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Digital Literacy and Technology Integration in Adult Basic Skills Education: A Review of the Research

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Digital literacy is "the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills" (Digital Literacy, 2019). Adult basic education (ABE)[1] practitioners can support the digital literacy development of their learners by integrating digital technologies into instruction and helping learners make use of them. This is especially important in our technology-rich society, which calls on each of us to have access to digital technologies and the skills to use them. Many adults do not and cannot. For example, service sector jobs (those jobs often available to adults with basic skills needs) comprise 32% of the U.S. workforce, and 73% of service sector workers lack skills to solve problems in digital environments (Bergson-Shilcock, 2017). Similarly, patient participation in health care is increasingly reliant on digital skills. Patient portals, wearable health tracking devices, and telemedicine have become ubiquitous despite the fact that many adults do not have the requisite skills and access (Harris et al, 2019).

Intensifying the challenge of the digital skills gap, many adults also lack broadband access.[2] While 73% of Americans do have broadband at home (Anderson, 2019), an increasing number of adults, especially those with annual household incomes below $30,000, are dependent on smartphones to access the internet (Anderson & Kumar, 2019). When Wi-Fi is not accessible, these adults are forced to use the small screens on their phones and limited and expensive data plans to do complex tasks such as filling out job applications. It is reasonable to conclude that if ABE learners cannot achieve digital competence within ABE programs, where they may have access to Wi-Fi, easier to use computers, and support from teachers and tutors, they might not have any chance to do so. This missed opportunity will impact their participation in work and daily life.

Beyond supporting the development of digital literacy, integrating digital technologies with instruction (and resources accessed through them) can enrich and extend learning activities. Adults unable to at-

[1] Note that we will use ABE as shorthand to refer to the range of traditionally served in adult language, literacy, and basic skills programs in the US, specifically adult ESOL, adult basic education, and adult secondary education students.

[2] "The term *broadband* commonly refers to high-speed Internet access that is always on and faster than the traditional dial-up access" (https://www.fcc.gov/general/types-broadband-connections).

tend classes in person could learn online, students in mixed-level classrooms might benefit from personalized educational options, and student engagement in learning can be boosted through use of media-rich digital resources (Warschauer & Liaw, 2010).

The affordances of technology-rich learning can positively impact reading, writing, and numeracy skills by making learning more interesting and more accessible (Rosin et al., 2017). Given the imperative to provide adult learners access to digital technologies and opportunities to support digital literacy skill development, our goal in this paper is to describe the relevant research on how to thoughtfully integrate digital technologies in ABE settings, and to highlight gaps in the research. Our intended audience is the many different stakeholders whose work impacts the provision of technology-rich instruction for ABE learners including teachers, program administrators, policymakers and funders, and researchers.

Integrating Technology in the Classroom to Support Digital Literacies

Researchers suggest that learning opportunities that support digital literacy development must be timely and relevant, be connected to learners' lived experiences, and provide careful balance between success and productive failure (Castek et al., 2015; Harris et al., 2018). Creating such opportunity requires planful and strategic decision making.

Use Technology to Meet Two Goals

Technology use in the classroom, in and of itself, does not produce better learning outcomes for students. However, optimal benefits can be accomplished if technology is integrated thoughtfully to 1) create opportunities for students to use digital literacy skills in support of content learning and 2) push their development of new digital literacy skills. Research has pointed to useful suggestions that can help teachers meet these two goals:

- Provide one-to-one access to computers or tablets (Darling-Hammond et al., 2014)
- Use digital technologies to promote critical thinking and problem solving rather than as electronic workbooks for drills and practice (Hayes, 2007; Vanek, 2017b; Warschauer & Matuchniak, 2010)
- Encourage learners to use technology for activities about which they feel more confident, and ensure adequate teacher-guided instruction for new or more challenging concepts (Darling-Hammond et al., 2014)
- Plan digital literacy activities systematically; that is, align them with technologies used to support academic content learning objectives and offering opportunities for social interactions, collaboration, and project-based problem solving (Darling-Hammond et al., 2014; Kolb, 2017)

Consult Frameworks to Support Planful Technology Integration

Decisions about when and how to use technology in a classroom are more easily made when guided by an evidence-based framework (e.g., TPACK,[3] SAMR,[4] and the Triple E Framework[5]). The Triple E Framework helps educators anticipate how chosen technologies 1) support student engagement, 2) enhance learning, and 3) provide opportunities to extend learning outside of class (Kolb, 2017). Teachers can use this framework to decide what technologies to use and how (Kolb, 2017). Gaer and Reyes (2019) suggest that combining all three uses is the "sweet spot — the perfect lesson."

[3] http://www.tpack.org/
[4] https://sites.google.com/a/msad60.org/technology-is-learning/samr-model
[5] https://www.tripleeframework.com/

Support Basic Computer Skills

The supported use of digital technologies helps learners build comfort with them (Jacobs et al., 2015). Teachers can enhance initial direct instruction on basic skills such as clicking and dragging or opening and saving a document by teaching relevant vocabulary (Vanek, 2017a). Next, teachers can embed use of these skills and vocabulary in relevant classroom activities that students do alone or in small groups. Learners should be told to expect to make mistakes, but with supportive instruction and peer-engagement, such productive struggles ensure opportunities for learning (Mishkind, 2016).

Use What Students Know

Instructors should integrate technologies that students can readily access and feel comfortable using (Smythe, 2012). Doing so might also prepare students to extend learning outside of the classroom.

Texting. Perhaps the most commonly used technology tool is texting. Pew Center research suggests that 92% of smartphone users text (100% if considering users 18–29) (Smith & Page, 2015). Sharma et al. (2019) found that when teachers or service providers used texting apps to nudge learners to complete assignments or attend appointments, the students responded with higher levels of engagement. This mode of communication, viewed favorably by learners and teachers, is based on the "nudge theory" of Thaler and Sunstein (2008), which posits that nudges move people to take action on tasks they know to be in their best interest. Additional evidence of the efficacy of nudging is seen in a randomized control study of texting with adult learners in Great Britain; students who received nudging texts had better attendance than the control group and also showed improved progress and course completion rates (Sanders, et al., 2019).

Texting can also be used to provide instruction to learners who do not have access to smart phones. In a field test of an ESL curriculum delivered through phone and text coaching, Vanek and Webber (2019) learned that students felt comfortable texting to complete microlessons whenever and wherever they had time for short bursts of studying, for example while on the bus or on breaks at work.

Social media. Employing social media in instruction encourages collaboration and supports peer learning, project-based learning, and other student-centered approaches to instruction. For example, Vanek et al. (2018) found that learners are fluent in many social media platforms. Posting and responding to each other to carry out activities on Facebook led to rich, interactive learning experiences, and resulted in more voluminous and complex writing than the classroom teacher had previously seen. A subsequent study showed that even participants with beginning levels of print literacy could use social media to interact with others, and doing so fostered critical literacy skills (Bigelow et al., 2017).

Make Technology Use Relevant

Selected digital technologies should be both relevant to academic skill development and support digital tasks beyond the classroom (Smythe & Breshears, 2017). For example, a literacy program in British Columbia embedded literacy work into programs at homeless shelters where classes provided supported opportunities to build computer skills and gave access to services or work toward attaining employment. Similarly, an affordable housing organization in California developed computer-based activities that helped adults develop digital literacies while they located and evaluated health information and developed financial literacy (Harris et al., 2018; Hellman et al., 2019).

Build Opportunities for Human Connection

While learning through digital technologies is often regarded as a solitary activity, research has demonstrated that learning in any environment is better supported with strategic use of teacher guidance and peer interactions (Darling-Hammond et al., 2014; Kolb, 2017). Likewise, interaction is important both when learning how to use a new technology (Sharma et al., 2019) and to encourage and support learners when they struggle (Jacobs et al., 2015). It also provides a personal connection that may be especially important when adults lack basic skills and confidence in their ability to learn (Harris et al., 2018).

Provide Opportunities to Create Content

Digital technologies are useful for media-rich content creation which can enrich project-based learning activities. When learners create online content, they gain new kinds of visibility (Bigelow, et al., 2017). This can increase self-efficacy and engagement in learning (Darling-Hammond et al., 2014). The skills required to create media-rich content are similar to those for a traditional paper, yet also support comfort and fluency with new media skills development (Smythe, 2012). For example, Smythe found that a community-based adult learning organization in Nova Scotia used collaboratively learner-produced documentary film as a central learning activity. The completed films were streamed online, creating an audience for the work.

Programmatic Strategies Supporting Technology Integration

Successful technology implementation requires changes beyond instructional practices and classroom procedures. Research additionally suggests key programmatic actions as well.

Agency Partnerships

Partnerships play an important role in supporting technology integration by helping education programs leverage the resources of other organizations (Jacobs et al., 2015; Smythe, 2012; Sharma et al., 2019). Partnerships can also ensure access to digital learning opportunities beyond formal education settings. For example, a social service agency could embed instructional support, using digital literacy resources created by an ABE partner that helps learners navigate their website and locate needed resources (Vanek, et al., in press). However, partnerships often begin with short term projects that are grant funded and can be difficult to sustain. Strategizing to support sustained partnerships should be initiated in the project planning phase to make it more likely that it will continue to have an impact after initial funding ends (*Upskill with edtech*, 2019).

Professional Development

Effective professional development is particularly important when helping teachers with technology integration because the technology landscape is constantly changing. Also, rethinking instructional practice that integrates digital technology tools is complex and likely to require a shift in mindset (Harris, 2015; Lotherington & Jenson, 2011). Research-based principles of effective professional development provide guidance to overcome these challenges.

So that resulting technology integration focuses on student learning and not use of one specific technology tool, effective professional development needs to be relevant to teachers' needs, be aligned with program goals, and help teachers learn together (Smythe, 2012). Specifically, it should 1) have a focus on content, 2) provide active learning experiences, 3) be aligned with teachers' beliefs and program goals and initiatives, 4) be sustained (ideally, for 20 hours or more) and 5) provide opportunities for teacher collaboration (Desimone, 2009). Ample, ongoing technical support is also needed (Darling-Hammond et al., 2014).

Access

Ongoing access to digital devices and broadband is crucial for digital literacy skill development. Then, activities can include media-rich content and opportunities for self-directed learning through exploration of information found on the World Wide Web (Darling-Hammond et al., 2014). Access to digital tools and activities should not be thought of as only appropriate for any one level of education, but rather should be understood as integral to addressing all adult learners' needs, interests, and uses (Smythe, 2012). The impact of access stretches far beyond the classroom. Jacobs et al. (2014) found that ample access to digital technologies "coupled with convenient access to supportive peers and networks, can lead to increased personal empowerment, civic participation, and lifelong learning" (p. 8).

Needed Research

The field needs additional and more varied types of research to answer questions for practitioners, policy makers, and instructional resource developers.

Find Synergy Between Digital Technologies and Teacher-Led Instruction

Digital technologies provide resources and structure to extend learning beyond the classroom and to support instructional differentiation; however, face-to-face instruction more easily affords personal connection and rich affective supports to meet students' needs. A key question, then, is what is the appropriate mix of technology and face-to-face instruction, for whom, when, and for what purpose? Answering these questions would inform a broad range of stakeholders as they craft lesson plans, make budgeting decisions for ABE programming, and establish sound education policy.

Develop Assessments to Measure 21st Century Skills

Although there are several frameworks describing digital literacy (e.g., ISTE standards for students, 2016; TESOL Technology Standards, 2011; Wedlake, et al., 2019), there is not always a clear connection between them and assessment instruments. Instead, assessments generally measure discrete skills in isolation, for example the computer basics assessment module of the Northstar Digital Literacy Assessment[6]. This is problematic because it does not reflect the ways in which computer skills are used (*Digital blindspot,* 2019). Research should support digital literacy assessment development that measures learner progress with higher-level and integrated skills. Vista et al., (2018) recommend that assessments focus on formative skill development using checklists that track student progress along a continuum of competencies. More research in this area can elucidate how to accomplish this.

Align Research on Technology Integration and Principles of Adult Learning

A third research gap lies in the way that technology is framed with respect to principles of adult learning. Much research has focused on whether a particular tool improves learning outcomes. However, a focus on a particular tool fosters what might be called the 'cool tools problem' wherein teachers and administrators find ways to use a tool, as opposed to requiring that tools meet the needs of learners and support adult learning. Instead, research is needed that evaluates tools and technologies from the perspective of effective adult education practice. Furthermore, such research could make connections between ways adult learners use technology outside of class and how that supports learning inside of class.

[6] https://www.digitalliteracyassessment.org/

Conclusion

Digital literacies are essential for adults' full participation in economic and civic life. There is a danger that the lack of digital access and digital literacies could add disproportional disadvantage to adult learners already struggling to succeed (in meeting their goals). ABE programs are well situated to mitigate this. Recent research makes connections between digital technologies used in support of learning in ABE programs and strengthening digital literacy. Research also provides guidance on ways to achieve planful classroom technology integration. Done well, access to and support for use of digital technologies in ABE classrooms can give adult learners opportunities to learn in diverse and ever-expanding ways and help them build the digital literacy skills needed to engage fully in activities that require them.

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