to create their blogs.

It can also be helpful to create a handout to share with students. A handout or other instruction should be offered that will explain the uses of blogging, including a list of expectations and guidelines, directions for how students will join the class, and some example blog posts that perhaps you have created. Sharing this information with students and showing them what to expect that can be helpful for building student comfort and confidence for the new experience.

It may even be helpful to have students write their first blog post in the classroom so that the teacher could help with editing, and making sure the content is appropriate prior to posting. Before starting, spend some time talking about possible prompts, how often they will blog, who the audience will be, the length and requirements for posts, etc. Let's go over these in a bit more detail.

Frequency of Blogging

How often should your students blog? Ask students to discuss how often would they like to visit a blog and read about something that is important to them. Typically readers might like to see something new every few days, so writing a blog post more than once a week would be a good idea. Some topics might lend themselves to greater frequency, such as science and school activities.

Give them a scenario to brainstorm. If a Student Council member had a blog, what activities would he/she blog about? If the school's Yearbook editors had a blog what would they like to communicate, or highlight through the year?

Students enjoy the chance to be creative and have choices, and will probably be excited about having options for choosing their own themes, fonts, and more, which will help build some motivation to write. Move around the classroom, facilitate while the students set up their accounts, personalize their page, and begin their writing.

Writing for a Specific Audience

This is an area often overlooked because there are many bloggers that 'rant' with no consideration for what the reader might be interested in. Get students to come up with a list of who their readers might be. Ask them to go beyond general descriptions such 'Parents' and 'Friends.' Would the 'parents' be 'Parents of students who are new to the school?'

Make them understand that the tone of voice of their blog post should be respectful and relevant to their target audience. Would a post containing inside jokes, snide comments, or emojis inspire an older reader (say a parent or a teacher) to return to the blog? Just like the tone of voice, the language and writing style needs to keep in mind the reader.

Headlines

As in any story, a blog post needs a strong title or headline. When you provide your prompt, as students decide on what angle to write about, ask them to consider an interesting title to their blog post. A title that would grab the attention of their Target Audience.

Students may not often have writing experience or some 'media' background. Find a sample of blog posts and news stories, and analyze how the headline was crafted. What words grab their attention? What word combinations stand out? Some headlines use questions, some use declarative and somewhat shocking statements. A strong headline gives the content of a blog post plenty of potential.

Blogging for the First Time

One way to have students start their writing in class is through the use of prompt responses. At the beginning, start small by instructing students how to join the class and have them begin responding to the teacher's posts with meaningful discussion points. If you have time in class to do this, it is beneficial for their progress as the year moves forward.

Even before having the students enter their blogs on the platform, have them use pen and paper, provide a prompt and give maybe 10 minutes for writing. Giving students this opportunity to first practice on paper helps them become more comfortable with writing before publishing posts for a more public audience.

When you give them the prompt, briefly discuss the Target Audience, and remind them at this time to keep in mind who they are writing for. Once they have written, help them to learn to evaluate their work and reflect on their writing. It will also help to reinforce the value in blogging as well as help the students to feel comfortable and confident in expressing their ideas. Perhaps even have students share their posts with a classmate and offer feedback to one another.

Once the responses have been written, give the students some time to use this writing as their first entry on the blogging site. By creating the first draft on paper, and then entering it as a blog post, they will have an opportunity to process the experience, to think, reflect and become familiar with how the activity will be.

Once you get the students set up and hopefully excited for blogging, it will be a continuous work in progress. Students will continue to express concerns, but we need to just provide support, and emphasize that it is okay to take risks, accept challenges, and work through them. Blogging is a tremendous benefit for many critical skills for students. Through blogging, students develop their online presence and digital citizenship skills, it promotes communication, collaboration, creativity, and critical thinking. It enables students to build comfort and confidence in a safe space, for sharing their ideas. By having students read peers' blogs, it can help to build relationships within the classroom. It helps educators to better understand the students' needs and interests and will enhance the communication that takes place.

Blogging Activities for Student Buy-In

Storytelling with Blogging

Blogging can be a good way to learn about students and become familiar with one's peers. It takes the first few weeks of school to get to know one another and become comfortable in the classroom. An idea for a different way to start the year is by using blogging as a way to learn about student backgrounds, interests, and learning needs. It is also a good way to develop an understanding of student skills in writing.

Starting Prompt Examples

One way to get to know students is through "icebreakers." However, not everyone is a fan of doing the traditional icebreakers, so perhaps trying something a little different might help. At the beginning of the year, sharing a survey with students or having them write about themselves on paper, without writing their name, and then having classmates guess, can also be a fun way to foster classroom relationships.

Another idea is to focus on a particular concept or create a prompt as a means of reviewing content material covered from the previous school year. A prompt done in this way can be very informative for determining the content that needs to be reviewed, and offer insight as to how to provide individualized instruction for each student.

Blogging provides a highly interactive way for teachers and students to convey information and show understanding. It promotes student voice and encourages students to feel comfortable in expressing their ideas in a safe learning environment.

E-penpals with Blogging

Another great activity to get students excited about blogging is connecting with an e-penpal through a site like [ePals](#) or through a teacher you know at another school. When students know that their blogs will be read by peers outside of their own school, they typically become more excited and engaged in the blogging process. This can be particularly engaging when you give students the freedom to choose what they can write about from a variety of topics.

While having a digital penpal can be great, you'll also want to make sure your students are familiar with the basics of digital citizenship (outlined below) so that they know how to appropriately and respectfully interact with their digital peers. Using a site like [Kidblog](#) can also be beneficial because it allows the teacher to approve every blog post and comment that is submitted before it can be posted online for others to see.

Student Privacy Concerns

Any time your students post anything online, there are serious considerations that must be taken. If students (particularly K-8) are posting in a public location, they should never be posting personally identifiable information that could allow a stranger online to find out who they are.

Additionally, teachers should always take time to provide lessons and instruction on online safety prior to an internet-based activity. Many times, teachers assume that because students grew up with digital devices, they are familiar with online safety. However, this is often not the case, and the responsibility can sometimes fall on the classroom teacher to be the primary source of information on online safety for many students.

When teaching students about online privacy, [Common Sense Media](#) has a wonderful collection of resources for K-12 teachers. These lessons can be used to introduce students to the ideas of online safety and can help make sure that students are ready for activities like blogging.

Blogging and Digital Citizenship

There are always concerns with digital citizenship when technology is involved and students are going to be creating and sharing content in the classroom. With the 9 elements of digital citizenship, there are several which are directly related to blogging and should be addressed at the beginning as well as on a continued basis to reinforce the expectations throughout the year.

As educators, we want to promote digital literacy for the students and make sure that students understand how to use the technology, how to access their blogs, and cite the information they use in their posts. There should be a focus on digital etiquette and how to properly interact with others, what is considered appropriate behavior, and communication in the online learning environment. It is important to spend enough time setting up the expectations and guidelines to make sure that students are interacting in ways that promote digital citizenship.

Students need to learn to respect others and also to think about the information that they are sharing about themselves, to respect the privacy of others, and represent themselves in an appropriate manner online. Providing examples of how to create strong passwords, maintain security, and to be safe online are very important parts of lessons on digital citizenship that should be included when starting to blog in the classroom.

Academic Benefits of Blogging

There are many academic and personal benefits to blogging. In terms of “21st-century skills”, blogging promotes critical thinking, collaboration, communication, and creativity. When used in the classroom, blogging provides opportunities for students to work on these and the 5th “C” content, and publish their ideas for authentic audiences.

As a blogger, a student has the benefit of improving their communicative skills, expanding vocabulary, and becoming better with grammar, for a few examples. Depending on the content area, blogging is helpful for students to learn to write in a specific way whether it be persuasive text or a narrative for example.

Blogging and providing opportunities for students to read and provide feedback to one another, opens up the communication and collaboration in the classroom, leading to greater student confidence and building a supportive learning environment. Students can share ideas and experiences, learning more from each other. Blogging enables you to write freely about your ideas and thoughts, and you can choose to share them or you can keep them private, but the end result is that you have a way to express yourself, be creative, and can then use it as a means for personal growth and reflection. In addition to these benefits, it promotes student autonomy in learning and can lead to higher student engagement.

Working with Young Students (K-3)

Age Specific Considerations

Blogging with students in the primary grades requires a different approach. While many of the academic goals are the same, younger students require scaffolds that older students may not. Students in this age group need help with organizing and producing their posts. They may also need technical assistance. These extra steps may sound complicated, but as with many things in this age group, the key is in managing student routines.

In order to reduce technical challenges, consider using [Easyblog](#) as your blogging platform. The setup is straightforward and the interface is easy for young students to navigate. The free platform also has an iPad app that can be used to facilitate blogging in a situation with limited access, such as the one iPad classroom. Signing into the blog by choosing your picture is something that even the youngest students can do.

Help students to organize their writing by providing [graphic organizers](#) or blog post templates. A fill-in-the-blank template may be the difference between getting a blog post from a young writer or a group of words. At this age, the audience for most posts would be family members, so remind students that their posts should say what they did, show what they know, and share how they feel. In this way, they will stay on track when writing and will also inform their families about class activities.

While writing is a creative process, one cannot escape the fact that our youngest students may not yet have mastered the mechanics letter formation. They will need assistance in order to produce a blog post. Blogging would be a great activity for parent volunteers or peer tutors from an intermediate grade to help with. Also, consider enabling speech recognition on student devices or voice typing in Google Docs to allow students to draft their posts.

How technical, organizational, and production challenges are resolved may be impacted by a number of factors. Grade level, available technology, and class routines will each affect how blogging is set up in a primary grade classroom.

Implementation Ideas

There are many ways to implement blogging in the primary grades. Some may choose to use blogging as a morning warm-up or as a center activity. In grades K or 1, consider composing a post together as part of your morning routine. Fill in a graphic organizer or post a template as a group and the teacher can post it on a class blog. In a third-grade class, the “student of the day” might be responsible to compose and post to the class blog.

Blogging could also be used as a review activity for any curricular subject. For reading, students can share vocabulary words they have learned, responses to reading selections or even reading comprehension exercises such as an

illustrated sentence. Mathematics applications can be equally simple: illustrated word problems, observations about patterns and shapes or explanations about data sets. Science allows for posts on seasons and other cycles or class experiments and observations. Holidays and other celebrations, important people, and even geography would all be appropriate social studies content to base blog posts on.

Differentiation should also be a part of the plan when setting up your blog. You may choose to create a [choice menu](#) for blog posts to allow students of differing abilities to represent themselves at their best. Perhaps a blog post does not need to be typed but could be recorded via [vocaroo](#) or [soundcloud](#) allowing for the occasional audio post or podcast. A student might be allowed to create a slideshow from images submitted by their classmates to accompany their blog post rather than use their own art.

Conclusion

Now that you're familiar with the blogging basics, you're ready for the next step! If you're a teacher who is planning on creating a blog for yourself, start thinking about your audience, your content, and the type of platform you'd like to use. If you're ready to introduce blogging to your students, check and see if any other teachers in your school have already started a blogging program so you can see what's working for them. You can also check out these great resources to find additional ideas and support on your blogging journey!

Additional Resources

- [Edutopia - Blogging in the 21st-Century Classroom](#)
- [TeachHub - A Beginner's Guide to Student Blogging](#)





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Coding

Coding in the K-12 Classroom

Jennifer Alexiou-Ray, Cassie Raulston, Diana Fenton, & Sherri Johnston

STEM

Coding

Programming

Learning Objectives

- Understand why coding is important in K-12 classrooms;
- Recognize the relationship between coding and important standards;
- Complete challenges and access resources associated with coding.

Computers are a part of almost every industry and are changing the way we live. Equally, this is true in education because computers and technology are used to deliver curriculum and offer opportunities for students to interact with technology. To better understand the role of computing in the world, we need to dive deeper and educate students on the basics of computer science.

Most students are taught only how to use computer and web-based software, rather than creating ways for them to use computational thinking and computer programming to solve authentic problems. One dimension of computer science that can easily be integrated into the curriculum is teaching students to code.

This chapter will provide preservice teachers with an overview of coding and how it is being taught in the K-12 setting.

Key Terms

Algorithm

a set of steps that are used to complete a task

Algorithmic Thinking

breaking problems down into smaller workable parts

Block-based Coding

coding with a programming language where the instructions are represented in blocks

Coding

a language that a computer can use to complete a task or a set of instructions

Computational Thinking

a problem solving process; typically broken down into decomposition, pattern recognition, abstraction, and algorithm design

Computer Language

structured commands written for a computer to process; some of the most common include JavaScript, Python, Structured Query Language (SQL), C, C++

Debugging

the process of testing, finding, and solving errors in computer programs

Pair-programming

two students sit at one computer, one is the “navigator” and one is the “driver”

Pseudocode

informal or simplified programming language that can be used to represent algorithms outside the computing environment

Unplugged

a coding lesson that does not require a computer

Why is coding in the K-12 classroom important?

Computers are a part of almost every industry and are changing the way we live. Equally, this is true in education because computers and technology are used to deliver curriculum and offer opportunities for students to interact with technology. To better understand the role of computing in the world, we need to dive deeper and educate students on the basics of computer science.

Most students are taught only how to use computer and web-based software, rather than creating ways for them to use computational thinking and computer programming to solve authentic problems. One dimension of computer science that can easily be integrated into the curriculum is teaching students to code.

Coding is simply a language that a computer can use to complete a task. It is a set of instructions given to a computer. “Coding is a new literacy. To thrive in tomorrow’s society, young people must learn to design, create, and express themselves with digital technologies” (Berkman Klein Center, 2014). According to the Institute of Museum and Library Services (2014), 65 percent of scientists with advanced degrees started being interested in the sciences started before

middle school. Adams and Mowers (2013) also indicate that coding skills are needed at all stages in life because it is a global language and more commonly used than spoken languages like English, Chinese or Spanish.

Research shows a growing need for coding in the job market. Computing jobs are growing at twice the national average while only 2.4 percent of college graduates with a degree in Computer Science (Adams & Mowers, 2013). As a result of this growing need, coding is now recognized as a critical literacy skill in the CS field, which people use to solve problems. Even outside of the CS field, many new jobs require some knowledge of computing and/or coding. Coding requires complex thinking and has evolved from solely technical skills to organize and communicate ideas (New Media Consortium, 2015). States such as Texas and Florida are allowing coding classes to count as a foreign language credit in high school (Zinth, 2015).

Offering computational thinking strategies with coding as part of the curriculum in elementary schools, K-5 students will have the exposure to 21st century skills that enable them to be successful in their future careers. In addition, research indicates that coding provides cognitive advantages to learning. "Learning a system of signs, symbols, and rules to communicate - that is, language study - improves thinking by challenging the brain to recognize, negotiate meaning and master different language patterns." (Adams & Mower, 2013).

Coding involves problem-solving, perseverance, collaboration, mathematical logic, and reasoning skills. Could anyone argue that these are not skills that we want for all students? It can be easy to get caught up in the common barriers of why not to code, such as lack of time, lack of knowledge, or lack of resources. But coding can be integrated into any curriculum and the learning can take place along with the students. There are many low or no-cost solutions to teaching students to code.

Educators need to first start with the belief that coding is for everyone and everyone needs to learn coding. Teaching coding is more than teaching the language for computing. It is not a language like ours, with vocabularies or alphabets, but special commands and abbreviations that are used to write computer software. Some of the most common coding languages include JavaScript, Python, Structured Query Language (SQL), C, C++. Coding can be thought of as a small part of the computer science field, which also involves physical systems, networks, storage, and collection of data or coding can be taught to reach more overarching goals conceptualizing the student as a global citizen and learner.

Coding and its relationship to ISTE Standards

Coding touches on most of the [ISTE \(International Society for Technology in Education\) Standards for Students](#) (ISTE, 2016). There are seven ISTE standards for students of a digital world. They are *Empowered Learner*, *Digital Citizen*, *Knowledge Constructor*, *Innovative Designer*, *Global Collaborator*, *Computational Thinker*, and *Creative Communicator*. These standards have been adopted across the country and world. Coding is a powerful tool we can use to cover more than just ISTE standards. Sylvia Duckworth, a world renown sketchnoter, summed up the ten reasons to teach coding from Aspinall (2015) perfectly.

Empowered Learner

When students code they become *empowered learners*. When a program is being developed, students set goals for program completion, develop strategies to "debug" or find mistakes in their program, and reflect on their work in order to make their program better by adding additional code. They also are able to share and receive feedback on their work. During the coding process students troubleshoot and use the knowledge gained to explore other emerging technologies as a result of understanding the logic behind how code is organized and executed.

Digital Citizen

Many times during a coding project students need assistance to troubleshoot their program. Students will turn to other programs or online documentation to assist them with their problem and program completion. In this case, students

must respect the intellectual property rights of others by giving proper credit. This is following the “Digital Golden Rule” and demonstrating digital citizenship.

Knowledge Constructor

Many students will code an app in order to solve a real-world problem. They will use research strategies and evaluate the accuracy of the information they acquire. Soon after, they will develop an idea and use their coding to seek a solution. These students are *knowledge constructors*. They are creating meaningful learning experiences for themselves.

Creative Communicator and Innovative Designer

As students create their programs they take into account the objectives of their product and work on expressing their ideas clearly and effectively. These coders go through the design process for generating ideas a number of times, test their theories, and refine their prototypes. As they accomplish their task, they use a variety of digital objects to create games, visualizations, models, or simulations. These students are blossoming into *creative communicators and innovative designers*.

Computational Thinker

The last ISTE standard coding meets is the one that is most obvious. That is the standard of *computational thinker*. When a child codes they are using algorithmic thinking, breaking problems down into smaller workable parts, and becoming adept at developing sequences of detailed steps to create and test their work. As students code, they begin to understand how computers execute their programs and what is involved in the production of the apps and they use daily.

What coding looks like in the classroom

Basic Coding Concepts

While the idea of teaching coding may seem overwhelming and complex, basic coding lessons do not even need to start with a computer. Coding lessons can progress from simple to complex. A lesson that does not require a computer is often termed “unplugged” because computer technology is not needed. A basic unplugged lesson might include teaching the students the vocabulary of coding. For example, writing an algorithm is one of the fundamental concepts in coding. An algorithm is a set of steps that are used to complete a task. Using the “unplugged” philosophy, students can write algorithms of their routine at school to learn this concept.

Challenge #1

Write an algorithm that consists of the steps you take to get ready each morning. What do you do first, second, and third? You can write this algorithm as if you were talking to another person, no need to use any “code” for now!

Progression from “unplugged” to “plugged” lessons with computers might start with simple coding programs. Simple coding programs for students are in friendly, graphical format with the more complex language hidden. For example, Blockly is a visual coding editor where students move around blocks to build code. The hidden language in Blockly is JavaScript. Blocks can be dragged and dropped and edited for simple programming in a puzzle like appearance.

When teaching “plugged” coding, computer availability might be a concern. To reduce the number of computers needed, a strategy that is considered a best practice when coding is the use of paired programming, which “is a proven method for both enhancing learning and writing better code” (Kraus and Protsman, 2017). Two students sit at one computer, one is the “navigator” and one is the “driver.” Then, at some point during the activity the two roles switch, which allows students experience with both roles and hands-on computer time.

Challenge #2

Try a basic [Blockly app](#).

For many coding games or apps, once the blocks are arranged, a program can be run to execute various commands. Many block type programs that are free are available to educators.

Challenge #3

[Now try Blockly again](#). This time you will be navigating your way through a maze.

As you can see with this previous challenge, lessons or time writing code can be spread out over multiple class periods with the recognition that some students might advance faster than others and multiple levels of programming should be available.

One resource that allows for this progression is Code.Org. Code.Org not only offers free training for educators but also plugged and unplugged lessons that educators can take and immediately use in the classroom. The free, web-based platform is where students can utilize Blockly to progress from simple to more complex coding concepts and teachers can track student proficiency and progress. It is designed with multiple courses that cater to different student age groups and reading proficiencies that help teach coding at a developmentally appropriate level.

Challenge #4

Visit the [Code.org Course Catalog](#) to see what options are available for the students you are planning to teach.

Coding with Scratch



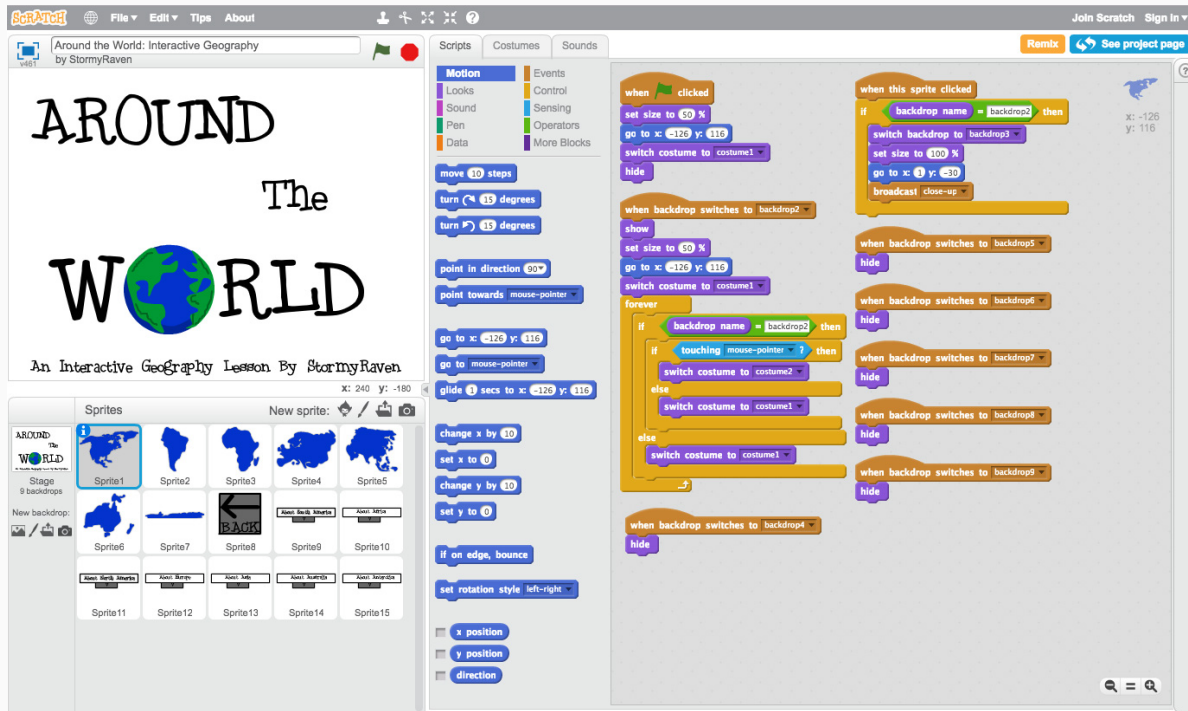
[Watch on YouTube](#)

Challenge #5

Visit Scratch and recreate some of these subject-based projects.

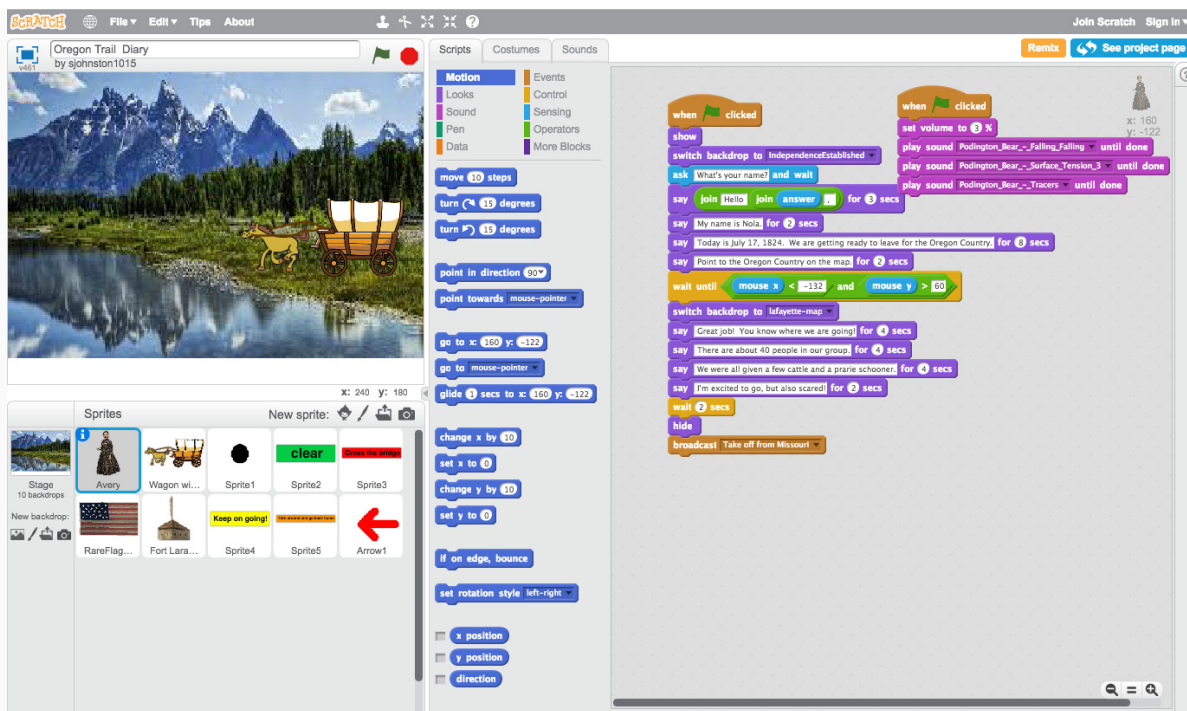
Geography

[Around the World Interactive Geography](#)



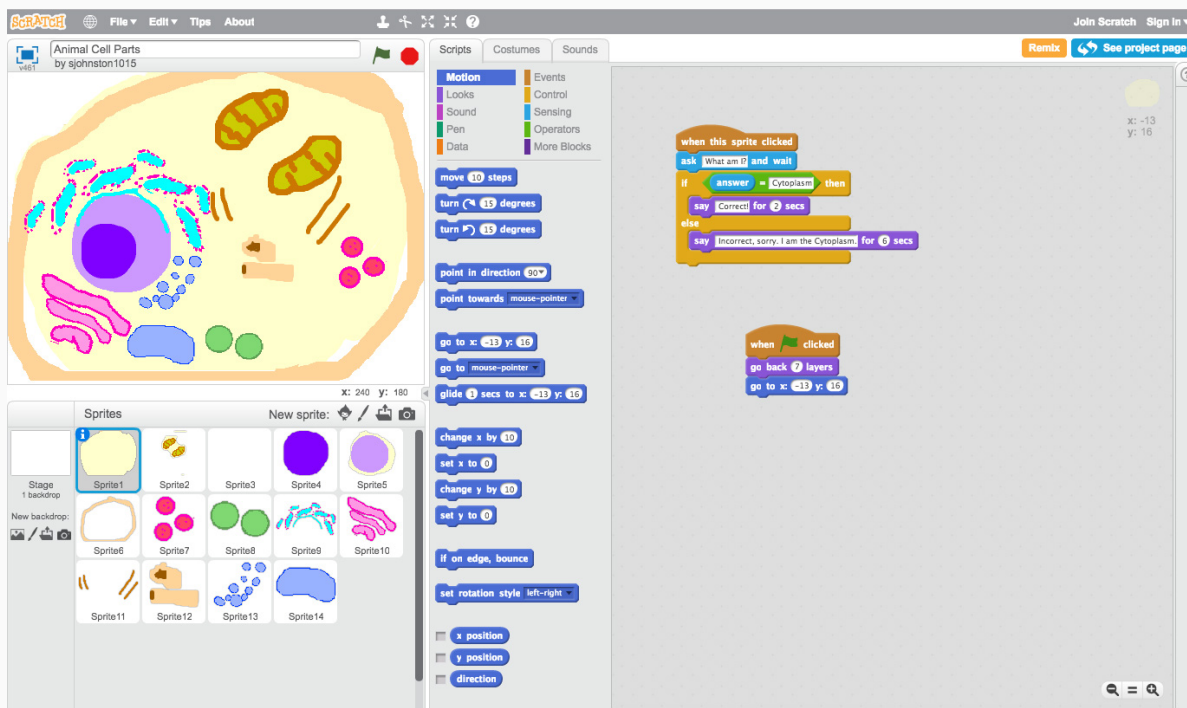
Social Studies

[Oregon Trail Interactive Diary](#)



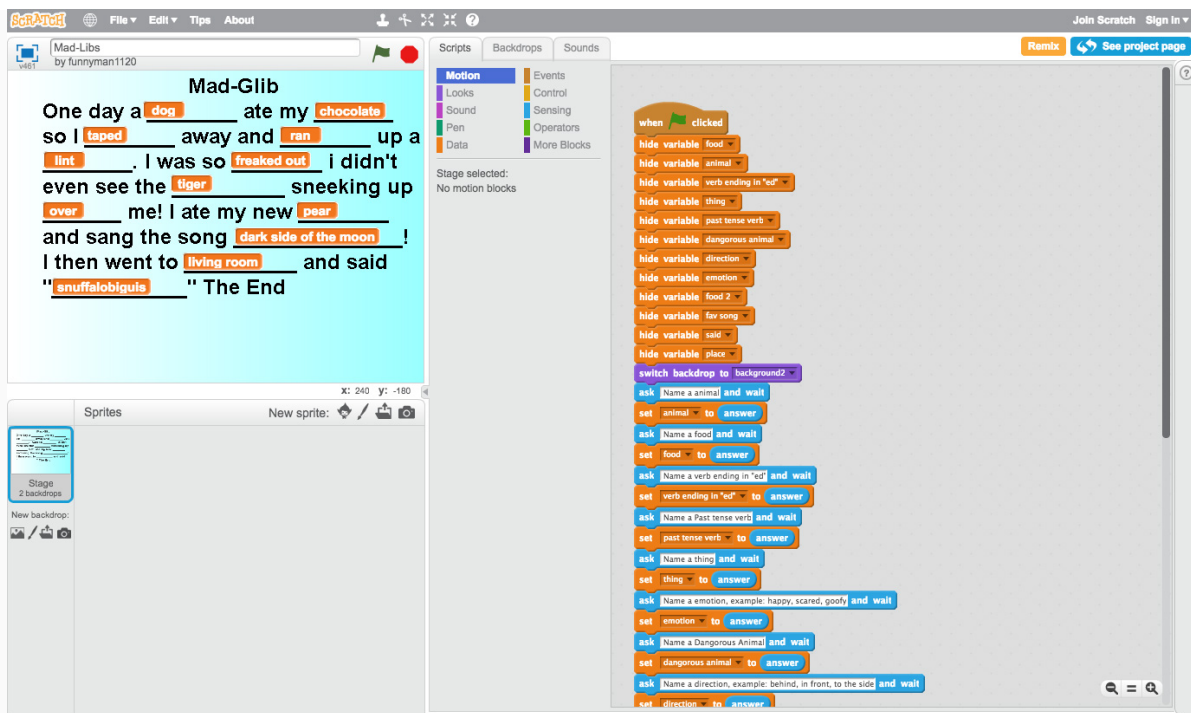
Science

[Animal Cell Parts](#)



Language Arts

[Mad Libs Story](#)



Coding resources and additional study

In addition to the resources you have explored in this chapter, there is an ever-growing list of tools and resources a teacher can use to aide in the integration of coding across the curriculum. Much of what is currently being used in education focuses on teaching students coding concepts in a block-based coding environment, like Blockly. However, some tools give students the option of learning simple coding languages or even beginning with block-based coding and moving to a coding language.

Low or No-Cost Coding Tools for the Classroom

- Computer Science Classes by [Code.Org](#) (free, ages 5-15)
- [Scratch Coding Cards](#)
- [20 Makey Makey Projects for the Evil Genius](#)
- [Scratch](#) - (free, ages 8-14)
- [The Foos](#) by codeSpark -free, ages 4-8)
- [Kodable](#) - (free, ages 5-18)
- [Littlecodr](#) - (card game)
- [Code Monkey Island](#) - (board game)

Children's Books to Encourage a Love of Coding

- [Computational Fairy Tales](#)
- [Hello Ruby: Adventures in Coding](#)
- [A is for Array](#)
- [Kids Get Coding: Learn to Program](#)
- [Coding for Kids by McCue](#)

Computer or Mobile Device Assisted Games

- [Bloxels](#) - (tactile video game design)
- [Makey Makey](#) - (making/programming)
- [Osmo Coding Awbie](#)
- [Osmo Coding Jam](#)

Web-based Software for Coding

- [Tynker](#) - (fee-based ages 8-13)
- [Code Monkey](#) - (online--paid solution to transition to writing code)

Robots for Hands-on Coding Application

- [Edison](#) - (programmable robot)
- [Dash & Dot](#) - (programmable robots)
- [Hummingbird Robotics](#)
- [Sphero](#) - (programmable robot)
- [Ozobots](#) - (programmable robot)

Coding Resources for Professional Study

- [Code.org Workshops](#)
- [Code: The Hidden Language of Computer Hardware and Software](#) by Petzold
- [Programming in the Primary Grades: Beyond the Hour of Code](#) by Patterson
- [Code in Every Class](#) by Brookhouser and Megnin
- [Girls Who Code: Learn to Code and Change the World](#) by Saujani
- [No Fear Coding: Computational Thinking Across the K-5 Curriculum](#) by Williams
- [Invent to Learn: Making, Tinkering, and Engineering in the Classroom](#) by Martinez & Stager
- [Computational Thinking and Coding for Every Student: The Teachers Getting Started Guide](#) by Krauss & Prottzman
- [Guide to Teaching Computer Science: An Activity-Based Approach](#) by Hazzan, Lapidot, & Ragonis

Additional Readings and Resources for Professional Study

- [Most Likely to Succeed: Preparing Our Kids for the Innovation Era](#)
- [Drive the Surprising Truth about what Motivates Us](#)
- [Mindset: The New Psychology of Success](#)

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Dr. Cassie Raulston is an Associate Professor for the Teaching, Leadership, and Technology programs at the University of Montevallo. She has degrees in Elementary/Special Education, and Instructional Leadership/Technology. Dr. Raulston's research interests include mobile learning, technology integration, coding, and gifted education. She presented a 3-hour hands-on workshop "Using Scratch and Robotics to Support Multiple Literacies in the Classroom" at the International Society for Technology in Education conference in Chicago in 2018. In addition, she has the privilege of collaborating with educators to develop and direct curriculum and multiple summer Coding Camps for students.



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2.3

Computational Thinking

Enoch Hunsaker

Computational Thinking

Coding



Learning Objectives

- Define computational thinking (CT);
- Explain the rationale for including CT as part of core curriculum;
- Understand research-based best practices for integrating CT with other core content at your grade level;
- Access a wide variety of resources designed to enable you to integrate CT at your grade level.

In today's high-tech and ever-changing world, it is increasingly clear that students need to be able to think critically and resolve complex and ill-defined problems in order to truly thrive in the environment where they are one day expected to live and work (Schön, 1987; Ventura, Lai, and DiCerbo, 2017). But while few would argue the utility of teaching critical

thinking and problem solving skills in schools, there is less consensus about how to do it, when to start, or what terms to use when teaching these important competencies.

One approach to teaching these skills is to teach computational thinking (CT). CT is particularly useful for the computer age, because it not only teaches critical thinking but also focuses on helping students "develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions" (ISTE, n.d., emphasis added). CT is the bread and butter of computer scientists, but it is also widely applicable for solving many other academic and non-academic problems.

CT is essentially a framework to describe a set of critical thinking and problem-solving skills, and it has gained significant traction as a viable and useful way of thinking about how to teach these skills in formal educational settings. While CT is not the only way to approach these skills, it provides a way of looking at problems so as to produce an automated or semi-automated solution that takes advantage of the unique affordances of computer technologies. It can also be beneficial in providing a common vocabulary, a wealth of resources, and a vibrant community of practice for teachers seeking to focus, coordinate, and improve efforts to guide rising generations in developing problem solving skills.



[Watch on YouTube](#)

Why Integrate Computational Thinking?

More than ever, we live in a world that is informed and inundated by computer technology. This fact may conjure thoughts of smartphones and personal computers, but increasingly, many everyday and traditionally non-digital objects are being designed to operate via a computer program. Some of these objects include streetlights, car engines, watches, roads, car tires, and even shoes (Hartigan, 2013).

As computer programs become more widespread, computer programming becomes an increasingly relevant skill, and many political bodies are recognizing this fact. Support for teaching computing in K-12 schools is growing in the U.S. and abroad. Several countries, including England, Finland, South Korea, and Australia, require that children learn computing or computational thinking (Rich, Jones, Belikov, Yoshikawa, and Perkins, 2017). Several U.S. states and districts have similar requirements (Partovi, 2017; EdSurge, 2016). The United States has not yet officially adopted such

measures, but appears to be moving in that direction. For example, in 2017 the Trump administration announced a yearly investment of \$200 million dollars into STEM education, noting that "the nature of our workforce has increasingly shifted to jobs requiring a different skill set, specifically in coding and computer science" (CNN Wire, 2017, emphasis added). Amazon, Facebook, and other major tech companies have committed a sum of over \$300 million (over the period of five years) to the new initiative (Romm, 2017). Thus, increasing attention, interest, and enthusiasm are paid to the role that computer science education should have in our schools (Bers, Flannery, Kazakoff, and Sullivan, 2014; Rich et al., 2017; Sullivan and Bers, 2016; Yadav et al., 2016; Yadav et al., 2017).

But before computer programming - or coding, as it is sometimes called - many believe that today's youth (and adults) need computational thinking (CT) to better solve the problems of the 21st century. CT may be considered a precursor to learning actual coding or computer programming skills. And while this is certainly true, it can also have a much broader application. The skills, attitudes, and approaches that make up CT are fundamental, universal, transferrable, and particularly appropriate and useful for the computer age. So, while a future computer programmer certainly needs CT, it is not necessarily true that everyone who learns CT should go on to learn coding. Rather, as computer technology becomes more embedded into the fabric of every industry, professionals in every industry need to be able to think in ways that leverage those computers to solve the problems of the future.

Learning computational thinking can benefit students both economically and academically. Each year there are far more computing jobs added than there are computer science graduates, with significant job growth projected for the foreseeable future (Bureau of Labor Statistics, 2018). Furthermore, studies have linked a host of academic benefits to learning CT, including improvement in student engagement, motivation, confidence, problem-solving, communication, and STEM learning and performance (Rich et al., 2017; Yadav et al., 2017).

What Is Computational Thinking?

Stephen Wolfram (2016) stated that the "intellectual core" of computational thinking "is about formulating things with enough clarity, and in a systematic enough way, that one can tell a computer how to do them." After gathering input from over 700 computer science educators, researchers, and practitioners, the International Society for Technology in Education (ISTE) and the Computer Science Teachers Association (CSTA) (2011) issued a [joint statement in which they provided an operational definition of computational thinking](#), which involves both a problem-solving process and a series of dispositions and attitudes.

Computational thinking may imply a certain degree of facility and familiarity with computers, but it is much more than mere tech savviness. It is a combination of disciplined mental habits, attitudes of endurance, and essential soft skills. CT allows us to not merely consume technology, but to create with technology (Yadav, Hong, and Stephenson, 2016). It is not a way of making humans more like computers, but rather of empowering humans to use computers more effectively to solve the problems of the Computer Age (Wing, 2006).

The ISTE/CSTA (2011) definition is thorough, but it may also be useful for teachers to have a few key words to keep in mind when planning lessons, guiding discussions, commenting on student work, etc. The following table is derived from the documentation of various organizations that seek to define and categorize CT in a useful way for educators (CAS Barefoot, 2014; Google, n.d.b; ISTE, 2014). This is not intended to be comprehensive, but it does provide a reasonably complete snapshot of the most crucial components of CT.

Components of CT (CAS Barefoot, 2014; Google, n.d.b; ISTE, 2014)

Skills

- **Decomposition:** Breaking down data, processes, or problems into smaller, manageable parts
- **Pattern Recognition:** Observing patterns, trends, and regularities in data
- **Abstraction:** Making a problem more understandable by reducing unnecessary detail.
- **Algorithm Design:** Developing the step by step instructions for solving this and similar problems
- **Evaluation:** Ensuring that your solution is a good one.

Attitudes

- **Confident:** believing in one's own ability to solve problems
- **Communicative:** willing and able to communicate effectively with others.
- **Flexible:** able to deal with change and open-ended problems

Approaches

- **Tinkering:** experimenting and playing
- **Creating:** designing and making
- **Debugging:** finding and fixing errors
- **Persevering:** keeping going
- **Collaborating:** working together.

Review These Terms on Quizlet

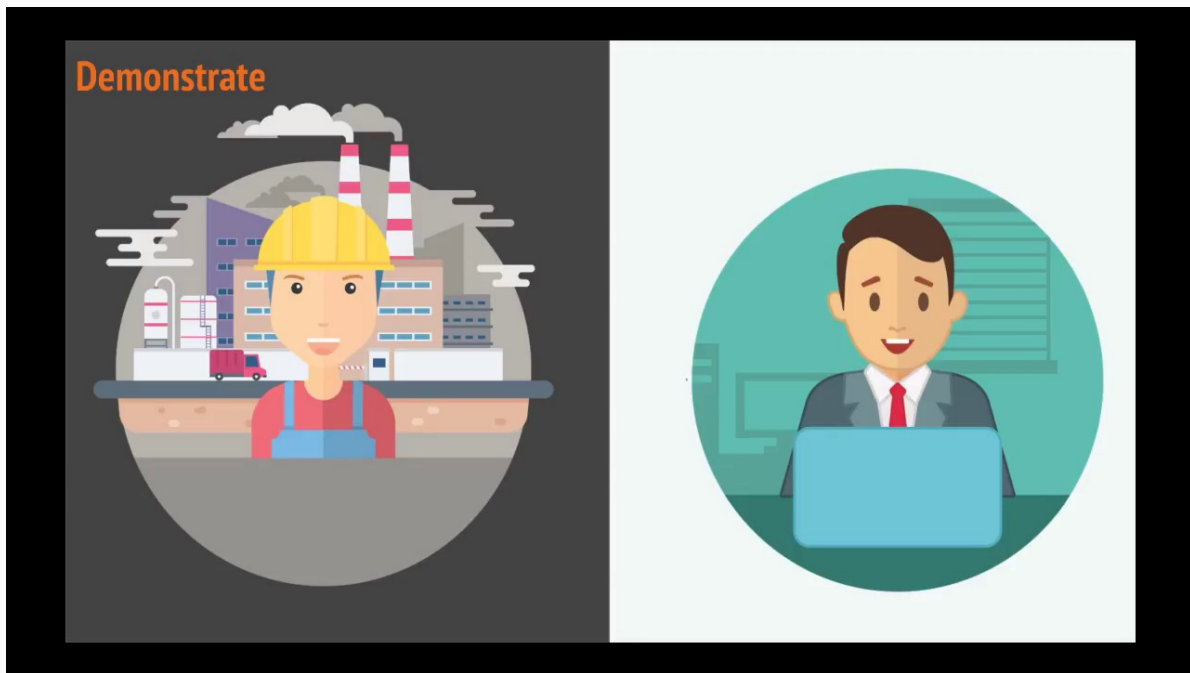
The image shows the Quizlet logo, which consists of the word "Quizlet" in a white, bold, sans-serif font. The logo is centered on a solid blue rectangular background.

Thought Exercise: Problem-Solving Models

Computational Thinking is an effective model of problem solving, but it is only one model. Others include scientific thinking or the scientific method (which is used by scientists to answer questions about how and why the world works) and design thinking (which is used by designers and engineers to design objects and experiences). Consider the steps of each of these widely-used problem-solving models:

Computational Thinking	Scientific Thinking	Design Thinking
<ol style="list-style-type: none">1. Decomposition2. Pattern Recognition3. Abstraction4. Algorithm Design5. Evaluation	<ol style="list-style-type: none">1. Ask a Question2. Conduct Research3. Form a Hypothesis4. Test the Hypothesis5. Record & Analyze Data6. Draw a Conclusion7. Communicate Results	<ol style="list-style-type: none">1. Empathize2. Define3. Ideate4. Prototype5. Test

Watch this video to better understand these processes:



Questions to Ponder:

- What might be the advantages and disadvantages of each problem-solving model?
- Could any model be applied to any problem? How might the types of results expected from each model differ?
- Are some problems better suited to one method than another?

Why Integrate CT in Early Childhood and Elementary Education

Establishing a way of thinking takes time, so if CT is to be truly grasped by the professionals of the future, they need to be familiarized with these concepts early and often throughout their academic career (Yadav, Mayfield, Zhou, Hambruch, and Korb, 2014). Computational thinking is "cross-disciplinary" in nature (Yadav et al., 2017), so it makes sense to start teaching it in elementary or even preschool, where all the subjects are naturally blended together for the students within the same environment.

Studies have shown that children as young as preschool-age (approximately 4) have been able to successfully learn basic CT concepts (Sullivan and Bers, 2016; Bers et al., 2014). Studies also show that learning this can be "an engaging and rewarding" experience for the students (Bers et al., 2014).

Technology permeates our world and experience. Bers, Seddighin, and Sullivan (2013) have argued that because technology is an integral part of children's experience, early childhood education should include the study of technology. Teaching computational thinking is one way to do just that. In early childhood education, we often focus on understanding the natural world, which is certainly worth studying, but the man-made world is also worth studying. Most children are more familiar with cell phones than with polar bears, yet teachers are more likely to teach a unit on polar bears than on cell phones. We can and should study both (Bers et al., 2013).

Some early childhood practitioners may question the appropriateness of teaching computational thinking to very young students, due to prevalent and well-founded concerns about giving too much screen time to young children (NAEYC and Fred Rogers, 2012). However, these concerns can be reduced by understanding that (1) there is a wide variety of CT activities that do not require the use of a screen (e.g., unplugged activities, screenless robots) and (2) that even activities that do involve screen time can—and should—be constructed as interactive, rather than non-interactive uses of technology (NAEYC and Fred Rogers, 2012).

Why Integrate CT in Secondary Education

Some secondary educators may understandably feel that, unless they are planning to get an endorsement in information technology education, computational thinking has little to do with them. However, teaching CT concepts in English, history, math, science, second languages, and other core and elective subjects is actually a great way to "support problem solving across all disciplines" (Google, n.d.a) Grover (2018) argues, "Like any skill, CT is best taught and learned in context, and embedded into class subjects."

If CT education is embedded across multiple subject areas at the same school, it has additional advantages, such as helping students to "make powerful connections between their classes and beyond" and "have a rich toolkit to draw from that crosses traditional subject borders" when faced with problems that are difficult to categorize within a traditional subject area (Sheldon, 2017).

Thought Exercise: CT - A 21st Century Literacy?

Many claim that computational thinking is an essential 21st Century Literacy which ought to be taught alongside reading, writing, and arithmetic in our schools. While you don't necessarily have to agree with this assessment, it is important to understand the rationale behind it.

Consider the following statements from CT education proponents, then consider the questions listed below:

Just as basic literacy in math and science are considered essential for all children to understand how the world works, education must also address the development of knowledge and skills pertaining to computing, which is now so integrally intertwined with every profession (Grover, 2018).

Computational thinking is a fundamental skill for everyone, not just for computer scientists. To reading, writing, and arithmetic, we should add computational thinking to every child's analytical ability. Just as the printing press facilitated the spread of the three Rs, what is appropriately incestuous about this vision is that computing and computers facilitate the spread of computational thinking (Wing, 2006).

Questions to Ponder:

- What is a "literacy"?
- Do you agree that computational thinking is a literacy?
- Do you agree that it is as fundamental as reading, writing, and math in the 21st Century? Why or why not?

How to Effectively Integrate CT into Your Classroom

This section is intended as a reference. Feel free to focus on reading the parts that are most relevant to you.

Research-Based Effective Practice for CT Integration

Teaching computational thinking has traditionally been viewed as a primarily constructionist endeavor (Bers et al., 2014; Buss and Gamboa, 2017). Constructionism posits that "children can learn deeply when they build their own meaningful projects in a community of learners and reflect carefully on the process" (Bers et al., 2014). In particular, the constructionist approach described by Seymour Papert "provides children the freedom to explore their own interests through technologies (Bers, 2008) while investigating domain-specific content learning and also exercising metacognitive, problem-solving, and reasoning skills" (Bers et al., 2014).

Within this broadly constructionist framework, a variety of instructional principles and methods have been identified as effective practices for teaching computational thinking. These practices can be adapted to most grade levels and subject areas.

- **Modeling.** Teachers should set an example of learning by modeling their own understanding, learning, and progress in computational thinking. Especially in the early stages, they should also model the computational thinking process for students so they understand what the learning, reflection, and revision look like (Highfield, 2015).
- **Integrating.** Teachers should collaborate with other teachers to facilitate the completion of interdisciplinary culminating projects (Bers et al., 2014).
- **Releasing Responsibility Gradually.** When teaching CT, educators should start with direct instruction, move to a simple guided activity, then issue an open-ended challenge or problem (Buss and Gamboa, 2017). Teachers should then continue to guide behavior, even while working/playing as a team (Highfield, 2015).
- **Encouraging.** Insofar as possible, teachers should provide "encouragement and problem-solving hints and tips," rather than outright answers (Buss and Gamboa, 2017).
- **Questioning.** Rather than providing answers directly, teachers should ask "probing questions" before, during, and after learning activities (Buss and Gamboa, 2017; See also Highfield, 2015) These questions should encourage students to reflect on their learning and might begin with phrases like the following (Buss and Gamboa, 2017):
 - "What if you were to..."
 - "How would you..."
 - "Have you considered..."
- **Fostering alternative problem-solving.** Teachers should promote alternative ways of modeling a problem (Buss and Gamboa, 2017), such as
 - Drawing out solutions on paper.
 - Discussing alternative solutions as teams.
 - Relating challenges to more familiar circumstances.
- **Using CT vocabulary across the curriculum** (Yadav et al., 2014). This can reinforce students' understanding of the terms and help them see their applicability across the curriculum and in daily life. For example, a teacher might refer to a set of rules or procedures as an "algorithm"; invite students to create an "abstraction" of how they feel; or emphasize that you are practicing "pattern recognition" skills.

How and When to Use Technology in CT Education

Teachers won't be utilizing technology every time they want to teach CT: they may be simply referencing CT vocabulary, helping students learn perseverance, or engaging students in an unplugged coding activity. However, since CT does involve "leverag[ing] the power of technological methods" (ISTE, 2014), a progressive program of CT instruction will inevitably lead to some integration of technological devices.

Just as PIC-RAT can be a valuable heuristic for evaluating classroom technology integration and designing technological learning experiences, it can also help guide educators in making decisions about how and when to use technology in the CT education process. In general, teachers should strive to provide learning experiences that guide students toward the creative and transformative ends of the PIC and RAT spectrums.

For example, an elementary teacher wanting to integrate CT into her curriculum might begin by explaining some key CT concepts to her students, such as decomposition and abstraction. She might then introduce a mathematical word problem that requires the students to break the problem into component parts and filter out unnecessary detail. So far, it has not been necessary to use technology, and most uses (e.g., an online worksheet) would likely have been passive or interactive replacements of traditional practice.

However, as the teacher helps her students to learn additional aspects of math and CT, she may see organic ways to integrate technology in creative and transformative ways. For instance, she may feel that the best way to teach shape properties and algorithm design is to bring some codable robots into the classroom and have the students program them to draw regular polygonal shapes. At first, the students may have some interactive time with the robots, simply so they can learn how they function. Eventually, however, their use will become creative as they design an algorithm to meet the teacher's challenge. Such an experience may transform the learning in several ways, such as

- helping the students make connections between math and computer science that they would not have made with mere worksheets;
- deepening the students' perception of the relevance of both math and coding;
- engaging students in content they might otherwise have found routine and boring.

CT in Early Childhood and Elementary Education

In addition to other research-based effective practices, the following ideas, examples and resources may be useful in an early childhood teaching context.

Ideas

- **Teach CT through Coding.** While learning CT does not require learning code, coding can be a particularly effective vehicle to introduce CT to young students, as it can help students to visualize and experience the concepts in a more concrete way. In particular, using "unplugged" activities and codable robots has been particularly effective for this age group.
 - **Unplugged Activities.** Unplugged activities are activities that teach coding concepts without involving a computer. Students may use a paper and pencil, manipulatives, or even their own bodies to experience coding principles in a deeper way. These activities naturally allow for conversations about and connections with CT skills, attitudes, and approaches.
 - **Codable Robots.** Codable robots can extend the coding and CT experience of young students. Robots provide lots of opportunities to integrate mathematical and engineering concepts into their coding and CT knowledge, and the connections students make can actually support their learning in traditional core subjects.

Examples

- Students learn about algorithms when the teacher explains what they are using the simple example of the routine students follow when they get up and come to school in the morning. Students then write their own algorithms for planting a seed and test it out with real seeds and soil (Randles, 2017).
- A teacher uses Ozobots (small robots programmable with paper and a marker) to teach her students about states of matter, geography, and coding. The ozobot moves across a map and the students must program it to move slower in cold regions and faster in warm regions. They need to practice communication, debugging, and algorithm design in order to make this work (Randles, 2017).
- Students create a math game with engineering toys and test every circuit before moving on to the next activity. If something doesn't work, they "debug" it. Students learn perseverance and communication skills in working together (Berdik, 2015).
- Students stuck in a difficult problem look toward a teacher for help, but the teacher directs them to "use prior knowledge, explore and work through it." Deep learning occurs as the students learn to persevere, collaborate, and rely on the CT process (Berdik, 2015).
- Students and the teacher together create an "algorithm" for the procedure of leaving the classroom.

Secondary Education

In addition to other research-based effective practices, consider the following ideas/examples for teaching CT in your specific subject area.

Language Arts & Foreign Language

- Students completing a short story unit are learning literary elements (e.g., plot, point of view, irony, etc.). Their assignment is to write a literary analysis in which they explore how a particular literary element influences a work. They utilize many CT skills throughout this unit, such as
 - Representing plot structure through abstraction (i.e., a plot diagram)
 - Logical organization and analysis of data in order to support their thesis.
 - Communicating and collaborating with others in class discussions
 - Th students also relate these skills to what they are learning in other subject areas (Barr, Harrison, and Conery, 2011).
- Students use logic to put together a jumbled story in correct sequence (Grover, 2018).
- Students identify patterns for different sentence types and rules for grammar (Grover, 2018).
- Students use first-order logic to arrive at conclusion based on given facts (Grover, 2018).
- Student construct social networks to analyze stories (Grover, 2018).
- Students program a story with alternative pathways ("Choose your own adventure") (Grover, 2018).
- Students analyze how algorithms affect dialogue and news feeds in social media (Angevine, 2018).
- Student collaborate to build a story, identify any "bugs" in the story, and fix those bugs to give the story a more logical flow. (Google, n.d.c)

Social Studies

- Students compare their modern lifestyle with the lifestyles of children from another era. They simulate the experience of children from the other era by writing about it in a blog. The teacher calls attention to the fact that they are practicing skills relevant to computational thinking, such as organizing and analyzing data logically, and representing data through an abstraction (Barr et al., 2011).
- Students review data and identify patterns and trends in wars and other historical events. The teacher helps the students recognize that they are practicing the CT skill of "pattern recognition." Students also create visualizations of these patterns and trends, and the teacher refers to them as "abstractions" (Grover, 2018).
- Students "create a simulation to study relationships in social science phenomena such as women's education and health." This is an abstraction (Grover, 2018).
- Students create models or "abstractions" for social systems, social networks, or social choice (Grover, 2018).
- Students use primary source data to study patterns of voting rights in the nation (Angevine, 2018).

Engineering

- Students look at a map of escape routes for the school. They recognize that the map is an "abstraction" and discuss how they could create an algorithm that would define the fastest way out of the school in the event of an emergency (Barr et al., 2011).
- Students compare and contrast the design thinking problem solving process and the computational thinking problem solving process and explore how each method can give them unique insights and solutions for engineering problems. They also discuss how the methods can be melded to provide more complete and better solutions.
- Students use engineering computer software to design structures.
- Students engage in a real-world construction simulation task as teams. They need to practice the skills of abstraction (drawing a design for the project), decomposition (breaking down the tasks that need to be completed). They also utilize CT approaches such as collaborating, creating, and (possibly) tinkering and debugging.

Music

- Students studying the diatonic scale and the concept of pitch use Scratch (a programming language) to create an "abstraction" of a xylophone. They also develop persistence as they work through a difficult problem (Barr et al., 2011).
- Students use algorithms to study intervals, rhythm, and composition (Angevine, 2018)
- Students explore musical patterns and create algorithms that can write a song (Google, n.d.c)

Mathematics

- Students model functions in algebra through programs (compare them to functions in programs) (Grover, 2018).
- Students write an algorithm (or precise sequence of steps) on how to do matrix multiplication or how to solve a quadratic equation (Grover, 2018).
- Students use decomposition to solve word problems (Grover, 2018).
- Students express generalizations (as algebraic representations) by identifying patterns (Grover, 2018).
- Students interpret and visualize statistics of an athlete's performance (Angevine, 2018).
- Students use robots to create a program that can draw any regular polygon of any regular size. They also explore how slight variations in the program can create fractal shapes.
- Students use basic patterns to label key points on the unit circle in terms of degrees, and then follows a similar process to relabel these points in terms of radians. Students can then develop an algorithm to convert between degrees and radians based on the patterns they used to count their way around the unit circle. (Google, n.d.c)
- Students use CT concepts to explore the linear association between variables using two sets of data. Students will read data in a spreadsheet and in a graph and identify positive and negative linear association based on the shape of the graph. (Google, n.d.c)

Sciences

- Do a species classification with explicit "If-Then" logic (younger grades) (Grover, 2018).
- Build a computational model of a physical phenomenon (Grover, 2018).
- Instead of playing with or manipulating pre-developed software simulations of scientific phenomenon, create (program) computational models and simulations to study and interrogate phenomena (Grover, 2018).
- Students use computational models and processes to predict the effects of removing a species from the ecosystem (Angevine, 2018).
- Students create simulations and abstractions that model safe and unsafe roller coaster designs (Angevine, 2018).
- Students model (i.e., abstract) different scientific laws and phenomena using CT concepts and approaches (Google, n.d.c).

Family and Consumer Science

- In a child development course, students engage in metacognition about the computational thinking process, and how it can help them to solve problems and make decisions in their own lives.
- In a sewing class, students observe common patterns in certain types of clothing. Later on, they create a pattern (i.e., an algorithm) for sewing a shirt. They also include diagrams (abstractions) within their pattern instructions.
- In a foods class, students explore and discuss patterns across cake recipes (e.g., classes of ingredients included, order of steps, baking times and temperatures). Students may also create their own cake recipe (algorithm) and test (evaluate) it based on a set of criteria of their choosing.
- In a personal finance class, students use computer software to track their spending over several months. They then use that data to find patterns and create graphs (i.e., abstractions) of spending patterns that can inform their future decisions.

Dance & Physical Education

- Students learning a variety of dance moves create their own dance (algorithm) by stringing them together.
- Students in P.E. learn about the wide variety of computational resources (e.g., apps, wearables) that can help them monitor and improve their physical wellbeing and personal health habits. They use data they collect from some of these sources to create reports (abstractions) to help them make decisions about what habits they will seek to develop.

CT Learning and Lesson Planning Resources Resources

The following table provides a number of resources for learning more about computational thinking and planning lessons that integrate its components.

Resource	Format	Grade Recommendation		
		PreK-2	3-6	7-12
CT Learning & Leadership				
Computational Thinking Leadership Toolkit (ISTE)	PDF	✓	✓	✓
Digital Promise's 10 CT-related micro-credentials	Web	✓	✓	✓
BYU's Understanding Computational Thinking and Teaching Computational Thinking badges	Web	✓	✓	✓
Google for Education - Computational Thinking for Educators free online course.	E- Course	✓	✓	✓
Integration Activities Across the Curriculum				
CAS Barefoot's Computational Thinking page	Web	✓	✓	
Google for Education - Exploring Computational Thinking: CT Materials	Web			✓
Wonder Workshop's Code to Learn Lesson Library	Web	✓	✓	
Computational Thinking Teacher Resources , 2nd Edition (ISTE)	PDF	✓	✓	✓
CT Vocabulary and Progression Chart (ISTE)	PDF	✓	✓	✓

Resource	Format	Grade Recommendation		
		PreK-2	3-6	7-12
Understanding Developmentally-Appropriate Integration				
NAEYC's Technology & Media website	Web	✓		
Fred Rogers Center Website	Web	✓		
Erikson Institute	Web	✓		
Unplugged Activities				
Code.org's CS Fundamentals Unplugged	Web	✓	✓	
CS Unplugged	Web	✓	✓	
Robotic Coding Activities				
Coding as a Playground : Programming and Computational Thinking in the Early Childhood Classroom by Marina Bers	Book	✓		
Robotics for Young Children: STEM Activities and Simple Coding by An Gadzikowski	Book	✓		
Ozobot Lesson Library	Web	✓	✓	
CAS Barefoot's Bee-bot Activity Guide	PDF	✓	✓	
Wonder Workshop's Learn to Code Curriculum	Web	✓	✓	
Ontario Math curriculum, Grades 1-8 Sphero Lesson Plans	PDF	✓	✓	✓
Block-Based Coding Activities & Tools				
Code.org's Pre-Reader Express Course and courses A-F	Web Games	✓	✓	✓

Resource	Format	Grade Recommendation		
		PreK-2	3-6	7-12
BootUp Curriculum for Scratch and Scratch Jr.	Web	✓	✓	
Scratch	Web Tool	✓	✓	✓
Kodable	Web Games	✓	✓	

Conclusion

Computational thinking is a method of solving problems that is both widely applicable throughout the K-12 curriculum and increasingly relevant in the 21st Century. Integrating CT into traditional core and elective subject areas can help students to make important cross-curricular connections, improve their academic performance, and develop important skills for creating solutions in the wide variety of vocations in which they will one day engage. As the popularity and relevance of CT becomes more apparent, many countries, states, and institutions are adopting it into their curriculum, so teachers should be aware of how this affects them, how it may affect them in the future, and the variety of resources they can access as needed. They are also encouraged to become as familiar as they can with CT skills, attitudes, and approaches, and to develop these competencies in their personal and professional lives.

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English Language Learning

Empowering ELLs through technology integration

Jui-Hsin Renee Hung & Ai-Chu Elisha Ding

English Language Learners

Second Language Acquisition

Learning Objectives

- Understand the concept of learner empowerment;
- Identify resources that can help develop learner autonomy and multiliteracies.

The purpose of this chapter is to introduce the notion of learner empowerment and provide available resources for empowering English language learners through integrating technology into your instruction. Under this broad concept of empowerment, in this chapter, we focus on two key aspects - developing learner autonomy and employing a multiliteracies perspective in the classroom. We further narrow the scope of each aspect by discussing what learning opportunities each of them affords. We follow this discussion with a list of technology tools that will assist with your incorporation of our suggestion, and provide a scenario-based example using some of the listed tools.

Key Terms

English Language Learners (ELL)

students who often come from families where languages other than English are spoken and whose English proficiency may be defined as limited at least at some point of formal schooling; often required to fulfill certain language requirements, such as language assessments or specialized language courses

Learner Autonomy

the ability to take charge of and responsibility for one's own learning in order to pursue topics that are relevant and interesting to the learner

Learner Empowerment

raising learners' awareness of the control they can have over their own learning process, which often goes hand in hand with the concept of learner autonomy (e.g., when language learners are empowered, they are given the power and ownership of their own learning and are allowed to negotiate identities in the learning process)

Multiliteracies

emphasizes that language use is context-specific and multimodal. It values the differences between different communication modes

Ownership

like learner autonomy, this concept hands more learning responsibility to students; moreover, it emphasizes on the importance of making connections between learners and the language they are learning at different levels as a way to strengthen the bond; promoting ownership is considered as a strategy to enhance learner autonomy

What do we mean by learner empowerment?

English language learners (ELLs), who often come from families where languages other than English are spoken, is a rapidly growing, but oftentimes underprivileged population of students in U.S. schools. These students sometimes have negative labels or stigmas attached to them because of language proficiency or cultural stereotypes. As a result of the negative labels and stigmas they are exposed to, ELL students may also hold negative beliefs about their own identities and competence.

In the classroom, too often these learners' voices go unheard and their diverse identities are underappreciated. **A simple definition for empowering learners is to give them power and ownership of their own learning and allow students to negotiate their identities in the language learning process.** Teachers have used various strategies to allow ELLs to voice their learning needs in the classroom. These includes incorporating students' home culture, home language, or prior experiences into the instruction, emphasizing diversity or multiliteracies, involving students in making learning-related decisions, or creating opportunities for students to express themselves in a multimodal manner.

To empower ELLs through technology integration into our instruction, in this chapter, we focus on two aspects under the broad concept: *learner autonomy* and *multiliteracies*. To promote learner autonomy in your classroom, you can start by creating collaboration and reflective opportunities for your students, and to raise the awareness of multiliteracies in your classroom by providing spaces for students to express their multiple identities in various forms. All of these have become much more accessible for both teachers and learners with the availability of new technologies.

Learner autonomy

Handing over responsibility to the students by encouraging their control of the learning process or allowing them the options to choose topics pertaining to their interest can promote their learner autonomy. The concept of learner autonomy has been closely associated with self-directed learning, and is seen as an important element that results in

learner empowerment. Fortunately, with the emergence of new technologies, learners do not necessarily have to rely on teachers for accessing input and learning resources. They are now given more choices to make learning decisions for themselves as to how, what, and when they want to learn.

We know that there are different ways to define learner autonomy, but in general, it can be defined as “the ability to take charge of one’s own learning” (Little, 2007, p. 15), and it concerns whether or not “learners are able to pursue topics and questions that are interesting and relevant to them” (Cennamo, Ross, & Ertmer, 2013, p. 58). In other words, through shifting responsibility from teachers to learners, we give learners the power to take charge of their own learning process.

Empowering ELLs through developing them into autonomous learners can happen within and outside the classroom. For example, in the classroom, as a teacher, we can include collaborative projects, review our assessment methods to ensure learner autonomy is considered, allow our students chance and time for reflection, or give them opportunities to monitor and assess their learning as well as opportunities to provide us feedback. On the other hand, outside the classroom, there are other methods we can encourage our students to take in promoting learner autonomy. For example, students can make use of digital learning technologies to pace their own learning, find support from distance learning, or seek other learning opportunities, such as language exchanges or study abroad experience. These approaches shift learning responsibility from teachers to learners and engage our students in a learning process where they possess more ownership.

Multiliteracies

While the backgrounds and needs of English language learners may vary profoundly, one thing they share in common is that most of them come from homes where languages other than English are spoken. This leads to their multiliteracies and a sense of multiple identities and cultures, and potentially to their lack of English language competence and cultural understanding of the U.S. education system. As a teacher, recognizing their differences is an important first step, and to further empower them through embracing their differences and encouraging them to show their differences, new technologies can bring a wide range of possibilities for the acceptance and enactment of multiliteracies in your classroom.

To empower ELLs, one aspect is to challenge the dominance of English language and the cultural values owned and imposed by the mainstream groups. In other words, as English as a second language or content area teachers, we should celebrate and incorporate ELLs’ home cultures and languages into our instruction. During the process, we help ELLs develop their bilingual and bicultural identities (or even multilingual and multicultural) instead of forcing them into the English-only mentality and being considered as “inferior” or “disabled” individuals.

The other method of empowering ELLs is to bestow them the opportunities for developing their competency as fluent and critical English speakers, readers, and writers. The notion of *multiliteracies* or *new literacies* further comes in as it recognizes that communications go beyond written or oral language. People communicate with one another through modes beyond language (e.g., gestures, interpersonal distance, sound, images). Therefore, aside from the traditional language competences (reading, writing, speaking, listening, grammar), a pedagogy of multiliteracies also emphasize cultivating multiliterate individuals who are “flexible and strategic and can understand and use literacy and literate practices with a range of texts and technologies; in socially responsible ways; in a socially, culturally, and linguistically diverse world; and to fully participate in life as an active and informed citizen” (Anstey & Bull, 2006, p. 55). Oftentimes, participating in such activities, ELLs are also given the space to reflect on their multiple identities more critically.

Enhancing learner autonomy and endorsing multiliteracies in the classroom are both important and neither should be overlooked. Therefore, to be a teacher who is committed to empowering ELLs means one will not only deliberately create opportunities for learners to take in charge of their learning, but also honor their home cultures and languages and strive to cultivate both the traditional and new literacy competences.

How can technology support learner empowerment?

Integrating technology into our ESL teaching can provide a good variety of ways to develop ELLs' autonomy and multiliteracies. With proper instructional design, technology can help teachers enrich the learning environments, differentiate the learning tasks, and give students the ownership of their learning. It also gives learners ways to express themselves through different channels and modes of communications. For example, by using communication tools such as instant messaging, students who are less confident of speaking are offered an alternative way to express their thoughts in conversational contexts. Or, by using photo or video cameras, students are able to express themselves with both language and visual representations.

Furthermore, one of the biggest challenges in teaching a multilingual/multicultural classroom is that the teacher may not share the same home language as the students and their families. To that end, technology resources such as Internet search engines, online dictionaries or translation services all play a crucial role in understanding and incorporating students' home cultures and languages into our instruction. Thus, technology not only can potentially enhance the effectiveness of our ESL instruction, it is also the key to realizing a transformative educational experience for ELLs.

What technology tools are available?

Technology for autonomy

1. Collaborative learning tools: Students develop autonomy when they take responsibility of their own learning individually, or collaboratively with their peers. The use of collaborative learning tools strengthens learner autonomy because it creates authentic language activities that are engaging, involves learners in decision-making processes where they direct their own learning with their peers, and extends the learning experience outside of the classroom. These activities improve students' language and autonomous learning skills at the same time. For example, many online collaborative writing tools allow students to compose a story together. Students can use collaborative learning tools to write with their classmates for a course project, or to do creative storytelling online with other writers they have never met. Many of the websites also offer a space for writers to publish their work online, which gives students a real audience to write to. Or, if students are producing a digital project collaboratively, they can share and put together ideas and multimedia resources in a shared digital space, which not only stores the information but also helps them sort out the ideas by engaging in decision-making processes.
 - [Google Drive](#): Google Drive may be seen as a cloud storage, but it is more than that and is very easy to use for collaboration and resource sharing. Plus, if you or your students are already using Microsoft Office, tools on Google Drive work very similar to Microsoft Office tools, making file exporting and importing between the two straightforward. For more information on how to use Google Drive in e-learning, this article provides some directions for you to go: [6 Effective Ways To Use Google Drive in eLearning](#).
 - [Padlet](#): Padlet enables students to organize and arrange ideas freely on a blank board. It makes sharing multimedia resources such as audio, video, images, and documents easy and fast. There is a lot of flexibility in terms of how to use this tool. You can create a shared board for your class, or your students can create one for their own group. The tool allows anonymous editing or sharing, so be mindful that if for your purposes you prefer to have identifiable contributions of the students, you will want to require student login. Otherwise, there will be no way to trace back who makes what changes.
 - [FoldingStory](#): This is a great tool to motivate students to write creatively together and to turn writing into a game. Your students can do collaborative storytelling with others. What makes this more exciting is each writer only gets to contribute 120 words or less within 3 minutes to a open story. When a line gets more likes from the readers, the writer will get on the leaderboard. If your students don't feel motivated to write, FoldingStory may bring some change. The site also keeps all stories that are finished for future readers.
 - [Piazza](#): This tool helps you build an online learning community for your course and has features that can encourage extended discussion outside of class. It differs from many other learning management systems in that anonymous postings are allowed, which may be especially beneficial to encouraging different forms of participation from ELLs. The website also provides subject-specific features so that you and your students can expand the discussion with the availability of specific textual and multimedia editing tools. According to their user testimonials, students tended to feel more comfortable discussing and asking questions on this platform.
 - Audio recording and editing tools: No matter where your students share their work or collaborate, if they want to create an audio recording and embed it into their project, these free tools are great to use:
 - Audacity (<https://edtechbooks.org/-Tj>): To watch tutorials for how to record with Audacity, you can check out Lynda.com, or read this blog article from [Jake Ludington's Digital Lifestyle](#).
 - GarageBand for Mac - <https://edtechbooks.org/-jdT>
 - [VoiceThread](#)
2. Self-directed learning tools: As mentioned above, students develop autonomy when they are in charge of their own learning, and self-learning has been considered as a critical process in developing autonomy. When students are involved in self-directed learning, they are usually engaged in activities including diagnosing learning needs, setting learning goals, implementing learning strategies, evaluating their own learning, or searching for different approaches or resources to support and pace their learning more effectively. In addition, particularly for those ELLs who are struggling or unmotivated, creating learning experience they can relate to may help turn around the learning outcomes.

- Self-paced learning tools:
 - [Duolingo](#): A favorite of many language learners. Learners can set daily goals for themselves and use different features to motivate them.
 - [CourseWorld](#): A huge collection of online talks and classes can be found on this site, making the search of resources much easier.
 - [Khan Academy](#): The site is very well-designed and offers a lot of amazing courses for learning subject areas, and by far an English grammar section.
 - [NoRedink](#): A great site designed for teaching and learning grammar and writing skills. It not only saves you a lot of time creating quizzes and assignments, but better than that, aligns with the Common Core Standards.
- Reflective learning tools:
 - Formative assessment/feedback tools: As mentioned earlier, allowing student to reflect on what you teach and to give you feedback is a great way to empower them. These great tools will help you collect student response in an efficient way:
 - [Google Forms](#)
 - [Socrative](#)
 - [GoSoapBox](#)
 - [SurveyMonkey](#)
 - [Recap](#)
 - [TodaysMeet](#)
 - Student self-reflection tools: Not just reflecting on what you teach, students surely need to reflect on their own learning process. With these following tools, students can record and capture a moment in their learning, add reflection to the image or video of that moment, and even share that with others:
 - [Fotobabble](#)
 - [Nutshell](#)
 - [Evernote](#)
 - [Video Notes](#)
 - E-portfolios: The following are tools that are safe for your students to create e-portfolios to record, share, and reflect on their learning, while you (and their parents) monitor their progress and online activities.
 - [Kidblog](#)
 - [Edublogs](#)
 - [Weebly](#)
 - [Wix](#)
 - [WordPress](#)
- Audio publishing tools: When your students create a digital project or an e-portfolio using the sites above, they can upload a podcast or an audio show they make to those sites. To give them another option, these sites are made for publishing audio shows:
 - [Podbean](#): This site also has a section for publishing education podcasts (<https://edtechbooks.org/-bfT>), where you will find online lessons, student projects, etc.
 - [Podomatic](#)
 - [BuzzSprout](#)
 - [Blubrry](#)
 - [Spreaker](#)
 - [YouTube](#)
 - [iTunes](#)

Technology for multiliteracies

1. Multimedia ESL lessons: ELL teachers are blessed with a great variety of resources available online for enhancing and enriching our instructions. In particular, the following websites offer great multimedia materials for developing language lessons that would help students improve their traditional literacy skills (speaking, listening, reading, writing and grammar) in an integrative way. These multimedia lessons offer visuals, audios, and hand-on activities recommendations that could meet learners' various learning styles. They incorporate authentic materials (e.g., TED talks, movies, online Youtube videos) that introduce a wide range of knowledge to empower the ELLs with the cultural capitals they need. Some of the websites also allow the teachers to adjust the language difficulty level to fit their ELL's needs. In addition, teachers can also use these multimedia materials to introduce students to the multiliteracies (new literacies) skills, getting students to start paying attention to the meanings conveyed through modes other than written and oral language (visual representations, ambient sounds, music, accents etc.). These multimedia materials could also serve as examples for students to consider how they could communicate in a multimodal way.
 - o **BBC Learning English** (<https://edtechbooks.org/-zA>): BBC offers free language lessons and listening practices based on current news reports. Their archived site also has a lot of great multimedia materials (<https://edtechbooks.org/-gg>) .
 - o **Breaking News English** (<https://edtechbooks.org/-cY>): it's free and it's amazing. As simple as that.
 - o **TEDxESL**: It really is a pity that this site is no longer updated, but all the available TED-talks-based lessons on this site are well-designed and engaging.
 - o **ESLnotes** (<https://edtechbooks.org/-SB>): Who doesn't like watching movies? ESL notes offer movie watching guide and discussion questions for some classic American movies.
 - o **Viralelt** (<https://edtechbooks.org/-qN>): The author of this blog, Ian, developed ESL lessons for intermediate to advanced adult ESL learners based on youtube videos that had gone viral on the internet.
 - o **ESL Pod** (<https://edtechbooks.org/-Pi>): ESL Pod does not only offer podcast lessons for ESL learners, they also have online blog posts, videos and also kinds of resources for ESL learners and teachers.
 - o **BrainPOP ESL**: BrainPOP ESL offer lessons specifically designed for ESL learning. With all the animations and games, this is a great resource for younger ELLs. In addition, with captions for all the videos, lessons hosted on [BrainPOP junior](#) are great resources for elementary ESL teachers, too.
 - o **Starfall**: Starfall has interactive games and lessons for emerging readers. Preschool and kindergarten teachers as well as elementary ESL teachers have been using this site to engage young kids.
 - o **Storyline Online** (<https://edtechbooks.org/-YF>): Elementary teachers, if you have never visited this website before, you have to visit it. This is one of the best websites for children's literacy and storytelling. The storytelling videos are all captioned, so they are appropriate for ESL learning as well. In addition to the videos, the website also provides activity guides for teachers.
2. Multimodal composing and digital storytelling: From the multiliteracies perspective, we need to give students opportunities to learn and practice using different modes and technologies. ESL teachers have been engaging ELLs' in multimodal composing and digital storytelling to empower them with the symbolic competence. Through multimodal composing or digital storytelling, ELLs relies on different modes of communication to express themselves. ESL teachers would further encourage ELLs to tell their own stories, express their emotions or introduce their home cultures and languages through digital storytelling.

- The following sites offer tips for using digital storytelling in teaching and also examples of digital storytelling videos:
 - **Story Center** - <https://edtechbooks.org/-nC>
 - **Story Circle** - <https://edtechbooks.org/-uk>
 - **Story Corps**
 - **Video in the classroom** - <https://edtechbooks.org/-so>
 - **Lang Witches- Digital storytelling** (<https://edtechbooks.org/-mx>): **what it is and what it is not**
 - **Larry Ferlazzo's blog post on digital storytelling** - <https://edtechbooks.org/-Ya>
 - **U of Houston's Educational Uses of Digital Storytelling** - <https://edtechbooks.org/-uf>
 - **Kevin Hodgson's blog post on digital storytelling** - <https://edtechbooks.org/-wu>
 - **Kathy Schrock's post on digital storytelling** - <https://edtechbooks.org/-Vm>
- The following websites or apps are excellent tools for multimodal composing or digital storytelling:
 - **Storybird**
 - **My Storybook**
 - **Storify**
 - **Toondoo**
 - **Pixton**
 - **Make Belief Comix** - <https://edtechbooks.org/-rNh>
 - **Storyboard That**
 - **VoiceThread**
 - **Tika Tok**
 - **Zimmer Twins**
 - **Toontastic 3D** - <https://edtechbooks.org/-ri>
 - **Green Screen**
 - **Stop Motion Studio**
 - **Powtoon**
 - **WeVideo**
 - **Shadow Puppet**
 - **Haiku Deck**
 - **Trading Cards Creator1** - <https://edtechbooks.org/-Bf>
 - **Trading Cards Creator 2**

Example of using technology to empower ELLs

Miss Caroline is an ESL teacher at the Flower Elementary School. One third of the student population at this school are ELLs whose home language includes Spanish, Chinese, Korean, Arabic, Turkish and Swahili. Also, one third of the student population are enrolled in free or reduced price meal plans. Miss Caroline speaks English as first language and can speak a little Spanish. Each ESL class Miss Caroline teaches has around 18-20 students. She has a teaching assistant, and there are community volunteers coming into her classes to help her on a regular basis, too. The Flower Elementary School has 1:1 technology access where kindergarten to 3rd grade have access to iPads and 4th grade or higher has Chromebooks.

In this lesson unit, Miss Caroline engaged the 4-5th grade ESL students to learn about their home cultures and introduce their home cultures to one another through storytelling. The lesson started with Miss Caroline leading the students to discuss what culture means and why cultural understandings are important. Miss Caroline asked the students which culture(s) they felt they were affiliated with and what they know about those cultures.

Next, Miss Caroline mentioned how holidays have significant cultural and historical meanings behind. She used Thanksgiving in the US as example. By introducing Thanksgiving, Miss Caroline taught students vocabulary words related to Thanksgiving such as parade, pilgrim, gravy, mashed potato, turkey, harvest. She also used a [BrainPOP lesson](#)

to teach students past simple tense, which is an important grammatical knowledge for telling stories. She showed a [cartoon that tells the story of Thanksgiving](#), and asked students to retell the story of Thanksgiving.



[Watch on YouTube](#)

She then introduced some Thanksgiving traditions in the US such as the Thanksgiving dinner or the Macy's parade in New York. Miss Caroline also brought photos of her family celebrating Thanksgiving together and shared her thanksgiving stories.

Afterwards, Miss Caroline announced the digital storytelling project. She told students they were to pick an important holiday in their home cultures and create a digital story about how their family celebrated the holiday. Prior to making the digital story, Miss Caroline assigned three mini tasks to the students:

1. Conduct online research on the holiday you are going to introduce (in either English or your home language); write a brief introduction of the holiday in English.
2. Interview your parents or grandparents to learn about how they celebrated this holiday; take notes on the stories they shared and collect photos if possible.
3. Choose three words relevant to the holiday in your home language, create [trading cards](#) to introduce them to the class.

(<https://twitter.com/HiPandarow/status/961194028757692416>)

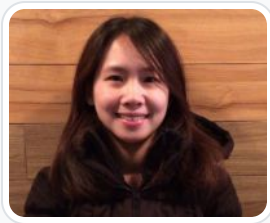
Then, Miss Caroline taught the elements of good stories and how to write personal narratives. She also introduced action words and adjectives that are useful for writing stories. She then engaged students in creative story writing by randomly picking 3 trading cards other students created to make a story.

Next, Miss Caroline asked students to write the script for the story about how their family celebrated a holiday in their home culture. She prompted the students to think about whose point of view they are going to write for, what events occurred, how they would sequence the events, what problems, dramas or emotions were involved. After the story has been structured, she also guided the students to pay attention to the grammars and word choices.

Miss Caroline then provided various activities to teach students how to create a good digital story. She told students a digital story utilizes things beyond language to convey meaning to the audience. This includes images, sounds, music and even a dramatic tone. She showed to students a few digital story examples she found on [Story_Center](#) and the [Storyline Online](#).

She also adopted a [storyboard template](#) she found online to guide students to create different scenes for their digital story. Meanwhile, students went online to search for royalty free music and images they need for their digital stories, and included that information in the [storyboard](#).

Finally, Miss Caroline instructed students how to use [WeVideo](#) to build and edit their digital story videos. Students worked on creating videos to tell the stories of their families. When they were done, they published the videos and shared the videos with their families.



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2.5

Foreign Language Teaching, Part 1

Promoting creativity and learner choice in foreign language teaching through technology integration

Rachelle Dené Poth

Second Language Acquisition



Learning Objectives

- Recognize how technology can help foster authentic learning and student choice;
- Identify common tools to support communication, collaboration, creativity, and student choice.

Technology provides so many ways for students to learn anywhere and at any time, and at a pace that is comfortable for each student. As educators, we want students to be able to connect with the classroom and the resources, as well as to develop global connections in their learning. Finding the right tools to use can take time and the search for a tool to implement in the classroom should always begin by asking the question “Why” integrate technology and “How” will it enhance learning for students. Knowing what tools to use takes time and having resources available to start with, and being able to involve students more in the process will be highly beneficial.

Technology enables teachers to teach from anywhere and the availability of tools which lend themselves to more interaction between the teacher and the students and the content continues to grow. Using digital tools provides more differentiation and personalized learning, and opportunities for students to become the leaders and creators in the classroom. They can create with these tools and share lessons with the class, increasing the resources available to all students, or they can simply use the opportunity to become the creator, as a way to help them to learn the material in a more meaningful and authentic way.

Key Terms

technology_integration,project-based_learning,media_literacy

Authentic Learning and Choices

The use of digital tools means that learning is no longer confined to the traditional time and setting of the classroom. The learning environment can be anywhere , at any time and at a pace that is comfortable for students. When students are given choices in how to show what they have learned, they are more likely to be engaged and excited for learning. They will feel valued. The lesson and learning will be more meaningful because it has been made personal to them. Students can look for and interact with resources that meet their own needs and teachers can use these resources to find out what the student needs are. With the many ways to assess students using digital tools today, data is available instantly, allowing teachers to provide feedback to students when they need it the most.

Student Choices

Having feedback while learning happens is critical for student growth. When teachers give students the opportunity to make choices about the types of activities they are interested in, students become more empowered in their learning and can self-direct. When teachers relinquish some of the control and leave the decision-making to the students to determine how to show what they have learned, or let them create their own homework assignment, they are more empowered in their learning.

In years past, classrooms were teacher-centered. With the tools available today and the goal toward increasing student empowerment, through choices in learning, we move from the teacher-centered classrooms, to student-centered and optimally, student-driven learning environments.

In a student-driven classroom, students have opportunities to lead the activities in the classroom and to do more than just be passive learners. They actively make decisions and have input into their learning experiences. With the launch of the new ISTE student standards last summer, focus is on the empowered learner and student-driven learning. The standards emphasize the importance of providing students with opportunities to do more than just use technology but to “leverage technology” and to create with technology to gain new perspectives, to communicate, collaborate, and become responsible digital citizens.

In particular, [ISTE - Student Standard 6](#) - “Creative Communicator: Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.” Students create, communicate and develop a voice in learning.

Relevant Resources

The advantages of digital tools is that many things are easily accessible. Educators and students can access information anytime from anywhere, the materials stay up-to-date and there are many choices so each student and each teacher can find something that is relevant to them. Continue looking for opportunities to try new tools and methods with students, and to involve the students in the decisions. Ask for their input and let them show you what they can do. By doing this, everyone has a personal investment and we all learn.

Communication through collaboration

There are many options which promote student collaboration and enhance writing skills and student voice, providing students with many opportunities to develop their voice and be creative in communication.

Blogging

Through blogging, teachers can provide support for students and help them to gain confidence in writing and speaking. Some platforms to try are [Spaces](#), [Seesaw](#), [Edublogs](#), which can be used to have students complete writing prompts and creative writing assignments. These tools can be used to open up the communication between peers in and out of the classroom and promote digital citizenship skills for students in a safe, online learning space. Students have the opportunity to make their blog space their own. In the foreign language classroom, this is a great way for students to practice writing in the language they are learning, and sharing their ideas with students in different countries.

[Padlet](#)

Padlet is a “virtual wall” which promotes collaboration, communication, creativity and more because of its versatility. Students have created their own Padlet to share projects, create a digital portfolio space, work as part of a team on a group project and to share research findings from a scavenger hunt. Students learn how to interact in the online space more by posting and commenting to a discussion question, adding their own resources for a collaborative class project, working in small groups and using it for brainstorming during the early stages of a project. It is also a great way to connect with other students and classrooms throughout the world by sharing the Padlet link with other educators, opening up ways for students to communicate in a creative way and broaden their perspectives.

Tools for promoting Creativity and Student Choice

There are many ways for students to create presentations and share their information and learning in visual ways. Some of the tools offer multiple ways to create presentations and to even use these tools for other purposes like creating newsletters, signs for the classroom, and more, which can be other ways to have students create with the language and design materials for their learning space.

A few options for having students present information in a visual way, with options for multimedia include the following:

[Book Creator](#) fosters collaboration and enables educators to connect students with peers, even globally, to develop social awareness and in particular, empathy as they learn. Students create a book for use as a journal or digital portfolio as they develop self-awareness and self-management. For PBL, it can be a great choice for an artifact of their learning.

[Buncee](#) can be used for creating presentations, interactive lessons, formative assessments and more, with many options for including different characters, fonts, animations, and video. There are so many options available within Buncee for students to create presentations which include so many relevant and authentic pieces. In foreign language classrooms, students can demonstrate their listening, reading, writing and speaking skills by creating a Buncee. For example, students can record audio to describe their favorite activities, talk about family, narrate a story, or add a

YouTube video to further demonstrate a concept, use the features like drawing, uploading items, sharing a link, or simply taking advantage of all the different stickers, animations and other tools provided within Buncee. With Buncee, students can find everything they need to create an authentic product and will be more engaged in the learning process. Using Buncee is a way to address each of the ISTE-Standards for Students.

[Piktochart](#) is a tool for creating infographics, social media flyers, engaging presentations and more. Students can use Piktochart to create menus, self-descriptions, talk about movies and even create TV advertisements, recipe presentations and anything related to the content material. Their work can even be downloaded and printed for display in the classroom.

[Spaces EDU](#) offers a digital portfolio platform that assists teachers to better understand students, their interests and needs in learning. With Spaces, teachers can create individual, class or group spaces. With individual spaces, the interactions between teacher and student help with self-awareness and self-management as students develop content area skills and in a supportive space. Digital portfolios help students to develop SEL skills of self-awareness and self-management. For educators, join the Spaces Educator group for a supportive PLN and place to share ideas and make new connections.

[Storyboard That](#) is a very authentic tool for telling a story, expressing a concept, and really creating an engaging project. It fosters innovation in designing and empowers students in the learning process. Students show what they have learned in their own personal way. By using Storyboard That, students can select from many templates with diverse options for themes, backgrounds, characters, text, props and more. There are many lesson plans available to implement with Foreign Languages and more. It is a great option to provide to students, because of the variety of options available to express creativity and promote student choice and voice. Deciding how to best use digital tools can be challenging at times, but a good place to start is to hear directly from the students. Involving the students in the classroom decisions and then asking for reflections on their experience with using the tool helps educators to understand if and how technology is enhancing their learning process.

[Visme](#) is a “drag and drop” tool, which is easy to use for creating infographics, reports, different presentations and other visuals that can be used in the language classroom. It has a library full of images, charts and more, making it easy for users to create exactly what they need. Students have used it to share their Project Based Learning work and have been able to create very engaging, authentic projects that show their learning and also promote a more meaningful learning experience.

[Storybird](#) is a tool great for having students narrate a story and have choices in beautiful backgrounds to use for their storybook. The students can be creative and have fun learning in the process so that students can read books created by their classmates, adding more authentic works to class materials. Students can download their creations or can even have the books printed in softcover or hardcover format. These are great to purchase for use in your classroom as learning materials for future classes and this exemplifies what personalized learning and having a choice can do to engage students and increase their learning potential. There are so many options available with Storybird to find something that fits right in with the theme of what students are studying.

[Educreations](#) is a digital tool that enables students to use an interactive whiteboard space and add drawings, images, text and also record audio to their lesson. This is a great tool to use to have students teach a lesson as part of a more authentic practice or for an assessment, and it is also a way that students can create projects. For example, drawing and narrating about one’s dream house or creating a family description.

[Adobe Express](#) is a free online tool for creating videos, images, and other presentations in a very visually engaging way. Students can use Adobe Spark to tell a story, create a video presentation and record audio, or make infographics for class. With tools like Adobe Spark, students can find everything they need to represent their ideas and be creative in the process.

[Powtoon](#) can be used to have students create animated cartoons with comic characters and a lot of other add-ins, audio, text and much more. It is easy to create with PowToon and students can find all of the images, fonts, icons, and

visuals they need to tell their story. This can be great for retelling folk stories from the culture students are learning about, or for telling their own stories in the language they are learning.

[Flip](#) is another video response tool that enables students and teachers to interact with a variety of discussion topics. You start by creating a “grid” and then adding a “topic.” A grid could be one level of a course or all students. Students go to the grid to see new topics posted for discussion and then have time to record a response and even reply to their classmates. Flip launched more updates this summer and it now integrates with Microsoft and Canvas. You can have students record short videos of 15 seconds or even longer up to 5 minutes. There are many attachments that can be added to the topic. Teachers can also set up the topics in advance and set when they post and freeze, making scheduling easier. Flip is also a way to connect students with other classrooms or even professionals in different fields, to connect with real-world applications of the content material.

Telegraph is a very easy site to publish a stand-alone web page, which can be used to have students create a sign, a newsletter, a journal entry, or anything as an alternative format to pen and paper or using a Word or Google Document. It is easy to use and create with Telegraph. Students start by typing in the website, adding a title, their name, and even some pictures or posting links to other websites. When students have finished, they publish it and it will have a unique web address that can easily be shared with anyone.

What are the benefits of these tools?

The point to remember is that it is not just about using the tool in class. There is a difference between technology use and technology integration. Going forward with bringing technology into the classroom, it should serve a purpose that benefits student learning. Each of these tools promotes more personalized and meaningful learning for students. These tools can be used to enhance, amplify and facilitate deeper and more authentic learning. Using technology just for the sake of using it is not a good choice. But using it to help students find their voice, learn what they want to do, what they can do, and what they need help with, does make sense. When technology is used with purpose, learning opportunities will amplify.





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Foreign Language Teaching, Part 2

Enhancing communicative competence in FLT through technology integration

Ai-Chu Elisha Ding & Jui-Hsin Renee Hung

Second Language Acquisition



Learning Objectives

- Understand the concept of communicative competence;
- Identify resources to help support authenticity and collaboration and the creation of effective learning environments.

The purpose of this chapter is to introduce the notion of communicative competence in foreign language teaching and provide available resources for enhancing language learners' language skills through integrating technology into your instruction. We focus on two aspects - authenticity and collaboration, and how to create learning environments incorporating these ideas through technology integration. After our discussion on the two aspects, we compile a list of online resources that you can refer to when teaching different language skills, followed by two scenario-based examples.

Key terms

Authenticity

materials are produced by real speakers or writers for a real audience and for a real purpose; the learning tasks are designed to engage students in genuine communications with real audience; emphasizes an authentic context or discourse, not just a "native" speaker

Collaboration

engaging students in working and communicating with one another to accomplish a learning task together (e.g., students learn to communicate effectively for group work and assume shared responsibility)

Communicative Competence

language learners' ability to understand and use language effectively to communicate in authentic learning environments that allow them to connect what they learn to real-life situations

Why is communicative competence important?

Among the five World-Readiness Standards for Learning Languages proposed by the American Council on the Teaching of Foreign Languages (Cutshell, 2012), communication is one of the five focal areas that decide how effective language learners can use language competence to participate in communities through achieving different communication goals, such as interacting with other members, understanding communication topics, or presenting information to various audience. The emergence of technology has made it easier for language instructors to improve their students' communicative competence as more forms of group work, teacher-student interactions, and authentic learning situations become available.

Communicative competence goes without saying to be one of the most important goals for foreign language teaching. Learning a foreign language allows students to be connected with the world and be able to understand and communicate with people of other cultures, which has become inevitable in today's diverse classrooms and workplaces. However, being able to communicate in a foreign language, in written or oral form, is not easy. It is made up by competences beyond linguistic knowledge. The following figure offers an overview on the four areas contributing to communicative competence:

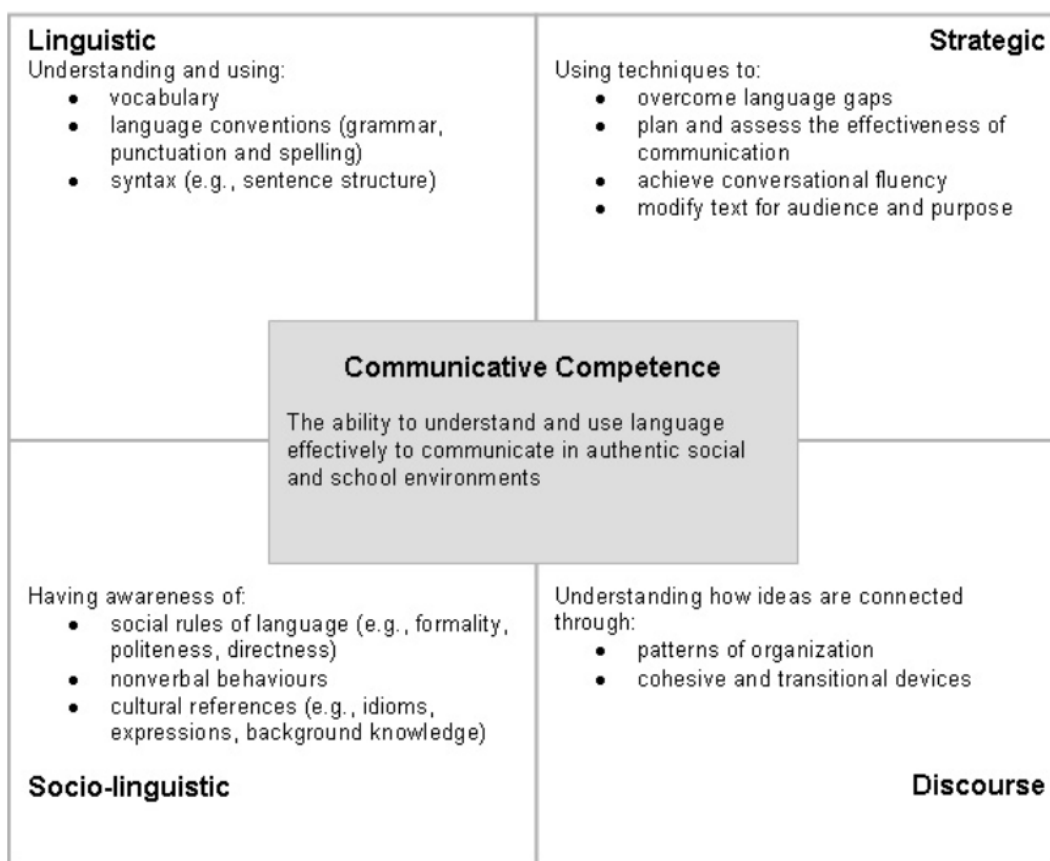


Figure 1. The four areas of communicative competence (The Alberta Government, n.d.).

As shown in figure 1, communicative competence requires more than knowing the vocabulary, grammar or language patterns. The foreign language learners also need to be fully aware of the social rules of the target language, the cultural references, the communication modes and then strategically utilize various communicative strategies to build up a successful communication. Therefore, as we help our language learners develop their listening, speaking, reading and writing skills, we need to consider how our instruction addresses all four areas of competence constituent of the communicative competence.

How to enhance students' communicative competence?

A communicative language learning approach heavily emphasizes language learning through interactions and real-life learning situations. To create lessons that enhance students' communicative competence, two concepts you would not want to miss are authenticity and collaboration.

Authenticity

To enhance students' communicative competence, one essential element of our teaching is the authenticity of the learning tasks. However, ***simply having students use the target language does not mean the learning task is authentic.*** Johnston (2007) pointed out that when learning tasks are presented in the form of drills or lockstep question-answer exercises, "the substance of the message is either completely immaterial or secondary to the grammatical form" (p. 64). To ensure the authenticity of language learning tasks, consider the following two questions:

- Do I use authentic materials in my teaching? (text or multimedia presentations produced by *real speakers* or writers for a *real audience* to convey a *real message*)
- Do I incorporate authentic communication tasks in my teaching? (structured but *genuine communications* with *real audience* inside and outside of classrooms)

Now, if it were twenty or thirty years ago, incorporating authentic materials or communication tasks probably wouldn't be the easiest task for foreign language instructors, but thanks to modern technologies, finding authentic materials and reaching out to authentic audience has made relatively easy. Through various information technologies, engaging in authentic communications with authentic audience who speaks the language without travelling abroad becomes possible.

Collaboration

It requires more than basic language skills to make effective communication happen, and building students' communication competence in collaborative learning environments gives them chance to focus their attention on linguistic development during social interactions. Collaboration allows students to work together toward a shared goal, through which they verbalize their ideas and engage in decision-making processes that stimulate awareness of their own strengths and weaknesses and leads to better comprehension of the content.

When we design a collaborative task, here are two key questions to ask ourselves:

- Do I select a topic for the learning tasks that are engaging, challenging and able to stimulate conversations?
- Does accomplishing the task require my students to use language as a tool to communicate and negotiate so that they will engage in meaning-making activities?

Of course, there are more to keep in mind as we design collaborative tasks, like how to group the students strategically to ensure enough diversity in the group or to ensure contribution from each group member, and whether or not we provide enough scaffolding to enable the students to complete the task, just like in other types of learning tasks. But here we especially want to emphasize that putting students in groups would not make it a collaborative task; rather, how to set up a task where each group member can serve as resources to one another and where languages mediate the process of meaning negotiation is what makes this language learning experience collaborative and meaningful. Many of the new technologies have been born with the idea of collaboration in mind. These technology tools not only diversify forms of collaboration but also create handy platforms that extend learning outside the classroom.

How to use technology resources for enhancing communicative competence?

Being able to communicate in a foreign language involves the speaker's integrated competence of the 6 language skills: **grammar, listening, speaking, reading, writing and culture**. In actual communications, these 6 skills are all necessary in order for a successful communication to happen. For example, imagine that a student wanted to talk to a professor about the assignment requirements. In this scenario, a series of literacy events happened and connected to one another, leading to the final communication event. First, the student needs to have the reading competence to understand the assignment description. He or she probably also needs to write an email to the professor in order to schedule the meeting. With this email correspondence as well as the face-to-face meeting, whether the student is familiar with the social rules of the culture dictates how successful this communication would be. In the face-to-face meeting, listening and speaking skills are undoubtedly critical for both parties to understand each other. Finally, the grammar knowledge governs the student's comprehension of all language output in all the literacy events.

So, as you can see from the example, all 6 language skills are equally important and need to be taught in an integrative way. But for the sake of categorization, we listed out the 6 language skills as separate categories and introduce technology tools that are particularly useful, but not limited to, for fostering certain types of language skills.

1. Teaching grammar

- **Kahoot:** Some basic drills (but not too much!) on grammatical structures are necessary. After you introduce a grammatical structure, it is a good idea to allow students practice the grammar structure before moving to applying the grammar knowledge in communicative tasks. To make the drill practice interactive and engaging and customized to fit your own learners' needs, foreign language teachers have been using Kahoot to create their grammar exercises. The alternative tools for interactive game-based assessment includes [Socrative](#) and [Quizizz](#).
- **Google Docs (<https://edtechbooks.org/-tV>):** Google docs has long been seen as one of the most powerful tools for student collaboration. By using google docs, you can encourage students to engage in pair editing one another's grammar errors and use the chat window on google doc to have silent conversations on how to correct the grammar mistakes. In order for the pair editing to work, teachers need to monitor the process closely and offer clear guidance and criteria to scaffold the process. Tell students what they should be looking for during pair editing and perhaps color code the types of errors (spelling, punctuation, word choice, or grammar). The following lesson plan offers great ideas on how to structure the process: <https://edtechbooks.org/-fC> Additionally, if you have your students blogging on Wordpress, you can encourage students to download the Poetica plugin (<https://edtechbooks.org/-AX>) to effectively engage in peer editing on Wordpress.
- **Wordreference:** Anyone learning a foreign language needs to know this website. This is one of the most powerful and essential referencing tools for learning a foreign language. They offer dictionaries in 18 languages. With each word, they offer definition, pronunciation audio, phonetic symbol and the compound forms. If you teach French, Spanish or Italian, this website even offers conjugator so the students can look up the conjugation of verbs in that language. The language forum of this website is also THE PLACE to go if you have grammar questions. Language learners and teachers around the globe gather on this forum to discuss and learn foreign languages together. It is just amazing! We highly recommend that foreign language teachers introduce this platform to language learners at the first week of class. Teach them how to navigate through the website to make the most out of it and encourage the language learners to participate in the forum discussions.
- **Corpora:** Corpora is another critical and powerful tool for improving students' lexical and syntactic understanding. Through corpora, students are able to see how a word is used in authentic communicative contexts and how the word should be placed in a sentence. Many studies have pointed out The use of corpora Usually, a corpus database would not be as intuitive as using Google search engine, so the language instructors really need to know how to navigate through the database and teach students how to use it, too. The attached link offer a list of corpora in various languages. If the language you are teaching is not listed, the most efficient way to find the corpus database you need is probably by googling "corpos+your target language".
- **Teacher learning resources:** The following two links offer you ideas for teaching grammar in the foreign language classroom as well as a learning module for grammar teaching methods.
 - Foreign Language Teaching Methods: Grammar - <https://coerll.utexas.edu/methods/modules/grammar/>
 - 16 Tips for Effective Grammar Teaching in the Foreign Language Classroom - <https://edtechbooks.org/-HX>

2. Teaching listening

- **BBC** (<https://edtechbooks.org/-YUk>): If you work with advanced language learners, BBC offers news articles, videos and audios in various languages. This is a great place for finding authentic resources for listening and reading practice.
- **Yabla**: Yabla offers authentic videos for improving listening in six languages: Chinese, Italian, Spanish, French, German and English. They have videos for all levels of language learners and the teacher can also monitor students' performance on Yabla, too. With the integration of dual language dictionaries and subtitles control, Yabla really is an incredible tool for listening comprehension training.
- **Innovative Language** (<https://edtechbooks.org/-rK>): Innovative Language offers integrated language lessons for over 30 languages. They offer audio and video lessons that learners can view on laptops or on the mobile app. You can download the audio and video lessons to your mobile phones and listen to them repeatedly when you are driving, walking or taking bus. Simply just utilize any small chunk of time you have to immerse yourself in the language with this tool. What's even more amazing about this learning platform is that, if you upgrade to premium account, you also get an online tutor who will help you personalize your learning, providing feedback on your submissions, and answer questions you have about the language!
- **Pocoyo**: If you work with young kids, Pocoyo offers cartoon videos for educational purposes in 6 languages: English, Spanish, Italian, Portuguese, Turkish, and Russian. They are great materials for delivering meaningful and authentic content-based language lessons for students of young age.
- **Lyrics Training**: Who doesn't love music? Language instructors have been using songs as a way for training language learners' listening comprehension. Lyrics Training provides music videos for over 10 languages. What's even more incredible about this website is that, with each music video, they embed fill-in-blank exercise with which you can adjust the difficulty level based on the learner's language proficiency.

3. Teaching speaking

- **Flipgrid:** Flipgrid is a great way to ignite student discussions. Basically, a teacher creates a grid with a central discussion question or task. Then, students respond to the prompt by interacting with one another in the form similar to making video diary but in a collaborative and safe social community. Teachers can use Flipgrid to foster cross-classroom and cross-cultural conversations in a safe and monitored environment. Through talking to a camera, it also encourages students who are shy and less confident to speak in class to have a voice and be heard in an authentic community.
- **Mango (<https://edtechbooks.org/-Ne>):** Mango offers language lessons in a great variety of languages as well. This website situates language learning in conversational contexts. With each language lesson, they list out the conversation goals and grammar goals. This website can be a great supplementary activity for students to practice and enhance their conversational skills.
- **My Language Exchange (<https://edtechbooks.org/-jKv>):** One of the best way to practice speaking a foreign language is through language exchange. My Language Exchange is an effective platform for finding a language exchange partner to practice speaking. They also offer lesson plans that you can follow to structure the language exchange sessions. Alternative platforms for finding a language partner includes Mixer (<https://edtechbooks.org/-FRf>), [Speaky](#) and Easy Language Exchange (<https://edtechbooks.org/-Wq>). However, like any other social networking platforms, you need to be very careful about giving out your personal information and making friends with people online. If teachers are concerned about the safety of unmonitored language exchange and want to find another classroom for conversation exchange, ePal (<https://edtechbooks.org/-Td>) and Skype in the Classroom (<https://edtechbooks.org/-fv>) are two possible platforms for this purpose.
- **Video Conferencing tools:** It goes without saying that video conferencing tools are game changers for foreign language learning. Foreign languages teachers are now using video conferencing tools to connect their students to the world. Combining with platforms for searching partner classrooms, video conferencing tools have allowed foreign language instructors to incorporate authentic and collaborative communication tasks in their teaching. The tools are usually fairly easy to operate. The challenging part for incorporating telecollaboration activities is the activity design, logistics and classroom management. The following blog post will give you some inspirations on how to design and implement such type of activity (<https://edtechbooks.org/-yxX>). The following are three free tools for video conferencing:
 - [Skype](#)
 - [Zoom](#)
 - [Google Hangout](#)
- **Video and audio recording tools:** Using video conferencing tools allows students to practice communications in the interpersonal mode (see [ACTFL's World-Readiness Standards](#)). On the other hand, having students make videos or audio recordings allows them to practice communications in the presentational mode through multimodal and creative ways. Making videos or audio recordings allow students to making meaning through storytelling. Through the storytelling process, teachers can also help student develop oral fluency and pronunciation accuracy. Below is a list of popular tools used by teachers.
 - [iMovie](#)
 - [Biteable](#)
 - [Shadow Puppet](#)
 - Sock Puppets (<https://edtechbooks.org/-mC>)
 - Toontastic 3D (<https://edtechbooks.org/-ri>)
 - Voice Memos (<https://edtechbooks.org/-eVb>)

4. Teaching reading

- **Vocabulary:** Learning vocabulary is almost the first step for language learners to start learning a new language as words are what delivers meaning and used to present ideas. Without lexical knowledge, students would not be able to understand other language speakers or texts, and to make themselves understood. Its relation to reading comprehension has also been discussed in studies (e.g. Pearson, Hiebert, & Kamil, 2007). In the following you will find some tools of different functions for teaching and learning vocabulary.
 - **Memrise** is a self-learning website that offers a variety of courses for different purposes or at different levels. Its language courses mainly focus on vocabulary, presenting and reinforcing content through multimodal ways repeatedly while providing exercises for learners to check their progress. Another similar self-learning site is [Busuu](#). Designed as self-learning tools doesn't mean they cannot be used in the classroom. Depending on the topics you cover, you can select courses from the websites to be used as additional exercises. Memrise also calculates points for the learners when exercises are finished, which would be an interesting way of motivating students or engaging them in a competitive way. Stories from other language learners are shared in its blog, giving readers first-hand reports on how language learning changes their life and perspective.
 - **Quizlet** is a powerful tool for both teaching and learning vocabulary. Teachers can create vocabulary sets for students to practice and can monitor their study progress online. Meanwhile, students can also create their own flash cards for reviewing vocabulary. The tool also makes creating exercises or homework easier for the teachers. You will find more possibilities to utilize this tool to suit your diverse teaching purposes.
 - **Rewordify:** There must be times when we wish to use an article in our class but find the vocabulary too challenging or inappropriate for the students' level. Rewordify helps teachers simplify the difficult vocabulary of a text and save them time in finding the exact right materials. Useful to the students as well, it also provides short sessions to facilitate reading comprehension and makes learning more personalized.
- **Creating word clouds:** [Word Sift](#) or [Wordle](#) are great resources for creating word clouds.
- **Dictionary or reference tools:** [Lingro](#) offers vocabulary translation in 11 language. [Shahi](#) is a really cool interactive visual English dictionary that gives you Flickr images according to your search. [Snappy Words](#), [YourDictionary](#), and [Lexipedia](#) are similar tools that help visualize English vocabulary words.
- **Graphic organizers:** Using graphic organizers is a great way to help student learn vocabulary words. To create graphic organizers, [Popplet](#) and [Inspiration](#) are two great tools.
- **Read aloud tools:** One of the key methods to teach reading to your students and to help develop reading comprehension is to read aloud to them. With diverse technology tools available, teachers and parents now have more options when reading aloud to their students and children. The downside of these tools is that most of them are not available in diverse languages and that many of them are not free.
 - [Read Aloud](#)
 - [Snap & Read Universal](#)
- **Newsela:** To improve students' reading skills, we often try to find outside reading for them because simply having students read the textbook would not be adequate. Newsela is a website that provides articles of current issues tailored for students of different levels. It allows teachers and students to annotate a text at the same time, and is convenient for teachers to track students' reading progress.

5. Teaching writing

- **Blogs:** Writing is seen as a personal act for many people. People write about their thoughts, interests, or personal stories, and share those with others through writing. This is one of the reasons why blogs have become a popular format for personal broadcasting. With its popularity, language teachers have incorporated blogging into their instruction. Plus, the use of blogs aligns with one of the Common Core State Standards in writing that it is important to give students purposes for writing. In short, to motivate and engage our students in purposeful writing that results in an immersive learning experience, here are some of the most popular blogging sites:
 - [Blogger](#)
 - Weebly (<https://edtechbooks.org/-KL>)
 - [WordPress](#)
 - [Tumblr](#)
 - [Wix](#)
- **Pen Pal School:** Making learning fun is one of the most important ways to engage your students in learning, and getting them a pen pal that brings cross-cultural experience is definitely an exciting way to go. This valuable experience will involve your students in authentic writing practices with authentic audience, increase their cross-cultural awareness, and foster their cross-cultural communication skills. Another site you can consider is International Pen Friends (<https://edtechbooks.org/-gH>). While helping you students have all the fun having pen-pal exchange, teachers need to be cautious about Internet safety issues in order to ensure a fun and safe learning experience for their students. Also, students need to be taught what personal information to share with their pen pal, especially before they get to know each other well enough. To make pen pal experience even richer, Global Read Aloud Project (<https://edtechbooks.org/-bT>) is another option teachers have if they want to combine reading and pen pal experiences for their students.

6. Teaching culture

- **Skype in the Classroom** (<https://edtechbooks.org/-fV>): A great way to teach culture is to bring your students to where the target culture is, but if this does not sound realistic, now you have options like Skype in the Classroom, which can bring your students in contact with that culture too without having to physically go to the place. This community connects your students to the world by offering virtual field trips, skype lessons, collaboration opportunities, games, and guest speakers, all of which enhance students' understanding of different cultures around the world.
- **Videos:** Nothing can beat authentic materials when it comes to teaching the culture of a language. We are lucky to live in an digital age when all kinds of authentic videos are available just a few clicks away.
 - [FluentU](#): One of the best site providing language immersion videos, FluentU makes a variety of authentic videos like news, talks, music videos, or movie trailers accessible to you and your students, and even better, with interactive subtitles. The site currently has a collection of videos in nine popular foreign languages.
 - [YouTube](#): We are sure that many of you have come to Youtube to be entertained. Though Youtube videos are not all made for learning purposes, you can select a few channels for your students to subscribe according to their levels.
 - [World stories](#): Listening to stories originates in a foreign culture is one way to immerse in that culture because stories carry cultural messages. On this site, you will find different children's story collections, and many of these stories are told in more than one language, and almost 30 languages in total.
 - BBC Bitesize Modern Languages (<https://edtechbooks.org/-XG>)/Modern Foreign Languages (<https://edtechbooks.org/-nft>)
 - Teaching Foreign Languages K-12 (<https://edtechbooks.org/-VC>)
- **Scholastic.com** (<https://edtechbooks.org/-nqH>): Not all of us were born in multilingual and multicultural families. To learn more about how to embrace diverse cultures before we go teach cultures to our students, these are some good reads about teaching cultures from educators and teachers working with different grade levels.

Examples of integrating technology in foreign language teaching

Case 1: Miss Lee from Sunshine Elementary School

Miss Lee teaches Chinese as foreign language at the Sunshine Elementary School in the midwest. She usually has about 15 to 20 students in 3rd to 6th grade in her class. They are all beginning learners with very limited Chinese proficiency. In this lesson unit, she designed activities and projects that prompt students to introduce their family members and compare the family values in Chinese and American culture. The lesson goes as following:

1. Teach key vocabulary and introduce the basic structure of a Chinese family

Miss Lee first taught the keywords for addressing family members in Chinese (e.g., mother, father, older sister and younger brother). Chinese has different titles for different relatives in the family depending on the seniority and whether the relative is from the father's side or the mother's side. Miss Lee explained the basic system for deciding how you address a relative. To help students visualize the relationship, she searched and found a diagram that depicts the basic structure of the extended Chinese family with titles for all relatives at <https://edtechbooks.org/-ld>.

2. Introduce sentence patterns that are useful for introducing family members.

Miss Lee then taught students two useful sentence patterns they can use to introduce family members later in communicative contexts:

- This is my/his/her _____. (这是我的/他的/她的 _____.)
- My/his/her _____ likes something/ doing something.

(我的/他的/她的

喜欢

_____.)

3. Students introduce family members on Flipgrid.

Miss Lee asked the students to introduce family members who live with them on [Flipgrid](#). She asked the students to either draw pictures of their family members or find photos of their family members for the introduction. Miss Lee encouraged students to practice doing the introduction a few times before they record their responses on Flipgrid.

< 0hrn83n Families in China and in the US About FLIPGRID

Introduce your family members

Please introduce family members who live with you in Chinese. Talk about who they are and what their hobbies or favorite food/sport/color/book are.

July 27, 2017 0 responses 0 views

DATE	NAME	LIKES	VIEWS
<div> <div>+</div> <div>Add a response</div> </div> <div></div> <div></div> <div></div> <div></div>			

Search responses

Miss Lee taught additional new sentence pattern, vocabulary and grammar that students need to know in order to engage in a later discussion about their family members in Chinese.

4. Teach sentence pattern, vocabulary and grammar that are useful for discussing family members with others.

- Sentence pattern: I have...She has... We have... (

我有...她有...我们有

.....)

- Vocabulary words: number 1~ 10 in Chinese
- Using the Chinese Quantifier:



5. Students work as groups to listen and relisten to the video responses posted on Flipgrid and complete a google doc worksheet.

Miss Lee divided students into groups. Each group has 4-5 students. Students work with group members to listen to all the video responses and complete a worksheet created with google doc on their digital devices. On the worksheet, Miss Lee listed questions in Chinese such as:

- How many students have younger sister(s)?
- How many students have older brother(s)?
- List five hobbies of the fathers.
- List five favorite food of the mothers.
- How many students live with their grandparents?


If students couldn't understand what the person said in the video, they are encouraged to ask the person to explain himself or herself in Chinese with the facilitation of body language, gestures and other techniques for overcoming language gaps.


6. Students play a Socrative game to review all the language points.

Miss Lee designed a [Socrative](#) game to help students review all the sentence patterns, vocabulary and grammars in an integrative and engaging way. Students are divided into groups to compete with one another. Using the video responses students posted on Flipgrid, Miss Lee developed quiz questions such as:

- (A picture of a girl pops up) This is Emily's younger sister. True or False?
- What color does David's older brother like?
- How many older sisters does Lindsay have?
- Does Jessica live with her grandparents?

1 of 1

 TEAM BLUE



这是Emily的姐姐。

Q zoom

T

True

F

False

SUBMIT ANSWER

7. Wrap-up discussion on the Flipgrid activity and provides insights into Chinese family values.

Miss Lee guided the students to discuss the common familial relationship and family structure in the US based on their observation of their own and their classmates' family structures. To guide the discussion, Miss Lee asked the following questions:

- How many students in our class have 2 siblings? More than 2?
- How many students in our class live with their grandparents?
- Do your grandparents live with your parents or your uncles and aunts?
- Do you think you will live with your parents after you become an adult? Why or why not?
- What do you think the core family look like in Chinese societies? Do you think Chinese have similar family structure as yours? What similarities and differences do you expect to find out?

After the discussion, Miss Lee showed the BBC lesson "Family introductions" (<https://edtechbooks.org/-KY>) to review some basic sentence patterns and vocabulary words, and offer some initial cultural insights about Chinese families.

8. Students interview Chinese native speakers to learn about their family members.

To engage students in authentic communications with audience outside of the classroom, Miss Lee arranged [Skype](#) sessions for the students to chat with Chinese native speakers to learn facts about their families. Students worked in a group of four on this telecommunication project. Each group interviewed 4 Chinese people to learn about their family members and their familial values. Students took turn to be the interviewer, note taker, cameraman and technology leader for the interviews.

To prepare students for the activity, Miss Lee and her students also spent one class period to come up with interview questions and did a mock interview in class. Miss Lee used the following questions to guide students' thought process:

- What are the cultural differences and similarities between families in China and in the US you assumed?
- What questions can you ask the interviewees to check whether the assumptions are correct?

9. Students create digital essays to share their understanding about families in China and in the US.

As the final culminating activity, Miss Lee had students create a digital essay to share their understanding about families in China and in the US. With this assignment, students worked with the same group members and used [Shadow Puppet](#) to make the digital essay by incorporating photos, videos, drawings and voice-overs. Miss Lee created a worksheet to facilitate students' script writing process and encouraged students to think about how they want to discuss the differences and similarities between Chinese and American families in the form of a video.

Case 2: Miss Dubois from the Henderson Middle School

Miss Dubois teaches French as a foreign language to students at the Henderson Middle School, which locates in a city in the east coast of the U.S. Typically, she has around 15 to 18 students in her class. Her students have learned some basic knowledge of grammatical gender, basic forms of pronouns, first-, second-, and third-group regular verbs in present tense, and a few other basic grammatical rules. The topics covered before mainly focused on greetings, family members, responding to questions, clothing, and some daily activities. The topic of this lesson is food. In this lesson unit, students learned to discuss food and drinks in social occasions in French. Miss Dubois took the following steps when teaching this lesson:

1. Introduce vocabulary and use games to help student practice

In learning a foreign language, gaining vocabulary knowledge is an important way for students to understand others and to get themselves understood. Miss Dubois introduced key vocabulary to her students, and selected a group of more common words to make a study list for her students on [Quizlet](#).

The screenshot shows the Quizlet interface for a study set titled "Food vocabulary". At the top, it says "Create a new study set" with a subtext "Saved 2 terms just now" and a "Create" button. Below the title, there's a "TITLE" field and a link to "Import from Word, Excel, Google Docs, etc.". There are also settings for "Visible to everyone" and "Only editable by me", both with "Change" links. The main content area displays two terms:

1	le lait	milk
	TERM	DEFINITION
2	le fromage	cheese
	TERM	DEFINITION

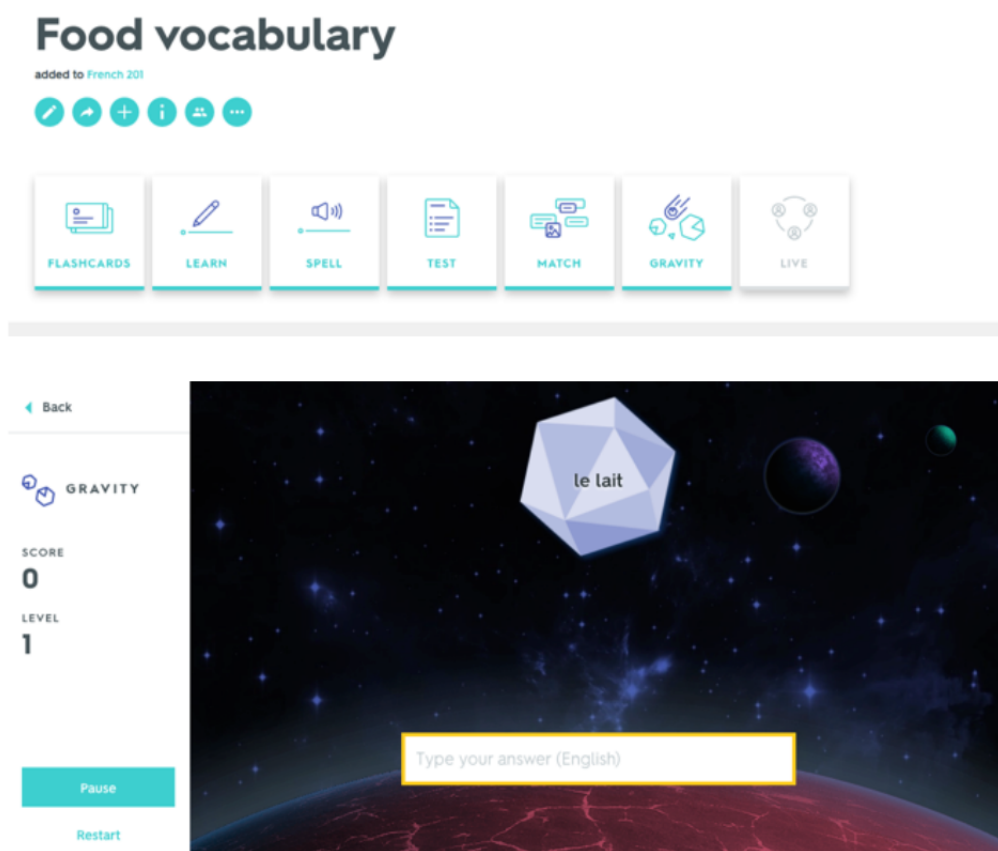
Below the terms, there are icons for "FRENCH" and "ENGLISH" and a "Change" button. At the bottom, there are icons for "Add", "Study", and "Share".

The study set she created was added as one of the study sets for her class. She created different kinds of exercises as homework for the students, and monitored the study progress her students had made for each study set. To make vocabulary practices more fun, she decided to also use the gravity game feature. Using this features requires no additional effort form teachers. You will just need to select a study set you have created earlier, and the site will help you turn it into a gravity game.

2. Introduce key grammatical patterns

Miss Dubois introduced several grammatical patterns, and emphasized those her students would need to use in communication with their classmates and pen pals in later tasks, such as the following:

- J'aime (bien)... = I like...
- Quel est ton/ta ... préféré/préférée? = What is your favorite...?
- J'avais (déjà) entendu parler de... = I had (already) heard of...
- Je savais que... = I knew that...
- Alors que... = While... / Whereas...



3. Build up cultural knowledge through videos that help review vocabulary taught earlier

Since one of the goals of this lesson is to enable students to talk about food with friends, Miss Dubois selected a short clip of a similar scenario where an English speaking student who wants to improve his French has connected with friends who are far away in Marseille, France. Though the context available to Miss Dubois' students would not be the same as that in this video, students would get to visualize how that communication looks like. The video selected is from BBC Bitesize Modern Languages (<https://edtechbooks.org/-UH>), but just keep in mind that the point of using a

video at this stage is to build up cultural knowledge students may need in later tasks while giving them chance to review vocabulary in an authentic context.

Description

Classroom Ideas

English schoolboy Ben is keen to improve his French and links up online with friends who are in a supermarket in Marseille. We follow Ingrid, Lili, Thibaud and Ulysse as they wander round selecting ingredients for pizzas. The girls choose traditional pizza ingredients – des champignons, des oignons, des œufs, du fromage, du saucisson. However, Thibaud and Ulysse are putting some unusual pizza ingredients in their basket – des bananes, du chocolat, des bonbons, de la Chantilly. Later on as they prepare their pizzas Ben takes the opportunity to practise his food vocabulary while he makes his own pizza in the UK. Everyone enjoys their pizzas although Ben has put too many chillies on his!



This clip is from: **France**

First broadcast: **26 February 2014**

This clip also features in:

Food and drink

4. Recycle the video by creating other tasks with it

It is always good to reuse a video students watch for practicing other language skills. For example, the video Miss Dubois selected to give her students more cultural input and review vocabulary can also be used to expand a discussion on topics related to cross-cultural communication or comparison. Did Ben and his French friends encounter any communication problems? What kind of problems do you think would happen if you were Ben? How would you solve them? These are just some questions you can ask to help your students better develop cross-cultural awareness, and you will sure find more to ask. Once you and your students spend enough time on a topic extended from the discussion, it is the right time to have them put thoughts into words. You can implement individual or collaborative writing tasks, depending on how well-prepared your students are in writing about the given topic. Alternatively, you can have your students start a blog that can be used to enhance collaboration between classmates as well as between them and their future pen pal (whom they will get connected later through PenPal Schools). Since having students exchange with a pen pal about a topic is our next step, it is important too that your students are equipped with the writing skills needed in exchanging with their pen pal.

5. Get connected with a class in a place where the target language is spoken

For language learners, nothing is more exciting than communicating with a real person in the target language. Miss Dubois connected her students with students who were doing the same project around the world through [PenPal Schools](#). The site offers a variety of online classes/projects for teachers to choose from. You can narrow your search based on the date to start, the project length, the subject, etc. as the screenshot shows below.

What will your students learn with their PenPals?

Your students will be matched with PenPals from around the world to collaborate through online lessons. Choose from any of these free standards-aligned projects.

Subject

Match Day ▾ Project Length ▾ Time Commitment ▾ Student Age ▾ French ▾ CLEAR

FRENCH CULTURE

3 Weeks
Ages 10+

Match Day Options: August 28th, October 23rd, December 11th

LA VIE QUOTIDIENNE

1 Week
Ages 10+

Match Day Options: December

Once you decide on the project, you will get a class code, with which you can invite your students to join you on the site. Then students will be matched based on the subject they are studying, age, etc. Convenience isn't the best part of using this site. As a teacher, we will need to keep our students safe in the learning space. PenPal Schools makes it easy not only to monitor the interaction between your students and their pen pal but also to rate their performance on the project, since you will be able to see all the exchanges between them.

One thing to pay attention to is that there usually will be deadlines for finding a match; be sure to consider this when you plan to use this site in your classroom. If you are not sure how to start, this blog article from a teacher in the PenPal Schools Global Ambassador Program (<https://edtechbooks.org/-GUF>) will give you some useful tips when you get ready for it.

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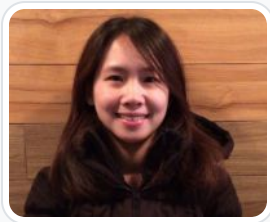
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Gamification

Taking Your Teaching to the Next Level: A Guide for Gamifying your Classroom

David R. Hill & Stein Brunvand



Learning Objectives

- Understand best practices for gamified learning;
- Identify common terms and tools for gamification.

The purpose of this chapter is to provide K-12 pre-service and inservice teachers with a set of guidelines, resources and tips for gamifying their classrooms. Important considerations for adopting a gamified pedagogical approach are provided for reflection and strategies for implementing this instructional method are outlined. Teachers will also be

introduced to different tools and technologies they can utilize to help facilitate instruction in a gamified classroom. Finally, examples of gamified teaching and learning are provided in order to help the reader better visualize what gamification might look like in their own classroom.

Gamified learning, or the gamification of learning, has been defined as the use of game design elements in non-game settings, such as a classroom, in order to increase motivation and attention on a task (Deterding et al., 2011; Simões et al., 2013). Unlike teaching through the playing of games, gamified instruction is the integration of gaming principles, which is a pedagogical approach that is gaining popularity in the K-12 classroom, post-secondary education, (Domínguez, et al., 2013; Caponeto, Earp & Ott, 2014) private and public corporations (Dale, 2014) and even in our personal lives as we share and track information such as fitness and health goals and accomplishments. Evidence suggests that gamified learning, or the creation of gameful experiences, can impact engagement, motivate target behaviors and drive innovation (Kapp, 2012). There are several testimonials from teachers that have gamified their classrooms on the ClassCraft website (<https://edtechbooks.org/-Ay>). ClassCraft is a gamified Learning Management System (LMS) outlined in more detail later in this chapter. These testimonials provide a firsthand look at how teachers are able to use gamification to engage their students in a variety of subjects by allowing them to earn points through the completion of various assignments, quizzes, exams and activities. A core component of a gamified classroom is that students are able to choose the assignments they complete in order to earn points and achieve an overall grade. For example, rather than requiring all students to complete the same exact assignment in order to demonstrate mastery of a certain learning objective, they could be provided with a range of assignments (i.e. writing assignment, small group presentation, lab activity) from which to choose. Research suggests that when students are allowed to choose which learning activities they engage with they are more likely to make selections that align with their own learning style, which can make the learning more relevant and meaningful to them (Biggs, 1999). The competitive nature of a gamified learning environment can also serve to motivate students to engage and excel (Nicholson, 2012). Therefore, a gamified pedagogical approach can help students develop their autonomy as learners and customize their educational experience in ways that are conducive to their academic success.

Key Terms

Additive Grading

a grading technique commonly used in gamified classrooms where every student starts with zero points (or no grade) and earns points and grades as they complete assignments throughout the school year or grading period

Badges

a digital artifact or image that is awarded to individual students upon the completion of an assignment or task or in recognition for the demonstration of specific skills or knowledge; another way, besides grading, to recognize student achievement

Leaderboard

the student roster displayed in order based on the number of points awarded; can include student names or be anonymous in order to maintain privacy

Levels

the grading scheme in a gamified class is made up of levels that students move through as they earn points in the class; each level has a minimum number of points required in order to attain that level; letter grades can be assigned to different levels (i.e. the top level could be considered an A+)

Locks

when a specific requirement must be met in order to access a particular assignment, task, project or level; for instance, Assignment 2 might be locked until a student earns at least 80% on Assignment 1

Best Practices for Gamified Learning

In his book, *What Video Games Have to Teach Us About Learning and Literacy*, James Gee (2014) describes 36 learning principles that are present in good games. According to Gee, these learning principles provide the catalyst for good game design and, in turn, can be used as guiding principles when designing a gamified learning environment. The following are a selection of those principles, along with a corresponding pedagogical strategy, that could be used in a gamified classroom. While evidence of these strategies can certainly be found in traditional classrooms, they are foundational elements of a gamified instructional approach.

- Good games provide players with information when they need it and within the context in which the information will be used. *Creating “just-in-time” learning opportunities helps students make direct connections between concepts.* For example, a teacher might create a series of online activities that students can access as needed to complete different assignments. The activities might direct students to external resources such as [Khan Academy](#) so they can watch a short tutorial video or complete practice activities. The value in this is that students determine what help and instruction they need and when they need it.
- Quality games challenge players so that they are routinely working at the peak of their abilities and knowledge. *Challenging students appropriately keeps them engaged and encourages them to learn more in order to meet the demands of the next challenge.*
- Games, particularly multi-player games, require players to collaborate and work in teams where they have to share knowledge and skills. *Creating collaborative learning opportunities can promote cooperation and the development of social skills.*
- Games provide the element of choice, which allows players to decide where to go and what to do based on the tasks and situations with which they are confronted. *Incorporating an element of choice in assignments and the educational experience overall makes students feel they have more control over their learning.*

In addition to these principles, a gamified learning environment should provide students with the chance to unlock different learning opportunities and challenges based on the completion of specified tasks and assignments. This is similar to progressing through levels within a video game whereby the player can only move forward by demonstrating mastery of a specific set of skills. Likewise requiring students to show competence on foundational assignments in order to move on to more challenging tasks can help ensure they are developing the knowledge they need to be successful.

Additive grading is another common element in a gamified classroom. With additive grading, unlike traditional grading, students start at zero and work their way up to their desired final grade by adding points earned through the completion of graded work (assignments, quizzes, presentations, tests, labs etc.). This mimics scoring in a video game where players start at zero and accrue points by accomplishing different tasks throughout the game. This approach to grading means that students always have a chance to recover from a low score on an individual assignment or test because they can always do more assignments to earn the points they need. In a traditional classroom, the majority of students believe that on day one of the school year, they start with a letter grade of A even though no assignments have been completed (Ackerman & Gross, 2018). This type of grade entitlement simply does not work in a gamified course for several reasons. One such reason is that students would have no real motivation to try risky or challenging assignments that may have adverse effects on their presumed grade standing. Moreover, if students did complete an assignment but did not earn a desirable grade, they may be more inclined to engage in grading arguments with the teacher because unlike additive grading, traditional grading provides the student with limited flexibility to recover from a low grade.

Figure 1 is a visual representation of the difference between traditional grading and additive grading. This is a sketch that was drawn by an undergraduate student enrolled in a gamified, educational technology course for students in a teacher certification program.

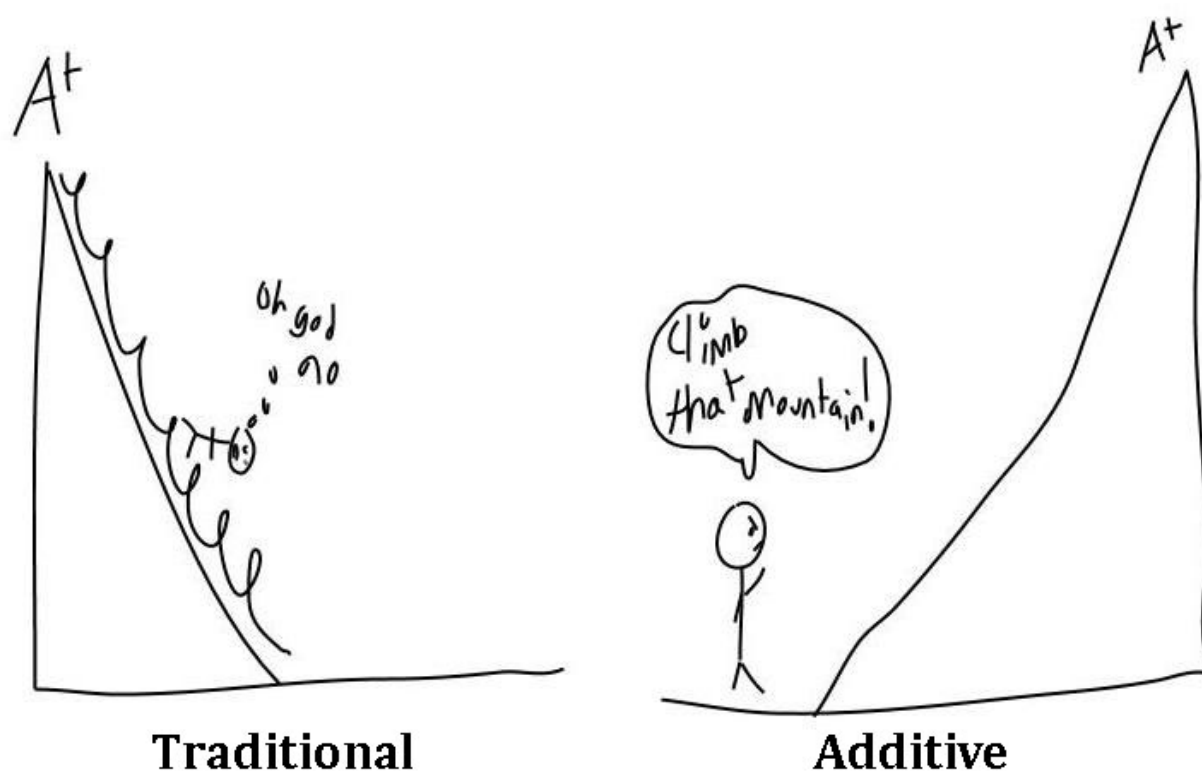


Figure 1. Traditional Grading vs. Additive Grading

Considerations for Implementation

Implementing a gamified approach to instruction has the potential to impact student learning in a positive way by providing a level of autonomy across assignment choice, easing performance anxiety on unfamiliar assignments through the use of additive grading, and providing embedded tools (e.g. GradePredictor, badges, etc.) to assist students with self progress monitoring (Ryan, Rigby, & Przybylski, 2006). However, it should be approached with caution as there are notable limitations associated with it. First, a gamified approach to learning alone does not guarantee academic success for all students. There will always be a risk that a student will not want to engage in classroom activities - no matter how the material is presented. However, teachers still need to provide effective content instruction that will hopefully capture students' attention and lead them to mastery of requisite skills and demonstrate competency on grade level state standards. Assignment autonomy for students is one of the most appealing qualities of a gamified approach to instruction but autonomy may be limited due to the mandated learning goals and objectives that will need to be mastered by all students in order to earn promotion to the next grade. Thus, creating a potential limitation to designing and/or offering specific types of assignments within the choice model.

In addition to mastering academic standards, there are contextual factors (e.g. resources, class and student characteristics) that may impede successful implementation. For example, adequately implementing a gamified instructional approach necessitates that students have regular access to computing devices as well as a basic knowledge of how to use those devices. Furthermore, annual licensing fees required by many gamification LMS tools may prevent certain schools and/or districts from participating due to budgetary constraints. Lastly, considerations for accommodating diverse learning groups confound the ease of implementation because some students may struggle when assignment constraints are lessened.

Implications for Practice

Today's classrooms are far from the homogeneous groupings of students that were once prevalent decades ago (Wille, Century, & Pike, 2017). Students of all abilities and learning styles are now integrated and taught within the same classroom making a "one size fits all" approach to instruction outmoded. Thus, teachers must consider how implementing a gamified approach to the curriculum will impact a diverse student population as well as providing struggling students with accommodations. More specifically, students with disabilities and students who are at risk of academic failure may encounter challenges with the amount of freedom and self-regulation required for many gamified environments. One recommendation is to provide ongoing support and training on the LMS and any other technology being used to support gamification. Furthermore, pacing, modeling, and alternative assessment strategies should be considered when implementing a gamified approach to instruction.

For individuals who need a highly structured learning environment due to attention or processing deficits, gamification may not be feasible. Structure and explicit instruction are key elements associated with effective instruction for students with disabilities (Israel et al., 2015). Structure within the classroom helps reduce social and environmental distractions that naturally occur during instruction and explicit instruction provides students with concise explanations, which is particularly helpful when multiple steps are required to solve a problem. Another limitation is that not all academic content is conducive to using a gamified approach. For example, subjects like Algebra may prove to be too rote in nature for teachers trying to develop a variety of assignments to fit within a gamified environment. Additionally, practitioners are charged with making sure students demonstrate proficiency on state standards thus not having a lot of flexibility to incorporate peripheral content beyond the mandated curriculum. With such limited options, implementing a gamified approach may prove to be too difficult or at the very least, minimal.

Implementation in K-12

Implementing a gamified approach in the classroom can be a daunting experience because there are so many variables to consider. Planning is key and the first step in this process should be initiating a discussion with a school based administrator to determine if a) gamification aligns with the school's academic mission, and b) are resources available for full implementation. Once permission has been granted, it is important to formulate a plan of action and determine a timeline for implementation. Things to consider include:

- a. Choosing a gamified LMS that aligns with the current teaching style of the classroom teacher, the academic content, type of learners, and the resources available. Once a platform has been selected, the teacher must acquire working knowledge of how the platform operates and more specifically how the various features and options function. It is recommended to start small and increase the use of gamification as one's experience grows.
- b. Determining what LMS features/options to use and then designing assignments around the selected features.
- c. Creating a variety of assignments that will appeal to a diverse sample of students but also challenge students. This would include assignments that go beyond what is typically offered (i.e. weekly quizzes, homework, etc.) in most classrooms.
- d. Weighting the assignment values so that students have to make a conscious choice of which assignments to complete in order to achieve a desired grade. Also, weighting the values so that students are unable to earn above average grades by only completing the most menial assignments.
- e. Self-reflect after each grading period to determine what changes need to be made to the gamified approach to instruction. No matter how much planning has occurred, there will always be elements that need improvement. Make adjustments accordingly and remember, this is a working process.

There are many ways to implement a gamified pedagogy into a classroom. Here are some examples to consider that might be useful depending on the goals and objectives of teachers looking to employ gamification in their classroom.

- a. Create a badging system to incentivise the development of certain academic skills and competencies.
 - a. Example: In a science lab a teacher could create a “Lab Tech” badge that students can earn by demonstrating they know how to use the various equipment in the lab. Students earning this badge could be given additional privileges and responsibilities on days where specific lab work was being done such as supervising small groups to insure equipment was being used properly.
- b. Promote teamwork and collaboration by creating quests or challenge activities for students to complete in small groups.
 - a. Example: In a physics or math class a teacher could present students with the challenge of building a bridge out of toothpicks and rewarding the team whose bridge holds the most weight with additional points on the assignment.
- c. Provide students with choice in the assignments they complete in order to demonstrate competency.
 - a. Example: In a social studies or history class where students are learning about a particular historical event or time period a teacher could have students demonstrate their understanding of that event or time period by selecting from an array of assignments including writing a traditional paper, giving a class presentation/mini lesson, producing a podcast or video news report or developing their own Wikipedia style webpage.
- d. Utilize an additive approach to grading so that students work to accumulate points in order to achieve the level, or overall grade, they want.
 - a. Example: A teacher could establish a series of levels with ascending point values for students to progress through as they earn points by demonstrating academic achievement and content mastery. This would allow students to more accurately track their progress and determine what assignments to complete in order to reach their target level (Hill & Brunvand, 2017).

These are just a few examples of what gamified teaching and learning might look like in the classroom. As with adopting any new pedagogical strategy, it is recommended that starting out slowly and implementing different elements of gamified learning over a period of time is likely the most effective way to transition to this style of teaching.

Grade Levels

How gamification “fits” within a specific grade level must be determined prior to implementation. Each tier of K-12 grade clusters (i.e., primary and secondary) present unique advantages and challenges when designing gamified content. For instance, primary grades have advantages over secondary grades for several reasons. First, class size is smaller, which means teachers can spend more time assisting students. Second, students typically remain with the same teacher throughout the day so class scheduling is generally not an issue. Third, by remaining in the same class, students are exposed to the gamified environment on a consistent basis, which leads to a better understanding of how the LMS works and the expectations of the teacher. One notable disadvantage to using a gamified approach to instruction at the primary level is the lack of self-determination and regulation among the students. Teachers may find themselves spending more time on teaching self-determination and self-regulating skills to the students versus academic instruction. Therefore, it would likely be necessary to provide a more narrow range of options to younger students so that while they still have a choice, that choice is constrained.

Gamification of instruction at the secondary level seems like a natural fit as secondary students will inherently be more adept at managing the autonomy associated with a gamified approach to instruction due to the increased expectations, pace, and personal responsibilities associated with secondary education. Also, the attraction of infusing technology across the instruction will be enticing as educators continue to compete with personal technology for their students’ attention.

Gamified Learning Management Systems (LMS)

While it is possible to implement a gamified approach without relying on a specific set of technologies, it is certainly much easier to manage assignments, track points and assign badges if you have the right tools. Over the last decade, a

variety of gameful learning environments such as [ClassCraft](#), [GradeCraft](#), [Virtual Locker](#), and [Canvas](#) have been developed and are available for purchase. All platforms focus on the facilitation of gamified learning across K-12 schools but with slightly different capabilities and aesthetics.



[ClassCraft](#) is a fantasy-themed, game-based classroom-behavior-management tool designed to promote teamwork and collaboration on academic assignments rather than competition among student participants. Each student creates an avatar (see Figure 2) to represent them in the ClassCraft LMS environment. Groups of students work together to gain Experience Points (XP) through positive classroom behaviors and academic achievements. As students level up, they earn powers with real-world effects such as the ability to drop a low quiz grade or the privilege of picking where they sit in the class. In essence, students are able to earn different privileges by accumulating XP through positive behaviors and demonstrating the attainment of defined learning objectives. Students also need to maintain the health of their avatar by monitoring their Health Points (HP). These points are earned, or loss, primarily through positive and negative behavior in class. There are Action Points (AP) as well and these are used each time students exercise a power through their avatar.

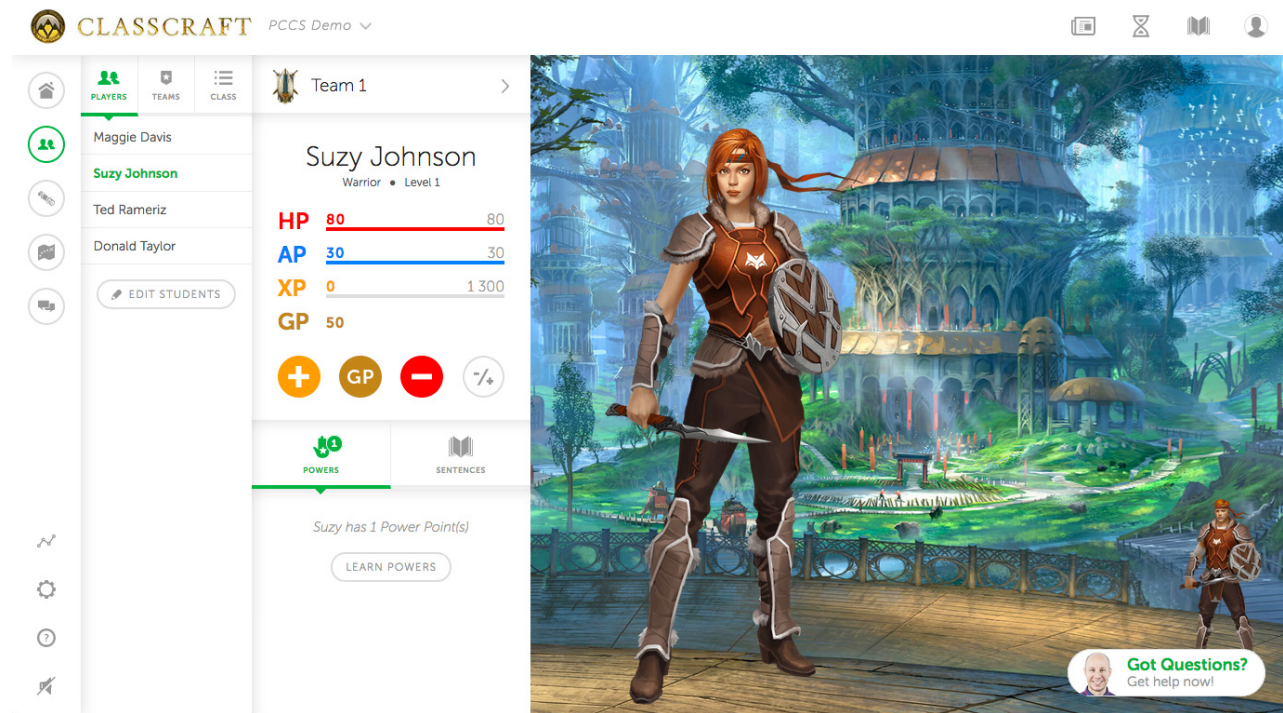


Figure 2. Classcraft Sample Student Avatar

While there is a gradebook and the opportunity to track academic achievement in [ClassCraft](#), this particular tool seems more focused on rewarding specific behaviors and encouraging students to work in cooperative teams. You can [watch a short overview video](#) about [ClassCraft](#) to learn more about this gamified LMS. In addition, the [ClassCraft 101 page](#) has a variety of how-to videos to help you get started and links to free PD as well as a teacher forum.



[GradeCraft](#) incorporates a variety of elements of gamified learning including additive grading, where students start at zero and advance through levels (Figure 3) by earning points via the completion of assignments and other graded tasks. Assignments can also be structured such that the successful completion of one assignment will unlock, or make available, subsequent assignments.

EDT211 [Demo] Designing Technology Based Learning Solutions WINTER 2017					Class Info Stein Brunvand
OVERVIEW					
Dashboard	Grade	Level	Point Threshold	Locked?	Options
Grading Status	A	Digital Native	795,000		
Course Data Exports	A-	Google Chromebook	755,000		
Analytics	B+	MacBook Air	725,000	🔒 Earn a grade for the MPortfolio Assignment	
Announcements	B	iPhone	685,000		
Calendar Events	B-	Microsoft Windows	645,000		
COURSEWORK					
Assignments	C+	Compact Disc	605,000		
Attendance	C	Commodore 64	555,000		
Gradebook	C-	Apple II	515,000		
USERS					
Players	D+	Apple I	475,000		
Groups	D	HP-35 Calculator	425,000		
Staff	F	8-Track Tape	385,000		
Observers		Compact Cassette Tape	325,000		
COURSE SETUP					
Course Settings		IBM UNIVAC Computer	275,000		
Assignment Settings		FM Radio	235,000		
Grade Predictor Preview		Phonograph	205,000		
Grading Scheme		Wireless Telegraph	155,000		
My Courses		Optical Telegraph	75,000		

Figure 3. GradeCraft Levels (Undergraduate Educational Technology Course)

Figure 4 shows a sample list of assignments from an educational technology course for preservice teachers. Other gamified elements present in [GradeCraft](#) include a leaderboard, badges that can be awarded for exceptional work, focus on mastery learning, the creation of avatars to represent students in the LMS environment, and student choice in assignment selection. The [GradeCraft](#) site has a [helpful set of resources](#) that describe gameful pedagogy and the basic elements of designing a class based on gameful learning. In addition, their [Getting Started Guide](#) provides detailed instructions on how to set-up your gamified class. While these instructions specifically reference the use of [GradeCraft](#), they can easily be applied to other gameful LMS environments as well.

Options ▾

↓ ⚙ CLASS ATTENDANCE	140,000 points
↓ ⚙ READING REACTIONS	60,000 points
↓ ⚙ BLOG POSTS	35,000 points
↓ ⚙ TECHNOLOGY REVIEWS	40,000 points
↓ ⚙ TECH TALKS	100,000 points
↓ ⚙ PEER CRITIQUES	10,000 points
↓ ⚙ MPORTFOLIO	50,000 points
↓ ⚙ TECHNOLOGY ENHANCED INSTRUCTIONAL ACTIVITIES	150,000 points
↓ ⚙ ONLINE CLASSROOM DEVELOPMENT	80,000 points
↓ ⚙ FLIPPED CLASSROOM LEARNING ACTIVITY	75,000 points
↓ ⚙ MULTIMEDIA PROJECT	100,000 points
↓ ⚙ IN-CLASS ACTIVITIES	240,000 points

Help
ClassCraft

Figure 4. GradeCraft Assignment List (Undergraduate Educational Technology Course)



[Virtual Locker](#) (Figure 5) is a cloud based LMS and emphasizes behavior reinforcement by utilizing various individualized token economy systems embedded throughout the LMS. More specifically, badges and “grit” points are awarded for various student behaviors to increase motivation and engagement. Similar to [ClassCraft](#), [Virtual Locker](#) targets student engagement and motivation as its primary focus but uses a different approach by individualizing the user’s experience through the use of custom lockers for each student.

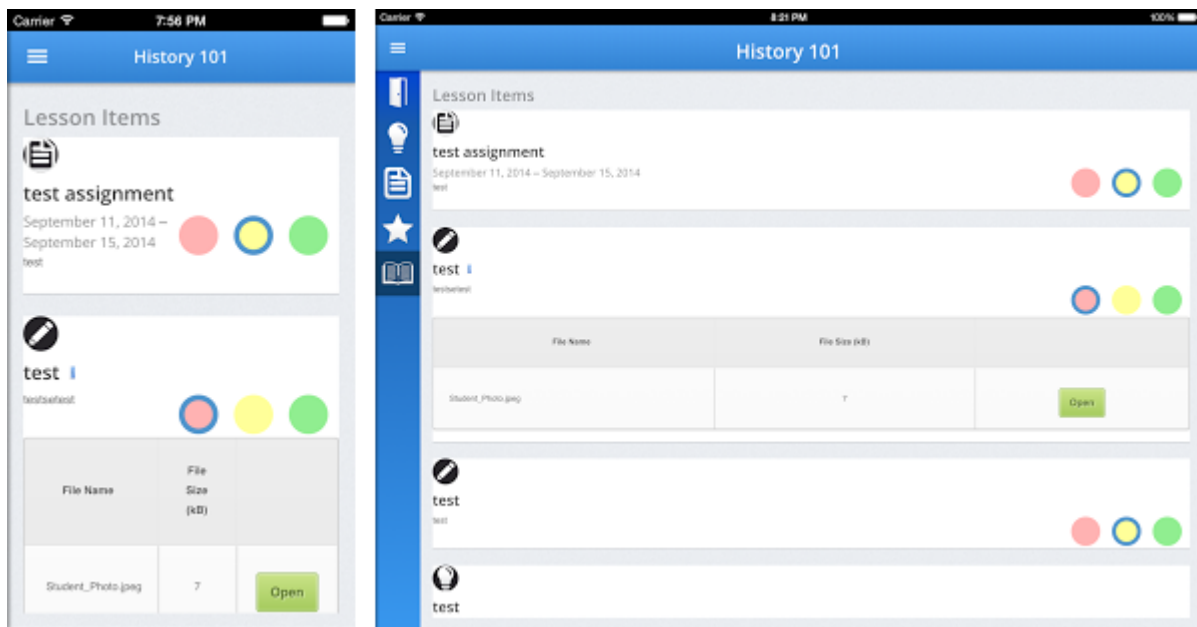
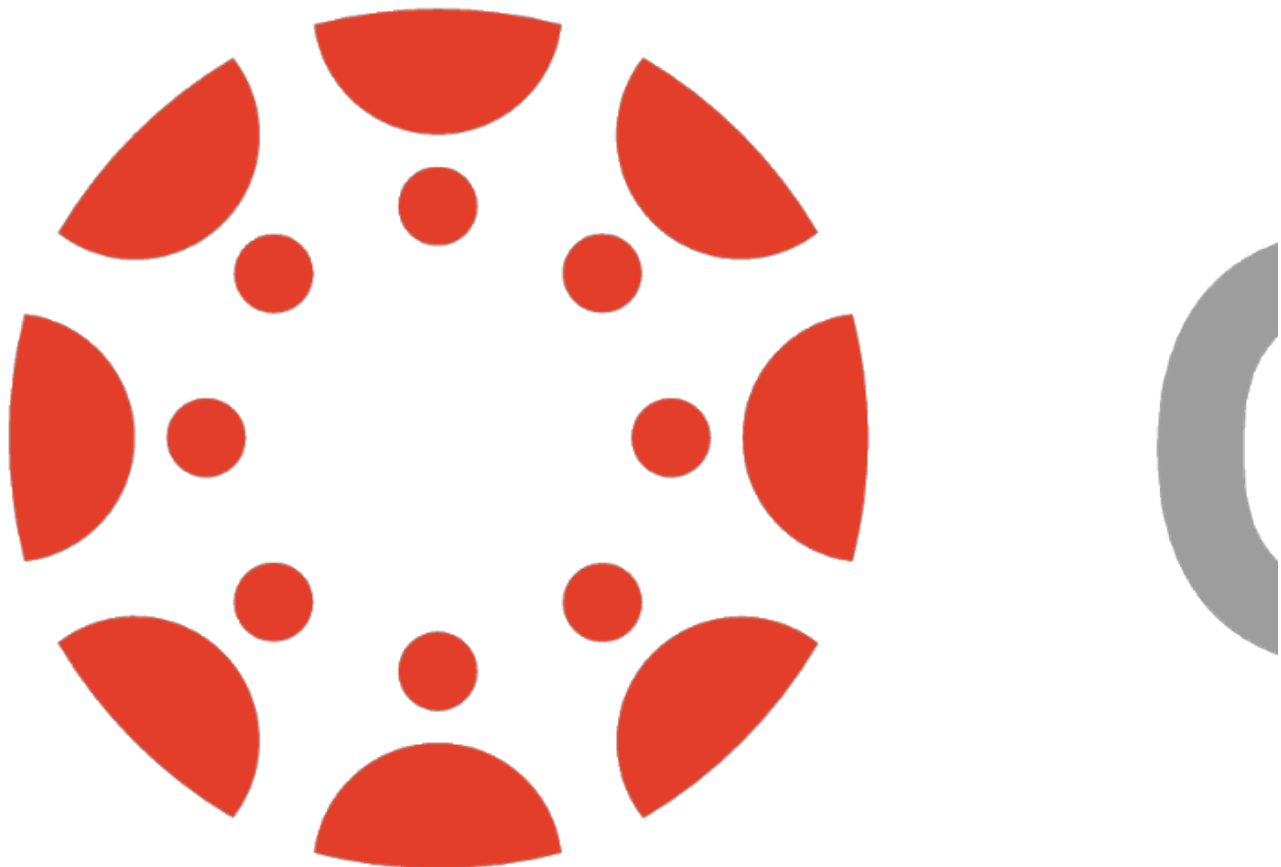




Figure 5. Virtual Locker LMS




[Canvas](#) has grown in popularity at the postsecondary level with several prominent universities electing to use [Canvas](#) as their LMS. Capitalizing on this increase in popularity, Canvas has expanded its capabilities and can now be used in K-12 education. Overall, [Canvas](#) is an excellent tool for practitioners and has a wealth of useful tools to help facilitate instruction, manage assignments and grades (see Figure 6), but is limited in gamified elements such as badges and other motivational tools. It is likely that [Canvas](#) will continue to develop and add new features as demand for gamification tools increases.





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Summer 2016 - EDT-422-101 / EDT-522-101

Hello and welcome to EDT 422/522. This page will provide you with information about the course and how we will be using Canvas during the semester. Much of this information has already been communicated through different means so it may be a bit repetitive. You can review the syllabus ([422](#) [522](#)) to get more information about the course as well. If you have specific questions about different features please let me know or check out the [Canvas Student Guide](#).

The navigation to the left of the screen will help you make your way around the course site. The [Announcements](#) area contains weekly updates similar to what I e-mail out every Friday. Assignment guidelines can be accessed through the [Assignment's](#) section (makes perfect sense doesn't it?). And, as you might have guessed, all assignments will be submitted through this section as well. I use the Chat tool for my online office hours so feel free to drop in for a chat during those designated times. Our weekly online discussions will be facilitated through the [Discussion's](#) feature. Useful resources such as the weekly podcasts and readings can be found in the Files area. The weekly modules can be accessed through the [Module's](#) link and you can track your performance in the class through the Grade's area. These are the main components of the site that we will be using this semester.

The following video provides a brief overview of how we will be using Canvas and the different features within this learning environment during the semester. This video was created at the start of the Winter semester in 2015 so you might notice the dates are not current for this semester. However, it still has relevant information about how Canvas will be used for this class. It is not a detailed review of how each feature works, however. If you have specific questions about different features please let me know or check out the [Canvas Student Guide](#).

<https://www.youtube.com/watch?v=h8G-uMa-ai0&feature=youtu.be>



Figure 6. Canvas Mainpage (Graduate Educational Technology Course)

Badges

In addition to assignment choice, badges can be used to increase student engagement when gamifying academic content in the classroom. Aesthetically, badges resemble avatars and can be modified based on the classroom teacher's needs (Brunvand & Hill, in press). They are awarded to students after specific criteria (i.e. grade or performance) on assignments have been achieved. For example, a student may earn a "participation" badge by exceeding the average level of student participation during a discussion assignment. Another function of badges is to use them as an unlocking mechanism for future assignments or pathways. For instance, once a student has successfully completed five quizzes, a "quiz" badge is earned and a new assignment is unlocked. The primary function of a badge is to reinforce the behavior of the student when he or she takes risks and successfully completes various assignments. However, be strategic in how badges are used because when used too often, they may diminish the intrinsic motivation of students on other assignments (Hanus & Fox, 2015). There are a variety of tools that you can use to create badges for your students, which would allow you to integrate that element of gamified learning into your teaching without having to adopt an entirely new LMS. Tools such as [OpenBadges](#), [Canva](#), [MakeBadges](#), and [Credly](#) are just a few of the tools available to create custom badges.

Concluding Thoughts

Providing your students with opportunities to take risks without the fear of failing creates an environment of exploration where students are empowered to pursue different pathways to mastery. Implementing a gameful approach to your classroom can also be an effective way to promote active engagement in learning by allowing students to make personal choices about the assignments they complete. While there is certainly a lot of planning and thought that needs

to go into the process of gamifying your classroom, the reward of seeing your students motivated to learn makes it worth the effort.

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Access it online or download it at <https://edtechbooks.org/k12handbook/gamification>.

iPad Learning Centers

Let's use iPads in Learning Centers!

Ya-Huei Lu & Danielle Sherman



Learning Objectives

- Understand what learning centers are and how they work;
- Identify concrete ways to use iPads at learning centers.

The purpose of this chapter is to share concrete examples of how K-2 teachers could incorporate iPad learning centers in the classroom. First, we talk about how teachers could set up centers and group students. Second, we introduce the ways of utilizing two iPad apps– Seesaw and Kidspiration–to design learning center activities for reading, writing, and Math. Lastly, we include additional tools for the teachers who are interested in exploring alternative resources.

Key Terms

[Differentiation](#)

tailoring instruction to address students' individual needs

[Learning Center](#)

a space set in the classroom that allows students to engage in independent and self-directed learning activities

What are Learning Centers or Learning Stations?

Learning centers (also called stations) are one of the most common instructional activities used by many early elementary teachers. This way, young students can work on completing different tasks at the same time, while all in the same classroom. We see, stations and centers as similar, but will use the term centers throughout this chapter. During the center time, students can work individually, in pairs, or in small groups. It is suggested that the center should be able to accommodate between 3 to 5 students in each team. Examples of learning centers could include reading centers, writing centers, math centers, computer centers, iPad centers.....etc.

Why are Learning Centers Beneficial?

Learning centers are beneficial for students because they allow teachers to differentiate instruction. In this case, learning centers can differentiate learning by providing a wide range of activities to help students (Tomlinson, 2014). Learning centers allow teachers to engage students by accommodating their learning needs. Teachers could easily add technology, physical movement, or student collaboration into a variety learning centers. When designing learning centers, teachers should assign the tasks that are developmentally appropriate and challenging enough to spur students' growth (Tomlinson, 2010).

Perhaps one of the largest benefit for learning centers is the ability to meet with small groups of students while the rest complete all the centers. For example, some teachers have used centers for Writer's Workshop. Students progress through each stage by visiting different centers with tasks to help them move forward in the writing process.

What Are the Best Practices for Learning Centers?

How Should You Organize the Classroom Space?

Centers should be spread out throughout the classroom. This way, students can interact in small groups without distracting other groups. In addition, we recommend defining the space as much as possible so students don't wander or spread out too much. You can do this by assigning a center to a table, the rug, a reading corner, or their desk. You can also provide a wider range of seating. One center might have a table and chairs, the next center might be sitting on the floor. This is helpful because students can have options of seating. This kind of flexible classroom environment might resemble Figure 1 below. (Watch this [Edutopia video](#) to learn more about making classroom environments flexible)



Figure 1. A Flexible classroom environment arrangement (image source: [Edutopia](http://Edutopia.org), 2015)

The first center you should designate is the teacher center. Find a place that is easy to work with your small group and see the entire class at a quick glance. One suggestion would be a kidney table at the back of the room. If student need to do a lot of writing, place them where there is a hard surface. If the center involves reading or using an iPad, consider allowing them to sit on a rug.

We suggest teachers keep the location of each center the same day by day, but always making needed adjustments. Students thrive on structure and depend on reliability. For example, keep the math center at the table every time. Don't switch from rug one day to table the next. Another way to keep things simple is rotate in a circle. The group that starts at the table rotates to the left and so forth.

How to Group Students Using Differentiation

First, plan how many groups of students you will have. As you place students in groups, consider who struggles or just needs extra time to process and work. It is also important that the groups will work well together. Teachers need to be attentive to student-student relationships. Avoid putting students together who will require effort to put out fires.

Once you have differentiated your groups, decided how students will rotate through the centers. The lowest group should start with the teacher in order to assure they get the time they need to understand the concept. This will also make the rest of the activities which may relate to the subject easier to tackle independently or with a partner. Continue seeing groups in order of their ability, lowest to highest. Time management is key during centers. It's important to differentiate time per group as well. For example, teachers should spend more time on meeting with the students who need more assistance. The last group to meet with the teacher should be high ability because they will most likely whiz through an activity that took other students three times as long. Differentiating time grants students the opportunity to thrive with extra time as well as keeping other students from long periods of wait time resulting in boredom which leads to misbehavior. Lastly, although it may seem obvious to the teacher that each group is leveled, it is important that we do not draw attention to the different ability groups. Instead of labeling groups as high, medium, low or red, yellow, green, just call the group by the first center they are assigned to first. For example, teacher group, iPad group, table group, etc.

If you choose to do centers for Language Arts in the morning, and Math centers in the afternoon, you can consider using different groupings. Remember that every student has strengths and weaknesses. Although a student may struggle in Math, he may excel in reading. Also make sure these groups are fluid and change throughout the year. Some students will progress more quickly than others. It is also helpful to mix up the groups to allow for new interactions with different students.

Strategies of Using iPads in Centers

One of the great strategies we found from experienced teachers is they created the cueing cards that have the app icon on the cards. Teachers can use these cards to provide students with cues as to what app they should be using at a certain time (See Figure 2). Therefore, when using iPads in centers, we recommend teachers print out the app icons that you plan to use. Teachers can do so by Google searching for the images of the app icons and save all the images into a Word document. After printing out and laminating the images, teachers can display these icon images on the classroom bulletin board or put it on the student table during the center time.

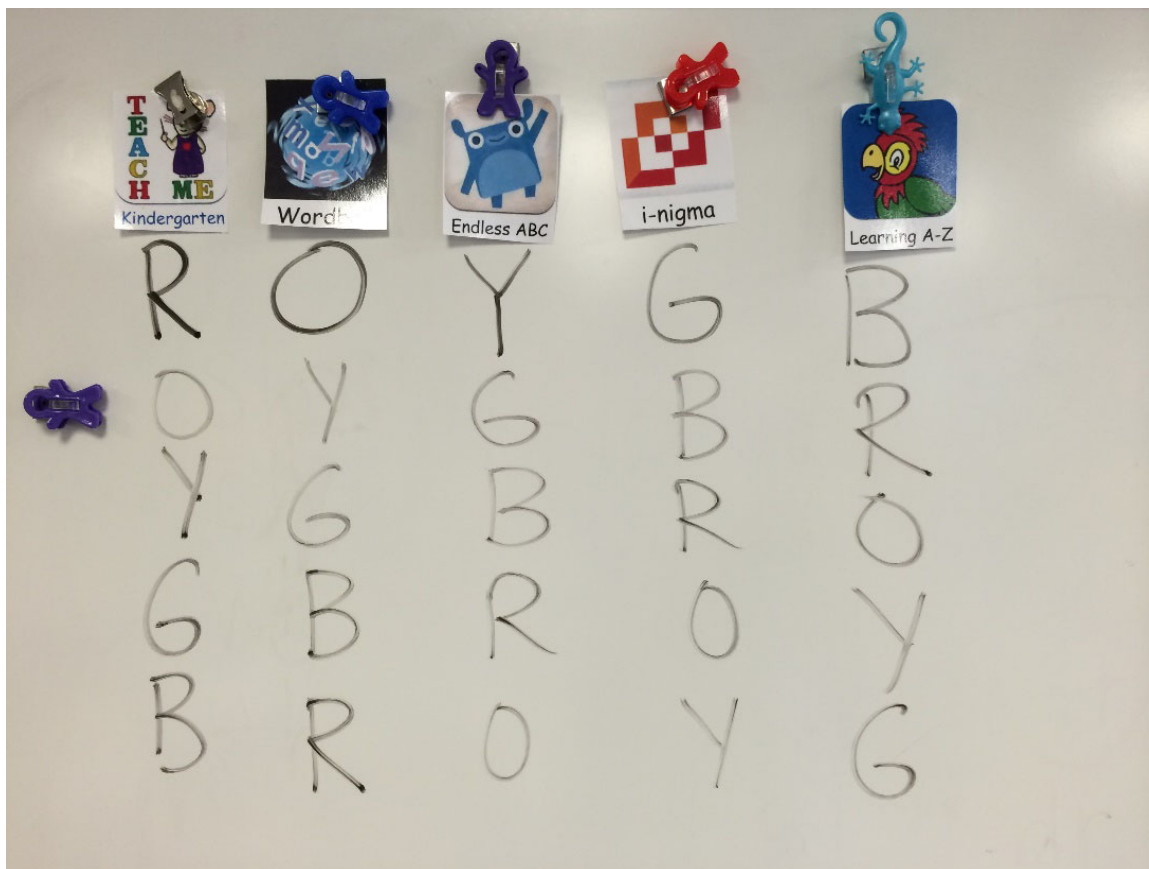


Figure 2. App icons and centers.

In the following section, we introduce two iPad apps that allow for greater engagement as well as transform a lesson that would not be possible without technology. iPad use in centers can be way more than just drill and practice or games to keep students busy and quiet. There are many apps that allow students to create and share evidence of their learning. That being said, determine just a couple apps that will be the most versatile in function. Teaching time is precious. Often times, there is not enough time in the schedule to teach a new app every week. Teach students a couple great apps that can be used over and over again while changing the objectives each time.

Students can work independently during centers yet once all the students go home, the teacher can see and listen to the students' understanding of a concept by using apps with recording features.

Tools

[Seesaw](#)



SEESAW

Seesaw is an app that allows students to add items to their online portfolios seamlessly. Teachers can review and approve student creations on Seesaw and easily share their learning progress and creations with the parents.

Seesaw allows students to work in a variety of ways to showcase and record their learning progress. This is particularly important for station design because teachers can only be at one place at a time. A center activity may require students to independently build a 3D shape and identify the name. How can the teacher know if students accomplished this task correctly when he or she is working with other groups and cannot be there to monitor each student's learning process? With Seesaw, teachers can ask students to submit photos of the shapes they built and audio-record or write down the name of the shape on Seesaw. Figure 3 shows an example. Seesaw is like 1 on 1 time with the teacher prerecorded. Once the students leave for the day, you can assess the work students posted on Seesaw and determine if they understand the concept. Once you approve their submissions, parents will receive a report and can see their child's work that otherwise would not have been possible. (See Figure 4).

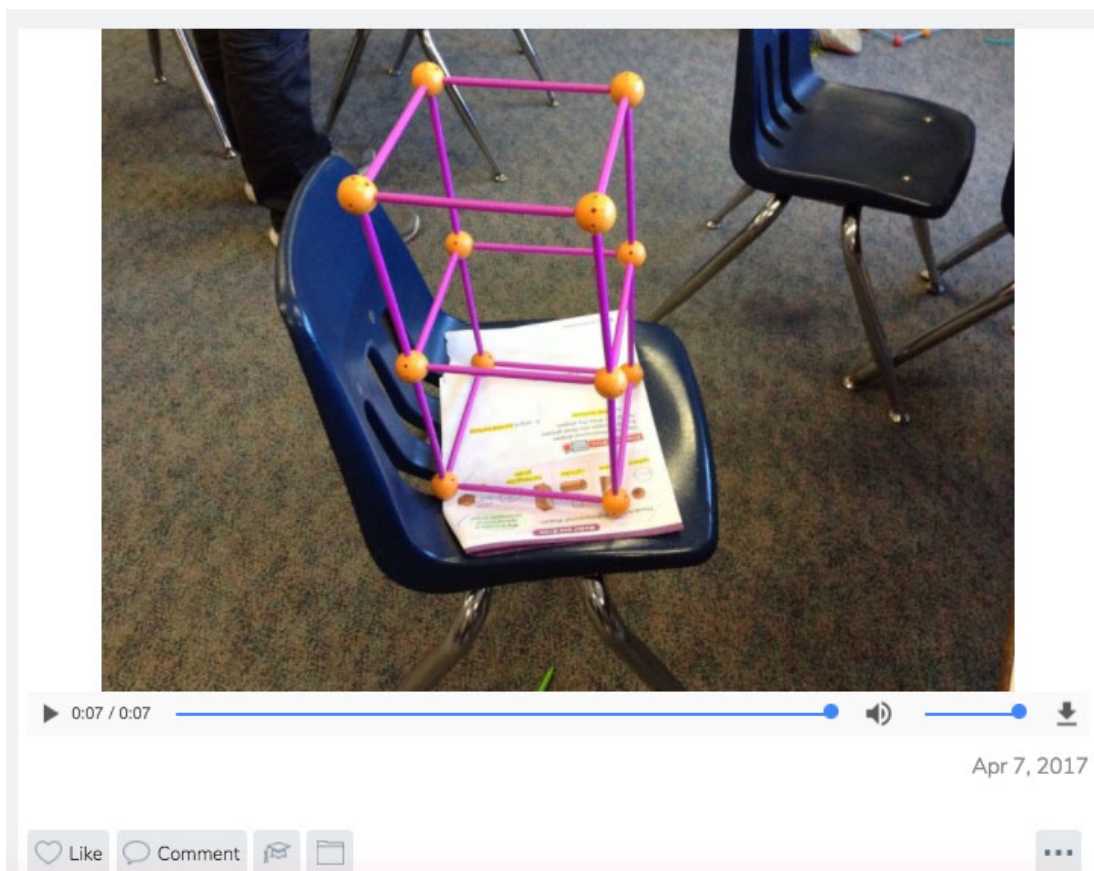


Figure 3. Student named the 3D shape (Source: Ms. Sherman's class. Watch the [video](#))



Figure 4. Parents can like and comment to the student's work on Seesaw.

Writing

Lesson Title: Write, Read, Revise

Recommended Grades: 1 +

Standards: (writing, editing, collaboration, reading)

Teachers can utilize Seesaw in different learning centers. For example, having students take a picture of a completed writing piece and record themselves reading their writing. Figure 5 shows an example of student's work. As students read it, have them use the pen features to revise/correct any mistakes they found as they read aloud. This assignment allows students to not only be more engaged in the project with the voiceover feature, but build a habit of reading over their writing and making edits where they are needed. Having students read, write, and revise using SeeSaw is also a great way for teachers to document students' learning. Teachers could also tweak the project to have students collaborate together. For example, let one student read his/her work as the author, and then have a partner record his/her feedback to the author. Then, the author can make changes of his/her work based on the feedback.

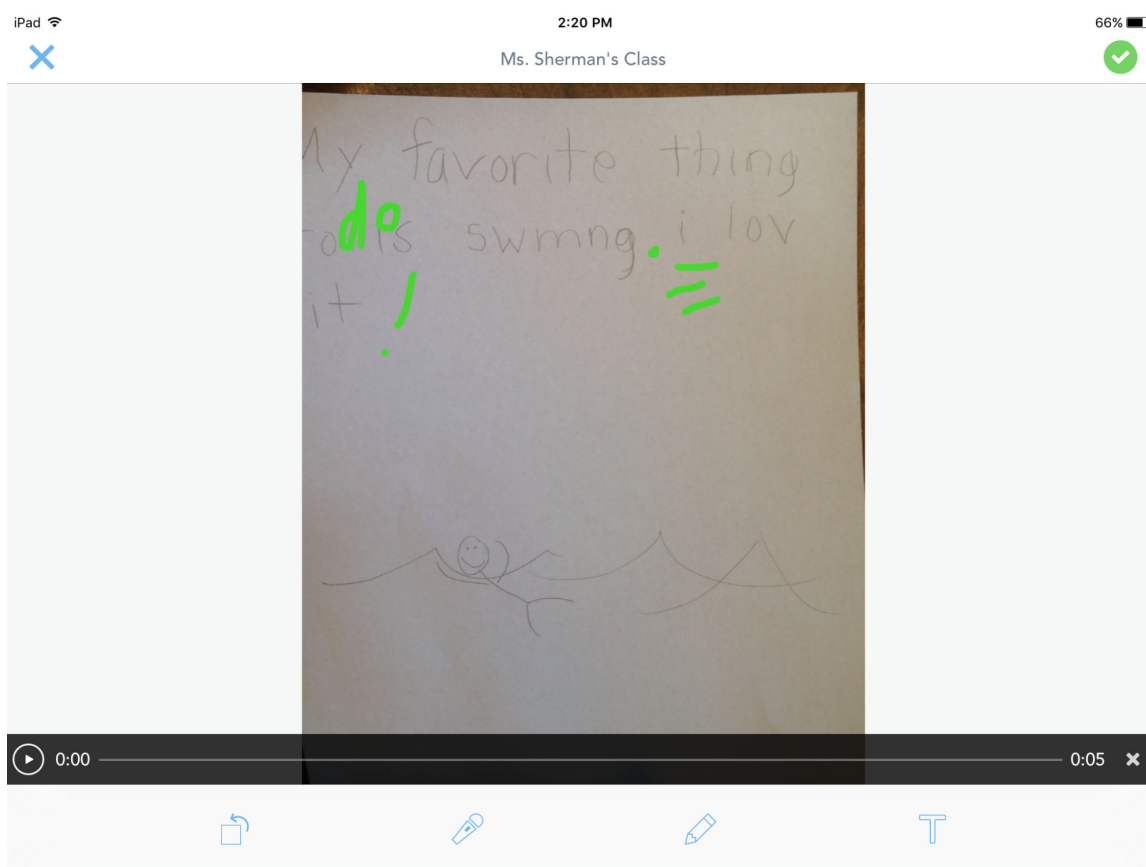


Figure 5. A student's reading the writing in SeeSaw (Source: Ms. Sherman's class: watch the [video](#))

Math

Lesson Title: Clockwork

Recommended Grades: 1+

Standards: (Measurement, telling time)

The teacher will prepare a mini clock manipulative for each student and slips of paper with the digital time to the hour, half hour, etc. Have each student pull out a slip of paper and make their clock manipulative match the digital time shown on their slips of paper. Then, have students take a picture of the slip of paper with the time, as well as their clock.

Lastly, have students voice record themselves while saying the specific time shown in their pictures (See Figure 6 for an example).



Figure 6. A student's voice recording (Source: Ms. Sherman's class. Watch the [video](#))

Reading

Lesson Title: Read Like You Mean It

Recommended Grades: K+

Standards: (Reading, fluency)

There is another way to use Seesaw in a reading center. Teachers can have students take a picture of a page in the book they are reading. First, have students record themselves reading the page like a robot and have them listen to the replay and submit their recordings to Seesaw. Then, have students take another picture of the same page. This time ask them to record their reading using different expressions (e.g., like using a sad tone, happy tone), and replay the recording (See Figure 7). This activity will help students recognize the importance of reading with expressions. Moreover, this activity will help teachers assess students' ability to read with expression.



Figure 7. A student recorded reading a book (Source: Ms. Sherman's class. Watch the [video](#)).

Kidspiration Maps



Kidspiration Maps is a creation app that specializes in graphic organizers. It has hundreds of engaging images varying in topics such as farm animals, U.S. History, weather, money, and much more! The app also includes text, drawing, and recording features. The wide range of images as well as accessible features makes it easy for students to use this app to express their knowledge in all subject areas.

Phonics/Vocab

Lesson Title: Letter-Picture Match

Recommended Grade: K-2

Standards: (Alphabet, word recognition, onset and rimes)

This lesson can be differentiated depending on the grade. In Kindergarten have students create a page each week with the focus letter. If the letter of the week is A; have students draw or type the letter “a”, then have students find 3 pictures that begin with the letter “a”, lastly have students record themselves saying the letter “a”, the sounds it makes, and then the images they chose. In first grade have students find images that are from the same word family (See Figure 8 and Figure 9). For example, if they are studying words that end with -at have them find images that end with -at. They can also record the sound and images they chose. In second grade and up, have student find a picture of one of their vocabulary words and have them make a web of synonyms and antonyms using either pictures or texts.



Figure 8. A beginning letter example.

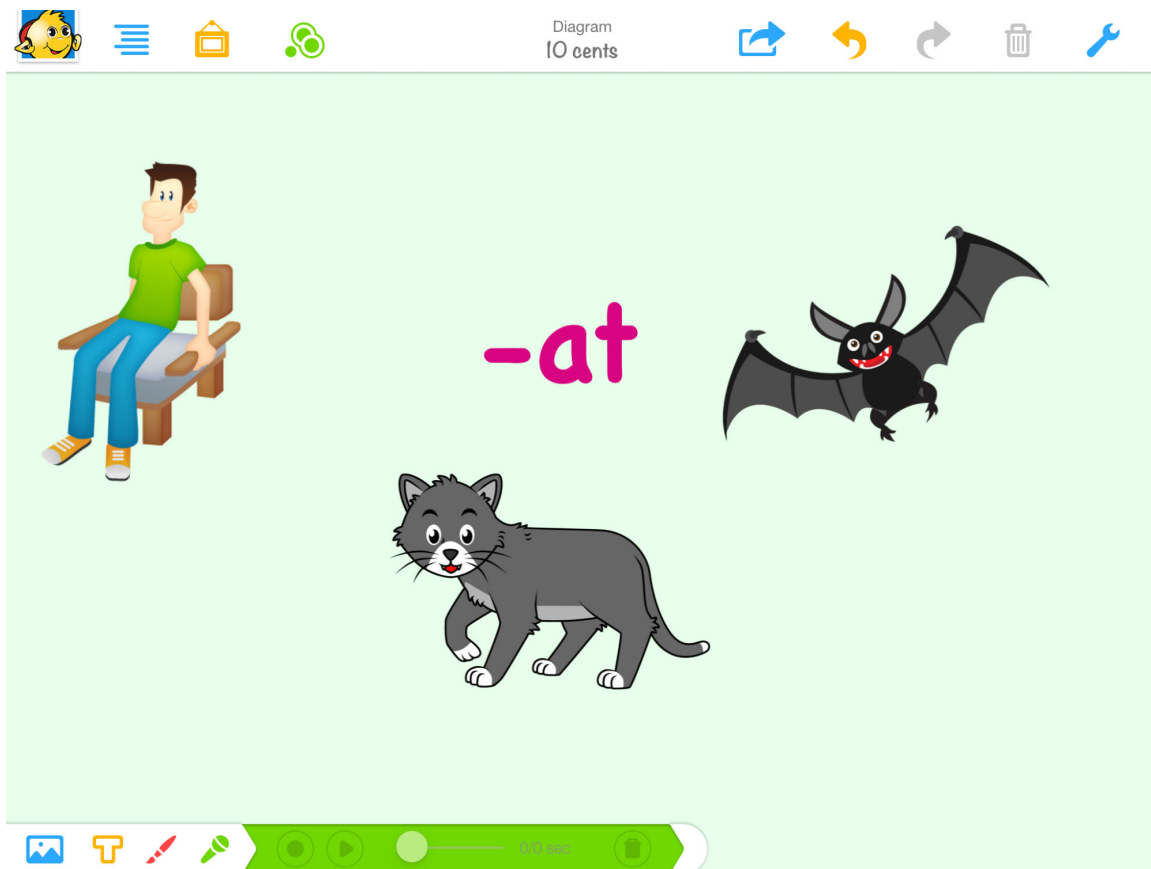


Figure 9. A word family example.

Math

Lesson Title: 3 pigs < 4 cows

Recommended Grade: 1+

Standards: (Math, greater than, less than)

Kidspiration has a good selection of math images and symbols. These are best accessible by using the search bar and searching "Math". The greater than and less than symbols will easily be displayed. Have students create pictures of images such as adding three pigs to one side and then choosing the less than symbol and adding four cows to the other side. Have them record themselves saying the sentence: "3 pigs are less than 4 cows" (See Figure 10). In second grade, have students use greater than and less than symbols to demonstrate money value. Have them use the money images to create correct math sentences such as 3 quarters is greater than 5 dimes (See Figure 11).

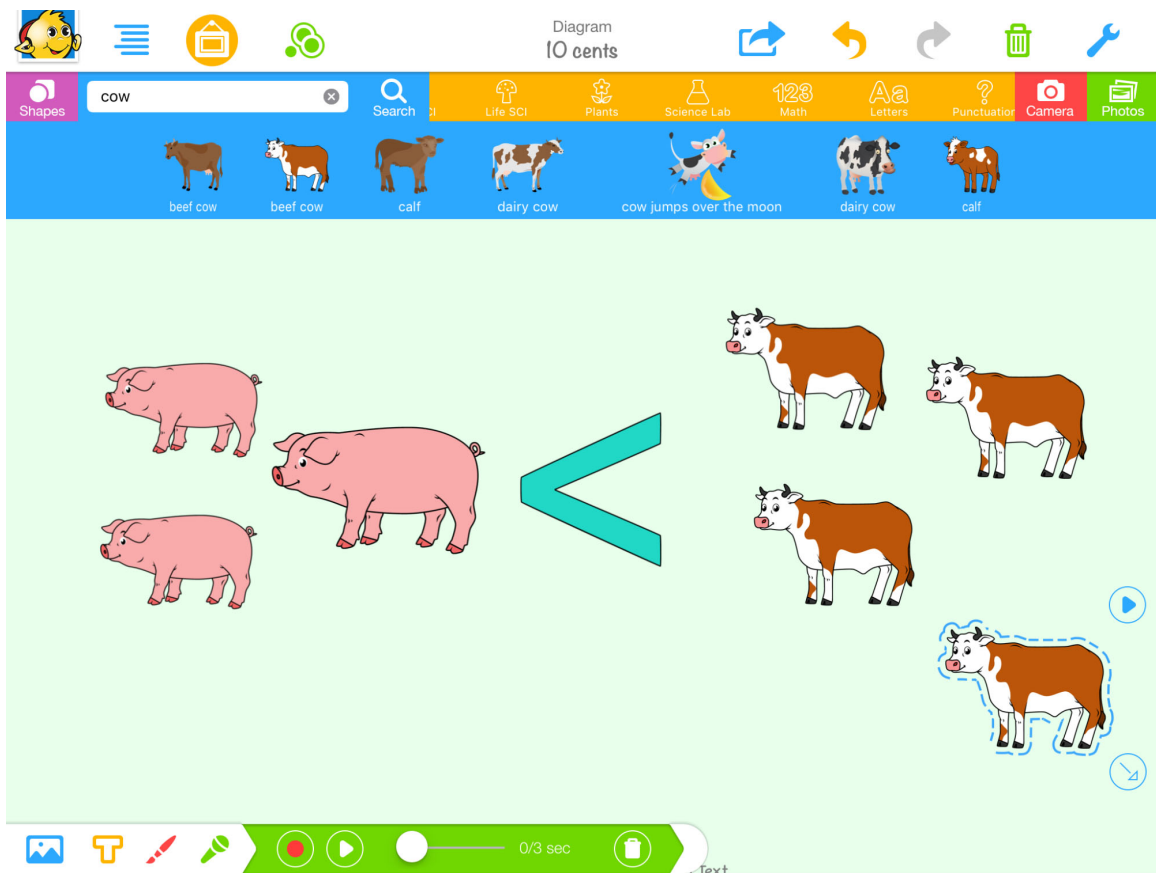


Figure 10. Compare 3 pigs with 4 cows.



Figure 11. Compare 3 quarters and 5 dimes

Reading

Lesson Title: Picture Comprehension

Recommended Grade K+

Standards: (Comprehension skills, setting, character, etc.)

After a Read Aloud with distinct setting and characters have students demonstrate their comprehension of the story by having them find images that represent the setting and characters in the story (See Figure 12). The students can also voice record a short summary of the story including the main plot.



Figure 12 Using Kidspiration to show the understanding of a story

Additional Resources

- [How to set up Seesaw or get Help](#)
- [More Seesaw ideas](#)
- Search “Seesaw Teachers” on Facebook to connect with other teachers. You could learn how other teachers are using the app, or ask for ideas!



- [Using Kidspiration map for early years](#)
- [Lesson plans for using Kidspiration](#)

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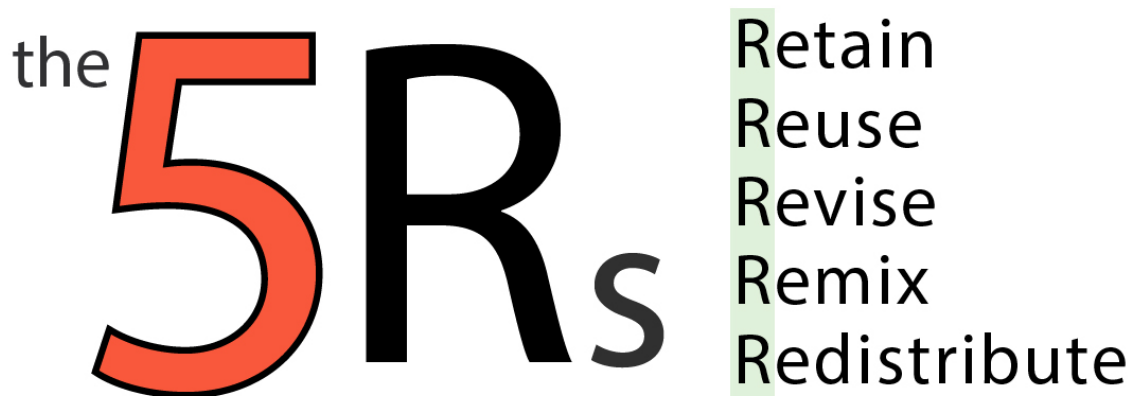
Open Educational Resources

Yin-Chan Janet Liao

Open Educational Resources

Openness

Open Education



Learning Objectives

- Define Open Educational Resources (OER);
- Identify types of OER, benefits of using OER in teaching and learning, examples of OER used in K-12 education, and platforms to search for and share OER.

As a teacher working in an elementary or a secondary school, it is very likely that you need to face a crucial reality - having limited time to deal with all kinds of school duties, including developing lesson plans, creating teaching materials, and documenting student learning progress, etc. This reality in K-12 educational settings could be particularly overwhelming if you are a beginning teacher. Luckily, with the advent of technology and the emergence of K-12 Open Educational Resources (OER), more free and quality resources become available for K-12 teachers. OER allow teachers to save the time creating teaching materials from scratch, yet still have access to materials that support student learning engagement. OER have created an extraordinary opportunity for educators to customize teaching and learning as well as sharing knowledge in various forms across communities, states, and even countries.

Key Terms

Open Educational Resources (OER)

materials for teaching, learning, and research that people have free access with no cost and can legally retain, reuse, revise, remix, redistribute them

Openness

the level of license on educational resources which indicates different conditions, restrictions, or permissions users need to follow when they use or share the educational resources.

What Are Open Educational Resources (OER)?

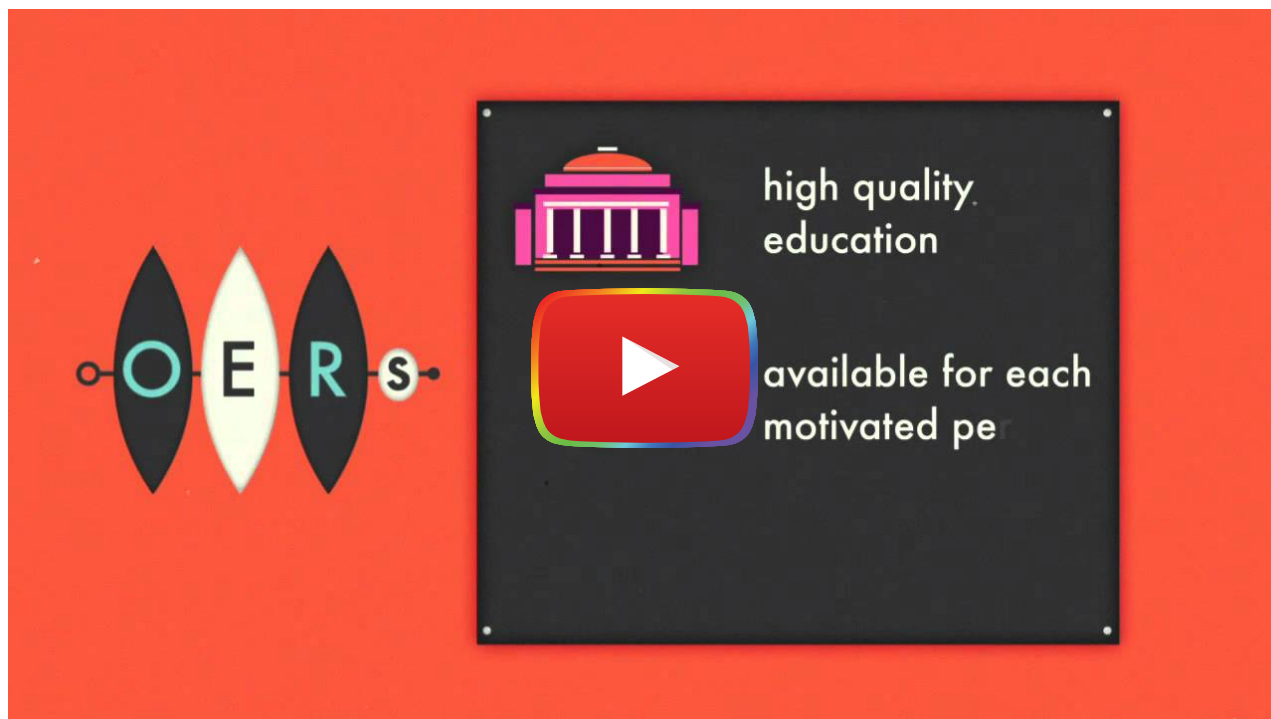
OER can be a wide variety of materials used for educational purposes such as videos, lesson plans, digital books, online courses, and teacher websites. Although there are slight differences among how people define and evaluate quality OER, the general understanding describes OER as openly licensed materials that provide users free access and permission for *5R* activities:

Here are definitions and examples of the 5R activities teachers can engage in OER for their teaching and learning:

		Example Let's say you found other teachers' lesson plans licensed as OER on teachers' websites. You would be able to...
5R Activity	Description	
Retain	The right to make, own, and control copies of the content	download, duplicate, store, and manage the lesson plans
Reuse	The right to use the content in a wide range of ways	use the lesson plans in your class and post them on your class website
Revise	The right to adapt, adjust, modify, or alter the content itself	delete two instructional goals on the lesson plans
Remix	The right to combine the original or revised content with other material to create something new	add a video and an activity to the lesson plans and make them your new lesson plans
Redistribute	The right to share copies of the original content, your revisions, or your remixes with others	give a copy of the original or new lesson plans to your colleagues in the school

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Why Open Education Matters? “Education is SHARING”



[Watch on YouTube](#)

“The OERs - Open Educational Resources” by intheacademia is licensed under CC BY.

As described in the video above, there are many characteristics of OER that can be beneficial to K-12 teachers in supporting their teaching and professional growth, as well as student learning.

One of the important characteristics of OER is that OER must be **free** - both to give and to take. Imagine when teachers are motivated to put effort in their teaching preparation for instructional materials, many of them might need to start from scratch or pay out of their own pocket to purchase some existing resources created by other educators. However, teachers should not be dealing with this situation in a school environment that already has very limited time and resources for teaching preparation. With OER, any teacher can search for thousands of high-quality online instructional resources in a wide spectrum of content areas and get access anytime for free. When teachers commit part of their time creating and sharing open and free teaching resources with the education community, in return, the collective effort will allow them to save time and money on quality teaching resources for their own classrooms. For instance, instead of paying ten dollars to download a low-quality worksheet from ABC.com for a Math classroom activity worksheet, Mr. Johnson would be able to search on different OER websites and download three different worksheets with high reviews from other teachers for free.

Utilizing OER can not only save teachers' money, but also save their time to prepare for their teaching more efficiently. For instance, Ms. Williams, a beginning 5th grade teacher, can search for existing lesson plans other 5th grade teachers created that align with the same Math standards she wants to teach. Instead of creating a lesson plan starting with a blank document, Ms. Williams already has an idea what activities can be integrated in a lesson plan to address specific instructional goals by searching OER created by other teachers. From there, Ms. Williams can easily gather different ideas and activities she found from standard-aligned OER and create instructional materials for her own class.





In addition to saving teachers' time and money, OER can be useful and beneficial for teachers because they are **customizable**. Teachers are encouraged to take an advantage of this feature of OER allowing users to engage in 5R activities. With the permission to remix and revise, teachers have the **flexibility and choices** to change whichever parts of OER that do not apply to their classes can customize the content based on their own teaching needs and students'

learning needs. For example, Mrs. Harrison downloaded a series of digital reading materials for readers in different levels from an OER website, including news and stories that she would like to let her 2nd grade students practice reading. Yet, it would be impossible for her to directly adopt all the materials in his class due to learners' various language proficiencies. This issue could be quickly resolved with OER resources as users are generally granted the rights to revise the content according to their own teaching needs. Thus, Mrs. Harrison can easily modify the difficulty level of a reading to offer a differentiated reading activity to her students. In addition, Mrs. Harrison could also remix the resources to fit her teaching needs. For example, she could create three folders (Beginning, Intermediate, and Advanced) in her Google Drive and categorize all the reading materials she found in those folders. Then, by continuously adding more reading materials in those three folders over time, she would be able to collect and customize OER resources to address a wide variety of learning preferences and needs of different groups of students.

Lastly, OER can also help teachers keep their instructional materials **stay current**. Compared to the traditional hard copy textbooks that K-12 schools usually replace on a multi-year cycle due to huge cost on replacement, teachers can update the content on OER anytime for free. Thus, OER is also particularly handful for teachers who need to meet new standards and instructional goals.

Openness of OER

Anyone can search for and engage OER in the 5R activities because OER are made available under open licenses. [Creative Commons licenses](#) are commonly used for giving copyright permissions to the creation of OER. Creators can decide the **openness** of their OER by having their work licensed under different levels/types of Creative Commons license. Then, OER users need to follow the conditions of the licenses when they engage in the 5R activity. Here is a table showing the six levels/types of Creative Commons license with their conditions:

License Types	Description
 Attribution CC BY	<p>This license lets others distribute, remix, tweak, and build upon your work, even commercially, as long as they credit you for the original creation. This is the most accommodating of licenses offered. Recommended for maximum dissemination and use of licensed materials.</p>
 Attribution-ShareAlike CC BY-SA	<p>This license lets others remix, tweak, and build upon your work even for commercial purposes, as long as they credit you and license their new creations under the identical terms. This license is often compared to "copyleft" free and open source software licenses. All new works based on yours will carry the same license, so any derivatives will also allow commercial use. This is the license used by Wikipedia, and is recommended for materials that would benefit from incorporating content from Wikipedia and similarly licensed projects.</p>
 Attribution-NoDerivs CC BY-ND	<p>This license allows for redistribution, commercial and non-commercial, as long as it is passed along unchanged and in whole, with credit to you.</p>
 Attribution-NonCommercial CC BY-NC	<p>This license lets others remix, tweak, and build upon your work non-commercially, and although their new works must also acknowledge you and be non-commercial, they don't have to license their derivative works on the same terms.</p>

License Types

Description



Attribution-
NonCommercial-
ShareAlike
CC BY-NC-SA

This license lets others remix, tweak, and build upon your work non-commercially, as long as they credit you and license their new creations under the identical terms.



Attribution-
NonCommercial-
NoDerivs
CC BY-NC-ND

This license is the most restrictive of our six main licenses, only allowing others to download your works and share them with others as long as they credit you, but they can't change them in any way or use them commercially.

"Six Types of Creative Commons Licenses" by [Creative Commons](#) is licensed under [Creative Commons Attribution 4.0 International License](#).

OER Attribution

"Education is sharing" is the key concept behind OER. While creators of educational resources give their permissions to others for using their original work for free, it is necessary for OER users to give credit to creators and attribute their original work when they reuse, remix, revise, and redistribute the work. In other words, attributing the creative work you used to its original creator is the premise of a respectful and legal use of OER.

Here are examples of an appropriate way to give attribution:

Attribution of Original Work



"Creative Commons 10th Birthday Celebration San Francisco" by [tvol](#) is licensed under [CC BY 2.0](#)

Attribution of Modified Work



"Creative Commons 10th Birthday Celebration San Francisco" by [tvol](#), used under [CC BY](#) / Desaturated from original

Remember:

Title? "Creative Commons 10th Birthday Celebration San Francisco"

Remember:

Title, Author, Source, and License are all noted

Attribution of Original Work

Author? "[tvol](#)" - linked to his/her profile page

Source? "[Creative Commons 10th Birthday Celebration San Francisco](#)" - linked to original Flickr page

License? "[CC BY 2.0](#)" - linked to license deed

Attribution of Modified Work

Modification? "Desaturated from original"

"Examples of Appropriate Attribution" by [Creative Commons](#) is licensed under a [Creative Commons Attribution 4.0 International license](#)

More information about OER attribution can be found here: [Best Practice for Attribution](#)

Where Can K-12 Teachers Look for OER?

Here is a list of resources teachers can use to search for OER for teaching, learning, and their own professional development:

General Search

- [Google Advanced Search](#) (Scroll down in advanced search and set "usage rights" parameters to "free to use, share, or modify")
- [CC Search](#) (The CC Search tool automatically filters your search to find Creative Commons licensed resources)

Image Search

- [CC Search](#) (You can pick a number of image sources you want to search across)
- [Wikimedia Commons](#)
- [Flickr](#) (You can search through content under each type of Creative Commons license)
- [Google Image](#) (Scroll down in advanced search and set "usage rights" parameters to be "Free to use, share, or modify")
- [Pixabay](#) (Pixabay images are public-domain images that you can use freely for personal and commercial purposes without attribution to the original author)
- [The Noun Project](#) - Collection of CC Licensed Icons
- [Europeana](#) (Access to digital resources of Europe's museums, libraries, archives and audio-visual collections. Not all the works are openly licensed so be sure to check for usage right)

Video Search

- [YouTube](#) (Type in your search term followed by a comma and then "creativecommons" the videos returned are CC licensed. For example: World War 1, "creativecommons")
- [Vimeo](#) - post and search for Creative Commons licensed videos)
- [Internet Archive](#) - a great collection of old video and movie footage
- [TED - Ideas Worth Spreading](#) (All TED videos are released under a Creative Commons BY-NC-ND license)
- [Al Jazeera](#) (various Creative Commons licenses)

Audio/Music Search

- [Jamendo](#) - free music tracks licensed under Creative Commons
- [ccMixer](#) / [digccmixter](#) (music for videos, games, podcasts, etc.)
- [Free Music Archive](#)
- [SoundCloud](#)

Education Search

- [Curriki](#) (a leading K-12 global community)
- [OER Commons](#) (search based on subject areas, education levels, and standards)
- [Gooru](#) (K-12 courses and instructional materials)
- [OpenEd](#) (K-12 Classroom Assessments, Homework, Videos, Lesson Plans)
- [ShareMyLessons](#) (search K-12 resources based on education levels and standards)
- [PhET](#) (K-12 simulations)
- [WatchKnowLearn](#) (K-12 free educational videos, various types of license)
- [Connexions](#) (modules that can be organized as courses, books, reports)
- [EDSITEment](#) (CC licensed K-12 lesson plans)
- [Feedbooks](#) (public domain ebooks)
- [Bookdash](#) (children's PDF eBooks and [audiobooks](#))
- [African Storybook](#) (children's eBooks in various languages)
- [GeoGebra](#) (free interactive Math materials)
- [CK-12](#) (standards aligned K-12 Math & Science resources)
- [Khan Academy](#) (K-12 Math and Science instructional videos)
- [Mountain Heights Academy](#) (course materials in high school STEM, Language Arts)
- [The Office of Superintendent of Public Instruction](#) (Secondary Math and ELA)
- [Siyavula](#) (open textbooks for high school Math and Science)
- [PBS Learning Media](#) (has different types of license)

Complete Courses for Teacher Professional Development

- [P2PU](#)
- [OpenCourseWare Consortium](#)
- [Open Learning Initiatives](#)
- [Open Course Library](#)

Practice: Let's engage in the 5R activities

Now, you have a general understanding of OER, including its definition, characteristics, and ways of use, let's begin to practice using OER and engaging in the 5R activities in two ways:

As a Taker - Get useful OER made by other people

1. Identify your purposes/goals/needs of instructional materials you are looking for.
2. Search for openly licensed resources on different websites. It is a good start to search for OER from the list of resources provided above.
3. Get access to the resources you found and make sure they are openly licensed under Creative Commons which provides you the permission with stated conditions.
4. Get ready to reuse, revise, remix your OER.

As a Giver - Make OER for others

1. Identify your purposes and goals of instructional materials you want to share.
2. Create a new material or revise and remix existing OER based on your purposes and goals.
3. Have your material licensed under Creative Commons:
 1. [Choose a type of Creative Commons license](#)
 2. Apply the license to the material you want to share
4. Redistribute your OER on one or more [websites](#) (e.g., Flickr, Vimeo, OER Commons).

Additional Reading Resources of OER

- [Why Openness in Education?](#)
- [OER Mythbusting](#)
- [On Quality and OER](#)
- [OER Quality and Adaptation in K-12: Comparing Teacher Evaluations of Copyright-Restricted, Open, and Open/Adapted Textbooks](#)



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STEAM Mindset

Mary Jeanne Olexa Smith

STEAM

STEM



Learning Objectives

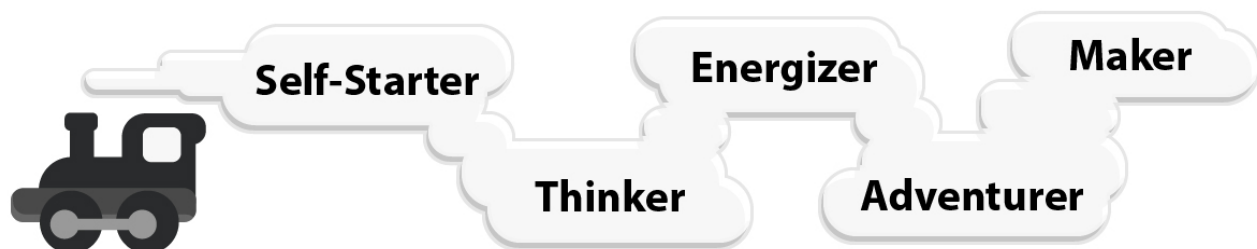
- Understand the five attributes of the STEAM Mindset;
- Identify activities and supports to promote the STEAM mindset.

The purpose of this chapter is to consider the acronym STEAM in a new light. Rather than considering STEAM as a collection of curriculum areas (Science, Technology, Engineering, Arts, and Math) this chapter suggests that STEAM can be an acronym for another relevant combination of attributes (Self-starter, Thinker, Energizer, Adventurer, and Maker). In this model, learning “under your own STEAM” is a mindset that encourages exploration, experimentation, and learning in every curriculum area for every student. This chapter uses an outline convention called CARTS (Concept/Content,

Activities, Resources, Technology, Support) to provide information and realistic consideration of the topic, a STEAM Mindset.

The educational community is abuzz with the words STEM and its expanded relative, STEAM. STEM refers to the renewed emphasis on Science, Technology, Engineering, and Mathematics and the co-mingling of these curriculum areas. STEAM includes the Arts as an integral component of the academic landscape. Teachers and students are asked to develop their skills in these areas in an effort to enhance their academic prowess and career success. Yet, learning is so much more than a curriculum. It is a life perspective, a life skill, and a life-long endeavor. STEAM, in this chapter, goes beyond science, technology, engineering, arts, and math to a mindset that underpins the fabric of curriculum. STEAM is a mindset of Self-motivation, Thinking, Energizing, Adventure, and Making. The five attributes are significant because they encompass internal and external elements of a mindset that foster growth. Inservice and pre-service teachers in K-12 education who are self-motivated, who are always thinking of the next learning challenge to take on, who energize others with new ideas, who venture into new educational territory, and who solidify their learning with meaningful lessons and projects foster their own professional development and student achievement. The STEAM mindset is a catalyst for learning that lays the groundwork for the skills necessary to approach the curriculum with confidence, capability, and competence.

The STEAM Mindset, in this context, moves from an emphasis on curriculum to a support of the learner. It is a mindset that places learning in the hands of the student. The teachers and students work together to foster an environment where each person is encouraged to grow. It recognizes Carol Dweck's concept of a growth mindset (Dweck, 2007, 2016). It capitalizes upon Angela Duckworth's understanding of GRIT (Duckworth, 2017). And, it sets forth a path for implementation and action. The learner taps into his or her self-worth to become a self-starter and a self-sustainer, a thinker, an energizer, an adventurer, and a maker.



The five STEAM attributes

I love trains. I rode a train from Paris to Rome that was so crowded I had to stand for the entire midnight ride. I peered out of the window and wondered about the people who lived in the dimly lit homes that flew by. I rode a train from Philadelphia to Montreal that took fifteen hours, and embarked on a twenty-four hour jaunt to Orlando via the Silver Meteor. I marveled at the grandeur of Alaska that I saw from the train that traveled between Anchorage to Denali, Alaska. Whenever I can, I use public transit trains to get into the city. Trains can take you around the city or across the country. Trains speak of power, adventure, and a view of the world. It is no wonder that Great Grandpa Smith's model steam locomotive became my symbol for the power and empowerment of a STEAM Mindset.

Key terms

Fixed Mindset

a belief that individual qualities, such as intelligence or talent, are fixed (unchanging) traits

Grit

a non-cognitive trait comprised of passion and motivation to achieve a particular objective

Growth Mindset

a belief that individual qualities, such as intelligence or talent, can be developed through dedication and hard work

Independent Learning

a learning scenario in which the learner takes charge of their own learning (also self-directed learning)

Mindset

a self-perception that people hold about themselves, such as believing you are intelligent

Project-Based Learning

the use of real-world scenarios, challenges, and problems, to help students gain useful knowledge and skills that increase during their designated project periods

STEAM Attributes

Self-Starter, Self-Motivated, Self-Driven

Realize your self-worth. Believe in yourself. Live in a state of mindfulness. Have a purpose. Set goals. Take the initiative. Develop strategies. Synthesize your thoughts. Gather support, connect, communicate, persevere, persist, seize an opportunity. Be a self-manager. Write your own story.

Thinker, Embrace Technology

Thinking, critical thinking, innovative thinking, creative thinking, design thinking, decision-making. Use your talents. Use your tools. Use technology. Be a problem-solver and a questioner. Have a curious inquiring frame of mind. Apply what you learned to new situations in school and in the “real” world. Reflect on your learning and use your reflection to build new learning.

Energizer

Engage. Energize the people around you. Smile. Be a positive force. Build relationships. Be a team builder, an ethical person. Empower others. Be filled with empathy. Embrace eclectic learning. Contribute.

Adventurer

Be authentic, and aware. Be an explorer, experience, investigate, experiment. Engage in active learning, appropriate risk-taking, action, analysis, and personal assessment while being resourceful.

Maker

Be motivated. Have a meaningful purpose. Use design thinking, tinkering, generative learning, mastery learning. Engineer. Authorship. Share your talents. Let your actions and your work be seen. Let your voice be heard.

A STEAM Mindset

Theories ignite our thinking. Research provides credibility to a theory. But practical explanations and instructions guide everyday practice. A mindset is a perception a person holds about himself or herself. It is the person's frame of reference. Carol Dweck suggests that a person's ability to learn is fluid, not fixed (Dweck, 2007, 2016). A person is not born with all the intelligence he or she will have. The person can expand his or her potential. Angela Duckworth adds that passion and perseverance drive that expansion. A person who is passionate about a topic will pursue it far more than an uninterested individual. In essence, the person "takes charge" of his or her learning and becomes an independent learner.

Yet, there are nagging questions for educators. How can the theory, the research, become a part of my classroom instruction? What do I look for? How do I foster an environment of growth? How do I take curriculum such as science, math, and engineering, typically areas of apprehension for many students, and engender a passion and persistence to learn in these fields?

One answer is to look toward a STEAM Mindset. In exploring a STEAM mindset, students and teachers have a framework for growth, passion, and action. A STEAM Mindset looks for and encourages an individual to be a self-starter and a self-sustainer. A learner is ready to begin a task or a project because he or she sees a purpose in the task, sets goals, develops strategies, and elicits support. The student has the resilience to motivate himself and sustain himself, and to persist in learning. Educators can assist learners with these steps. The teacher can begin by stating a purpose and helping students set goals. The teacher can provide meaningful, authentic feedback that encourages perseverance. As time passes, the teacher can minimize involvement and encourage self-sufficiency.

With similar pedagogical strategies, the teacher can encourage critical thinking. Carefully crafted questions can channel and expand a student's thought processes. What do you think about this? What will happen if...? This occurred, so what? These can be launching questions for creative thinking and problem-solving. Correlations to the student's experiences heighten the potential for involvement and passion. Working a geometry problem can be tedious, but designing a new space for physical education in the school, brings the math home. Technology can illustrate, illuminate, and broaden a student's critical and creative thinking. The simple exercise of evaluating a website for credibility is an example that encourages deliberation.

A STEAM Mindset suggests that an individual is an energizer. The person works with others, encourages others, supports others, and is supported by others. The person is ethical, honorable, and has integrity. Communication and collaboration are hallmarks of an energizer. The energizer empowers others by encouraging comments and actions. A teacher can provide opportunities for students to become energizers with authentic project-based activities and genuine feedback.

Learning is an adventure. A STEAM Mindset brings out the adventurer in individuals. An adventurer takes reasonable risks in learning. The learner investigates, explores, experiments, and discovers. The learner is resourceful, exploring various avenues to find answers and leaves no stone uncovered. The learner is open to new information, techniques, and challenges. Notice how these attributes mesh with the STEM/STEAM curriculum, especially with scientific exploration. Educators can foster an adventurous spirit by posing open-ended questions, encouraging students to seek answers for themselves, inviting students to ask questions, and leading students to plausible answers, rather than declaring responses as correct or incorrect.

As a student becomes more attuned to his or her STEAM Mindset and embraces an adventurous spirit, a thinker mentality, and an energizing rapport, he or she may produce a product. A maker emerges. A maker is a producer rather than a consumer. A maker is an author, a designer, an engineer, an artist, a builder, a tinkerer. A teacher can facilitate a maker's spirit with suggestions and encouragement. Design an app, create a website, write your own story, reflect on a lesson, paint a picture, illustrate a fable, plant a garden at home and explain what happens, or take care of a pet.

A STEAM Mindset is important because it is a mental framework that allows an individual to look inward and outward, to motivate and to look for motivation, to absorb learning, make learning, and share learning. Teachers and students

who “buy into” the STEAM Mindset are able to build their own learning and continue learning throughout their lives.

Activities

STEAM Poster/People Activity (Early Middle School)

Classes are punctuated with STEAM allusions and techniques. Bulletin boards illustrate the qualities of a STEAM Mindset. Students are asked to consider what STEAM attribute best exemplifies themselves, even if the attributes is just budding. Students will be grouped with similar students and given a poster board or large paper cutout of a person (depending upon the tenor of the class). Students will illustrate the poster or figure, and include attributes of their STEAM quality, e.g., “This is what a self-starter looks like.” At various times during the first two months of school, students will add information to the poster/figure and try to develop their skills in the area. Subsequently during the year each group will merge with another group, teach them about their STEAM quality and encourage the new group to exhibit similar qualities. This will occur until all of the teams have shared. Posters will be displayed around the classroom. Students will use a Google Classroom assignment to reflect on their ability to work as self-starters, thinkers, energizers, adventurers, and makers. In the reflections, students will discuss how they have used these attributes to learn content and technology skills. Evidence of assimilation will be demonstrated as students accept STEAM roles as part of curricular projects.

STEAM Cards (Younger Students)

Younger students are immersed in the components of a STEAM Mindset in an enjoyable manner in this series of activities. Initially, the teacher conducts classroom discussions about the STEAM attributes. The teachers guide students to think about a picture that would represent one or more of the STEAM attributes that the students feel as if they would like to practice. Students create a STEAM card and put it on their desks or spaces to remind them of the attribute they are representing. After several weeks, collect the cards and play a matching game where students try to find like-minded students. The students demonstrate their experiences as they try to practice the STEAM attribute. Demonstrations could be a drawing, a poem, a short story, or a game the students work on together.

Project-based Learning

Project-based Learning is a vehicle for developing and sustaining a STEAM Mindset. Classrooms throughout the world are using this pedagogy to encourage independent learning, collaboration, and producing a product. A corollary that works well with project-based learning is what has been termed “flipped learning,” where students are given access to short videos explaining a topic. They view the video at home or on their own time, and then discuss in class. This provides greater class time for clarification and project work.

Challenge Yourself as an Educator

Education is a profession where learning never ends and teaching always begins with a passionate learner. Challenge yourself to start something new in your area of expertise (or in a new area), think about relevant topics in the education field, hone your technology skills, energize others, perhaps through a professional learning network (a group of like-minded educators interesting in furthering their expertise), create your own plan of action, venture into new learning areas, and make a difference.

Resources

Research tells us that human beings learn from different avenues. They learn from their senses. They learn from physical and mental connections they are able to make. Learners assimilate what they have learned into their own cognitive framework and they adapt their framework to accommodate new learning. Research provides clues to the mystery and majesty of learning. The body of information is growing as evidenced by this sampling of resources.

General Information

- [Brain-based Learning](#)
- [10 Research-based Insights On How the Brain Learns](#)
- [Growth Mindset](#)
- [GRIT](#)
- [Eight Paths to Every Student's Success](#)
- [10 Ways to Teach Creativity in the Classroom](#)
- [How to Foster Curiosity and Creativity](#)
- [Curiosity is critical to academic performance](#)
- [The Power of Collaboration \(look to the right for a multitude of videos\)](#)

Project-Based Learning

- [Buck Institute](#)
- [Project-Based Learning](#)
- [Project-Based Learning on Pinterest](#)
- [Google Tools: Drive, Docs, Sheets, Slides, Google Classroom](#)

Explore: Independent Learners, Adventurers, Makers

- [What if students controlled their own learning? | Peter Hutton | TEDxMelbourne](#)
- [Developing Independent Learners: Guiding Students to Be More Resourceful](#)
- [Active Learning 1: Being an Independent Learner](#)
- [Valley Catholic Elementary School: Fostering Independent Learners](#)
- [Management Strategies to create independent learners](#)
- [Assessment & Feedback that Foster Independent Learning](#)
- [Virtual Field Trip - Amazon Rainforest](#)
- [Virtual Field Trips -- plethora of Virtual Field Trips with information](#)
- [Virtual Field Trips from Discovery Education](#)
- [Create your own virtual field trip](#)
- [Kids Learn STEM Lessons Online by Becoming Virtual Adventurers](#)
- [The Jason Project](#)
- [How the Maker Movement Connects Students to Engineering and Technology](#)
- [Student Makers Conference](#)
- [Student Makers Conference | Dallas Brooks Community Primary School](#)
- [Maker Education: Reaching All Learners](#)
- [Makers Faire 2](#)

Technology

Use technology to foster your own STEAM Mindset and to teach others.

Organize your ideas and data

- Consider using a website called “[Symbaloo](#)” to create tiles for links
- Use social bookmarking such as [Diigo](#)
- Use [New Google Classroom](#), [More on the New Google Classroom](#) to organize and distribute assignments for students. Google Classroom is part of the G-Suite for education, but as of 2017 Google Classroom is also a part of a general google account. Look in the “waffle,” nine dots, on your Google account.
- Use a lesson planning tools like Planbook.com (easy and helpful but cost \$12.00 a year) or free [Lesson Plan Templates](#). Include a STEAM attribute in each unit plan or lesson plan.
- Make your ideas and data accessible
- Make a repository of all your ideas in a folder, Google Drive, or Microsoft Drive
- Give your ideas easily recognizable titles

Explore

- Develop Search techniques: Clarify Key Words, [Use Advanced Search](#)
- Websites ([including the International Society for Technology in Education, ISTE standards](#))
- Social Media such as Twitter and Pinterest
- Youtube (subscribe to channels with Educational Topics)
- [TED Talks for Education](#)
- New technology such as augmented reality, virtual reality, and wearable technology. Consider Google Expeditions and Google Cardboard (tool).

Experiment

- Plan and execute a project. Evaluate your progress.
- Ask friends how well their projects worked and what they would have done differently.
- Make learning fun for the students by using teacher and student created games. Tools such as [Kahoot](#), [Quizlet](#), [Quizizz](#), and [Flippity](#) (an add-on to Google Sheets) will get a teacher started.

Share your ideas with others

- Check your sources before sharing. Adhere to digital citizenship protocol. [Common Sense Media Digital Citizenship](#) has great lesson plans and tools for keeping students safe and their families informed.
- Discuss your project(s) with others, classmates, teachers, students.
- Collaborate on a project.
- Post ideas on a blog or other social media.

Challenge

- Not all of the resources will align with your educational philosophy. Which resources resonate with you? Create your own evaluation tool. Use a document, spreadsheet, or form.
- Create your own portfolio of your ideas and aspirations. Use Google Tools, Microsoft OneDrive, or other curation tool.
- Create your own website, pinterest site, blog, or instagram illustrating your understanding of and application of a STEAM Mindset.

Support

STEAM is more than teaching and learning content or engaging in activities. STEAM is a mindset for growth that incorporates independence and collaboration, understanding, engagement, and responsible risk-taking. Support is vital for inservice or pre-service teachers in K-12 education to begin to build confidence and take risks to improve learning. Here are some STEAM support techniques:

Self-Starter

- Ask a supervisor for suggestions on reading material from experienced, trusted authors.
- Read, read, read
- Follow educational leaders such as Sir Ken Robinson on TedTalks

Thinker, Technology

- Use phrases such as “I wonder. . . .,” “I would like to know more about” “What if” to get yourself thinking about improvements.
- Use technology tools such as Edmodo, Google Groups, the Google Stream section of Google Classroom, Twitter, Facebook, and other social media and websites to learn what others are doing to enhance their practice.

Energizer

- Talk with other students who are in your program or another complementary program.
- Talk with an advisor, a cooperating teacher, or an administrator
 - Ask questions
 - Offer suggestions and ask their opinion.
 - Work with others

Adventurer

- Look for experts in a content area, for example, talk with a scientist from a local company, a teacher in the field from another school, a parent that has expertise in writing, cooking, or health care.
- Engage in free webinars that highlight aspects of teaching and learning. [Simple K12](#) host webinars frequently. The webinars are free and helpful.
- Explore new learning by attending conferences. National, state, and local conferences are held in almost every curriculum area including reading, math, science, social studies, and technology. Check with supervisors for availability in your area.
- Venture into the workings of the district. Ask if you can attend school board meetings to become acquainted with the governance of the district.

Maker

- Make connections through services such as LinkedIn.
- Create a “support journal” listing goals, supporters, support, feedback, and next steps. Use as an evaluation tool and reference resource.

Be gentle with yourself. Take it one step at a time, and keep “learning under your own STEAM” for yourself and your students.

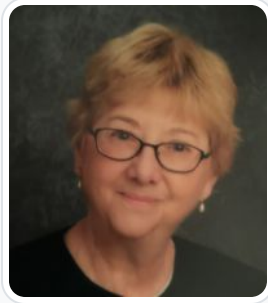
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Part 3

Legal, Ethical, and Socially-Responsible Use

The [Teacher Educator Technology Competencies](#) provided by the Society for Information Technology and Teacher Education (SITE) state the following:

Teacher educators will address the legal, ethical, and socially-responsible use of technology in education.

This section addresses a number of legal and ethical issues that teachers face when using technology in their classrooms and their personal lives and also provides guidance for teachers in determining how to best use emerging technology tools in a socially-responsible manner.

Copyright and Open Licensing
Digital Equity
Online Professionalism
Online Safety
Universal Design for Learning



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3.1

Copyright and Open Licensing

Royce Kimmons

Open Educational Resources

Openness

Open Education

Learning Objectives

- Understand concepts of copyright, public domain, fair use, and open licensing;
- Find open educational resources (OER) online;
- Recognize how to cite and share OER.

Copyright is established in federal law and varies from country to country. In the U.S., copyright was written into the original constitution in 1787, wherein it was stated that copyright is established "to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries" (Article 1.8.8). Thus, at its foundation, copyright in the U.S. exists "to promote the progress of science and useful arts," and authors are given control of their creative works for a specified period of time so that they can profit from them, thereby encouraging them to create more.



[Watch on YouTube](#)

What do you think?

How do you think copyright considerations will affect or has affected your teaching?

- ☐ I will often be afraid to use valuable resources
- ☐ I will sometimes be afraid to use valuable resources
- ☐ I will never be afraid to use valuable resources

Key Terms

Copyleft

an alternative to copyright that allows one's work to be copied, shared, or remixed (e.g., Creative Commons)

Copyright

legal protections for authors of creative works (e.g., books, movies, lesson plans) that prevent them from being used by others without permission

Fair Use

the limited ability to use copyrighted works without permission as determined by four factors (Nature of Use, Type of Work, Amount Used, and Commercial Impact)

Open

in the context of openly licensed materials or open educational resources (OER), this means gratis and libre; gratis means that content and resources are provided at no cost, while libre means that people are free to do what they want with these resources

Open Licenses

an license that allows users to freely use a resource without seeking permission (e.g., public domain, Creative Commons)

Public Domain

in the US, a technical term referring to works that are not subject to copyright protection, such as very old works

Royalty Free

a variation of copyright that allows materials to be used in some limited manner (e.g., print an image up to ten times) without paying a fee

Types of Works

Copyright applies to any tangible or electronic creative work, such as a book, movie, video, song, lyrics, poem, picture, lesson plan, web page content, etc. Any creative work is copyrighted as soon as it is created. Intangibles, such as ideas, concepts, and mathematical equations and works that lack originality cannot be copyrighted.

Gaining Copyright

Since copyright applies as soon as a work is created, authors do not need to go through any process to copyright their works. They are copyrighted automatically. However, proving that you hold the copyright on your creative work is another matter. For instance, say that you write a novel and lend the manuscript to your neighbor to proofread. What is to prevent your neighbor from claiming that the novel is her creative work and, therefore, claiming to hold its copyright? To help in preventing and addressing copyright problems, the U.S. government allows copyright holders to register copyright with the [U.S. copyright office](#). Thus, while an author does not need to do anything to copyright a work, they do need to go through a process if they would like to register the copyright of that work to safeguard against infringement.

The Copyright Symbol

The copyright symbol may be placed on a work to remind and inform users of its copyright status: ©. However, the copyright symbol is only a reminder. The absence of the symbol does not mean that the work is not copyrighted, and the presence of the symbol is not proof that the work is copyrighted (as will be discussed further in the case of public domain works).

Ownership

By default, the author of a work holds the copyright on that work. The main exception to this rule would be if the author was being paid by someone else to create the work and the author had signed a contract stating that work created while on-the-job belongs to the employer commonly known as "work for hire". Contracts might also stipulate that this depends upon when and where the work was created (during standard work hours vs. after work hours or in the office vs. at home). Some educator contracts state that creative works by an educator are owned by the educator, while others state that they are owned by the school or district. So, if you would like to know who holds the copyright of works you create as part of your job, you should check your teaching contract or contact your employer.

Usage

Copyright generally means that others cannot use copyrighted material without the permission of the author and that permissions are restrictive. For instance, downloading a bootleg version of a movie is a violation of copyright, because you did not purchase the copy from the copyright holder. Further, even if you do purchase the movie from the copyright holder, you can only use the movie in the ways that the copyright holder allows (e.g., for private home use, not for public use). Thus, by purchasing a copy of a work, you do not "own" that work in the sense that you are not free to do whatever you like with it. You must still abide by any copyright restrictions placed on the work, which might determine how and where you use the work, your ability to make copies of the work, and your ability to modify the work.

Linking

You can generally provide a web link to copyrighted material from your own materials without permission from the copyright holder. This is different from copying/pasting the copyright material into your own work, because it allows the copyright holder to maintain control of their content and to generate revenue through web traffic. The primary exception to this rule would be if you provided a link to materials that should not be publicly accessible and, therefore, allowed your users to bypass restrictions placed on the content by the copyright holder.

Losing Copyright

Copyright comes with a time limit. The purpose of this is that the U.S. government recognizes that copyright can only benefit the copyright holder for so long and that at some point copyright should expire. Currently, the U.S. copyright law states that copyright ends 70 years after the death of the author. Upon expiration, copyrighted materials move into the public domain. Copyrighted materials may also lose their copyright status under other conditions. For instance, a copyright holder may relinquish the copyright status on their work, thereby allowing it to pass into the public domain.

Copyright and Technology

Advancing technologies, ranging from the player piano to the internet, have always had unintended consequences for copyright law, and copyright law has always been slow to keep up with advancing technologies. Copyright law has changed over time, but as new technologies empower us to share and use copyrighted materials in new ways and at greater scale, copyright law gradually changes in response.

Common Questions

Can I legally show my students videos from my Netflix account or other subscription streaming services?

No. Your license agreement does not allow you to do this.

When is a work copyrighted?

As soon as it is created or published.

Does a work need to be published to be copyrighted?

No, though it must be in some physical form (e.g., manuscript, recording).

Does an author need to register their work in order for it to be copyrighted?

No. Authors may [register their work with the US copyright office](#) to protect against infringement, but even unregistered works are copyrighted.

If something is labeled with a copyright symbol (i.e., ©), does that mean it is copyrighted?

Maybe. The symbol serves as a reminder, but the copyright might have expired.

If something is not labeled with a copyright symbol (i.e., ©), then is it copyrighted?

Maybe. Maybe not. The label has nothing to do with whether or not a work is copyrighted. The copyright label only serves to remind and to inform. If you see no label, you should assume that the work is copyrighted and look into the matter further.

Can I link to copyrighted materials?

In most cases, yes. Just be sure that you are linking to the resource as it is provided by the publisher (not uploaded to someone's personal server, etc.) and that your link does not bypass a copyright holder's login system.

Can I embed copyrighted materials into my presentation or website (e.g., YouTube videos)?

That depends on the terms of the license that the copyright holder has released the content under. Generally, if a site like YouTube gives you an embed script, then you are able to use it (provided that you do not change the script, remove attribution, etc.).

What do you think?

In the last classroom that you taught or observed in, was a DVD player available for showing movies to the entire class?

☐

Yes

☐

No

Additional Resources

Some additional resources that may be useful for exploring these issues include the following:

- [Copyright Crash Course](#)
- [Wikipedia: Copyright](#)

Fair Use

[Fair use](#) is an exception or limitation to copyright law that allows you to use some copyrighted materials in particular circumstances without the copyright holder's permission. Specifically, if used for nonprofit educational purposes, some copyrighted materials may be used for teaching, but your use (a) should directly relate to your educational goals, (b) should only utilize a relatively small portion of the work, and (c) should not negatively impact the copyright holder's ability to profit from the work. Fair use means that copyright-restricted works can be used for educational purposes without permission under certain conditions. The four guiding principles that determine if use is fair are:

"Fair Use" Guiding Principles

- Nature of Use
- Type of Work
- Amount Used
- Commercial Impact

The first principle covers what you are doing with the content and whether your use aligns with the author's intended use. Fair use only applies to uses of works that are transformative in nature. This means that your intended use must be different from the author's intended use. Consider a novel. You can quote lines from a novel in a paper you write without permission from the novel's author, because you are writing the paper to analyze literary elements of the novel, not to tell a story. If, however, you took those same lines and placed them in your own novel, then that would not be an example of fair use, because your intended use would be the same as the original author's intended use. In education, this means that using someone else's educational content (e.g., an image from their textbook) would not generally be fair use, because your intent is the same as theirs (i.e., educational and, therefore, non-transformative).

The second principle gives greater flexibility in using informational or factual works than to artistic or creative works. Thus, copying a few pages from an encyclopedia is viewed as more conducive to fair use than doing the same with a detective novel, because the information's benefit to society is readily apparent.

The third principle ensures that you only use as much of the copyrighted material as is necessary to achieve your goal. Thus, quoting a line from a novel would be considered fair use, but copying multiple chapters of the novel for this purpose would not. This is both a quantitative and qualitative consideration, in that you should not use more than is needed but fair use also should avoid using the "heart" of a work.

And the fourth principle considers whether copyrighted material negatively impacts the author's ability to profit from it. If you copy an article to share with your class, this would prevent the copyright holder from selling access to the article, which would be a violation. However, if you were to copy only a paragraph of an article for this purpose, it is less feasible that the copyright holder would potentially lose money on this use. So, this use would be more defensible as fair use.

Examples

If it weren't for fair use, you wouldn't even be able to write a paper that quoted a famous author without permission, which would be a serious matter for scholarly progress. Consider this quote from *The Fellowship of the Ring*.

All that is gold does not glitter, not all those who wander are lost; the old that is strong does not wither, deep roots are not reached by the frost. - J. R. R. Tolkien

Without fair use, the inclusion of this quote in a paper on literary analysis or on this website would be a copyright violation, because I did not seek the author's prior consent to make a copy of this text from his book or to distribute it online. However, my use in this case is a transformative use and is only large enough to make the educational point, so it is allowable. Would being able to read this quote on this website prevent someone from reading his book (thereby depriving the copyright owner of profits)? Certainly not. On the contrary, however, if I were to provide several chapters of Tolkien's book online without prior permission from the copyright holder, then this would certainly be a copyright violation that could be acted upon.

Similarly, copying another teacher's lesson plan, changing a few words, and posting it online would be a blatant copyright violation. Fair use becomes problematic in education if you are trying to use educational works in your own creations (e.g., materials created specifically for education, such as lesson plans or textbook chapters) and/or you are using too much (such that it might prevent the owner of the copyright from profiting from the work).

Guidelines

To determine if a desired use of copyright-restricted material would fall under fair use, ask yourself four questions:

1. Use: Is the use transformative? (Yes = Fair Use)
2. Type: Is the work informational/factual in nature? (Yes = Fair Use)
3. Amount: Is the use minimal? (Yes = Fair Use)
4. Impact: Does the use negatively impact the copyright holder's ability to profit from the work? (No = Fair Use)

Fair use is a judgement call, but the call is made based on the answers to these four questions. Thus, if your answer to all four questions aligns with fair use, then your use would likely be judged as fair. If the answer to one question does not align with fair use, then your use might still be fair, but it increases the potential for it to be judged otherwise. And so forth. In many court cases, uses that met three criteria have been deemed as fair, and in others, uses that only met one or two criteria have been deemed as fair, but there is never any guarantee. In short, only a judge can determine if use is fair, but a judge would use these four guidelines in making the determination.

Institutional Rules

To help safeguard their institutions and employees, many schools will adopt rules for interpreting fair use. For instance, some institutions will allow copyrighted materials to be used up to a certain percent of the work (e.g., a section of a book can be copied as long as it constitutes 10% or less of the entire book). These rules are not perfect reflections of the law but are rather interpretations intended to protect.

Here's a comparison. Let's pretend that 55 mph is the speed limit throughout the U.S. but that the government allows for people to exceed this speed limit "a reasonable amount" in particular cases of emergency. If such a law existed, it would be up to judges to determine if any case of traveling faster than 55 mph constituted a legitimate emergency case and if the actual speed was reasonable. Like copyright, this law sounds fairly fuzzy. Let's also say that you are a bus driver and your school has a rule that this law means that you should only exceed the speed limit if a child is hurt and in these cases you should never go faster than 65 mph. Though this is not actually what the law says, it is your school's interpretation of the law and is intended to keep you and the school safe.

Thus, when considering institutional rules, you should recognize that they are intended to prevent you from breaking a rather fuzzy law but that they also may not entirely reflect what the law actually states. In any case, you are safest

abiding by your institutional rules for fair use, because this helps to ensure that your institution will be on your side if there is any question about your copyright-restricted material use.

Parody

Parody is one example of fair use in which copyrighted materials may be used to critique the author. Thus, using an image of someone to critique that person would probably be fair use (as in the case of [Galvin v. Illinois Republican Party](#)). However, using one person's copyrighted works to critique a different person or an unrelated social issue (as in the case of many memes) would likely not be parody, since the copyrighted work is being used to make fun of something other than the author or the work itself.

Positive Examples

These are examples that would probably qualify as fair use (i.e. they probably do not violate copyright):

- Quoting a few sentences from a book in a paper on literary criticism;
- Adding text to a movie screenshot to critique/parody the movie;
- Including a paragraph of text from a book in a quiz as background for asking questions;
- Showing a short clip from a popular movie to analyze how it was made.

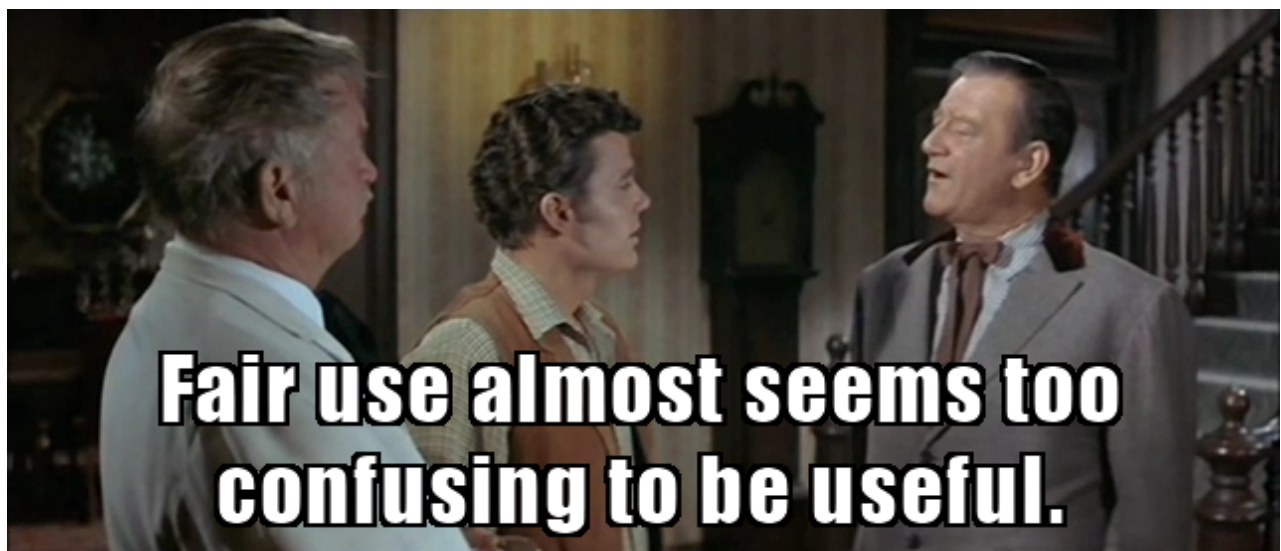
Negative Examples

These are examples that would probably NOT qualify as fair use (i.e., they probably violate copyright):

- Copying pages from a workbook for students to complete;
- Copying or remixing a lesson plan;
- Creating a calendar of pictures that were photographed by someone else;
- Including a popular song as background music on a YouTube video your students create;
- Holding a public screening of a movie in the school auditorium that you have purchased for personal use.

Navigating Fuzziness and Risk

Fair use can be very fuzzy, and it may be that educators violate fair use regularly in their classrooms without worrying about legal repercussions. Even if copyright is violated, the risks associated with violation tend to vary by use. For instance, if you copy a lesson plan for use in your classroom without first gaining permission, the odds are that you will not run into any legal issues. However, if you try to sell this same lesson plan online or share it on your teacher blog, then the legal risk increases. This does not mean that you should violate copyright discretely, but merely that this decision would be based upon a moral imperative rather than legal risk.



The Bottom Line

Fair use is complicated, only provides educators with limited opportunities for use, and is typically more of a headache than it is often worth when talking about any substantive use of copyrighted materials.

Additional Resources

The U.S. Government has recently started [archiving court cases related to fair use](#), which may be instructive if you have specific questions about what courts are classifying as fair use and not.

What do you think?

If you followed all copyright restrictions, how do you think this would impact your ability to effectively teach your students?

- ☐ It would severely reduce my effectiveness
- ☐ It would moderately reduce my effectiveness
- ☐ It would somewhat reduce my effectiveness
- ☐ It would not negatively impact my effectiveness

Public Domain

Copyright law varies from country to country, but in the US, [public domain](#) is a technical term referring to works that are not subject to copyright protection.



Categories

In general, there are three groups of works that are in the public domain:

1. Old works for which the copyright has expired;
2. Exempt works that may not be copyrighted or that were created under certain conditions;
3. Any works that have been released to the public domain by their authors.

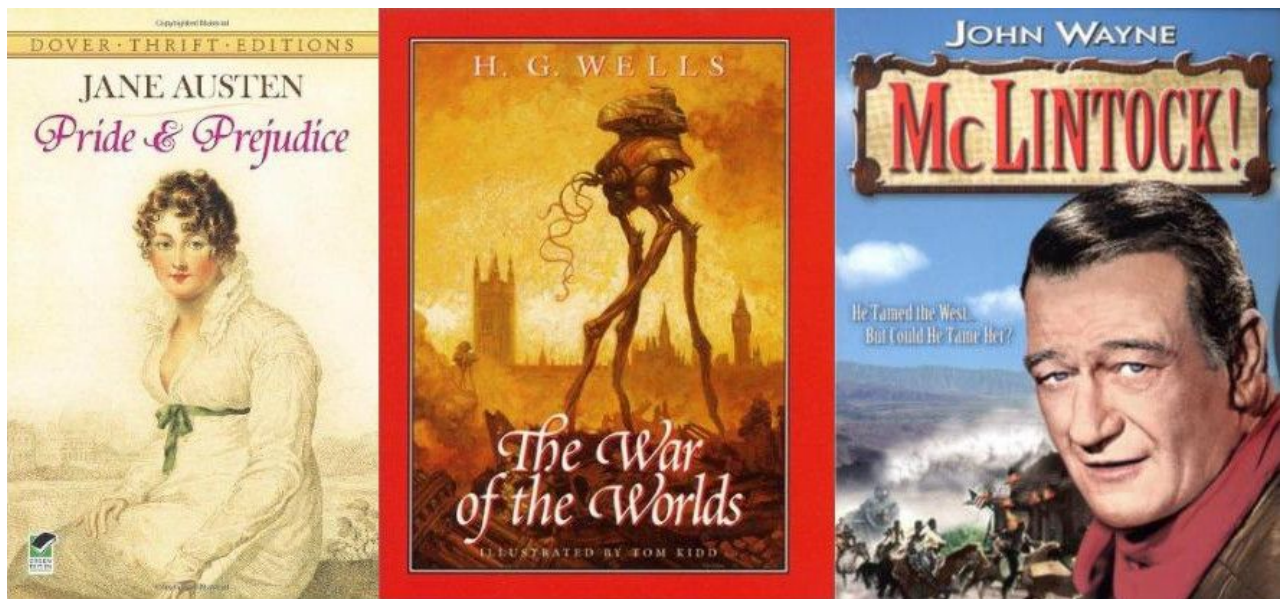
Old Works

Under the current US copyright law, any copyrighted work will automatically pass into the public domain 70 years after the death of the author. In general terms, this means that virtually all classics or materials older than 120 years or so are in the public domain. To determine if a specific work is in the public domain, however, you should find out when the author died and add 70 years in order to determine the date at which copyright expires. This time frame has gradually

been lengthened in US history, so some works may still be in the public domain that were created less than 70 years ago.



For instance, the John Wayne and Maureen O'Hara movie [McLintock!](#) passed into the public domain in 1994.



Examples of public domain works

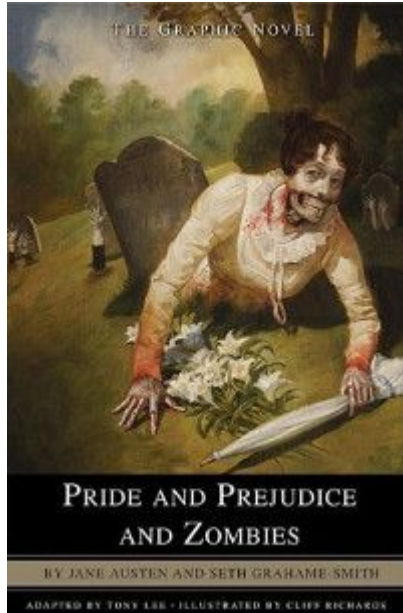
Exempt Works

Copyright can only be applied to specific types of works (e.g., books, movies, images) and cannot be applied to general knowledge. For this reason, you do not need to cite anyone when you state a fact (e.g., "Jupiter is a planet"). Works may also be exempt from copyright if they are created under certain conditions of employment. The most common example of this is when US federal employees create works as part of their jobs (e.g., active duty service men and women in the armed forces). Works that these individuals create (e.g., photos taken) may be placed in the public domain by virtue of their employment.

Released Works

Any author of a work may willingly choose to release that work into the public domain by simply labelling the work (e.g., "this work is in the public domain"). By doing so, the author gives anyone (e.g., individuals, corporations) the right to use their work for any purpose, without limitation or attribution.

Use



Since they are not subject to copyright protection, public domain works may be used for anything and may even be included in derivative works and may be sold. There are no restrictions on how these works may be used, so citations are not generally needed. However, if you are using public domain content in your own work, it would be helpful for others to know what parts are public domain so that they know how they might also reuse and remix your content.

Public Domain Repositories

- [Project Gutenberg](#)
- [Army Photos](#)
- [Library of Congress](#)
- [Internet Archive](#)
- [U.S. Fish and Wildlife Digital Library](#)
- [Digital Public Library of America](#)

"Open" Resources

Is this like  source?"



[Watch on YouTube](#)

The terms "[open](#)" and "free" colloquially have many meanings. "Free" generally has two that may be best understood by referring to their latin equivalents: *gratis* and *libre*. In the context of openly licensed materials or open educational resources (OER), *gratis* means that content and resources are provided at no cost. *Libre* means that you are free to do what you want with these resources.

As an example of this distinction, you may find a website with "free" videos or another teacher may give you a set of old textbooks for "free" (i.e. *gratis*), but you are not then able to do whatever you want with those videos and textbooks (i.e. not *libre*). Similarly, Facebook is a *gratis* service, because you do not pay a fee to use it, but it is not a *libre* service, because you have only limited access to download, delete, or control your data within Facebook. This is an important distinction, because many *gratis* resources are not *libre*, and when we talk about *openness*, we mean both *gratis* and *libre*.

That is, Gratis + Libre = Open.

The Five "R's" of Openness

Openness may mean different things to different people, but when we refer to openness in terms of open licensing, we mean openness that gives us freedom to do the five R's:

1. Retain
2. Reuse
3. Redistribute
4. Revise
5. Remix

Hilton III, J., Wiley, D., Stein, J., & Johnson, A. (2010). [The four Rs of openness and ALMS analysis: frameworks for open educational resources](#). *Open Learning*, 25(1), 37-44.




Open Licensing

Sometimes authors of creative works who want to share them openly want to maintain some control over what others can do with their work. [Open licenses](#) have arisen as a means for openly sharing content while at the same time preserving desired rights to the author.

Open licenses find a nice balance between the restrictions of copyright and the unfettered freedoms of public domain, making them a good option for anyone desiring to share their work with others. Authors of creative works have the right to release those works under any license they choose (except in cases where they have signed over that right to a publisher, employer, etc.). The table below provides three examples of common open licenses.

Table 1

Common Open Licenses

Name	Image	Links
Creative Commons		<ul style="list-style-type: none">• Creative Commons
GNU General Public License (GNU-GPL)		<ul style="list-style-type: none">• GNU License• Wikipedia: GNU General Public License
MIT License		<ul style="list-style-type: none">• MIT License Template• Wikipedia: MIT License

Common Open Licenses

Creative Commons



To help authors to release their works easily and in a manner that safeguards the rights that they care about, a number of template licenses have been created by [Creative Commons](#). Many works found on the internet are licensed under one of these types of licenses, and in general, you do not need permission to use them in your work as long as you properly attribute (cite) them and abide by any additional requirements set forth in the license.









There are four requirements that may be appended to a Creative Commons license. These include the following:

- **BY or Attribution**—This means that you need to cite the author of the original work if you copy or remix it.
- **SA or Share-Alike**—This means that if you remix the work you should release it under a license similar to the one it was initially released under.
- **ND or Non-Derivative**—This means that you cannot make your own derivative version (or remix) of the work but must use it exactly as-is.
- **NC or Non-Commercial**—This means that you cannot use the work for primarily financial gain.

Depending upon which of these requirements are placed on the work, Creative Commons licenses can come in a number of varieties. Two are merely restatements of [Public Domain](#), while the rest provide the author of a work the ability to retain varying levels of control of how the work may be used. The most common Creative Commons license is the **CC BY** or **Creative Commons Attribution** license, which basically means that others are free to reuse, redistribute, revise, and remix the creation as long as they properly cite the author. More information about each license is provided in the following table.

Table 2

Creative Commons License Brief Explanation Table

License Type	Image	Brief Explanation
Public Domain - By Age		These works are not subject to copyright or their copyright has expired.
Public Domain - Released		These works are released to the public domain by their authors before the copyright has expired.
Creative Commons Attribution (CC BY)		Others may reuse, redistribute, revise, and remix the creation as long as they cite you.
Creative Commons Attribution-ShareAlike (CC BY-SA)		Others may reuse, redistribute, revise, and remix the creation as long as they cite you and share their creation under an identical license.
Creative Commons Attribution-NoDerivs (CC BY-ND)		Others may reuse and redistribute the creation as long as they cite you. They may not create a derivative work (e.g., remix or revise it).
Creative Commons Attribution-NonCommercial (CC BY-NC)		Others may reuse, redistribute, revise, and remix the creation as long as they cite you, but they may not use your creation for commercial purposes.
Creative Commons Attribution-NonCommercial-ShareAlike (CC BY-NC-SA)		Others may reuse, redistribute, revise, and remix the creation as long as they cite you and share their creation under an identical license. They may not use your creation for commercial purposes.
Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND)		Others may reuse and redistribute the creation as long as they cite you. They may not create a derivative work or use it for commercial purposes.

Creative Commons License Brief Explanation Table

Finding Resources

In general, copyleft and creative commons licenses value open practices in that they seek to allow for works to be [reused, redistributed, revised, and remixed](#), but licenses vary based upon what is required of the user to do so legally. For instance, the Creative Commons Attribution license (or [CC-BY](#)) requires the user of the work to give appropriate credit, to provide links to the license, and to not suggest that the original author endorses any new use of the resource.

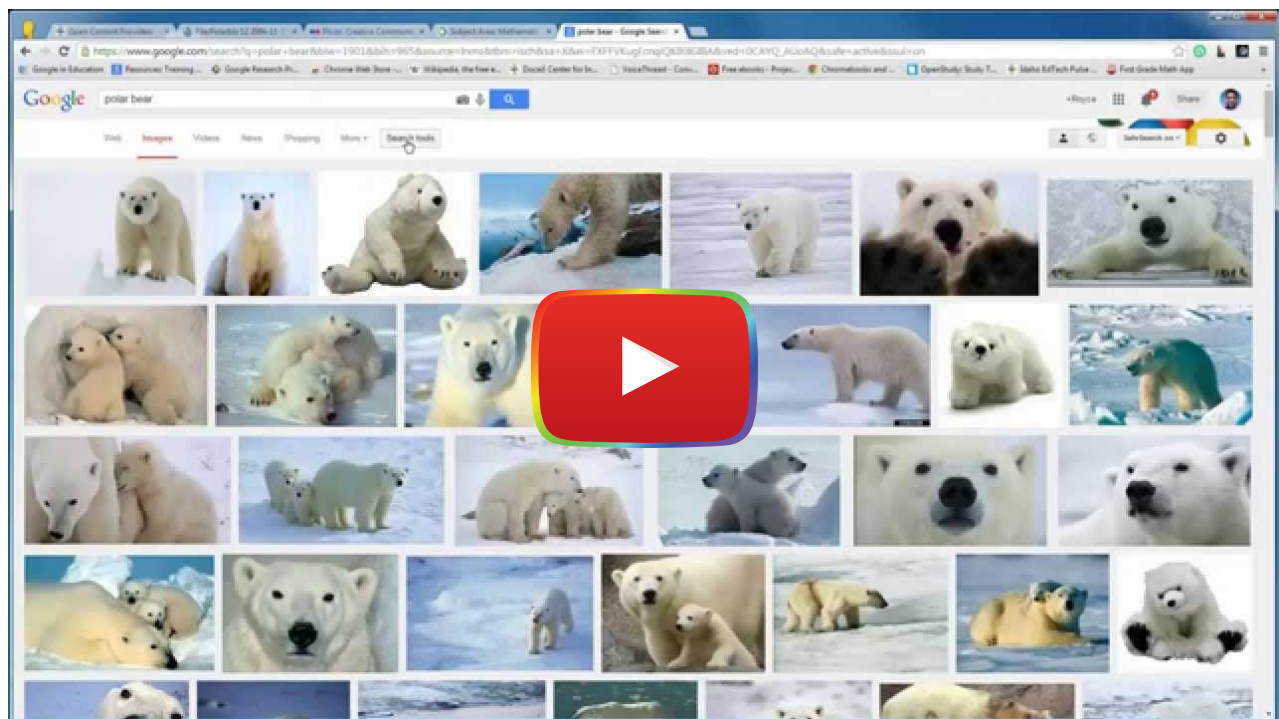
More details on specific Creative Commons licenses are provided in the Attribution Quick Reference Guide. There are a number of libraries, search engines, and search engine settings that allow you to easily search for copyleft-licensed works. Some popular examples include:

- [Wikimedia Commons](#)
- [Creative Commons Search](#)
- [Flickr Creative Commons](#)
- [Vimeo Creative Commons](#)
- [Creative Commons Music](#)

If a work (e.g., picture, song, video, lesson plan, rubric) does not have a statement of copyright status attached to it, you should generally assume that it is copyrighted and should seek permission before using it.

Open Content Providers

Open educational resources (OER) are made available from many different sources. This list, though not exhaustive, includes some of the more prominent providers. Explore these resources to find material that will be useful for you in your classroom, taking note of what licenses resources are released under. Watch this video to learn how to use a search engine to find openly licensed content.



[Watch on YouTube](#)

Open Textbooks & Curricula

1. [EdTech Books](#)
2. [Open Textbook Library](#)
3. [CK-12](#)
4. [Saylor](#)
5. [Connexions / OpenStax Library](#)
6. [Textbook Equity](#)
7. [Equity Press](#)
8. [BC Campus](#)
9. [Wiki Books](#)
10. [Odell Education](#)
11. [Cool4Ed](#)
12. [Merlot](#)

Search Engines

1. [OER Commons](#)
2. [Creative Commons Search](#)
3. [Google Advanced Search](#)*
4. [Google Advanced Image Search](#)*
5. [Yahoo Image Search](#)**

* Be sure to set usage rights to "free to use share or modify".

** Be sure to click the arrow in the top left and select "Labeled for Reuse" in the bottom left.

Text Content Providers

1. [Wikipedia](#) - open encyclopedia
2. [Simple English Wikipedia](#) - simplified encyclopedia
3. [Project Gutenberg](#) - public domain texts
4. [Wiki Source](#) - source materials
5. [Wiki Quote](#) - quotations

Media Content Providers

1. [Wikimedia Commons](#) - open media
2. [Digital Public Library of America](#) - public domain works
3. [LibriVox](#) - public domain audio books
4. [Photo Pin](#) - open photos from Flickr
5. [Internet Archive](#) - public domain works
6. [U.S. Army](#) - public domain images
7. [Flickr](#) - creative commons images
8. [Vimeo](#) - creative commons videos
9. [Creative Commons Music](#) - various creative commons music sites
10. [Jamendo](#) - creative commons music
11. [Library of Congress](#) - public domain works
12. [Internet Archive](#) - public domain works
13. [U.S. Fish and Wildlife Digital Library](#) - public domain works (mostly)

Open Courses

1. [Lumen Learning](#)
2. [Wikiversity](#)

Tools

These tools are not technically open educational resources, but they can be used to aide you in creating, remixing, and sharing open educational resources.

1. [Google Drive](#) - write and create collaboratively
2. [Rewordify](#) - simplify difficult texts
3. [Text Compactor](#) - summarize texts
4. [Simplish](#) - simplify and summarize texts
5. [Open Text Summarizer](#) - summarizes nonfiction texts

Attribution

When utilizing someone else's work in your own, you should be sure to attribute the work. In education, we generally use [formatting guidelines from the American Psychological Association \(APA\)](#), and you should cite works according to these guidelines if required for a research paper or publication. However, in most situations, a simpler citation that includes the work's title, author, license, and url will be appropriate. All work licensed under an open license will generally require you to properly attribute (cite) the resource in order to use it in your own work. **Failure to properly cite one of these works if it is used in your own work is a violation of copyright.** At minimum, you should attribute such works with the following information:

Attribution Items

Title

What is the title of the work (e.g., name of article, picture, or song)?

Author

Who created the work?

Source

Where did you find the work (e.g., url)?

License

What license is the work shared under (e.g., CC BY)?

As possible, you should also cite these works in such a way that it is clear to which portions of content the attribution refers and so that the attribution is prominent. For instance, if you include a Creative Commons image in a book you are writing, the attribution should be included as a caption under the image. When such attribution is not possible, including attributions in a works cited page is acceptable if it is clear to which content each reference belongs (e.g., providing page numbers).

Common Questions

If there is no author mentioned, how do I cite the resource?

Use the author of the website. If the website does not have a mentioned author, use the name of the website (e.g., "CK-12").

What if there is no copyleft license or notice of public domain mentioned?

Remember, just because no copyright symbol is present does not mean that the work is open (e.g., not every page of a Harry Potter book has a copyright symbol on it, but it is still copyrighted). Since everything is automatically copyrighted, you should generally assume that all work is copyrighted and should not treat it as an open resource without further investigation.

May I use a copyrighted work if I properly cite the author?

This depends on what you are using it for (see the discussion of fair use), but generally, you must have written permission to use it in any significant way.

If something is marked as released under Creative Commons, but there is no specific license identified, which should I use?

You should probably either use the most restrictive license (CC BY-NC-ND) or the most common license (CC BY). Use your best judgment.

Can I modify or revise an openly licensed work?

This depends on the license. In most cases, yes, but you may need to release your new work under the same license. The primary times when you cannot do this would be when the license prohibits derivative works (e.g., any CC BY-ND and CC BY-NC-ND).

Can I use *Royalty Free* work?

This is tricky. [*Royalty Free*](#) does not generally mean free as in *libre* (i.e. free to use for whatever). Rather, it typically means that you can use a work in a very specific way (e.g., print an image up to ten times) that will vary based upon the provider. So, *royalty free* is essentially just another way of saying *copyrighted*, but the material might be able to be used in some very limited manner without paying a fee.

If something is copyrighted, does that mean I cannot ever use it?

You *can* use it *if* you have the *copyright holder's permission*. You can always contact the owner and ask her/him if you can use it. Open resources are handy, simply because they make it easier for you to use materials without asking permission every time you want to use something.

Sharing Your Work

As the author of a creative work, you can release your it under an open license or into the public domain. All you need to do is place the Creative Commons license on your work or state that the work is in the public domain, and this allows others to know how they can use it. For example, by simply placing "CC BY 3.0" below a picture, you give anyone the right to use it for any purpose as long as they attribute you as the author.

Public Domain or an Open License?

As the author of a creative work, you should consider the benefits of different ways of sharing your content. In short, if you don't care how it's used but just want others to be free to use it, release it into the public domain. If you want to receive credit (be cited) when others use it, use CC BY 3.0. For a more detailed walkthrough of how you should release your content, follow the steps provided in the table below.

Table 3

Workflow for Choosing a License

Step	Question	Yes	No
1	Do you want to allow anyone anywhere to use the work however they want without giving you credit?	Public Domain	Go to Step 2
2	Do you want to make sure that anyone who uses your work also shares their work in the same way?	Go to Step 3	Go to Step 4
3	Do you want to prevent others from profiting from your work?	CC BY-NC-SA	CC BY-SA
4	Do you want to prevent people from changing your work?	Go to Step 5	CC BY
5	Do you want to prevent others from profiting from your work?	CC BY-NC-ND	CC BY-ND

More details about the Creative Commons licenses may be found on the [Creative Commons website](https://creativecommons.org/licenses/).

Example Statements

Releasing your work under an open license is easy. Just place a statement somewhere on your work that states what license you are releasing it under. The Creative Commons site provides a wizard to create a statement and image for you, or here are a few more examples:

- This work is released under a CC BY 3.0 open license by [Your Name Here].
- This work is released into the public domain.

Conclusion

This chapter has provided an overview of copyright, public domain, fair use, and open licenses. With this knowledge, teachers should feel sufficiently knowledgeable to use copyright-restricted resources in a legal manner. They should also be able to find and use public domain and openly licensed resources, to properly cite them, and to release their own creations openly.





Royce Kimmons

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Royce Kimmons is an Associate Professor of Instructional Psychology and Technology at Brigham Young University where he seeks to end the effects of socioeconomic divides on educational opportunities through open education and transformative technology use. He is the founder of EdTechBooks.org, open.byu.edu, and many other sites focused on providing free, high-quality learning resources to all. More information about his work may be found at <http://roycekimmons.com>, and you may also dialogue with him on Twitter [@roycekimmons](https://twitter.com/roycekimmons).

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3.2

Digital Equity

Equitable Technology Access and Learning

Vikram Ravi

Equity

Inclusion

Digital Equity Schools

Digital Divide Schools

Homework Gap Solutions

Digital Equity Teachers

Learning Outcomes

- Recognize barriers to device and internet access for students and their parents;
- Understand digital equity strategies to improve learning and communication;
- Identify resources to support technology integration in the classroom for all learners.

Ms. Cooper has taught biology in an affluent, suburban high school for the past eight years. The district decided to adopt an open online textbook for all their biology classes in the coming year, and Ms. Cooper is excited to use the textbook and believes it will be helpful for many students. The online textbook includes engaging videos and online worksheets and quizzes.

Three weeks into the new semester, she observes a few students in each of her classes who are not completing assignments and not doing well on quizzes. She learns that one of them is relying on a smartphone and mobile data plan to complete homework, knowing that such a device is too small to navigate the online textbook and quizzes with ease. Ms. Cooper becomes concerned with how she can appropriately reach out to determine and address the needs of a number of students and their families.

As technology integration in student learning at school and at home increases, there is a need to consider the diversity of students and their families. This includes identifying and addressing how to support student homes lacking adequate internet, with limited devices, or with less experience in digital literacy and skill development. This means that a foundational understanding of digital equity and a disposition to find flexible solutions to address diverse student needs is critical to helping all students learn.

Key Terms

Information Communication Technology (ICT)

an extensional term that describes any product that will store, retrieve, manipulate, transmit, or receive information electronically in a digital form. ICTs include communication devices such as the radio, television, cell phones, personal computers, email, social media, and Internet.

Digital Divide

a difference in access or participation via digital technologies experienced by two or more individuals or groups of people

Digital Equity

a condition in which all individuals and communities have the capacity and resources needed for full participation in a 21st-century education, economy, and society.

First-Level Digital Divide

when groups experience uneven opportunities to access information communication technologies

Second-Level Digital Divide

when groups may have similar access to information communication technologies, but gain different levels of benefit from them as a result of literacies, training, technical support, or other factors

Digital Divides

The concept of the **digital divide** began in the early 1970s when microcomputers first became popular in the United States (Gunkel, 2003). The term later became widely used during the 1990s to describe both the gap between homes with computer access to the Internet and homes without these **information communication technologies (ICTs)**. The term digital divide provides recognition of the gap in opportunities and experiences of those who are online with those who are not, including students. Today, the uneven level of access with ICTs is known as the **first-level digital divide**.

This first-level divide includes uneven levels of access to educational tools for students and their families. It has been exacerbated by an increasingly rapid pace of technological innovation, which includes the mass adoption of televisions, desktops, the internet, laptops, smartphones, and tablets. As the widespread use of one tool is achieved, one or more technologies have already emerged, creating new disparities for teachers, students, and parents. This first-level divide is further pronounced by disparities in income and education among students, families, and schools, often realized across racial or ethnic lines.

While this first-level divide has influenced disparities in how the Internet is used by students, ICT access alone does not guarantee improved outcomes in information literacy, computational thinking, and lifelong learning. There are disparities in how students with similar levels of ICT access are using technology to consume media passively versus using technology to create, design, build, explore, and collaborate. The difference in this digital participation is known as the **second-level digital divide**, or the digital participation divide or digital use divide.

Numerous scholarly studies since the 2000s have documented the existence of the second level divide in education. This divide has led to uneven levels of digital literacy education provided to students in schools and homes and results from a lack of resources and emphasis in developing necessary technical and computational skills to thrive in a digital

economy. As an example, underserved schools have historically used technology for test-prep, drill and practice exercises, or remediation more than for active creation and knowledge construction (Cho & Watkins, 2018). Parent education attainment is another key factor that contributes to the level of instruction and support students receive in their homework and additional exploration and learning. For example, a student with a mother who is a web developer with a master's degree is more likely to be exposed to computer programming languages and develop a number of other digital skills that will provide an advantage in their education, workplace, and society.

Understanding the first and second-level digital divides can better prepare teachers to respond to the dynamic challenges their students and their families face. These digital divides characterize historic and structural barriers that have disproportionately affected minority, undereducated, and poor families in both rural and urban areas (Pierce, 2018). These disparities in digital access and participation cannot entirely be resolved by teachers and schools. However, teachers play an important role in building digital equity. **Digital equity** is a condition in which all individuals and communities have the capacity and resources needed for full participation in 21st-century education, economy, and society. Building digital equity in the classroom requires intentional strategies and planning to reduce barriers and to realize benefits from technology.

Digital Equity and Student Achievement

Teachers are increasingly integrating technology into daily curricula. As a result, students have become more reliant on computers and the internet to complete and excel in homework, quizzes, and other assignments. As students have varying levels of access to these ICTs, the first-level divide can lead to uneven educational opportunities. This disparity is referred to as the “homework gap” because students with home internet and device access have a number of advantages over other students in completing school assignments.

Students with home internet have more time and flexibility compared with students without home internet access, who are dependent on a smartphone data plan, or who rely on other access points such as their school technology labs, libraries, or local businesses. Students with slower internet speeds or limited mobile data plans have limitations on the online assignments and instruction they can do from home. These limitations include slow loading of large files, poor connections for real-time interactions, and multimedia and web conference streaming limitations (Gronseth, Michela, & Ugwu, 2020). These students may also have to share or accommodate other family members relying on the same internet connection, devices, or physical location, creating significantly longer lag times when using educational tools such as a collaborative document or instructional video.

Students with only smartphone access or no device at home at all are at a disadvantage compared to their classmates who have a laptop, desktop, or tablet at home. Smartphones often do not have sufficiently large screens or keyboards to facilitate a greater range of opportunities such as reading from e-textbooks, taking online tests, learning to code, using editing and design software, utilizing accessibility aids, or accessing website resources not formatted for mobile phones. Students without access to larger devices have fewer opportunities to explore new ideas, reinforce concepts from school, and hone new skills.

Additionally, students without access to enough devices in their homes may need to share devices with other family members. Students may also have different home setups and spaces to access their devices. For example, desktops and other stationary devices may be in an area where someone is trying to sleep or in a distracting environment with many people. All of these circumstances can limit the availability of devices for homework and other opportunities for learning and exploration. When devices significantly slow down or break, students face additional challenges completing school activities compared with students with an adequate number of devices at home.

Students without home internet access or who are smartphone-dependent are likely to have lower homework completion rates as well as lower levels of digital skills. This gap in digital skills “compounds many of the inequalities in access and contributes to students performing lower on school grades, standardized test scores, and being less

interested in careers related to science, technology, engineering, and math” (Hampton, Fernandez, Robertson, & Bauer, 2020).

The magnitude of this first-level divide has become more pronounced over the years. Hundreds of millions of K-12 students in 2020 were unable to physically attend their classes due to school shutdowns caused by the COVID-19 outbreak. The first-level divide in classrooms no longer provided an advantage in homework alone but also in receiving core classroom instruction. This situation demanded greater attention to the importance of addressing how online learning could be equitable for students with diverse backgrounds and needs.

Digital Equity Strategies in K-12 Classrooms

Because of the rapid pace of technological innovation, digital equity strategies are continually being discovered, applied, and reevaluated.

The [Universal Design for Learning](#) (UDL) framework can enable teachers to continually develop and evaluate digital equity strategies to not just fix but remove ICT-related barriers for students. Teachers who effectively integrate UDL guidelines ensure there are flexible, effective options for students with varying levels of ICT access to accomplish learning goals.

The [PICRAT](#) technology integration model can also help teachers identify and evaluate current and emerging educational technology tools that improve digital learning. The PICRAT model invites teachers to consider the following questions with tools used in the classroom: (a) What is the students' relationship to the technology? (b) How is the teacher's use of technology influencing traditional practice?

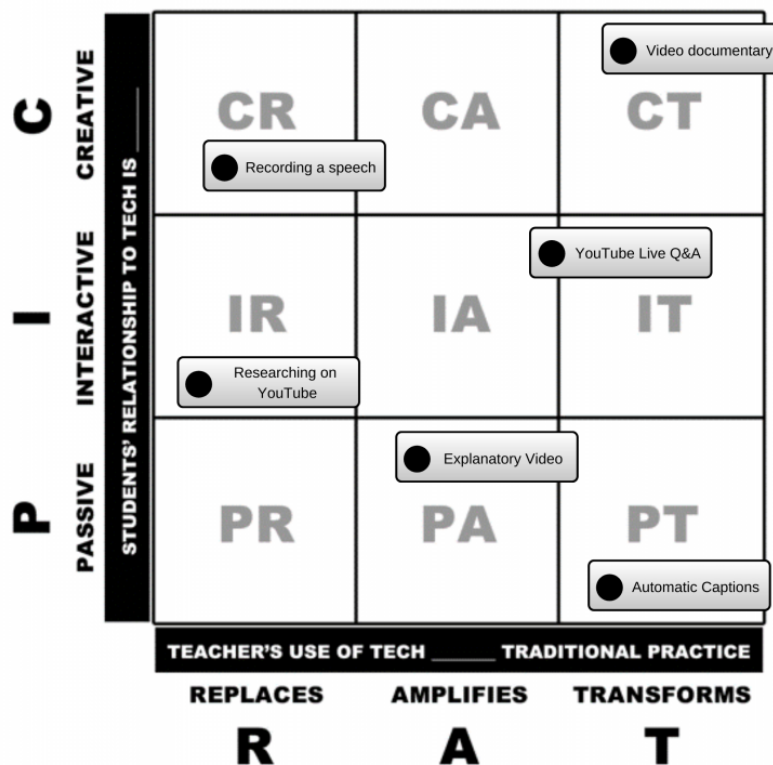


Figure 1. Example YouTube Uses Within the PICRAT Model

This model enables teachers to more intentionally consider each educational tool selected and how it's implemented. Teachers who effectively use this model can better recognize and ensure they are providing students with enough opportunities to use technology to create, design, build, explore, and collaborate, rather than just exacerbating second-level inequities by passively replacing pre-digital instruction.

Many classroom digital equity strategies are grounded in these two theories because they address at least one level of the digital divide. The UDL guidelines can be used to provide needed flexibility for students affected by barriers from the first and second-level digital divides. The PICRAT model and other technology integration models can enable teachers to focus on building digital skills for active creation and knowledge construction—addressing the second-level divide. These frameworks can be used as a tool for teachers to develop and adapt digital equity strategies and practices each semester as circumstances change.

Addressing the first and second-level digital divide for students, parents, and teachers requires a commitment to cultivating a digital equity mindset for all (Howard, Schaffer, & Thomas, 2018). In developing this mindset, teachers will recognize that they are not always able to address such circumstances on their own. Schools and districts must also be involved in adequately acknowledging and addressing this complex challenge, as various policies and limitations may impact a teacher's ability to address both divides. Below are questions for teachers to consider as they develop an intentional process to improve digital equity outcomes in their classrooms.

Planning

- What does digital equity and inclusivity look like for my classroom? What evidence can I collect to show to what extent digital equity outcomes have been achieved?
- What are sensitive, appropriate ways to survey students and/or their parents to identify digital equity needs including access to home internet and internet-enabled devices, needed digital literacy and digital citizenship training, or ongoing technical support? If these needs have already been gathered by the school, how can I access them?
- How can the (a) number and quality of devices, (b) access to home internet, and (c) internet bandwidth or size of mobile data plan affect my curriculum and lesson plans?
- What technologies will students and parents be responsible for using throughout the year for learning and communication? What assumptions have I made about how familiar everyone is with each technology? And what amount of support am I prepared to give them as they learn?
- How much time should I spend becoming familiar with each technology, understanding its potential, and learning to integrate it into the classroom? What resources and people in my school can provide technical support and collaboration if I need help?

Implementation

- In in-person, synchronous online, and asynchronous online learning environments, how can I create an exciting, inviting environment that encourages meaningful participation for students across different strengths, backgrounds, and personalities?
- How can I encourage students to take ownership of their digital learning environments including minimizing distractions created by smartphones and other devices?
- How can I effectively coach students and parents who need additional support with specific technologies? How can I effectively utilize the resources and capabilities of other students, education technology specialists, librarians, social workers, and other school staff to provide additional support?
- How can I support parents to better support their children's learning and academic performance? How can I support parents with lower digital literacy skill levels in accessing the parent engagement tools such as platforms for monitoring student grades and other learning resources?

Reflection

- What data and experiences can I use to reevaluate whether students and parents have the resources and capacity to be successful as technology integration in schools increases? How can I use analytics from specific learning tools, surveys, performance evaluations, and other data and observations to make an informed evaluation?
- How can I create a personal learning environment to ensure I am made aware of updated information (e.g., blogs, RSS feeds, news sites, social media feeds, podcasts, and video channels) around education technology and digital equity topics?
- What professional learning networks in my school, community, or online could support my efforts to learn about new and existing technologies and how to effectively integrate them into the classroom?

UDL Guidelines for Digitally Equitable Classrooms

Provide Multiple Means of Engagement

- Leverage digital content to ensure examples, theories, and people represent multiple cultures and not one dominant perspective (Optimize relevance, value, and authenticity, UDL Checkpoint 7.2).
- Instill information literacy skills through exposure to collaborative learning communities of content experts, open educational resources, online forums, and other resources (Foster collaboration and community, UDL Checkpoint 8.3)

Provide Multiple Means of Representation

- Provide options for live instruction, including both video and audio conferencing, and asynchronous learning, including print, online, and offline content (Provide Options for Perception, UDL Guideline 1)
- Ensure image file sizes are reduced and other content is accessible through a desktop and mobile-friendly interface (Offer alternatives for visual information, UDL Checkpoint 1.3)
- Identify technologies that provide multiple language settings or can be quickly translated through browsers, plug-ins, or other tools for English language learners (Promote understanding across languages, UDL Checkpoint 2.4)

Provide Multiple Means of Action & Expression

- Identify flexible ways to share information and resources, communicate urgent updates, and hold parent-teacher conferences, for parents with varying work hours or who rely on mobile phones and don't regularly use or access email (Use multiple media for communication, UDL Checkpoint 5.1)
- Develop flexible submission policies for assignments and provide options to submit work through paper or digitally (Use multiple tools for construction and composition, UDL Checkpoint 5.2)

Conclusion

Teachers with a digital equity mindset are needed to support learners in being able to fully participate in today's educational opportunities, society, and economy. The multiple levels of the digital divide demonstrate that universal access to technology alone is insufficient to achieve digital equity. However, as teachers recognize the need to simultaneously address both ICT access and creative, transformative technology integration, they support students and their families to be better prepared in an increasingly digital world.

Additional Resources

<u>National Digital Inclusion Alliance</u>	This alliance provides resources for digital literacy programs, digital equity research and data, and regularly updated content on addressing digital divides.
<u>ISTE Digital Equity Network</u>	This professional learning network is focused on challenging the status quo concerning the “haves and have nots” of access while providing consistent information and actionable resources to better help school leaders make equitable decisions concerning technology infrastructures and digital learning.
<u>Edutopia - Digital Divide Topic Page</u>	This page includes relevant articles and content focused on issues related to equalizing access to technology and providing opportunities for all learners to engage in experiences that develop digital literacy.
<u>Consortium for School Networking (CoSN)</u>	This professional association provides thought leadership resources, community, best practices and advocacy tools to help leaders succeed in the digital transformation in K-12 education.
<u>Designing for Diverse Learners</u>	This chapter from the open textbook Design for Learning provides an overview of considerations for diverse learners, barriers, and supports, including for those with low internet bandwidth and digital literacy levels.

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Online Professionalism

Royce Kimmons

Social Media

Teacher Education

Learning Objectives

- Understand the legal and ethical professional requirements placed upon teachers;
- Develop a conceptual understanding of professional identity in online spaces;
- Identify problematic behaviors;
- Analytically deconstruct realistic teacher scenarios to determine when mistakes were made.

I try to act differently on Facebook than I do in real life, ... because I have heard so many warnings about jobs and employers looking at your Facebook profile. (Josefina)

You're a teacher. Your goal is to teach kids. So, the only people that can tell you how to do your job are the people that write textbooks about "how to teach," right?

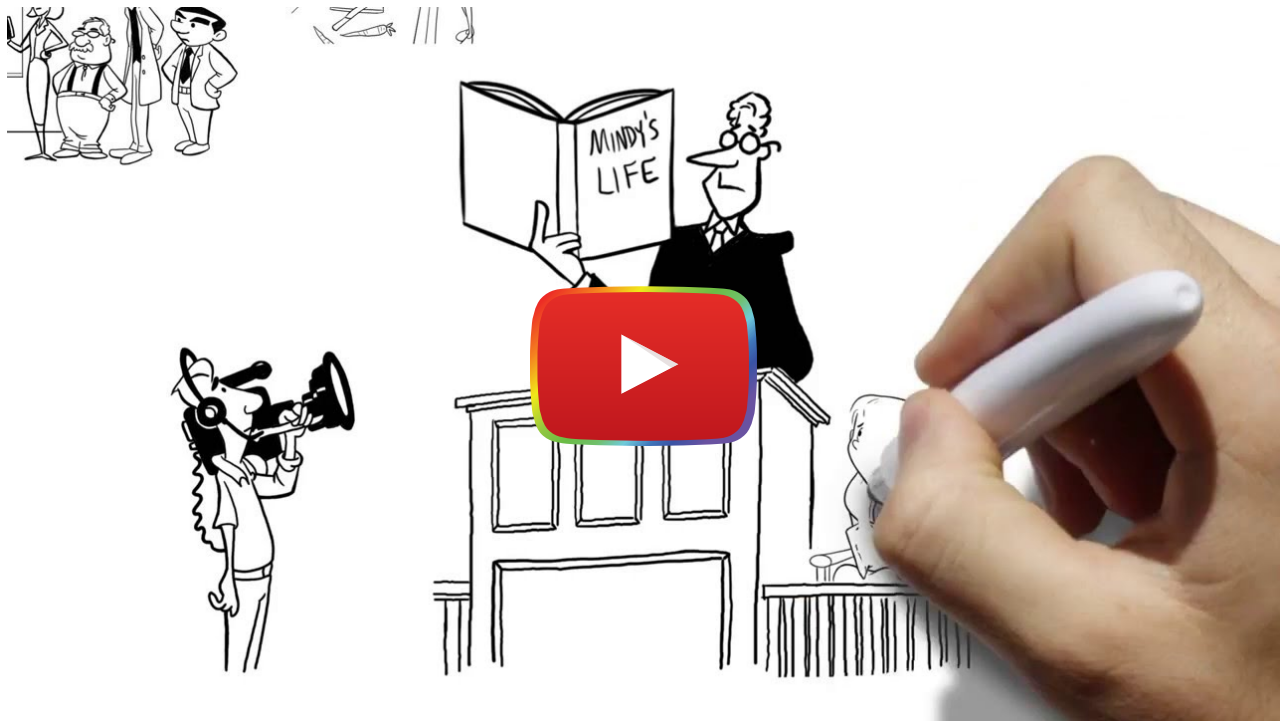
Well, not really.

We teach within social contexts, and since you answer to an employer, the way you teach and the way you act are subject to the guidelines of your employer and the laws where you live. For public school teachers, your employer is the state and the people it represents.

So, when it comes to your professional behavior, you have to abide by **(1) national laws, (2) state laws, (3) district policies, and (4) institutional policies** if you want to keep your job.

If you don't understand these laws or policies, or choose to ignore them, then you are not immune to the consequences, which might include disciplinary action, termination, or imprisonment. The only way to be sure that you're safe as a teacher is to know what the laws and policies related to your profession are and to abide by them.

This chapter provides information on professionalism but also periodically provides statements from teacher education students who are trying to grapple with how they should go about using social media while at the same time becoming professional educators.



[Watch on YouTube](#)

Key Terms

Data Persistence

the ongoing storage and availability of data via web platforms (e.g., old social media posts)

Moral Turpitude

a typically not-well-defined clause in teacher contracts that allows employers to hold teachers accountable for the morality of their actions

Online Identity

I wouldn't want to be completely myself on Facebook, because I don't want two thousand people knowing everything about me. You only see a little bit of who I am. (Nora)

People are complicated creatures. They live in complex societies and must navigate various social circumstances on a daily basis just to go about life. People also often make assumptions about others and judge them based upon very limited information.

Online, people craft identities for themselves that are often inflated and unreal. As one college student explains:

You get on Facebook and see all these pictures of your friends having a great time on all these adventures, getting engaged, and having kids, and everything, and it kind of creates this whole comparison. Like: Why is my life not as exciting as this person's? (Daphne)

We watch each other's activities online and draw conclusions about one another, even though these conclusions might be based upon very limited information and be grossly off-base.

As a teacher, this is important to understand, because whether you like it or not, others will draw conclusions about you based upon what they see online, and whether those conclusions accurately reflect your identity or not, they can have effects on your ability to be an effective teacher and to lead a fulfilling professional life.

Control vs. Influence

I saw a friend of mine that posted a picture of another friend with two bags of marijuana in both hands and a joint hanging out of her mouth, years after it happened. He posted this picture of her on Facebook, on her profile, and I could see it, and I'm not friends with her. (Josefina)

One of the problems with social media is that once something is posted, it can be stored, shared, and reposted with ease. Imagine if you write an email complaining about a student to your friend. Imagine if the same friend posted this email to Facebook to share how difficult it is to be a teacher today. Even if you didn't post the email yourself, might this still shape how others view you and have repercussions for your job? Yes, it could.

As an internet user, you have control over what you post, but you do not control what others post about you or what others do with your information once it is available, so you can only influence these things.

As the figure illustrates, you do not always control every aspect of how people might perceive or judge you, and this is especially true in electronic media, even if you are not posting anything illegal or unprofessional yourself. This means that, as much as possible, you should try to take ownership of your online presence and ensure that others are not able to incorrectly make assumptions about you based upon what they may find. This also means that you should be very careful about what you share and what you allow others to share about you.

Data Persistence and Life Transitions

In high school, you go through stages. I went through a hippie stage in high school. Now, I'm a junior in college, so my phase now is a little more grown-up. ... The person that you are as a freshman in high school is a lot different than the person you are as a junior in college, ... [and] that's the scary thing about the web in general is it's on the web, and it's there forever. (Brinley)

Another problem with electronic media is that data are persistent. That is, if you started a Facebook account when you were in high school, the same data that you placed into the system at that time could be available for others to see years later when you are a college student or teacher. Aside from simple embarrassment, this [data persistence](#) can have implications for you as a teacher if you do not take control of your online presence.

Who I was in 2008, when I was in high school, before I graduated ... I don't want people to see that, ... because it is who I was then, but that part of my life is over. ... So, I actually forgot about it myself. (Evangeline)

It's probably a safe bet to assume that the way you want people to look at you when you're 25 isn't the same that you wanted them to look at you when you were 16. This means that, as a 25-, 35-, or 85-year-old, you should try to ensure that your online presence accurately reflects who you are now and how you want to be perceived now. This is especially true as you go through major life transitions, like becoming an adult and professional, or if you are trying to distance yourself from previous activities or experiences that you do not want to define your life in the future. If you had a few wild years as a young adult, do you really want those to define how others perceive you now? If you got into some trouble as a teenager, should the teenagers that you teach be able to find that out? In short, you should be aware that much of your data online is persistent, but you can delete and/or control a good portion of it. So, you should take care to determine what people can find out about you from your digital footprint and clean it up as necessary.

Legal and Professional Standards

Abiding by the law is a good start, if you're going to be a teacher. (Violet)

State laws vary somewhat, but generally speaking, there are some simple laws that teachers must abide by. Some of these laws determine how teachers can appropriately interact with students. For instance, the Utah Administrative Code (R277-515-3-C) states that:

The professional educator, upon receiving a Utah educator license: [...] (3) shall not commit any act of cruelty to children or any criminal offense involving children; (4) shall not be convicted of a stalking crime; (5) shall not possess or distribute illegal drugs, or be convicted of any crime related to illegal drugs, including prescription drugs not specifically prescribed for the individual; (6) shall not be convicted of any illegal sexual conduct [...] (14) shall not solicit, encourage or consummate an inappropriate relationship, written, verbal, or physical, with a student or minor; (15) shall not participate in sexual, physical, or emotional harassment or any combination toward any public school-age student or colleague, nor knowingly allow harassment toward students or colleagues; (16) shall not make inappropriate contact in any communication—written, verbal, or electronic—with minor, student, or colleague, regardless of age or location.

Some of the simple laws highlighted above include the following:

- Teachers should not interact or communicate with students or minors in any manner that might be construed as romantic, abusive, harassing, cruel, sexual, or overly intimate;
- Teachers should not promote or use illegal drugs (including prescription drug abuse and underage drinking);
- Teachers should not communicate "inappropriately" with students or colleagues, regardless of age or location.

Violating these laws will get you fired or imprisoned and may also lead to permanent loss (or failure to gain) your teaching credential. Yet, as you can see, some of these laws are subject to interpretation. For instance, what does "inappropriate" mean? And who decides? The answer is *not the teacher*. Appropriateness is determined by the state, the district, or the school, not you. Beyond legal compliance, teachers are also expected to be "role models of civic and societal responsibility," ([Utah Administrative Code, 2010](#)), and national standards have recently been adopted by professional organizations related to teacher professionalism ([NASDTEC, 2015](#)). The way that districts and state boards of education interpret professionalism is subjective and contextual, since it's loosely defined in terms of "appropriateness," and even teachers' personal lives are subject to scrutiny.

You probably shouldn't have a picture of you in a bikini as your profile picture, because you're trying to be a professional. (Violet)

Relying upon legal and policy advice from statewide organizations, districts tend to adopt policies that are intended to help keep student-teacher relationships "professional." Some common key policies include the following:

- Employees must have authorization to communicate with students that are currently enrolled in the district;
- Employees must only communicate with students "about matters within the scope of professional responsibilities;"
- Employees must comply with district requirements for record retention and destruction as they apply to electronic media.

As a result, communication with students could be considered inappropriate if it:

- Is not authorized by the district (e.g., friending a student on Facebook);
- Is not about official classroom-related business (e.g., weekend or vacation plans, students in a different class);
- Is done in a way that bypasses district electronic structures intended to monitor and archive student-teacher communications (e.g., personal email accounts, messaging a student on Facebook).

Though these are policies and not laws (i.e., you probably won't go to prison for breaking them), if you violate these policies you could be subject to disciplinary action, including termination of employment and loss of teaching credentials. All relationships in life have unstated assumptions or requirements that aren't clearly spelled out, and teacher contracts and professional standards are typically written to allow for a high degree of personal interpretation on the part of administrators.

We are placed in responsibility of kids ... we should hold ourselves to the highest standards. (Evangeline)

Moral Turpitude

Parents are trusting us with the most precious thing in their life, which would be their kid, and so they want someone who has ... good values, good morals. ... I definitely think that teachers are probably held to a higher standard as far as Facebook is concerned than a lot of other professionals. (Ingrid)

In law and teacher contracts, morality is typically invoked as the standard for determining the appropriateness of teacher actions. Yet, when school districts hire teachers on a contract, the contract may not clearly spell out absolutely everything that a teacher might do wrong and how the district will respond if that happens. This is in part because no one can guess all the things that could possibly go wrong at the outset. For this reason, teacher contracts have traditionally included what are called "[moral turpitude](#)" clauses. A "moral turpitude" clause basically means that "anything else that you might do that the community thinks is wrong," like coming to work in a bathrobe and penny loafers, "is probably wrong, and the district can punish you accordingly."

The thing about moral turpitude is that it's not clearly defined, and what is or isn't okay may vary based upon your community, school board, and so forth, but you have no way of knowing this unless you understand the culture of the school and community where you work. Similarly, some states have written the following into law: "The educator shall be of good moral character and be worthy to instruct or supervise the youth of this state" ([Texas Administrative Code, 2010](#)). So, by this, the state can also make a judgment as to your moral character based upon what you do both online and offline.

Moral turpitude can apply to just about everything in a teacher's life, including electronic media. Doing it in a public area online is the exact same as doing it in a public area in real life, and if you do something online that someone associated with the school can see (e.g., students, parents, administrators, etc.), then your behavior might be deemed as inappropriate if it violates moral turpitude, or what the community or school board thinks is appropriate.

As a result, if you use electronic media in any way that (1) violates law or policy or (2) interferes with your ability to effectively perform your job duties within the community (as judged by the school board), then you may be subject to disciplinary action, including termination.

What do you think?

Should schools be able to punish teachers for immoral behaviors?

☐ Yes

☐ No

Freedom of Speech

If you have really strong opinions that are offensive to a majority of people or would offend your students or their families, then you shouldn't display those. [It's] not that you can't have [those opinions or beliefs], but you shouldn't display them on something like Facebook. (Violet)

The [First Amendment to the U.S. Constitution](#) ensures that people have rights to freedom of religion, speech, assembly, and petition. However, professional standards can have the impact of restricting some of these freedoms when evaluating teachers. For instance, the legal ramifications of sending a late-night text to a minor may vary from state to state, but school boards can adopt policies that penalize teachers from doing this. Similarly, school boards have the ability to interpret "appropriateness" and "professionalism" in a variety of ways and can discipline teachers for perceived violations (e.g., pictures of drinking or smoking on Facebook, "friending" a student).

Though teachers have certain freedoms that are protected by the constitution, this protection does not mean that you can willingly violate district policies with immunity. You cannot, for instance, have romantic, sexual, or other inappropriate social relationships with students or minors, online or offline. You cannot solicit minors to use alcohol, drugs, or tobacco, and some have interpreted putting pictures of yourself drinking or smoking online as doing precisely that. You cannot carry or consume tobacco, drugs, or alcohol "while at school or at school-related activities," and many districts require their teachers to meet certain dress and grooming standards, like being "clean" and "neat, in a manner appropriate for their assignments" ([Texas Association of School Boards, 2010](#)). If you are disciplined for what you believe to be protected speech, you might have a case for a lawsuit against the district, but you might not win the case, and the overall experience might seriously impact your career.

Someone might think: "Wait a minute, I'm over 21, so it's legal for me to use alcohol/tobacco/etc, right? It's also legal for me to kiss my boyfriend/girlfriend in public, to wear a revealing swimsuit at the beach, to write racy fiction, to critique my boss behind her back, to cuss about the lunch menu, to vent about parents, and to pose as a model in a risqué video. So why should I need to be careful about posting those things online?" In short, you need to realize that you are in a position of power with the children that you teach, and parents and school boards expect you to be a role model for those children. As a result, if parents or the school board believe that you are not being a positive role model in terms of their interpretation of the morality of the things that you do, then they can cite "moral turpitude" as grounds for disciplinary action. So, you might not explicitly tell your students "alcohol is cool, you should all drink with me," but if you post a picture of yourself partying at the bar, then parents or administrators might interpret that this is your message, and teachers have been fired or otherwise disciplined for posting things like this that they believed were completely harmless.

Fairness

I do think that there is a difference in what people perceive teachers to be [in comparison to other professionals], and I do feel like it's unrealistic in some regards. (Penelope)

Is this fair? Is this respectful of teachers as professionals? Maybe. Maybe not. Either way, teaching contracts give school districts a good standing for making the case that even though you may not be acting illegally, they can fire or otherwise discipline you for any behavior that they think is questionable.

Additionally, electronic media makes the line fuzzy between what is private and what is public, what happens on school grounds and what happens away from school. So, if your district expects you to act in a certain way to fulfill your job duties, then those same expectations might apply to you in online spaces, especially if students, parents, or colleagues can see what you're doing, and even if it was not your intention for them to see it. For example, there have been many recent cases when a teacher sent a private message, text message, or picture to a friend or colleague, who then forwarded the content to others. In these cases, even though the teachers did not intentionally release the message or

picture to the public, they are still accountable for the content when the person they sent it to reposts it or shares it with others.

The thing about electronic media is that it makes saving, sharing, and broadcasting easy. Even if you aren't the one doing the broadcasting, you could still be penalized if you put it into the electronic medium to begin with. So, could an angry ex-girlfriend/boyfriend share that private message that you sent them? Possibly. Could that co-worker that you chatted with on Facebook when you needed to vent about a group of kids forward the chat contents to your boss? Again, possibly. These things have happened, and when they do, the teacher who creates the content to begin with is the one who comes under fire.

What do you think?

Does society make fair demands on teachers' social media use?

☐

Yes, teachers are held to a fair standard.

☐

No, teachers are held to an unfair standard.

Teachers vs. Student Teachers

We knew what we were getting into, and we knew that we were going to be role models, so we knew we were going to have very high standards. (Nora)

Are student teachers held to the same standards as full-time teachers? In a word, yes. Student teachers are generally treated like teachers, except that they don't have employment contracts with the schools where they work, and they are not treated as competent professionals, so they actually have to be more careful about the things that they do. This means that student teachers are expected to comply with all district, state, and national requirements discussed previously, just like full-time teachers, but they are also expected to receive written permission from their cooperating or mentor teachers before communicating with students via electronic media.

Additionally, student teachers are specifically prohibited from communicating with students for social reasons and are responsible for maintaining appropriate content and privacy settings on their personal electronic media (including social networking sites, like Facebook and Twitter, and blogs, like Tumblr or Blogger).

Student teachers should also consider the fact that since they will be entering the job market to become full-time teachers, what they do online will be judged to at least the same standard as full-time teachers when they are being considered for a job. After all, if districts see that you aren't abiding by their district policies when you're a student teacher, then why would they hire you as a full-time teacher?

Sometimes student teachers might think that they're safe, because any questionable content that employers might find online about them has dates associated with it, and they believe that employers will recognize this and cut them some slack. "She was just a typical, crazy college student" or "everyone experiments with stuff like that in high school" are not good defenses, and your employer will probably not give you any benefit of doubt, because instead of asking you about it, they'll most likely just throw out your résumé, no questions asked. Schools don't want college kids teaching their students; they want competent professionals. So, you need to show them that you aren't just "a typical, crazy college student." You should try to show them that there is nothing in your life that could be interpreted as immoral or inappropriate, no matter if it happened last week or ten years ago.



IMG_1505.jpg, MAFS-USA Intercultural Program via Flickr, CC BY-SA

Risky Behaviors

"Because children are so naturally inclined to follow examples, ... would I want my son's teacher to have pictures of her drinking on Facebook? No. ... So I kind of understand ... why ... there's so much pressure on us not to post those kinds of things. ... I think that with other professions there is less of that pressure, because you are not working with their kids. ... It's not like they are entrusting their child to you for seven hours a day, five days a week. (Penelope)

Many in our culture act differently online than they would in real life, and federal and state legislators and school districts have passed laws and policies regulating the use of what they call "electronic media."

"Electronic media" are subject to the same requirements as any other type of communication medium (e.g. speaking, telephone calls, etc.). So, if you could get into trouble saying or showing it to someone in person, then you could get into trouble for saying or showing it online. Just because something's online, it doesn't mean that it's special or protected or anything of that sort; it just means that it can go viral more quickly.

In legal and policy documents, "electronic media" includes any form of electronic communication. This includes, but is not limited to, text messages, instant messages, emails, blogs, forums, chat rooms, video sharing services (e.g. YouTube, Vimeo), editorial comments (e.g. online newspapers, YouTube comments), social networking sites (e.g. Facebook, MySpace, Google+), telephones, cell phones, and web-based applications (e.g. Google Docs, online video games) ([University of Texas at Austin, 2011](#); [Texas Administrative Code, 2010](#); [Texas Association of School Boards, 2010](#)).

So, basically, the technology doesn't matter. If you can communicate with someone through it, then it is considered to be a form of "electronic media," and you're just as much responsible for what you say in electronic media as you are for what you say in real life.

Some educators believe that they can say or do whatever they want via these media as long as they do so "privately." The problem is that privacy in online media is very different from privacy in real life and may not really exist. Email, Facebook messages, and text messages can always be forwarded, hacked, or shown to others, and a great number of teachers who have gotten into trouble for how they use electronic media were only posting things that they thought were "private."

Examples of Risky Behaviors

"Duh! I'm not going to ask my students to join me at a dance party over Facebook! This doesn't apply to me."

Well, you might want to think about it, because school districts interpret what is and isn't appropriate behavior, and here are a few examples where teachers have gotten into trouble:

Examples

- A fifth-grade teacher in New York is awaiting termination hearings after she privately said on Facebook that she "hates [her students'] guts" and that she wouldn't save them if they were drowning (https://www.huffingtonpost.com/2011/03/14/teacher-christine-rubino-n_835586.html).
- A Massachusetts biology teacher lost her job after calling her students "germ bags" and local residents "arrogant and snobby" on Facebook (<https://abcnews.go.com/Technology/facebook-firing-teacher-loses-job-commenting-students-parents/story?id=11437248>).
- A substitute teacher and coach in New Hampshire was fired after "friending" a student on Facebook, which the district viewed as a breach of appropriate boundaries (<https://www.greatfallsbtribune.com/story/life/2014/04/28/teacher-fired-for-friending-her-students/8347061/>).
- A teacher in the UK was fired for self-publishing a novel about the exploits of some of her students that included risqué content and profanities (<https://www.independent.co.uk/news/education/education-news/teachers-racy-novel-to-encourage-pupils-to-read-1735250.html>).
- A Missouri teacher and volleyball coach was fired when administrators discovered that she had worked as a porn actress two decades before (<https://blog.sfgate.com/hottopics/2011/03/09/teacher-fired-for-porn-star-past/>).
- A Pennsylvania English teacher was suspended after calling some of her students "rat-like ... rude, disengaged, lazy whiners" in a blog post (<https://theweek.com/articles/487144/should-teacher-fired-blogging>).
- A Maine football coach resigned after accidentally posting a naked picture of himself on Facebook (<http://sports.yahoo.com/blogs/highschool-prep-rally/maine-football-coach-resigns-accidentally-posting-naked-photo-233913817.html>).
- A Maryland school district employee was fired after light-heartedly correcting a student's spelling on Twitter (<https://www.nydailynews.com/news/national/maryland-school-district-employee-fired-tweet-article-1.2947002>).

One thing that you should notice from this list is that no two cases are identical, and few of these teachers broke the law. What they have in common is that the district believed each teacher's behavior to be immoral or inappropriate, and the district had the power to enforce its interpretation of morality and professionalism upon its teachers. Some involve alcohol, some involve crude language, some involve risqué photos or behavior, etc., and most teachers didn't think they were doing anything wrong, thought they were posting content "privately," or "accidentally" shared something that they otherwise wouldn't have shown to students. None of that really matters, though, because they were disciplined all the same.

What do you think?

Do you have some risky content on social media that should be changed, cleaned up, or deleted?

☐ Yes, definitely

☐ Maybe a little

☐ Not at all

Recent Scenarios and Analyses

All of the examples above made major headlines, but most teachers who get into trouble for these types of behaviors are disciplined quietly, which means that you never hear their stories.

One of the most common ways that teachers are getting into trouble with electronic media is through "boundary violations." Though not always illegal, a "boundary violation" constitutes a breach of appropriate boundaries that should be placed between teachers and students. Boundary violations are sometimes difficult to recognize, because they often begin with good intentions or appropriate behaviors but at some point cross a fuzzy line. Below are 5 deidentified, real scenarios (taken from recent cases and provided by an anonymous author) wherein teachers have gotten into trouble. The provided analyses are intended to help you understand what the teacher did wrong and when their behavior "crossed the line."

Scenario 1

Fact Pattern: Mrs. Apple taught junior high school. One day, Sally Student came into her classroom visibly upset. Sally had a difficult home situation. Mrs. Apple gave the student a hug and listened to Sally. Sally felt validated. Over the next several months, Sally repeatedly went to Mrs. Apple for advice and comfort. Mrs. Apple gave Sally her phone number and told her she could call if she needed to talk.

Mrs. Apple and Sally frequently talked on the phone and exchanged numerous text messages. One day, Sally's father discovered the messages on Sally's phone. He met with Mrs. Apple and asked her to stop communicating with his daughter. Mrs. Apple stopped calling Sally, but Mrs. Apple felt that Sally still needed her support, so she communicated with her over social media. She also met with Sally outside of school to give her gifts, such as clothes and art supplies.

Analysis: This situation will result in a possible termination of employment and suspension of the educator's license for up to five years, depending on aggravating and mitigating circumstances. In addition, it will likely result in difficulty in the relationship between Sally and her father.

While it is good and appropriate for educators to express encouragement and empathy to students, educators should maintain boundaries with students. Communicating with students in an extensive, ongoing fashion is not appropriate. If a student needs counseling, the educator should refer the student to the school counselor. Gifts to specific students are not appropriate. Communicating with students privately over text or social media is not appropriate. If an educator needs to communicate with a student regarding school or extracurricular activities, the educator may use text or email, but should include a principal or parent on the message. Situations where the educator exceeds boundaries and becomes a parent-like figure to the student may result in a rift between the student and his or her parent. The student will transfer affection to and share confidences with the educator rather than the parent. The rift is further broadened because the student will hide the relationship with the educator from the parent, and secrets create separation.

Scenario 2

Fact Pattern: Tammy Teacher has a boyfriend who asked her for pictures of her naked. Tammy used her school-issued iPad to take pictures of herself. Tammy had been told that she could use the iPad for personal reasons, so she thought it would be fine. Unknown to Tammy, the iPad automatically saves to the cloud storage system set up by the school. The images were subsequently located by a student on the cloud account who then emailed them to everyone in school.

Analysis: Tammy's employment will likely be terminated for violation of the school's acceptable use policy. In addition, Tammy's educator license may be suspended for up to two years. The Utah educator standards prohibit possession of indecent or pornographic images on school property or on school devices, which includes the school-issued device. She could also be charged criminally. It is a class A misdemeanor in Utah to access indecent or pornographic materials on school property. See Utah Code Ann. § 76-10-1235. If Tammy had possession of the images while at school, she would have violated the law.

Scenario 3

Fact Pattern: Tom Teacher is a coach and teacher. He has a personal Twitter account that is public, meaning anyone can follow and unfollow Tom at any time. Tom likes to post pictures of his team on his Twitter account and share information about the team's games/tournaments/success. He tells his players he is on Twitter and some students follow him. Tom follows some students on Twitter as well. In addition, Tom is following celebrities and other Twitter users who will post images of sex or nudity on their Twitter feeds or who will post jokes or stories with sexual or racist content. Tom will sometimes retweet those posts. One day, a parent saw her child looking at Tom's Twitter feed and saw some of the sexually suggestive posts that Tom had retweeted.

Analysis: Tom could possibly lose his job, and his educator license could be suspended.

Educators should be aware that their social media activity may subject them to discipline by their employers. The Utah Educator Standards prohibit exposing students to harmful material. If an educator suggests that a student follow him/her on Twitter and then posts material that could be viewed as inappropriate or harmful for a student, that would be a problem. If an educator has public profiles on social media, then he/she should take care to make sure that content is something he/she would feel comfortable with a parent of a student seeing. If the educator doesn't want to come under public scrutiny for social media activity, he/she should make the profiles private and not allow parents or students to follow or friend the educator. It is best practice not to friend students.

Scenario 4

Fact Pattern: Trent Teacher accesses sexually explicit videos on YouTube at school on his school computer. He only does it before school, after school, and during his prep period. Patty Principal stopped by to talk to Trent one day about a student and saw the phrase "Brazilian Babes" on Trent's minimized internet bar.

Analysis: Trent may be fired for violation of the school's acceptable use policy. In addition, Trent will most likely have his educator's license suspended for up to two years. He may also be prosecuted criminally. School acceptable use policies and the Utah Educator Standards prohibit possessing pornographic material at school or any school-related activity. UPPAC usually suspends the licenses of educator's who access pornography at school. In addition, there could be criminal charges. Utah Code Ann. § 76-10-1235 prohibits accessing pornographic materials at school.

Scenario 5

Fact Pattern: Pat Principal was approached by a student, Tina Teen. Tina told Pat that she had been sent a text message with a nude picture of another student, Samantha Student. Samantha had sent the picture to her boyfriend, Tim Teenager. When Tim and Samantha broke up, Tim sent the picture to numerous other students. Pat asked Tina to email him a copy, and he called the police. The police investigated and several students were charged with distribution of child pornography. Pat was also charged for possession of child pornography because he had Tina send him the picture. (The charges were later dropped.)

Analysis: When an educator becomes aware of a student in possession of possible child pornography, the educator should not have the student (or anyone else) transmit the image further. Instead, the educator should contact the police immediately who will then take possession of the device containing the image.

Best Practices

When considering how to behave online, you should keep these principles at the forefront of your mind:

Principles

1. Draw clear lines between personal and professional social media use.
2. Never post anything anywhere that you would be uncomfortable with your students or their parents seeing (or that you would mind being featured on the nightly news).
3. Be critical of yourself, and regularly evaluate your online persona (by conducting searches on yourself, etc.).
4. Realize that posts to social media are never completely private.

With these principles in mind, some concrete best practices that can guide you to use social and other online media safely include the following:

Best Practices

1. Keep personal use as private as possible.
2. Check (and periodically re-check) your privacy settings.
3. Consider how others will interpret your posts.
4. Be mindful of your clothing and activities in images and videos that are posted online.
5. Never mention students by name in any social medium.
6. Avoid saying anything negative about your students, individually or as a group.
7. Do not post student work to social media.
8. Periodically logout of your accounts and search for yourself online to evaluate your digital footprint.
9. Be very careful and thoughtful about how you connect with students, parents, and colleagues online (e.g., friending).
10. Do not create, view, or share pornography (or anything that could be considered pornographic).

Conclusion

The problem with giving clear answers about what's okay and what's not okay to do in online spaces is that it depends on the community, school board, administrators, students, and parents that you work with, because they are the ones that make judgements on moral turpitude and appropriateness. Especially if you are a new teacher, you don't know how these different people will interpret your actions. Before posting anything online, however, you should carefully consider the risks of posting the content against the benefits. If the benefits don't outweigh the risks, then don't do it.

Especially if you are young in the profession, it might be hard for you to make this judgment, because you may not know what all the risks are, how community members might react, and so forth. If in doubt, it may be a good idea to ask

administrators or veteran teachers in the school in order to get a feel for the school and larger community, but, obviously, even veteran teachers and administrators get into trouble sometimes. So, the bottom line is that there will always be risk with posting personal information online. The question you have to consider is how much risk are you willing to take, and what might you need to give up in order to avoid unnecessary risk.



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3.4

Online Safety

Royce Kimmons

Social Media

Cyberbullying

Student Safety



Learning Objectives

- Understand common threats to personal security online (e.g., malware, hacking, phishing) and how to recognize and counteract them;
- Understand legal and ethical requirements placed upon teachers to keep students and their information safe and secure (e.g., privacy, inappropriate content, cyberbullying, child pornography);
- Recognize strategies for making a classroom safe and secure for students' online activities.

Since there has been an internet, there have been those who seek to use it for malicious purposes. Many of these people have very sophisticated understandings of both human nature and internet technologies, and this allows them to

take advantage of those with limited understanding of these technologies or who are naive in providing sensitive materials online. As a user of the internet and as a teacher, it is essential for you to understand these threats and to develop strategies for addressing these threats in your own life and in the lives of your students. We will approach this issue from two directions. First, we will consider how teachers should seek to ensure their own personal safety and security while using these technologies, and then second, we will explore how teachers should safeguard their students in the classroom and beyond.



[Watch on YouTube](#)

Key Terms

[Child pornography](#)

any pornographic or illicit depiction of a child; viewing, sharing, or owning child pornography is a felony in the United States

[Cyberbullying](#)

a form of bullying that uses internet and other technologies as a means for perpetrating bullying behaviors

[Hacking](#)

when a person or program bypasses or tricks normal security procedures in order to gain access to a site or service

[Malware](#)

malicious software or any software or app that is designed to steal your personal information or cause your electronic devices to behave improperly

[Phishing](#)

an attempt to maliciously exploit sensitive personal information online; a play on the word "fishing," because it implies the use of bait to trap a victim

Personal Security

In this section we will explore three ways that those with malicious intent may seek to make your personal online experience less secure and less safe through malware, hacking, and phishing. As we explore each, we will provide examples of how the threat might impact lay internet users and also provide guidelines for simple threat reduction or prevention.

Malware

[Malware](#) or malicious software is any software or app that is designed to steal your personal information or cause your electronic devices to behave improperly. It was recently estimated that the number of malicious programs created and available on the web now exceeds the number of non-malicious programs and that about 7% of all downloads that users make are malicious in nature.

There are many different categories of malware. Viruses are some of the most well-known, which are typically designed to delete your information or do your computer harm, but there are many other forms as well. Spyware is very common and is software designed to spy on you while you use your device or the Internet, collecting information about you as you go. You may not believe that what you do on your device is particularly interesting and wonder why anyone would want to spy on you, but the simple answer is that information is valuable and that you provide a lot of information on your device that might be profitable to someone. This information includes financial information, such as credit card or bank account numbers, or personal information, such as Social Security numbers, addresses, or phone numbers. a third category of malware is bloatware, which is a type of program that may not necessarily be malicious, but merely takes up space, slows down your device, forces you to view advertisements, or does other things that are not conducive to the kind of experience you want with your device.

Most modern devices are equipped to deal with malware and new updates are released almost daily to combat these threats, so there is little possibility that your device will become infected on its own as long as your software is up to date.

The real problem with malware is that it is typically installed or spread by accident as users circumvent security measures on their own devices or are tricked by a website or program that seems legitimate. For instance, you might go to a website and see a popup that says you have 98 viruses on your computer and that you should click a button to scan your computer. By clicking that button, the website is actually trying to get you to download and install malware. That is, people are often tricked to install malware by thinking that they are removing it. For this reason, you should never trust any popup unless you know what program it is coming from. If you have an anti-virus program on your computer and it detects malware, any popups warning you of this threat will be clearly identified as belonging to that program. If, however, you see a pop up that comes from any other source, then you can know that it is malware, and you should not click on it.

Another common way that malware is spread is through email. If you receive an attachment through email that you have to click to open, by clicking that attachment you may install something malicious on your computer. For this reason it is important to know and understand the types of files that you might receive over email and how to identify legitimate files. The simplest way to identify a legitimate file is by looking at the file extension, or the part of the file name that goes after the period, such as .pdf, .xls, .zip, or .doc. Each of these file extensions signifies a different type of file. Some of these types of files are commonly used to spread malware while others are safer.



Some of the most dangerous file types that you need to be aware of include the following: .exe, .msi, .dmg, .zip. Just because a file has this extension does not mean that it is necessarily malicious, because there are many legitimate files and programs that use these extensions, such as legitimate programs that you may download from the Internet. However, you typically should not expect to receive these kinds of files in an email. So, if you see one of these types of files in an email, you should be very careful about installing it and only do so if you can verify the legitimacy of the sender.

If you have malware installed on your computer there are two simple things you can do to help remove it. First, if you see a program running on your computer that you do not recognize or that you think should not be there, you can uninstall it. On

some operating systems, you can even find a list of all the programs installed on your computer and go through the list one by one, removing any programs that you think are not legitimate. When you do this, some malware will not allow you to completely uninstall it or will install a second program when you try to uninstall the first. Sometimes this means that you will have to go through and uninstall multiple programs in a row in order to clean your computer but also that you may not ever be able to remove everything on your own.

The second step is to install a legitimate antivirus program and allow it to clean your computer for you. There are many legitimate programs available online or at the store, but not all are equal. To figure out what kind of antivirus will work best for you, consider reading reviews from reputable sites. Most legitimate antivirus programs require an annual subscription fee (e.g., McAfee, Norton), but there are some companies as well that may have an introductory version of their antivirus software that is available for free or on a trial basis (e.g., Avast!, AVG).

Hacking



Eine Computer-Tastatur by Colin, CC BY-SA

In the context of online security and safety, a [hack](#) is when a person or program bypasses or tricks normal security procedures in order to gain access to a site or service. Hacks can be problematic for everyone, because it means that a hacker can gain access to personal information about users, such as credit card information or passwords, or make online purchases or use services without consent. Even legitimate websites can sometimes be hacked, giving hackers access to company information or personal information of users. Sometimes these websites are hacked at a site-wide level, wherein lots of users' information is compromised, but it is more often that they are hacked at the user level, wherein a hacker gains access to a single person's account.

As a lay user, there's not anything you can do to prevent a site-wide hack, but you should recognize that such acts are possible and that any website you give your information to has the possibility of being hacked. This means that if you are not certain that the website values your security and privacy or that it is run by a company that has the technical expertise necessary to counteract potential hacks, then you should be hesitant to provide information to such a site. Additionally, if a site really doesn't need certain information about you (e.g., does Facebook really need to know your address), then you should consider not including this information.

Personal hacks, however, are much more common and preventable. Most personal hacks occur for one of three reasons: 1) failure to logout, 2) weak passwords, or 3) unsecured wifi. The first reason is the easiest to counteract, because it typically occurs on a device that is either publicly used or shared by multiple users. If someone else has access to the device, then you should logout of your accounts as soon as you are done. Many people, for instance, have their Facebook accounts hacked by roommates, family members, or friends, and though this may not lead to financial or legal trouble, it can have social ramifications that could be avoided by a simple logout. Also, if you are using a shared computer, do not allow the web browser to remember your passwords. Rather, ensure that if anyone wants to get into your account on that device, then they will have to enter your username and password themselves.

The second way to prevent personal hacks is to use secure passwords. Passwords that are short or that use common words are easy to guess. Some sites will show you the strength of your password when you first create it or even require you to create a password that meets certain security requirements. The more complex and lengthy your password is the more difficult it will be for someone else to guess it. For this reason, you should introduce complexity into your password in one or more of the following ways: use both upper and lower case letters; use both letters and numbers; when possible, use symbols; use a complete sentence or lengthy phrase; and avoid common words (e.g., "lucky") or common word variants (e.g., "1ucky"). You should also consider changing your passwords frequently and using different passwords for different sites. Having multiple passwords can be unwieldy and difficult to remember, so you may want to consider using a password manager such as Keychain Access on Mac OSX, [KeePassX](#), or [LastPass](#) to help you keep track of many different or difficult passwords.

And the third way to avoid personal hacks is to only use secured wifi or to avoid doing sensitive work over unsecured wifi. This is especially important in highly trafficked public areas, such as airports, university campuses, or markets.

When you connect to wifi, you will typically be warned if the wifi is unsecured, and secure wifi is typically identified by your device with a security symbol (such as a lock).

If you access the internet over unsecured wifi, this means that any information your device sends or receives may be intercepted by a third party. So, submitted sensitive information over unsecured wifi (e.g., passwords, credit card numbers) could be intercepted and recorded by someone else "listening" for data on that wireless network. Being already logged into a site before connecting to the unsecured wifi could be problematic as well, because someone could "listen" to your credentials for that site and hijack your session (e.g., if your email account is already open, they could potentially begin using it).

There are ways to make an unsecured wifi network more secure for sensitive use (e.g., using a VPN), but this typically requires third-party software and some technical know-how. Generally speaking, if you are using an unsecured wifi network, then you should avoid doing any sensitive work and be careful about the sites you access and the information you submit, because this might open you up to a personal hack.

Phishing

One final way that sensitive personal information can be exploited by those with malicious intent is through the use of phishing scams. **Phishing** is a play on the word "fishing," because it implies the use of bait to trap a victim. Phishing scams take many forms, but the most common form is through an email and fake website combination.

You might receive an email that tells you that your bank account password has expired and that you must login to update your password. When you click on the link, it takes you to a site that looks like your bank, and this site has fields for you to enter a username and password. If you enter your username and password into these fields, the website will record this information, and the scammer who created the site can use it to log into your actual account without your knowledge. Another variation of a phishing scam might be an email that asks you to send your personal information including credit card information, usernames, or passwords to an email administrator at a particular address. Both of these types of scams are dangerous, because they can extract information directly from users that scammers can then use to access sensitive information or resources online.

To avoid phishing scams, there are three easy guidelines to follow. First, never send sensitive information to anyone over email. Actual administrators will never ask for your password or other information over email, and fake email addresses can often look legitimate. Also, email addresses can be hacked, and there have been cases where hacked email addresses of people in administrative positions have been used to request additional passwords from others.

Second, if you receive an email that gives you a link to follow, be suspicious of the link even if it seems to come from a legitimate source. Typically, if you hover your cursor over the link you can see the full address. Sometimes, a scammer may send you an email that claims to be from your school, university, or financial institution and give you a link to login to a site that purportedly belongs to that institution. When you hover on that link, you should see the full address and can determine whether or not it really is linking to the intended destination. Often, the text of the link will say one thing but actually link to something very different.



Third, before you enter username or password information into any sensitive site, such as an online banking system, university email system, or online shopping site, check the address to see if it is a secure site. Most website addresses begin with the letters "http," which stands for Hypertext Transfer Protocol. This is the protocol used for most standard websites that you access on the Internet, and if you cannot tell, you should assume that the site uses HTTP. HTTP, however, is not a secure protocol. Anyone can create a site that begins with "http" without any type of verification, and for this reason, scammers will often create sites that look valid in order to steal your information.

If the URL begins with "https," however, this is a very different story, because "https" is the secure version of "http." Setting up an HTTPS site requires more verification than the alternative, which means that it is less likely to be a phishing site. All major sites that ask for sensitive information should use this protocol, and if you are ever directed to enter sensitive information into a site that does not use "https," then you should not do it.

Strategies for Personal Security

- Create and use secure passwords (eight characters or more that combine upper- and lower-case letters, numbers, and symbols);
- Check domains of links provided in emails and never login to a page that you access from an email message;
- Remove unnecessary identifying information from your online profiles (e.g., your address and phone number from your Facebook account) and other documents (e.g., resumes), and make your profiles as private as possible;
- Never enter sensitive information (e.g., credit card, bank account, social security number, password) into an insecure site (i.e. "http");
- Use a reputable anti-virus software, and don't install programs unless you know what they are and what they do.

Learning Check

Which of the following are true for safeguarding yourself online?

- ☐ only enter personal information into secure (https) sites that you trust
- ☐ use the same complex password on every site
- ☐ open email attachments of files like .exe or .zip to see if you get a warning
- ☐ logout of sites after using a public computer

Student Safety

All of the threats and strategies described above also apply at the classroom level, and the teacher should take steps to ensure that student uses of devices and internet technologies in the classroom are free from malware, hacking, and phishing. Teachers should recognize that as the closest point of contact for their students, they need to take an active role in ensuring their students' safety and security, but they are not alone in this endeavor. School and district technology professionals typically exist to help support the classroom teacher and can be great resources to help the teacher safeguard students. Most districts and schools have an acceptable use policy for their devices and networks. Teachers and students using these resources should understand and abide by these policies because they are designed to help ensure that everyone stays safe and also that the school complies with special legal requirements regarding student safety. Some of these requirements stem from mandates at the federal level, while others stem from mandates at the state level. Though these requirements may vary somewhat from district-to-district and state-to-state, there are some common areas where teachers are expected to take an active role in safeguarding students, in addition to those described above. We will now proceed by highlighting four examples of these areas, including: privacy, inappropriate content, cyberbullying, and the creation and sharing of child pornography or sexting.

Privacy

At the federal level, the Family Educational Rights and Privacy Act (FERPA), requires teachers and other school personnel to keep student educational and private information secure. This means that grades and student work should not be distributed online or made available to others without the consent of the students and their parents. At the school district level, this means that student information systems and grade books should be secured in such a way that they cannot be accessed by anyone other than the student, their parent or guardian, and necessary school personnel. At the classroom level, however, these principles still apply, and there is a clear potential for violations if teachers share student work in public places or require students to create accounts on services that may not meet school security requirements, such as public email, blogging, or social media accounts. For instance, an English teacher who has traditionally required students to keep a daily paper-bound journal may now have students create an account on a popular blogging platform and keep a journal there instead. Even if the teacher does not make grades visible in this platform, the journal entries are examples of student work, and if the information in that journal is accessed publicly or by anyone without permission, the teacher would be violating FERPA. It is the teacher's job to ensure that students have a safe learning experience and that their school work is kept private. Questions about privacy and security should be explored with school and district personnel who have expertise in determining compliance with regulations, but at its

heart, FERPA means that teachers need to be respectful of their students' right to privacy and avoid using Internet technologies in any way that may undermine this right.

Inappropriate Content



7/365 – Blue Eyes, Axel Naud, CC-BY SA

Even in well-filtered districts, students can still gain access to inappropriate content.

Schools are required by law to filter their students' access to Internet resources. The purpose of this is to ensure that students are not using provided resources to access materials that can cause them or others harm. School district acceptable use policies are often very explicit in what they consider to be inappropriate content, and they often reflect language from state level agencies and standards related to safe classroom environments and moral appropriateness. Blocked resources typically include but are not limited to content that is pornographic, violent, abusive, illegal, or otherwise inappropriate, sexually explicit, or harmful.

However, laws tend to be very fuzzy and subject to interpretation with regard to actual implementation. Thus, while one school district might completely block YouTube, another might enable access to specific channels within YouTube, and another might make the entire site available. In each case, school districts implement filtering policies that they believe strike a suitable balance between legal/ethical considerations and pedagogically valuable access to information.

Given this variability, district or school level filtering policies may not always be appropriate for specific classroom settings. That is, a district may implement a single policy for all students and teachers in the entire district, but this level of access may not be equally appropriate for teachers, graduating seniors, and first graders. For this reason, teachers should consider what resources students are accessing in their own classrooms and layer on top of district or school filtering mechanisms their own structures for ensuring that students are making wise and safe use of those resources.



Online Safety for Kids, Intel Free Pass, CC-BY SA

Ensuring safe use of internet resources can be achieved in three general ways. First, teachers can implement their own filtering systems in their classrooms or structure classroom access of these resources in such a way that accessing other resources would be difficult. One way of doing this is to set the homepage for all classroom devices to a classroom home page that only has direct links to the resources that the teacher approves. Sites like [Symbaloo](#) or [Only2Clicks](#) make setting up this type of landing page simple and can reduce confusion or frustration by students who may need a simple method for accessing necessary resources in the classroom.

Sometimes this approach might not be appropriate, because you may want students to seek out information on their own or to find information from multiple sites. In this case, you can consider creating a custom search engine through a tool like [Google Custom Search](#), which allows you to have fine-grained control over the types of resources that will be returned to your students through their searches. For instance, as students conduct a research project on Ancient Greece, you might provide a custom search engine that only returns results from Discovery, History Channel, and Encyclopedia Britannica. This allows you to still teach essential research and media literacy skills while also exercising greater control over the types of resources that students will need to parse through.

These strategies will not prevent students from typing in unlisted web addresses directly to the address bar, nor will they prevent students from using a general search engine to find new results. Similarly, even in the most restricted school districts, students can still find ways to bypass security settings by using proxy servers or other hacking mechanisms. For these reasons, even in the most structured classroom and well-filtered district, monitoring of student activities is essential to ensure that they are on task and not accessing resources that are inappropriate. This is especially important in 1-to-1 classrooms, which are becoming increasingly prevalent, wherein every student has a device at their disposal.

In addition, to help ensure that students know and understand classroom technology rules, you should make these rules clear and visible to students either by printing them on a poster or making a desktop background for devices that highlight them.



You can put your rules on your students' desktop backgrounds (click on the image and make a copy to create your own using Google Drawings)

When all is said and done, however, the teacher's greatest asset in monitoring their students is their own presence. If a student is afraid that you will look over their shoulder, he will be much less likely to seek after things that are inappropriate. For this reason, you should structure the physical layout of your classroom in such a way that allows you to see what is on your students' displays at all times and also allows you to have a physical presence near your students so that they know they are being monitored.

Some software products exist to help support this, such as classroom management or classroom monitoring software. They operate by collecting images from every student's display and combining them on the teacher's device so that the teacher can see all activities in the room at once. The major limitation of such software, however, is that it loses its power once the teacher is no longer monitoring the screen and essentially binds the teacher to a device and/or physical location, thereby removing necessary flexibility to move about the classroom.

Finally, if students know that they are being monitored, then it should also be made clear to them what they are expected to access and what they are not. When a student accesses something that is inappropriate, it is important for the teacher to react in a manner that is suitable for the transgression. Sometimes advertisements may have inappropriate content and may pop up on a screen through no misbehavior on the student's part, and a student who intentionally accesses a pornographic website should be responded to differently than a student who accidentally opens a page with a few swear words on it. In every case, the teacher should set a standard for behavior and reporting processes by requiring students to report to her right away if they come across inappropriate content and assuring them that if they do this they will not get into trouble. This type of understanding allows the students to take an active role in helping moderate the classroom themselves but also sets the expectation that even accidental access of these types of resources needs to be avoided, reported, and addressed.

Cyberbullying



Bullying online can feel even more real and pervasive than bullying offline.

Bullying has always been a problem in schools. In fact, most people who have gone through a school system have probably experienced bullying of some form, whether physical, verbal, or psychological. Some may treat bullying as commonplace and expected, but the effects of bullying are far-reaching and may influence students' emotional states, their ability to interact appropriately with their peers, their ability to be successful in their school work, and even their desire to lead a fulfilling life. Many high-profile cases have existed wherein bullying has escalated to extreme consequences, resulting in assault, murder, or suicide, which should lead us to recognize that bullying is a rampant form of abuse that should be counteracted at all levels.

Cyberbullying is a form of bullying that uses internet and other technologies as a means for perpetrating bullying behaviors. It has gained attention in recent years not because bullying is a new phenomenon but because these technologies have enabled bullies to enact abuse via new media with greater persistence and prevalence. Before the internet, a student being bullied might be able to find solace from tormentors in an after-school program or by going home, but these technologies allow bullies to insert themselves into the persistent experiences of students through online posts, text messages, and other venues. A student who uses Facebook when she goes home, for instance, might find herself stalked and verbally abused by the same bullies that were abusing her at school earlier in the day. Cyberbullying removes the opportunity for reprieve for the victims and allows bullies to cause emotional harm in a manner that is social, persistent, and invasive into their personal lives.

Many teachers may approach the issue of cyberbullying with skepticism, either because they do not believe that it is a problem or because they do not believe that the teacher should play a role in combating it. However, recent high-profile cases have shown that in situations of extreme abuse, lawsuits have been filed against schools and teachers for their unwillingness to respond to bullying behaviours online and their inability to punish students who use social media as a venue for abuse. Whether or not it is the teacher's role to be investigators and enforcers in this area, it is the teacher's role to be an advocate for their students and to understand the relationship between classroom social interactions and the well-being of their students at large.

For this reason, it is now commonly encouraged for teachers to take a proactive role in speaking out against cyberbullying and addressing specific instances of abuse when they arise. For comparison, if a teacher were made aware that one student followed another student home every day after school and left threatening notes on the victim's doorstep, it would be expected that the teacher would speak up and contact appropriate school and law enforcement officials about the situation. The realization that teachers need to have is that online interactions are just as real as face-to-face interactions, and instances of abuse need to be addressed despite the medium through which they occur. In short, victimized students need teachers to be their advocates, and bullies need to be taught about the real-life consequences of their actions, even if those actions do occur online.

Addressing Cyberbullying with Young Children



[Watch on YouTube](#)

Child Pornography and Sexting



Texting by Jhaymesivphotography, CC BY

A specific subset of inappropriate content that teachers and students need to understand is child pornography. [Child pornography](#) is any pornographic or illicit depiction of a child, and viewing, sharing, or owning child pornography is a felony in the United States. In the U.S., a child is defined, for these purposes, as anyone under the age of eighteen (18), and the internet and mobile phones have made child pornography a difficult problem for everyone to deal with.

First, though pornography is not itself illegal, pornography that depicts children is illegal in the U.S. Other countries have different laws, and much of the pornography that is produced, viewed, and shared on the Internet comes from other countries, which may not have laws against child pornography or may have a lower age of consent. This means that pornography that may be legal in another country and available online may be illegal in the U.S., and if students or teachers access or share such media, then they are guilty of a felony. For students under eighteen, this means that seeking out sexually explicit images or videos of others their age would be a felony, even though they may no longer think of themselves as children.

Second, and likely more alarming, mobile technologies, cameras, and texting have made it possible, and in some cases socially expected, for students to interact with one another in ways that are pornographic in nature, thereby leading them to not only view child pornography but also to create and share it. It is not uncommon for teens, for instance, to share sexually explicit photos with one another, and many teens do not see this as a problem, sometimes normalizing it within their peer groups. In such cases, photos are sometimes forwarded to peers, parents, and even teachers, meaning that those creating the images are guilty of a felony, but so are all of the others who received the images, viewed them, shared them, or saved them. Even if an adult gained access to such an image for the sole purpose of reporting it to the police, doing so could constitute a felony.

This state of affairs means that students and teachers need to be very careful and aware of the laws surrounding child pornography, and teachers need to counteract social influences that encourage young people to communicate and make themselves vulnerable in these ways. Students need to be taught the legal ramifications of these kinds of

activities but should also be taught their social ramifications and the potential social shaming that can result. Most of the students who get into trouble for these kinds of activities initiated them due to social pressure and a lack of awareness that these behaviors could lead to negative social outcomes or legal ramifications. As such, teachers should take seriously their role in helping students to develop the self-respect necessary to combat social influences related to sexting and child pornography and should treat this issue with just as much importance as any other dangerous, unhealthy, or illegal activity.

Strategies for Student Safety

- Keep student information, grades, and school work private;
- Proactively respond to cyberbullying, and be an advocate for your students who are victimized;
- Control and monitor what your students access in your classroom;
- Teach your students self-respect and the dangers of child pornography;
- Swiftly involve law enforcement in matters of student safety (e.g., cyberbullying, child pornography), and never look at, receive, ask for, or save child pornography (even for reporting purposes).

Learning Check

What should you do if you discover child pornography on your students' devices?

- ☐ Save the web page, video, or image for reporting.
- ☐ Attempt to identify students who were involved.
- ☐ Report the incident to your principal.
- ☐ Report the incident to law enforcement.

Which of the following statements about cyberbullying are true?

- ☐ Cyberbullying is just a more modern way of referring to traditional bullying (e.g., on the playground).
- ☐ Cyberbullying is rarely an issue in younger grades (K-8).
- ☐ Cyberbullying is only the concern of teachers if it happens at school or on school-owned devices.
- ☐ Cyberbullying is often more persistent and invasive than traditional bullying.

Conclusion

This chapter has explored issues of online safety by focusing on threats to the personal security of teachers (e.g., malware, hacking, phishing) as well as threats to student safety in the classroom (e.g., privacy, inappropriate content) and beyond (e.g., child pornography, cyberbullying). Given the severity of many of these threats, it behooves all teachers to understand these threats and to develop strategies for addressing them, both in their personal lives and in the lives of their students.



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3.5

Universal Design for Learning

Teacher Planning for Technology Integration

Esther Michela

Accessibility

Universal Design For Learning



Learning Objectives

- Identify sources of instructional barriers for students;
- Identify essential elements of UDL to lesson planning;
- Apply UDL guidelines and principles through technology;
- Access resources to incorporate UDL principles into a lesson plan.

TIP: If you are already familiar with principles of UDL, check out some of the supplementary videos for more information and review, and explore some of the resources at the end of the chapter.

Scenario

Mr. Hunter teaches 8th grade social studies in a large urban school district. While each of his classes has a unique makeup, over the course of the day he sees students from eight different countries, speaking 4 different languages. All of his students come from rich cultural backgrounds. He teaches students identified as having a disability, some who are gifted, and some who are both. He teaches students who are not identified as having a disability, but who read below grade level or struggle to pay attention. Some read above grade level, others are often bored with school. Some days, Mr. Hunter feels dizzy at the thought of what it will take to meet the needs of all his students. It just seems easier to focus on the curriculum and just present the required content.

Mr. Hunter isn't alone in feeling overwhelmed with the increasing focus on individualization. One approach is to try to teach to the middle or "average" student, hoping that it will cover enough of the students to be effective, but we must realize that there is no such thing as an average learner. As the diversity of students and their needs become more apparent, and because learner variability leads to an infinite number of possible learner profiles, we need to fundamentally shift the goal of our planning away from those in the middle to planning for that variability by providing flexible, authentic options to students to accomplish learning goals. Universal Design for Learning (UDL) provides a framework to help teachers do this.

Universal Design in Architecture

Universal Design (UD) was originally coined by Ron Mace at North Carolina State University as an architectural approach to building structures that includes accessibility features in the original designs. Common features such as stairs, swinging doors, button height, and visual signage can create barriers to access for a wide range of people, but especially those with disabilities. For this reason, architects began to design buildings that took into consideration a wide range of needs, such as providing a way for people who had difficulty walking up stairs as an alternate way of getting to the second floor. In reality, there are many considerations, from flooring and lighting to the width of a bathroom stall, that must be taken into account to provide universal access. By incorporating features in the original design such as ramps instead of stairs and automatic doors instead of buttons, people with and without disabilities may have equal access to aesthetically pleasing structures.

Learning Check



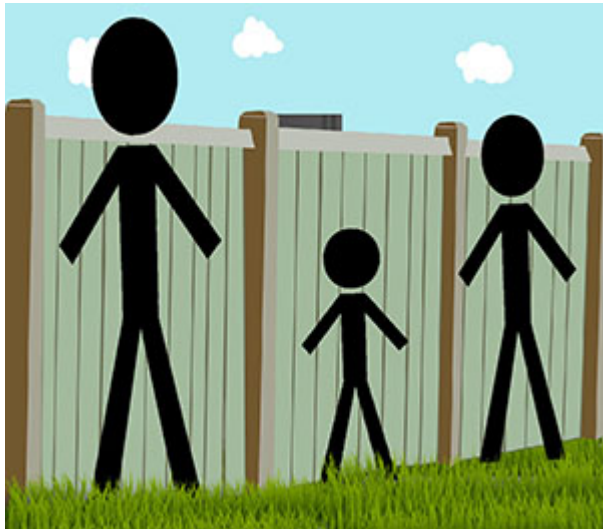
Consider this beautiful staircase in the Kunstmuseum in Bonn, Germany. Who else might struggle to use these stairs?

- ☐ Those with heart conditions
- ☐ Those who use wheelchairs
- ☐ Those who use walkers
- ☐ Those with a broken leg
- ☐ Those pushing strollers
- ☐ Small children
- ☐ Those making a large delivery

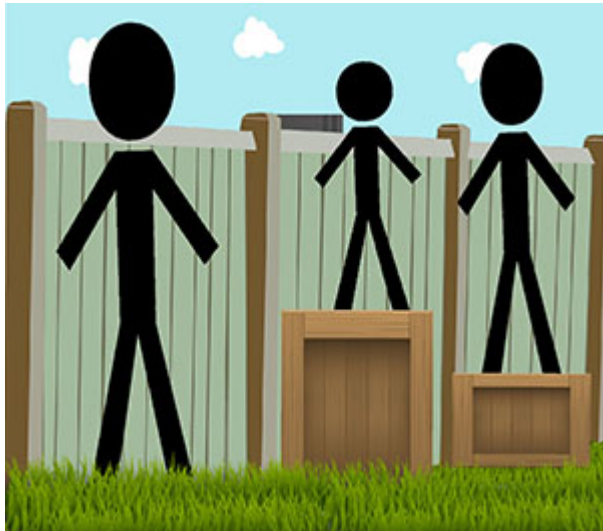
Universal Design for Learning

So what does this have to do with teaching and learning?

One thing we can take away from this is that there are unintentional barriers built into the world around us, including our educational system. These barriers can be physical, cognitive, or psychosocial, and they can be found in our schools, curricula, materials, and tools. Just like using a staircase presents a barrier for someone using a wheelchair, aspects of an educational curriculum can present barriers to students accessing necessary information. UDL locates the problems of access to education with the design and presentation of educational products, rather than in the students, and is a way to think about planning classrooms and lessons in ways that don't just fix barriers, but remove them. Take this example.



Three people want to see what's on the other side of the fence but two are faced with a barrier to the view. Only the tallest can meet the goal of seeing what's there without some kind of accommodation. The shortest person has no chance, even if he jumps as high as he can. The person on the right might be able to see by standing on her tiptoes, but that is a tiring exercise.



Often, the solution in schools is to provide accommodations that fit the varying needs of students. Generally, students are provided with the equivalent of a “box” to stand on, such as having text read aloud to them or having a scribe to write for them, that will let them access the general education curriculum.

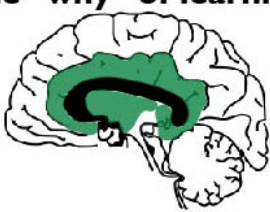
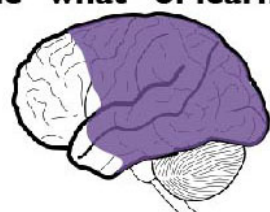



The aim of UDL, however, is to address the need for accommodations by designing lessons, curriculum, and materials that remove the barriers, symbolized by the chain link fence, which all of them can see through without needing any accommodations. This analogy only goes so far, as a fence still represents a physical barrier, but if the goal is only to see the other side, the fence allows each person an equitable opportunity to do so.

Here are a few examples that are commonly seen in schools. Textbooks can present barriers to accessing information for students with visual impairments or reading disabilities. Videos can present a barrier to students who cannot hear. Drawing a poster could present a barrier to students who have a physical disability or poor fine motor skills or just simply cannot draw well enough to express their ideas. Verbal presentations present barriers to students with social anxiety. The list could go on and on. The point is that many of the common pedagogical practices that teachers use will present a barrier to some students, and in those instances, teachers can either try to provide “boxes” for all of the students they know are struggling or replace the fence altogether with something more accessible.

UDL foundation in neuro and cognitive science

Universal Design for Learning is, in part, informed by research on how the brain functions during learning. It’s important to say up front that this is a very complex and still unfolding area of research. We cannot give it sufficient attention in this chapter, but a 5-video series called [Brain Matters](#) by Todd Rose is a good place to get a basic understanding. For our purposes, we need to know that learning is a complex process that takes place across three interconnected networks in the brain: the affective, recognition, and strategic networks (Rose & Meyer, 2002). Each network is made up of millions of neurons, and the process of learning any particular skill or information varies for every person based on their individual patterns of strengths, weaknesses, and learning preferences within those networks, as well as prior experience, skills, and the learning strategies a student employs.

<p>Affective Networks The “why” of learning</p>  <p>How learners get engaged and stay motivated. How they are challenged, excited, or interested.</p> <p>Provide Multiple Means of Engagement</p> <p>Stimulate interest and motivation for learning in different ways.</p>	<p>Recognition Networks The “what” of learning</p>  <p>How learners gather facts and categorize what they see, hear, feel, and read.</p> <p>Provide Multiple Means of Representation</p> <p>Present information and content in different ways.</p>	<p>Strategic Networks The “how” of learning</p>  <p>How learners plan or perform their tasks. How they organize and express their ideas.</p> <p>Provide Multiple Means of Action and Expression</p> <p>Differentiate the ways that students can express what they know or move through physical space.</p>
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Source: cast.org

Affective Networks

The affective network primarily deals with emotional states. This is the “WHY” of learning (CAST, 2018). Emotions have a powerful effect in learning as they can affect readiness, engagement, motivation, meaning making, and memory. One way to visualize this is to think of the characters in the Disney movie [Inside Out](#). The emotion characters had a lot of control over the decisions that were made. Similarly, the emotional state of our students will influence their ability to learn on a given day.

Recognition Networks

The recognition network allows students to receive and interpret incoming messages. This could be through reading, listening, hearing, tasting, or touching. This is the “WHAT” of learning (CAST, 2018). We commonly think of the “WHAT” as the content of the curriculum, the skills and knowledge that we want students to know and be able to do. These skills and knowledge are taught through a medium of some kind, through literature, lecture, archaeological artifacts, pictures, videos, math problems, science labs, a recipe, or a game of baseball.

Strategic Networks

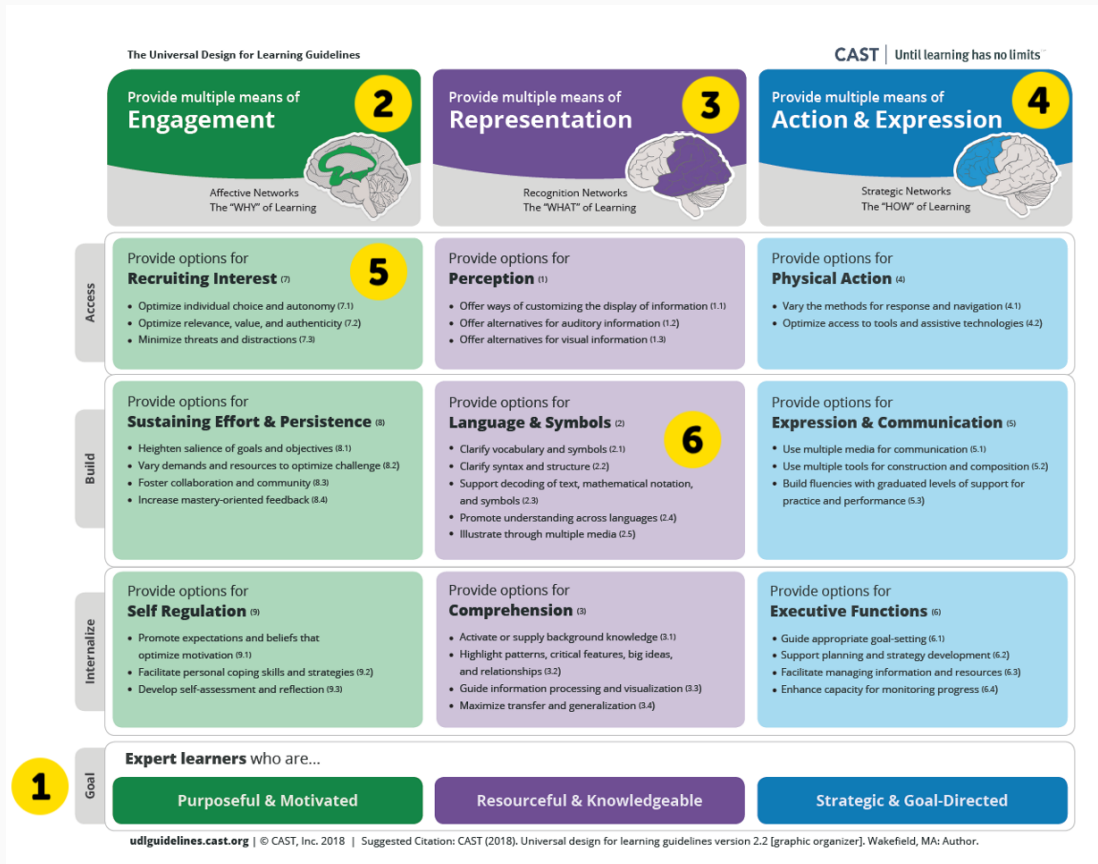
The strategic network is made up of the executive functions that allow people to plan, direct their attention, and be intentional about the way they approach a task. This is the “HOW” of learning (CAST, 2018). The strategies employed in learning include any goal directed behavior, managing time, and monitoring progress toward that goal. As students vary greatly in their ability to be strategic in their learning, teachers need to build in supports to make learning goals salient.

UDL Guidelines

The infographic below shows the foundational principles of UDL to address all three of the networks: providing multiple means of engagement, representation, and action and expression.

Do Now

Get oriented to the structure and purpose of the guidelines by clicking on the ThingLink image or link below. Click on each of the yellow circles for more information and examples.



[Access on ThingLink](#)

Additionally, if you would like concrete guidance or clarification on steps to take in your classroom, you should [explore the checkpoints on the CAST site](#).

Multiple Means of Engagement

The affective network correlates with learner engagement. The guidelines have been rearranged to put engagement first, partly because getting learners to actively engage with the material is an essential step in the learning process. We can differentiate engagement between psychological and behavioral engagement. Psychological engagement refers to how students employ cognitive processes during learning, such as paying attention, mentally organizing or analyzing information. Behavioral engagement refers to the physical actions a student uses to interact with the learning material, such as drawing, writing, reading, studying, or watching (Clark & Mayer, 2016). It is possible for students to be behaviorally engaged with a learning task without being psychologically engaged in thinking about it, so our goal as teachers is to support the internal, cognitive engagement.

Recruiting interest, or providing a "hook" to a lesson, is often an early consideration in lesson planning, though engagement must go beyond the hook. Once students are interested, how do we help them sustain their engagement and become self-regulated learners? The bulleted checkpoints provide specific recommendations on how to

accomplish this. Important considerations for engagement include providing learners choice and autonomy in authentic and relevant situations.

Multiple Means of Representation

The recognition network correlates to the representation of information. Content can be represented in many ways, visually through text, images, and videos; auditorily through recordings, lectures, and conversation, and through physical objects. Using only one method of presenting material can create a barrier for students. Providing multiple means of representation removes barriers to perception, language and symbols, and comprehension.

An example of this might be using closed captions when watching a video to help the student who has difficulty hearing, the student who has a hard time processing auditory information, and to support students who speak English as a second language. Providing access to digital dictionaries will allow students to look up unfamiliar vocabulary terms. Language translation tools or bilingual dictionaries are powerful aids to build comprehension. These tools are increasingly being built into educational programs so that each student can access content with the needed supports.

Multiple Means of Action and Expression

The strategic network correlates to how students show their learning. As discussed earlier, learning outcomes can be met in many different ways. This includes options for physical movement and action as well as options for expressing their learning.

For example, to meet the goal of comparing differences between the colonies, students could use a comparison chart like a Venn diagram, but they could also make a verbal presentation, make a poster, draw pictorial representations, compose a poem or song, build a model, or type a blog post on a tablet or computer. There are times in which a specific format or structured outcome is necessary, such as learning to plan, organize, and compose an essay. In this case, a teacher could still provide options on the topic of the essay, or whether it could be typed or handwritten.

Learning Check

Which of the following are example(s) of providing multiple means of engagement:

- ☐ Giving student access to digital, audio, and print versions of a text.
- ☐ Giving students the choice of topic for a persuasive essay.
- ☐ Giving students options of tools to use to compose an essay.
- ☐ Giving students access to the expected learning outcomes.
- ☐ Giving students options to work with other students

Learning Check

Which of the following are example(s) of providing multiple means of representation:

- ☐ Giving student access to digital, audio, and print versions of a text.
- ☐ Giving students the choice of topic for a persuasive essay.
- ☐ Giving students options of tools to use to compose an essay.
- ☐ Giving students access to the expected learning outcomes.
- ☐ Giving students options to work with other students in groups

Learning Check

Which of the following are example(s) of providing multiple means of expression:

- ☐ Giving student access to digital, audio, and print versions of a text.
- ☐ Giving students the choice of topic for a persuasive essay.
- ☐ Giving students options of tools to use to compose an essay.
- ☐ Giving students access to the expected learning outcomes.
- ☐ Giving students options to work with other students in groups

Lesson Planning with UDL

To begin to incorporate the UDL guidelines into your lesson planning, there are four critical elements to consider; (1) creating clear goals, (2) planning intentionally for learner variability, (3) using flexible methods and materials, and (4) monitoring progress in a timely manner.

1: Set Clear Goals

- Goals and desired outcomes of the lesson/unit are aligned to the established content standards.
- Goals are clearly defined and separate from means. They allow multiple paths/ options for achievement.
- Teachers have a clear understanding of the goal(s) of the lesson and specific learner outcomes.
- Goals address the needs of every learner, are communicated in ways that are understandable to each learner, and can be expressed by them.

UDL-IRN (2011) Critical Elements of UDL in Instruction (Version 1.2). Lawrence, KS: Author. CC-BY-ND 3.0

Setting goals for a lesson is one of the first steps in lesson planning. Connecting them to state content standards is common best practice, but making sure that they are clearly defined and separated from the means of assessment may require some explanation.

Consider this 5th grade social studies goal:

Students will fill out a Venn diagram to compare the cultural differences between the New England, Middle, and Southern colonies. (Utah State Standard 1, Objective 1, indicator e.)

As teachers, we need to be very clear about what exactly we want students to know or do after the lesson. The essential goal of the example lesson is for students to compare differences in the colonies, which can be illustrated in many different ways, through a poster, through a verbal explanation, through a powerpoint presentation, or an essay. Giving options for students to choose from is one way to eliminate barriers. This will be discussed more in section 3. What is salient for this principle is that goals must be focused on learning outcomes, without including a method, or means, of assessment. The primary problem with this goal as it's written is that it defines the only way students can show that they have met the learning objective, by filling out a Venn diagram. This may create a barrier for some students, such as those with visual impairments who cannot see the paper or those with poor fine motor skills who may struggle to write sufficient information in a small space, or a student who has more to say than can fit in the provided space. The original goal could easily be modified to meet this standard by removing the mention of the Venn diagram.

Students will compare the cultural differences between the New England, Middle, and Southern colonies. (Utah State Standard 1, Objective 1, indicator e.)

Clearly stated goals, when shared with students, will help everyone focus their attention and efforts on the most important aspects of the lesson. This does not mean that assessment should not happen. It should. Frequent assessment is important for monitoring progress. However, including the means of assessment in the objective limits students' ability to express their learning. As a teacher you may say that this is what IEP accommodations are for, and you would be correct, but can you see how the need for accommodation is reduced or removed when the means of assessment is removed to open up student options for expressing their learning.

Relevant UDL Checkpoints

6.1 (Guide appropriate goal setting), 7.2 (Optimize relevance, value, and authenticity), and 8.1 (Heighten salience of goals and objectives)

2: Plan Intentionally for Learner Variability

- Intentional proactive planning that recognizes every learner is unique and that meeting the needs of learners in the margins- from challenged to most advanced- will likely benefit everyone.
- Addressing learner strengths and weaknesses, considering variables such as perceptual ability, language ability, background knowledge, cognitive strategies, and motivation.
- Anticipates the need for options, methods, materials, and other resources including personnel- to provide adequate support and scaffolding.
- Maintains the rigor of the lesson- for all learners- by planning efforts (1) that embed necessary supports and (2) reduce unnecessary barriers.

UDL-IRN (2011) Critical Elements of UDL in Instruction (Version 1.2). Lawrence, KS: Author. CC-BY-ND 3.0

As there is no truly average learner, we need to plan for the range of students strengths, interests, and needs. Some teachers with a wide range of student needs have taken this approach: by planning to address the needs of the students with the most difficult challenges, the rest of the students generally reap benefits as well.

Intentional planning for learner variability can take many forms. It may be useful to make a list or spreadsheet to collect information and observations about your students to help inform your planning sessions. Information about your students will not come to you all at once. It requires conscious observation and record keeping to build usable knowledge for your planning. The more that you learn about your students, the more clearly you will be able to see what might present a barrier to them. Below is a list of potential barriers and common approaches to address those barriers with different groups of students.

Examples of Potential Barriers

Presentations and materials fail to provide sufficient examples for critical concepts.	Students are expected to understand the presented concepts through reading and lecture.	Book content and teacher-selected tools are expected to be of interest to all.
Lecture may be hard to extract key points from and take notes for.	One end-of-unit test and one project are used as the only means of giving feedback to students.	Lesson activities have a limited range of difficulty level that makes learning too easy or too hard.
Print materials may be difficult to see, decode, or comprehend.	A multiple-choice test may not be effective for some students to demonstrate understanding.	Feedback and rewards are selected in advance and are identical for all learners.
Content presentation and activities assume same basic background knowledge.	Social demands of class or activity may be too stimulating.	Individual effort and competition is the norm for all learning activities.

Source: <https://ccie.ucf.edu/wp-content/uploads/sites/8/2018/02/UDLBarriersExercise.pdf>

Commonly Used Tools and Strategies for Diverse Learners

English Language	Dictionaries and electronic dictionaries, translation programs, text to speech, speech to text, digital texts, closed captioning, collaboration with native speakers and bilingual students. Explicitly teach
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Learners	vocabulary and grammar. Activate and build on background knowledge. Tend to emotional needs. Allow alternative methods for assessment.
Twice Exceptional Students	Build on their strengths while minimizing barriers through no, low, and high tech tools. Vary grouping: sometimes group with those with similar strengths who can push learning. Teach organizational skills. Tend to emotional needs. Allow alternative methods for assessment.
Students with disabilities	Multi-modality materials, dictionaries and electronic dictionaries, text to speech, speech to text, closed captioning for videos. Explicit vocabulary instruction. Activate background knowledge. Teach organizational skills. Allow alternative methods for assessment.
Gifted	Offer options to extend learning, like learning new tools, exploring their own interests to apply the concepts, support other students. Allow alternative methods for assessment. Teach to student interests. Introduce more challenging content first. Allow them to test out of content they know.

Source: [Educating Everybody's Children: Diverse Teaching Strategies for Diverse Learners, Revised and Expanded 2nd Edition. Chapter 2: Diverse Teaching Strategies for Diverse Learners by Marietta Saravia-Shore.](#)

Relevant UDL Checkpoints

2.1 (Clarify vocabulary and symbols), 2.2 (Clarify syntax and structure), 2.3 (Support decoding of text, mathematical notations, and symbols), 2.4 (Promote understanding across languages), 3.1 (Activate or supply background knowledge), 6.2 (Support planning and strategy development), 8.3 (Foster community and collaboration), 9.1 (Promote expectations and beliefs that optimize motivation)

3: Use a Variety of Flexible Methods and Materials

- Teachers use a variety of media and methods to present information and content.
- A variety of methods are used to engage learners (e.g., provide choice, address student interest) and promote their ability to monitor their own learning (e.g., goal setting, self-assessment, and reflection).
- Learners use a variety of media and methods to demonstrate their knowledge.

UDL-IRN (2011) Critical Elements of UDL in Instruction (Version 1.2). Lawrence, KS: Author. CC-BY-ND 3.0

Consider that one of your broad, overarching goals as a teacher is to help students grow into expert learners who are purposeful and motivated, resourceful and knowledgeable, and strategic and goal-directed. The guidelines and checkpoints below provide guidance on how to accomplish this by providing flexible options to students. To put it succinctly, the three networks in the brain referenced earlier can be tapped into by providing multiple means of engagement, representation, action and expression. Providing students with multiple means, or pathways, to engage with content, access the information in a way that is digestible, and then show their learning gives students autonomy and allows them to become independent and self-directed learners.

Using Technology to Remove Barriers

While technology is not required to universally design a lesson, many of the tools now available can be extremely useful in removing barriers and promoting independent, self-guided learning. Many programs have built-in features that allow students flexibility and options in how they interact. Features could include the option to choose an avatar, change the display colors or font size, turn closed captions on or off, adjust the playback speed, and others. These features allow teachers and students to customize their learning environment to meet individual needs. Using technology for its own sake is not pedagogically sound, but targeted use of technology to remove instructional barriers can transform student learning and engagement.

One obstacle for teachers will be finding these tools and learning how to use them. Luckily, there are educators around the world who seek out and test different resources. The internet is full of ideas and tools. Many helpful websites are listed in the chapter resources.

Commonly Used Tools and Technology

Multiple means of Engagement	collaboration tools, interactive whiteboards, simulations, virtual reality, discussion boards, class blog or website, online learning, virtual classrooms, webquests, interactive assessment tools
Multiple means of Representation	text to speech or screen reading software, online dictionaries or translation tools, video, closed captions, simulations, touch screen devices, digital storybooks, headphones, microphones
Multiple means of Action/ Expression	speech to text or dictation software, online dictionaries or translation tools, video, audio recording, digital drawing tools, touch screen devices, digital storybooks, infographics, word processing tools, predictive text, mind mapping, graphic organizers, multi-media, clickers

Relevant UDL Checkpoints

1.1 (Offer ways of customizing display of information), 1.2 (Offer alternatives for auditory information), 1.3 (Offer alternatives for visual information), 4.1 (Vary the methods for response and navigation), 4.2 (Optimize access to tools and assistive technology), 5.1 (Use multiple media for communication)

4: Conduct Timely Progress Monitoring

- Formative assessments are frequent and timely enough to plan/redirect instruction and support intended outcomes.
- A variety of formative and summative assessments (e.g., projects, oral tests, written tests) are used by the learner to demonstrate knowledge and skill.
- Frequent opportunities exist for teacher reflection and new understandings.

UDL-IRN (2011) Critical Elements of UDL in Instruction (Version 1.2). Lawrence, KS: Author. CC-BY-ND 3.0

Universally designing assessment is an important part of progress monitoring. Assessments provide vital information to teachers about the growth of their students, but they can only provide accurate information if students can express their learning. The feedback students receive from teachers can help guide their own learning. Teachers must make sure that the assessment precisely matches the learning goals and does not present barriers, or that tools to overcome the barrier are embedded.

Relevant UDL Checkpoints

5.2 (Use multiple tools for construction and composition), 6.4 (Enhance capacity for progress monitoring), 8.4 (Increase mastery-oriented feedback), and 9.3 (Develop self-assessment and reflection)

Conclusion

You may get to the end of this chapter and think that this all just sounds like good teaching that's been happening for a long time. And you might be right. Good teachers do incorporate many of the practices that UDL promotes, but now we know better why and how these approaches work, and it is my belief that using UDL principles will enable more teachers to be intentional and strategic in their planning to meet the needs of the unique students who come through their classrooms.

Resources

Resources for Planning

UDL Guidelines	An electronic version of the guidelines where you can read about each principle in greater depth. Each checkpoint includes specific strategies on how to implement them.
The UDL Project	A group of elementary teachers created this site as they explored UDL implementation in their classrooms. It's a great resource to see what real teachers are doing to problem solve with UDL. There is a blog, a list of planning tools, and examples of math and language arts lesson plans.
UDL for Teachers	Videos explain the 9 principles. Each principle page includes a list of relevant high and low technology tools and apps, along with explanatory videos and supporting articles. A valuable resource to explore a wide range of flexible tools.
Learning Designed	This site gathers searchable UDL related materials, articles, courses, and other resources, free and paid. Free account. UDL credentialing available for those with further interest.
UDL Implementation and Research Network	Provides resources for teacher implementation, networking, and research. Includes a blog and searchable database.
UDL in 15 Minutes Podcast	The podcast holds discussions with current classroom teachers on UDL implementation.

Flipped Classrooms	A post on a practicing teacher's website about incorporating UDL principles with a flipped classroom.
UDL and the Learning Brain	A short (2.5 pages) article introducing important aspects of neuroscience that play a role in how the brain functions in a learning environment.
Diverse Teaching Strategies	Chapter includes descriptions of needs for racially, culturally and linguistically diverse learners and 25 strategies with classroom examples.
Technology Resources	
UDL Strategies	List of over 200 tech and tech-free strategies that correlate to the UDL guidelines.
Text to speech	List of free text to speech apps and tools for browsers and devices.
Speech to text	Extension for voice to text on Chrome browsers Instructions for voice to text function in Google Docs on Chrome browsers
Educational Technology	This page shares ed tech tips and resources for teachers and students.
Closed Captioning	Resource to help you add closed captions to a youtube video.
CAST - Free Learning Tools	A set of free tools created by CAST that can be used for science, math, and reading. A free account may be required.
UDL Editions	A limited selection of digital literary texts with links to vocabulary, annotation tools, text to speech, spanish translations, and a customizable display built in.
UDL for Teachers	Videos explain the 9 principles. Each principle page includes a list of relevant high and low technology tools and apps, along with explanatory videos and supporting articles. A valuable resource to explore a wide range of flexible tools.
UDL Professional Learning Networks	
Center for Applied Special Technology (CAST) @CAST_UDL	CAST is the organization that developed the UDL principles and continues to sponsor much of the discussion about UDL.
National Center on UDL @UDL_Center	Collects teacher examples
UDL Implementation and Research Network (UDL-IRN) @UDLIRN	Announcements on UDL and related research
Twitter #UDL	To follow all things UDL
Twitter #UDLChat	Weekly real-time chat about UDL principles between academics and professional teachers. Used for questions and sharing resources any time.

Teacher Education Resources

[Introductory Slidedeck](#)

A Google Slides slidedeck that introduces the concept and processes of UDL to teachers.

[Example Student Profiles](#)

A hypothetical (though realistic) group of diverse student profiles to aide in discussing student needs and learning strategies.

Supplemental Materials

Universally designed video illustrates physical barriers that might exist and how UD takes them into consideration.



[Watch on YouTube](#)

Universal Design in Architecture



[Watch on YouTube](#)

The End of Average



[Watch on YouTube](#)

The Myth of Average



[Watch on YouTube](#)

Video on Autonomy, Mastery and Purpose



[Watch on YouTube](#)

"The Mute" by Radical Face



[Watch on YouTube](#)

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Access it online or download it at

https://edtechbooks.org/k12handbook/universal_design_for_learning.

Glossary of Terms

Q Find something...

Additive Grading

a grading technique commonly used in gamified classrooms where every student starts with zero points (or no grade) and earns points and grades as they complete assignments throughout the school year or grading period

Algorithm

a set of steps that are used to complete a task

Algorithmic Thinking

breaking problems down into smaller workable parts

Authenticity

materials are produced by real speakers or writers for a real audience and for a real purpose; the learning tasks are designed to engage students in genuine communications with real audience; emphasizes an authentic context or discourse, not just a "native" speaker

Badges

a digital artifact or image that is awarded to individual students upon the completion of an assignment or task or in recognition for the demonstration of specific skills or knowledge; another way, besides grading, to recognize student achievement

Behaviorism

a learning theory popularized in the mid-20th century, it treats learning as a response to stimulus and it conditions students to properly react to stimuli; the brain's processes are not considered and viewed as a "black box"

Bias

how people's different experiences, life views, and ideologies shape their perceptions and understanding of information

Block-based Coding

coding with a programming language where the instructions are represented in blocks

Blog

an online tool, similar to a journal, where a user can write entries (called posts)

Blog Post

a single blog entry on a specific topic

Blogging Platform

an online site like Weebly or EduBlogs where blogs are hosted

Child Pornography

any pornographic or illicit depiction of a child; viewing, sharing, or owning child pornography is a felony in the United States

Coding

a language that a computer can use to complete a task or a set of instructions

Cognitivism

a learning theory that focuses on brain functions and how information is processed, stored, retrieved, and applied

Collaboration

engaging students in working and communicating with one another to accomplish a learning task together (e.g., students learn to communicate effectively for group work and assume shared responsibility)

Communicative Competence

language learners' ability to understand and use language effectively to communicate in authentic learning environments that allow them to connect what they learn to real-life situations

Compliance

legal, ethical, and institutional requirements of technology use (in contrast to their pragmatic use)

Computational Thinking

a problem solving process; typically broken down into decomposition, pattern recognition, abstraction, and algorithm design

Computer Language

structured commands written for a computer to process; some of the most common include JavaScript, Python, Structured Query Language (SQL), C, C++

Connectivism

a learning theory that believes that learning need not be isolated to the mind, but becoming a learned and capable citizen in a digital society requires learners to become connected with one another in such a way that they can make use of the network as an extension of their own mind and body

Constructionism

a learning theory in which students construct artifacts in the outside world that support and reflect their internal construction of knowledge

Constructivism

a learning theory that considers individual and social factors by holding that learning is constructed by learners on top of previous experience, attitudes, and beliefs

Copyleft

an alternative to copyright that allows one's work to be copied, shared, or remixed (e.g., Creative Commons)

Copyright

legal protections for authors of creative works (e.g., books, movies, lesson plans) that prevent them from being used by others without permission

Cyberbullying

a form of bullying that uses internet and other technologies as a means for perpetrating bullying behaviors

Data Persistence

the ongoing storage and availability of data via web platforms (e.g., old social media posts)

Debugging

the process of testing, finding, and solving errors in computer programs

Differentiation

tailoring instruction to address students' individual needs

Digital Citizenship

the skills and knowledge students need to fully participate in society via online tools, including safe and respectful use

Digital Divide

a difference in access or participation via digital technologies experienced by two or more individuals or groups of people

Digital Equity

a condition in which all individuals and communities have the capacity and resources needed for full participation in a 21st-century education, economy, and society

Digital Footprint

the electronic tracks that are left online as users create profiles, share posts, follow others, like content, etc.

Domain

the primary identifier of a website that is made up of a website name, such as facebook, google, or twitter, followed by a domain type (or top-level domain), such as .com, .edu, or .org

English Language Learners (ELL)

students who often come from families where languages other than English are spoken and whose English proficiency may be defined as limited at least at some point of formal schooling; often required to fulfill certain language requirements, such as language assessments or specialized language courses

Facility

the ease at which a new technology can be learned, implemented, or managed at the teacher- or student-level

Fair Use

the limited ability to use copyrighted works without permission as determined by four factors (Nature of Use, Type of Work, Amount Used, and Commercial Impact)

First-Level Digital Divide

when two groups experience uneven opportunities to access information communication technologies

Fixed Mindset

a belief that individual qualities, such as intelligence or talent, are fixed (unchanging) traits

Grit

a non-cognitive trait comprised of passion and motivation to achieve a particular objective

Growth Mindset

a belief that individual qualities, such as intelligence or talent, can be developed through dedication and hard work

Hacking

when a person or program bypasses or tricks normal security procedures in order to gain access to a site or service

Independent Learning

a learning scenario in which the learner takes charge of their own learning (also self-directed learning)

Information Communication Technology (ICT)

an extensional term that describes any product that will store, retrieve, manipulate, transmit, or receive information electronically in a digital form and includes communication devices such as the radio, television, cell phones, personal computers, email, social media, and Internet

Information Literacy

the ability to accurately understand and interpret information that is presented (e.g., recognizing accuracy, bias)

Institutionalization

infrastructural compatibility, cost, lifespan, and management scale of new technologies

Leaderboard

the student roster displayed in order based on the number of points awarded; can include student names or be anonymous in order to maintain privacy

Learner Autonomy

the ability to take charge of and responsibility for one's own learning in order to pursue topics that are relevant and interesting to the learner

Learner Empowerment

raising learners' awareness of the control they can have over their own learning process, which often goes hand in hand with the concept of learner autonomy (e.g., when language learners are empowered, they are given the power and ownership of their own learning and are allowed to negotiate identities in the learning process)

Learning Center

a space set in the classroom that allows students to engage in independent and self-directed learning activities

Levels

the grading scheme in a gamified class is made up of levels that students move through as they earn points in the class; each level has a minimum number of points required in order to attain that level; letter grades can be assigned to different levels (i.e. the top level could be considered an A+)

Locks

when a specific requirement must be met in order to access a particular assignment, task, project or level; for instance, Assignment 2 might be locked until a student earns at least 80% on Assignment 1

Malware

malicious software or any software or app that is designed to steal your personal information or cause your electronic devices to behave improperly

Media Literacy

the ability to access, evaluate, and create media in a variety of formats

Mindset

a self-perception that people hold about themselves, such as believing you are intelligent

Moral Turpitude

a typically not-well-defined clause in teacher contracts that allows employers to hold teachers accountable for the morality of their actions

Multiliteracies

emphasize that language use is context-specific and multimodal; values the differences between different communication modes

Open

in the context of openly licensed materials or open educational resources (OER), this means gratis and libre; gratis means that content and resources are provided at no cost, while libre means that people are free to do what they want with these resources

Open Educational Resources (OER)

materials for teaching, learning, and research that people have free access with no cost and can legally retain, reuse, revise, remix, redistribute them

Open Licenses

an license that allows users to freely use a resource without seeking permission (e.g., public domain, Creative Commons)

Openness

the level of license on educational resources which indicates different conditions, restrictions, or permissions users need to follow when they use or share the educational resources

Ownership

like learner autonomy, this concept hands more learning responsibility to students; moreover, it emphasizes on the importance of making connections between learners and the language they are learning at different levels as a way to strengthen the bond; promoting ownership is considered as a strategy to enhance learner autonomy

Pair-programming

two students sit at one computer, one is the “navigator” and one is the “driver”

Personal Learning Environment (PLE)

an environment that educators create by exposing themselves to information that is always updated and of practical value to their work (e.g., blogs, RSS feeds, news sites, social media feeds, podcasts, and video channels)

Phishing

an attempt to maliciously exploit sensitive personal information online; a play on the word “fishing,” because it implies the use of bait to trap a victim

PICRAT

a technology integration model that holds that all technology uses either exemplify a Passive, Interactive, or Creative (PIC) relationship between student and technology as well as have a Replacement, Amplifying, or Transformative (RAT) effect on pedagogy

Professional Learning Network (PLN)

networks that professionals build around themselves via social media to improve their practice, share resources, and improve morale

Project-Based Learning

the use of real-world scenarios, challenges, and problems, to help students gain useful knowledge and skills that increase during their designated project periods

Proof

evidence-based efficiency or efficacy of a technology to help improve student learning

Pseudocode

informal or simplified programming language that can be used to represent algorithms outside the computing environment

Public Domain

in the US, a technical term referring to works that are not subject to copyright protection, such as very old works

RAT

a technology integration model that holds that technology use either Replaces, Amplifies, or Transforms (RAT) pedagogical practices (Hughes, Thomas, & Scharber, 2006)

Royalty Free

a variation of copyright that allows materials to be used in some limited manner (e.g., print an image up to ten times) without paying a fee

SAMR

a technology integration model that holds that technology use in the classroom either takes the form of Substitution, Augmentation, Modification, or Redefinition (SAMR)

Second-Level Digital Divide

when two groups have similar access to the information communication technologies, but gain different levels of benefit from them as a result of literacies, training, technical support, or other factors

STEAM

Science, technology, engineering, arts, and mathematics

Technology Integration

the meaningful implementation of technology in educational settings to achieve learning goals

TPACK

a technology integration model that illustrates the complex interplay between Technological Knowledge, Pedagogical Knowledge, and Content Knowledge

Unplugged

a coding lesson that does not require a computer



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