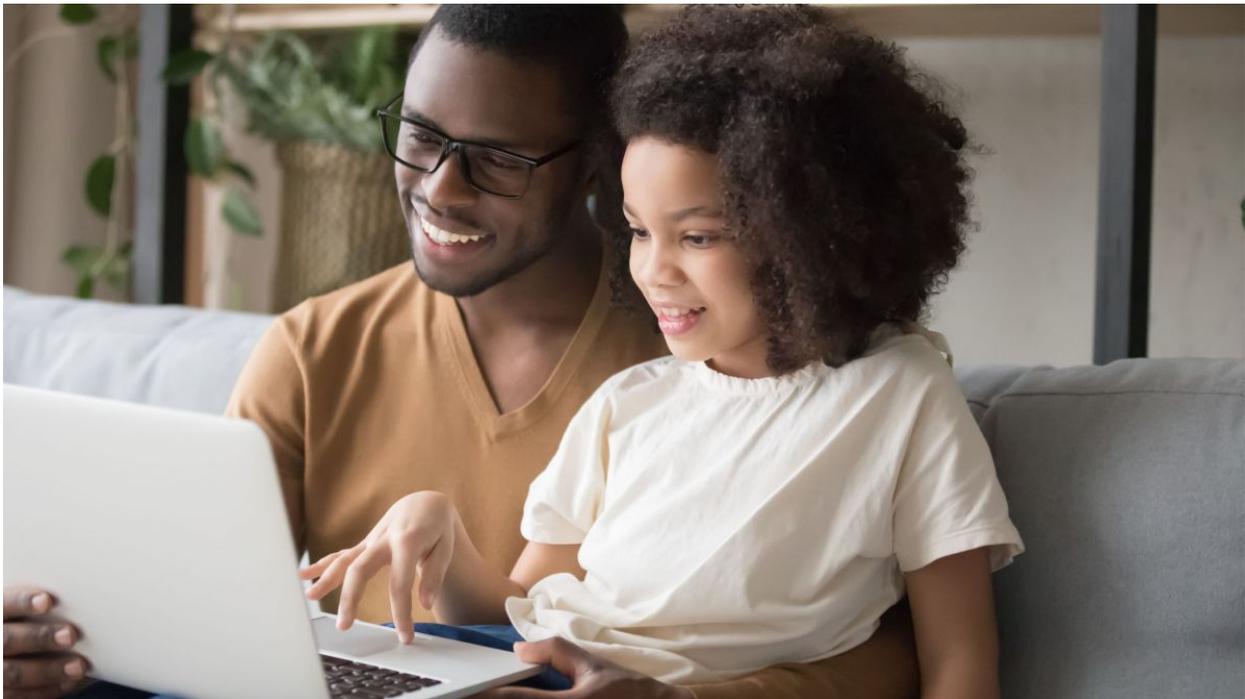


Digital Equity

Equitable Technology Access and Learning

Vikram Ravi



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?

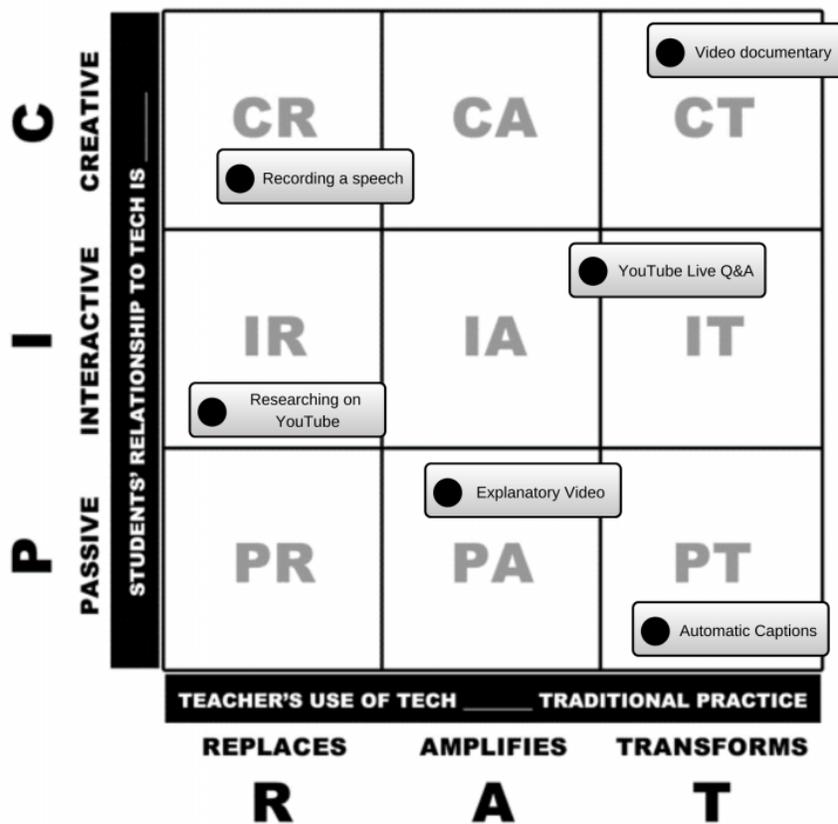


Figure 1. Example YouTube Uses Within the PICRAT Model

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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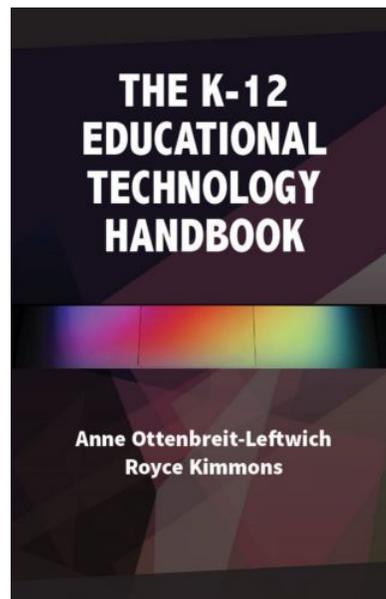
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