

Digital Divides: Perspectives on Technology Use Roadblocks in Schools

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[T]o realize fully the benefits of technology in our education system and provide authentic learning experiences, educators need to use technology effectively in their practice...However, a digital use divide separates many students who use technology in ways that transform their learning from those who use the tools to complete the same activities but now with an electronic device...The digital use divide is present in both formal and informal learning settings and across high- and low-poverty schools and communities (U.S. Department of Education, 2017, pp. 1,7).

As the authors of the 2017 National Education Technology Plan (NETP) suggested, when attempting to explore the nature and persistence of these gaps in examining schools' adoption and use, many researchers have used the term "digital divide." Initially, the digital divide was framed in terms of access to technology hardware and connectivity, resulting in a number of policy initiatives in the last two decades to increase the numbers of computers in schools and connectivity to the Internet in classrooms (Fox & Jones, 2016). These early efforts had a hardware-centric approach that differentiated between the computer "haves" and "have nots" primarily based on socioeconomic status, gender, and age. Although recent statistics have indicated that 95% of schools have the Internet connectivity required to meet current and future

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digital learning imperatives, (EducationSuperhighway, 2017), many learners (U.S. Department of Education, 2014), educators, and school librarians still report infrequent use of technology during the school day (Project Tomorrow, 2017). Providing equipment and connectivity appears to not be enough to spread technology-infused learning practices—what then, sustains the gap between availability and use?

Second-Level Digital Divide: Skill

Access to technology in schools does not always result in use (Hargittai, 2002), nor does use always result in improved instructional practices or enhanced learning outcomes (Warschauer & Matuchniak, 2010). Addressing this first-level digital divide did not guarantee usage. As computer and Internet access increased in schools yet gaps remained in use and impact, the research and policy discussions shifted to a “second-level digital divide” that focused on users’ technological competencies and skills for both teachers and students (Attewell, 2001; Crump & McIlroy, 2003; Norris, Sullivan, Poirot, & Soloway, 2003).

For educators and learners in K-12 schools, willingness to use technology is often related to their perceived personal competence using the technology. Attempts to bridge what are sometimes termed “information literacy” divides in schools have resulted in numerous professional development initiatives for in-service teachers as well as curricula for students (Wang, 2002). Despite the attention paid to increasing educators’ access to and skills with technology, limited progress has been made with integration (Horrigan, 2016; Marcovitz, 2006). Likewise, many school librarians have observed that while students may be *confident* with technology, many of them are not

competent with search, retrieval, analysis, and other skills relating to using technology to construct knowledge. One researcher described today's students as skill rich, but "information poor" (Hay, 2006).

As a consequence, the professional development opportunities and information literacy curricula continue to proliferate. These initiatives make limited gains; educators and students maintain that they do not have access to the tools or applications that allow them to truly transform their practices in schools.

Third-Level Digital Divide: Policy

Prior research focusing on access to connectivity, equipment, and skills training does not go far enough toward addressing issues significant to sustainable implementation. Because most educational studies focus on individuals, whether students, teachers, or administrators, technology critiques often focus on the person in explaining usage gaps. In particular, as suggested by Cuban (2013), such viewpoints have led to much finger-pointing at classroom level educators as the computer-use "problem" leading to proposed solutions focused on fixing teachers (e.g., mandatory professional development, distribution of laptop computers) as solutions. But this view is too narrow. Warschauer (2002) stated that

[a]ccess [to technology] is embedded in a complex array of factors encompassing physical, digital, human, and social resources and relationships. Content and language, literacy and education, and community and institutional structures must all be taken into account if meaningful access to new technologies is to occur (n.p.)

Factors beyond personal access and knowledge or skill levels affect usage. Cuban (2013) explained that classrooms and media centers do not operate in a vacuum. Classrooms and school libraries function within the culture and history of an individual school, which, in turn, operates within the system of a district and within additional layers of local, state, and national governance.

When it comes to technology, existing school culture and externally imposed policy both encourage and restrain possibilities for teachers and students, reflecting the social and technical environment within which school technology functions (Miranda & Russell, 2012). For example, in many states, school districts must have a technology plan on file with departments of education, but these policies are rarely updated on the frequent schedules that have been shown to make a difference (Bakia, Mitchell, & Yang, 2007). Access establishes basic structures for learning and teaching, individuals bring various attitudes and skills, but school culture frames values and expectations, and policy is the basis for technology's goals and intents. In this sense, school culture and policy form a third-level digital divide in school environments. The implications of policy on use were specifically recognized in a Rand study on the adoption of new technologies:

[L]aws and policies can create friendly or hostile environments that can promote or hinder technology implementation and exploitation. The passage of laws and enunciation of policies that explicitly promote or prohibit the use of a technology will significantly influence government, commercial, and individual decisions. (Silberglitt et al., 2006, p. 43)

School librarians often encounter many levels of policy that affect our technology environments. The school or district may have a permissions policy that does not allow individuals sufficient privileges to perform desktop maintenance. The district filtering policy may prohibit access to certain websites and applications like wikis and blogs. Or, the district may have a policy of computer replacement that is not in step with the speed of obsolescence. Often, these types of policies derail the use of new technology tools and skills.

Fourth-Level Digital Divide: Motivation

A final issue impacting the usage gap is related to motivation. Motivating educators to change traditional instructional practices to use technology meaningfully with learners remains a barrier to technology use and integration (Project Tomorrow, 2017). Some critics have suggested that the idea of a uniform approach to the digital divide ignores issues related to differential beliefs, interests, needs, and desires to use technology (Warschauer & Newhart, 2016). While rarely linked to digital divide issues, differences in values and incentive are regularly cited as impacting whether teachers integrate technology in their classrooms. For example, researchers who have examined teacher uses of technology have noted that differences occur based on beliefs about impact on student learning (Garthwait & Weller, 2005; Hew & Brush, 2007; Margerum-Leys & Marx, 2002), different attitudes related to disciplinary perspectives on teaching (Burch, 2007; Selwyn, 2011), and fears of computers replacing teachers (Probert, 2006; Recker, 2006) even to the extent that, “the fact that an opportunity is available and that there are no overt barriers to taking advantage of it, is not the same thing as making

that opportunity relevant and attractive to potential beneficiaries” (Burbules, Callister, & Taaffe, 2006, p. 87)

The theoretical basis for this fourth level stems from two established theories from educational psychology. First, Maslow’s (1943) *hierarchy of needs* suggests that individuals are not in a position to embrace activities and innovations in an organization until more basic needs of security and physical and emotional health are met. This perspective applies to situations in schools in communities that face economic and social challenges. That is, technology use in learning should only be expected once the school environment is safe and healthy. The need to address more visceral concerns may explain the persistent layer of Internet non-adoption and low technology use in high poverty areas, whether urban or rural (Bakia, Means, Gallagher, Chen, & Jones, 2009; Mardis, 2016).

In the second theory, *expectancy theory* (Vroom, 1964; Vroom & Deci, 1983), motivation is a function of belief in the value of the change times confidence in one’s ability to make the change. Expectancy theory posits that there is a positive correlation between efforts and performance, that favorable performance will result in a desirable reward, that the reward will satisfy an important need, and that the desire to satisfy the need is strong enough to make the effort worthwhile. The theory is based upon the following beliefs:

- 1) valence, or the emotional orientations people hold with respect to outcomes. The depth of the want of an educator for extrinsic (e.g., a raise or a promotion) or intrinsic (e.g, personal satisfaction) rewards;

2) expectancy, or expectations and levels of confidence about what they are capable of doing. In this area, motivation is linked with Bandura's (1982) concepts of *self-efficacy*;

3) instrumentality, or educators' perceptions of whether technology use will actually result in its promised outcome and that they will actually attain their extrinsic and/or intrinsic motivators.

If any one of these three factors is lacking (i.e., equal to zero), then the motivation to embrace the change is zero.

In order for a technology to be implemented in schools, the members of the school community must believe that technology will improve teaching and learning and must have the skills required to use the technology (Small, 1999a, 1999b). Indeed, some research has even demonstrated that belief in the technology's ability to affect positive change as well as the personal belief in the ability to effectively operate the technology are the pivotal elements of change and innovation (Partridge, 2007).

Conclusion

The single level "digital divide" perspective has proven to be an incomplete model and guide to setting our expectations of having technology widely used in our schools. I propose other factors that influence technology use. It would appear that there are actually multiple and emergent digital divides impacting learners' skills and readiness for the future workplace (Burbules et al., 2006; Culp, Honey, & Mandinach, 2005; Valadez & Duran, 2007). By reframing the term, we have a higher probability of seeking solutions required for meaningful change beyond just adding more computers.

As the figure below suggests, digital divides may function as quadrants of concern through which technology users may cycle when moved by structural and symbolic influences such as access to technology, bandwidth, and skill building opportunities linked to specific technology initiatives as well as influences driven by culture, as expressed through formal and informal policies and intrinsic and extrinsic motivation. Users' ability to successfully negotiate the barriers inherent in each quadrant has consequences (both positive and negative) for their ability to engage with other quadrants (Mardis, Hoffman, & Marshall, 2008).

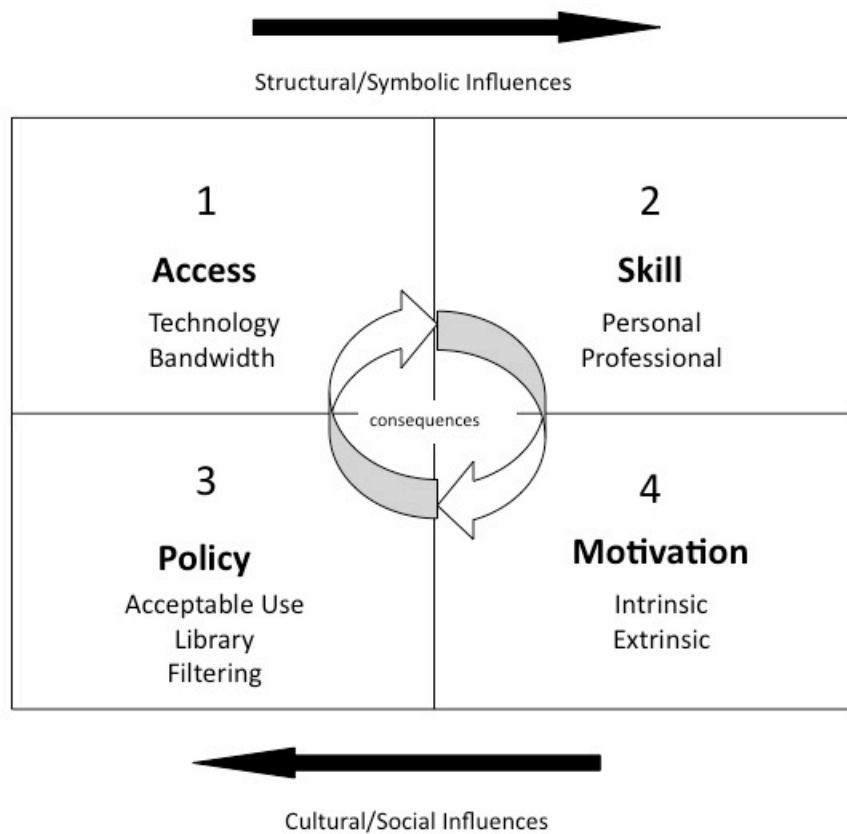


Figure 1. Levels of digital divide

As the figure suggests, these levels are neither sequential nor predictive; each educator will engage with various aspects of these divides in a variety of technology use

scenarios. As educators, including school librarians, are increasingly expected to be technology leaders, awareness of these different levels of divide can help all stakeholder devise strategies and practices that anticipate myriad complications. Motivation is, as Vroom's theory would reinforce, the multiplier that can either enhance a technology-infused environment or undermine it completely. Understanding why change is not occurring can often be key to making it happen. Setting appropriate expectations and discovering motivation to change are the best places to begin to address the seemingly intractable problem of technology equity.

Author's Note

This original, unpublished piece was written in honor of Dr. Ruth V. Small on the occasion of her festschrift in September 2017. I developed some of the ideas expressed here with T.E. Marshall (contributor to articles such as Arnone, Reynolds, & Marshall, 2009) and R.D. Lankes at Syracuse along with E.S. Hoffman of University of Hawaii (co-author of Mardis *et al.*, 2008). While these early discussions centered on community technology adoption and broadband use, their applications to K-12 school contexts were obvious. We were influenced by Ruth's work on motivation in teaching and learning in school libraries, especially by Ruth's seminal early work in which she reinforced that not only does "the effective use of motivational strategies in library and information skills instruction help to develop students' curiosity, intrinsic motivation, and a lifelong love of learning" (Small, 1999a, n.p.), but also that "learners perceived their instructors as having the primary responsibility for motivating them" (Small, Zakaria, & El-Figuigui, 2004, p. 98).

For this reason, the school librarians' roles in igniting educators' motivation to transform their practice with technology is an interesting and vital research area. Ruth's important contribution to our discussion of digital divides allows researchers to consider the hidden factors that may be preventing widespread technology use and broadband adoption even when important elements of access, skill, and policy were in place. Ruth's lifelong scholarly commitment to investigating the role of motivation has allowed us to see the human element in technology, innovation, and change.

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