CREATE Adult Skills Network | Collaborative Research for Educating Adults with Technology Enhancements

Digital Skills Frameworks and Assessments: A Foundation for Understanding Adult Learners' Strengths and Learning Needs

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The CREATE Adult Skills Network (the Network) research teams are developing technology-supported learning and assessment tools and implementing curricula to help adult learners build digital skills. Throughout this work, each team has noted the importance of gaining a better understanding of the digital skills learners need to fully participate in the research projects. To that end, this Network Brief will introduce several widely used and relevant digital literacy frameworks and assessment strategies used in adult education.

The brief provides high-level descriptions of the following frameworks:

- Northstar Digital Literacy standards
- The ISTE SkillRise Profile of a Lifelong Learner
- Seattle Digital Equity Initiative's (SDEI) Digital Skills Framework
- The Maryland Department of Labor/Adult Education's Digital Literacy Framework for Adult Learners

Digital Literacy Frameworks

Digital literacy frameworks list standards or competencies that shape our understanding of digital literacy. They are used to describe the skills required to use an educational technology resource. For example, they can tell researchers whether a learner can successfully engage in a study about teaching and learning that uses digital technology.

There are many digital literacy frameworks, which vary according to the "grain size" of the skills they describe and the goals of the organizations that create them.

This brief introduces a few popular frameworks currently used in adult education in the U.S. It also offers guidance on how practitioners and researchers can use digital literacy frameworks to support their work with adult learners.

A Note About Language

The Workforce Innovation and Opportunities Act II (WIOA II) defines digital literacy as:

> "… the skills associated with: (A) using technology to enable users to find, evaluate, organize, create, and communicate information; and (B) developing digital citizenship and the responsible use of technology" (2003).

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Different digital literacy frameworks use different language. Some frameworks refer to "standards," while others reference "tasks," and still others talk about "competencies."

Digital literacy frameworks serve as a bridge between the definitions of digital literacy and the objectives that shape instruction because they provide detailed descriptions of what learners can do as they engage with digital technologies.

These definitions, drawn from prior research or included in information published by federal agencies, can help researchers and practitioners understand what frameworks are supposed to do.

Two Prioritized but Contrasting Frameworks

The frameworks we discuss here include specific descriptions of how a learner might use digital technology. We also include abstract descriptions of behaviors and mindsets that learners need to have to use technology in work, school, and daily life. This section will detail the role of each framework in understanding the capacities learners require to engage with digital technologies in education settings and beyond.

Northstar Digital Literacy Framework

On the most specific end of the spectrum is the framework that the Northstar Digital Literacy initiative of Literacy Minnesota developed. The "Northstar Digital Literacy Standards" serve as the foundation of their assessments and offer a definition of the skills one needs "to perform tasks on computers and online" (Literacy Minnesota, 2022).

The standards are organized into three categories: Essential Computer Skills, Essential Software Skills, and Using Technology in Daily Life. Each category lists several lists of skills, as pictured in Figure 1.

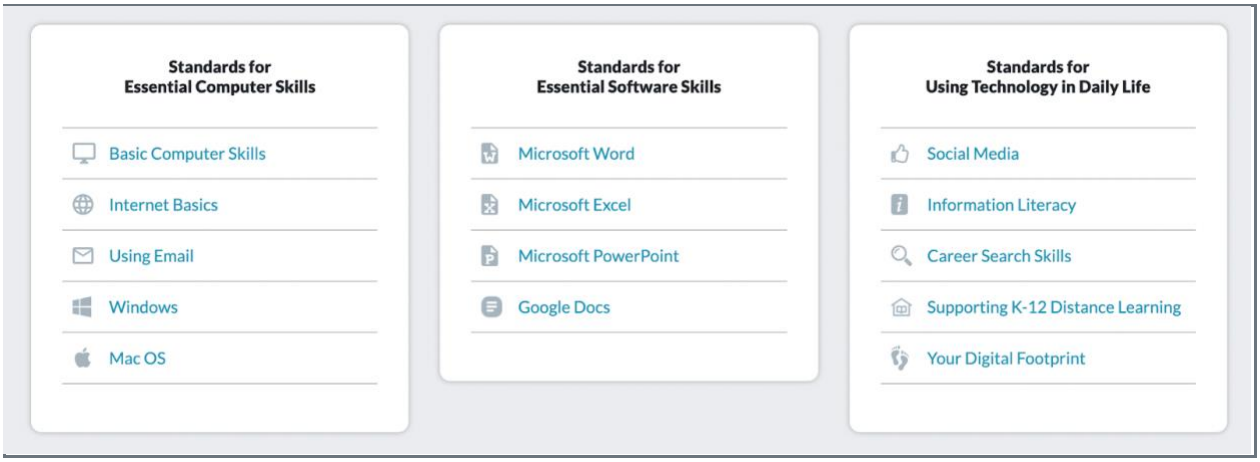


Figure 1. Northstar Digital Literacy standards categories and skills lists from https://www.digitalliteracyassessment.org (Literacy Minnesota, 2022)

The standards within each category represent specific skills. For example, the "Basic Computer Skills" list includes the following skills: "distinguish between different types of devices," "identify specific

computer hardware," "log on to and shut down a computer," and "identify mouse pointer shapes and the functions they represent."

The items listed within the "Using Technology in Daily Life" are a mix of skills and competencies that involve *application* of a set of discrete skills and knowledge. For example, "Career Search Skills" lists "demonstrate the ability to use search and filter functions in job search sites" (a skill), and "demonstrate understanding of hiring processes (including recruitment, screening, and selecting)," which is a competency.

Regardless of how they are framed, the items in the Northstar Standards include concrete descriptions of skills and knowledge. These describe what a learner requires to engage in tasks using digital technologies.

International Society for Technology in Education (ISTE) Profile of a Lifelong Learner

The Profile of a Lifelong Learner "defines the digital skills and lifelong learning dispositions that adult learners need to be competitive in the future of work" (ISTE SkillRise, 2020). ISTE developed "The Profile" based on (1) the ISTE Standards for Students (which ISTE developed for K-12 audiences and are more descriptions about what people can accomplish by using technology rather than how to use technology), (2) a research literature review describing skills required for success at work, and (3) review of previously published adult education and employability skills frameworks. ISTE intends for The Profile to fill a previously missing description of digital literacy–one that can link digital skills to behavior, mindset, and action.

The Profile consists of 5 "features": Lifelong Learner, Empowered Worker, Digital Citizen, Solution Seeker, and Mindful Colleague. See figure 2 for ISTE's presentation of the features.



Figure 2. ISTE SkillRise Profile features from https://skillrise.org/themes/skillrise/assets/docs/skillrise_profile.pdf (ISTE SkillRise, 2020)

Each feature includes a definition that describes how to use technology and practices that further describe the behaviors and actions of technology users.

For example, Feature 4 describes **Solution Seekers** who "use technology to explore independent perspectives, amplify creative thinking, and develop smart solutions to practical problems in work and life" and lists these "practices":

- "Practice 4a Solution Seekers are curious, flexible thinkers, and open to new ideas and experiences."
- "Practice 4b Solution Seekers persevere through open-ended challenges and work within design and resource constraints to help discover new solutions."
- "Practice 4c Solution Seekers leverage digital tools to break down systems, processes, and problems into component parts to develop critical understandings, new perspectives, and equitable solutions." (ISTE, 2020, p. 3)

This larger-grained approach to describing digital literacy is useful for understanding how skills will be used in the real world. The description can help teachers design instruction with the end goals of learners in mind.

Frameworks Informed by Other Frameworks

Several popular frameworks used in adult education in the U.S. are composites of skills frameworks from the fields of education, adult education, and workforce development. The goal of these composite frameworks is to bridge the gap between the more specific and abstract representations of digital literacy represented in the frameworks above.

Seattle Digital Equity and Inclusion Digital Skill Sets for Diverse Learners

The Seattle Digital Equity Initiative (SDEI) Digital Skills Framework (Wedlake, et. al, 2019) was created through reviewing digital literacy frameworks, assessments, and aligned curricula to define a set of digital skills adults need to fully engage in digital tasks. It was informed by these important sources:

- The UK's Essential Digital Skills Framework
- The European Union's DigComp 2.1
- International Computer Driving License
- International Society for Technology in Education (ISTE) Digital Literacy Standards
- Mozilla Web Literacy Competency Framework
- Northstar Digital Literacy Assessment and Standards

The framework is comprised of 10 categories which encompass 74 skills, presented and defined here as they appear in Wedlake et al. (2019, p. 8).

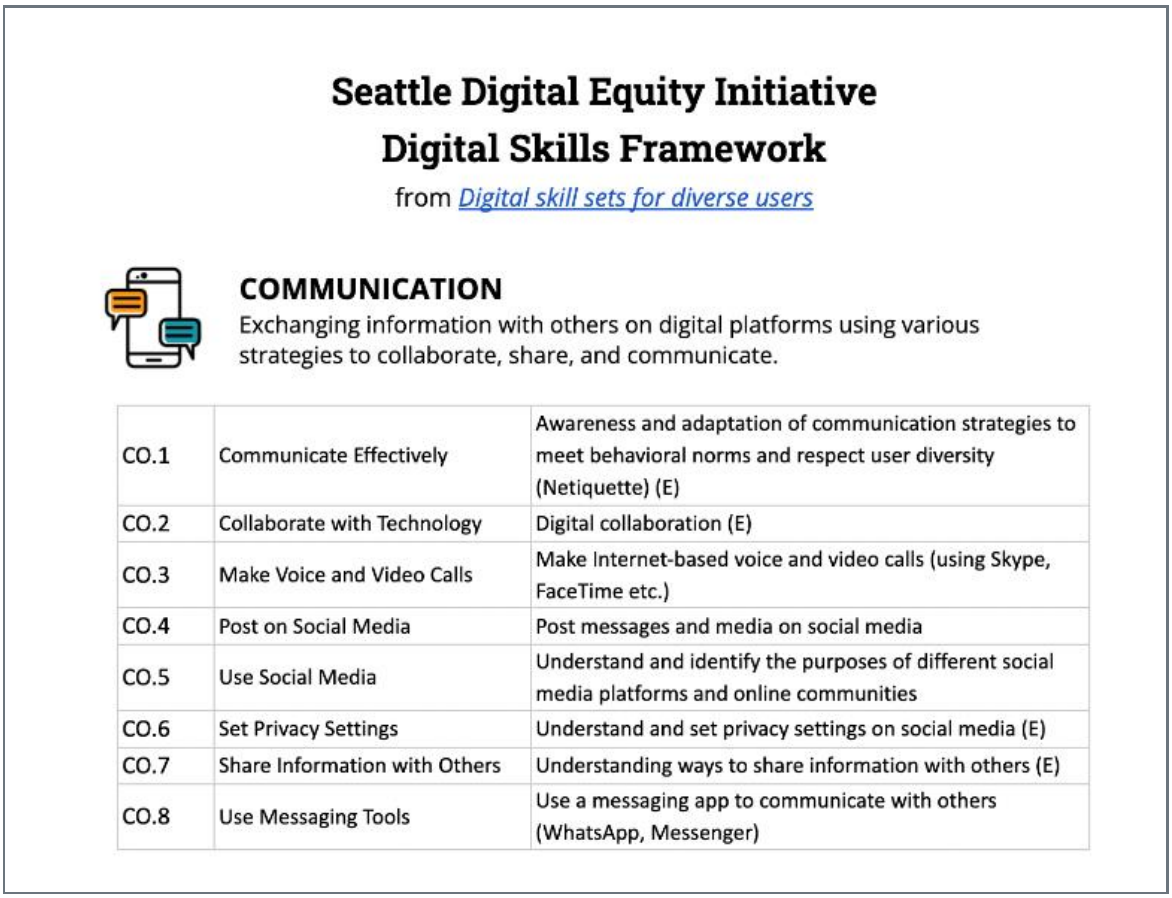
- *Communication: Exchanging information with others on digital platforms using various strategies to collaborate, share, and communicate.*
- *Creation: Engaging in digital spaces to design, create, and revise content online.*

- *Device ownership: Practices that support device longevity, including physical care, protective software, and using technical support.*
- *Gateway skills: Foundational skills required to use a device and participate online.*
- *Information skills: Skills to apply, evaluate, and manage information across digital and physical environments.*
- *Lifelong learning: Engagement in self-assessment of digital skills. Using self-reflection to tailor accessible digital environments and continue digital skills learning.*
- *Mobile: Understanding basic functions of a mobile device to communicate and access goods and services.*
- *Online life: Access to online resources that support digitalization of daily tasks and socialization within a broader digital community.*
- *Privacy and Security: Maintenance of practices to secure digital identity, recognize threats, and understand the broader safety implications of working in a digital environment.*
- *Workplace: Advancing workplace success and professionalism through engagement with an organization's online tools and other supportive digital systems.*

The SDEI framework defines "skill" as a combination of specific and abstract descriptions of behavior and mindsets required to use digital technology.

For example, the category "Communication" includes skills like, "Use a messaging app to communicate with others," and "Make Internet-based voice and video calls," but does not describe the steps required for users to do these things.

The EdTech Center@World Education, with the permission of the authors of the SDEI Framework, created a complete list of the skill groups and skills lists, along with a rubric template to use in performance-based evaluation of learners, shown in Figure 3.



Seattle Digital Equity Initiative
Digital Skills Framework
from *Digital skill sets for diverse users*

COMMUNICATION
Exchanging information with others on digital platforms using various strategies to collaborate, share, and communicate.

CO.1	Communicate Effectively	Awareness and adaptation of communication strategies to meet behavioral norms and respect user diversity (Netiquette) (E)
CO.2	Collaborate with Technology	Digital collaboration (E)
CO.3	Make Voice and Video Calls	Make Internet-based voice and video calls (using Skype, FaceTime etc.)
CO.4	Post on Social Media	Post messages and media on social media
CO.5	Use Social Media	Understand and identify the purposes of different social media platforms and online communities
CO.6	Set Privacy Settings	Understand and set privacy settings on social media (E)
CO.7	Share Information with Others	Understanding ways to share information with others (E)
CO.8	Use Messaging Tools	Use a messaging app to communicate with others (WhatsApp, Messenger)

Figure 3. Excerpt from the EdTech Center's resource based on the SDEI Framework from https://docs.google.com/document/d/1-ucdHhRwlBEkEeZR7kDKPSXznWquwVihYpZsFYDNojM/edit?usp=sharing (World Education, 2022b)

The skills listed within each category of the SDEI Framework give just enough detail to show what a learner should be able to do within each skill group, without getting too far into the weeds.

Maryland Digital Literacy Framework for Adult Learners

The Maryland Department of Labor, Adult Education, created their own framework, the Digital Literacy Framework for Adult Learners ("Maryland framework") (*Digital literacy framework for adult learners*, n.d.). Maryland framework co-author Jamie Harris noted that like the SDEI work above, this framework is informed by the Dig Comp, ISTE, and Mozilla standards or competencies in addition to the SDEI, British Columbia's Digital Literacy Framework, OCTAE's Employability Skills Framework, and The Essential Elements of Digital Literacies (Belshaw, 2014) (personal communication, January 14, 2022).

The Maryland framework also incorporates research on digital literacy, academic and English language proficiency standards, adult education teacher competencies, and federal policy. The Maryland framework lists seven interconnected "essential elements" of a digitally literate learner, illustrated in Figure 4.

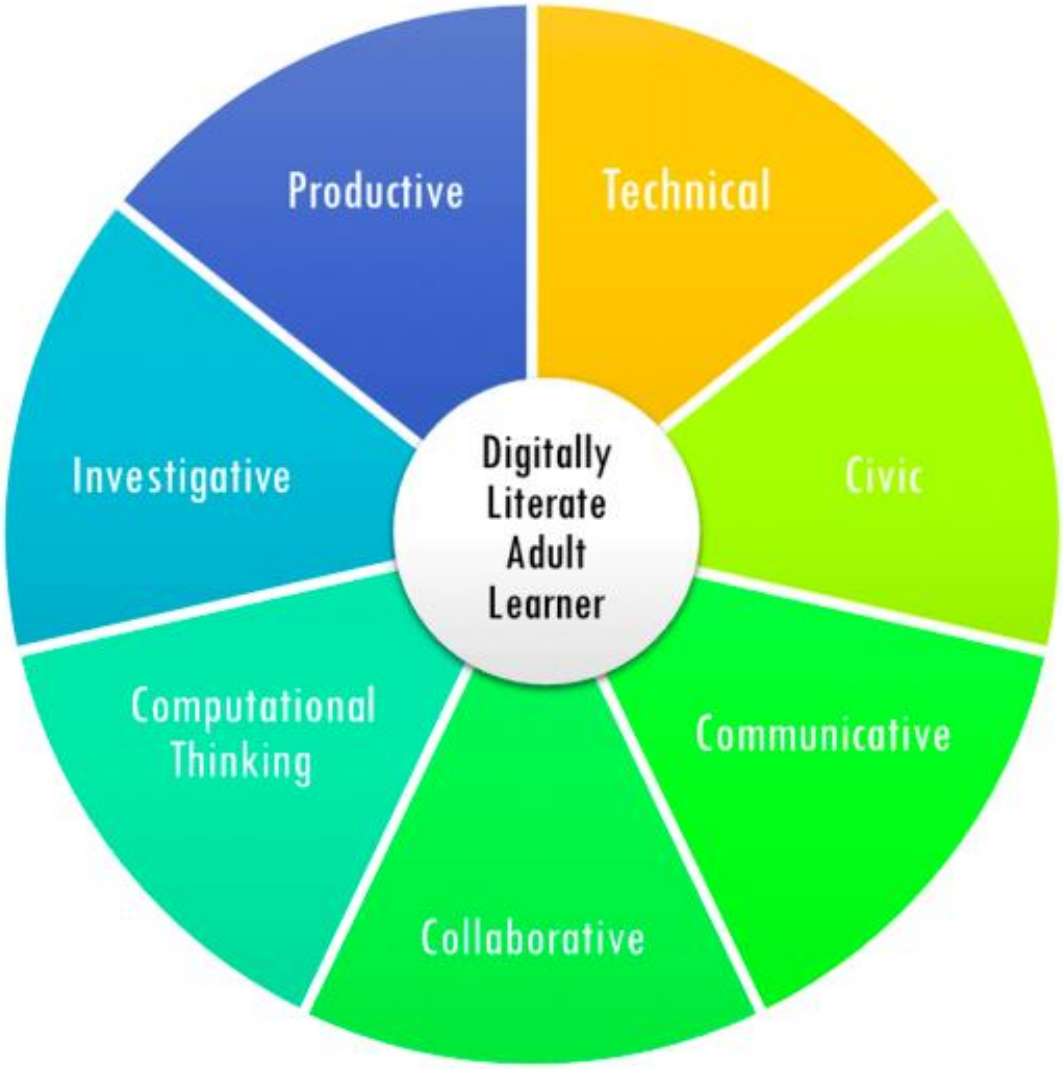


Figure 4. Maryland framework's illustration of digital literacy elements from http://labor.maryland.gov/gedmd/digitalliteracyframework.pdf (*Digital literacy framework for adult learners*, n.d.)

The structure of the framework is consistent for each component "element". Each element includes:

1. a definition,
2. "guiding questions" (based on the work of Hinrichsen & Coombs; 2013) that simultaneously add shape to the definition and provide a rough self-assessment for learners,
3. a description of specific skills and/or abstract behaviors (whichever is more appropriate for the element) that demonstrate competence, and
4. situational examples showing the element's skill application in the contexts of life, education, and employment.

Though the Maryland framework lists a less comprehensive set of skills than the previously described frameworks, it includes guiding questions and situational examples. These can be incredibly useful to practitioners as a guide for integrating more technology use into their instruction.

Using the Frameworks

Each of the different frameworks gains relevance depending on how it is used. The first questions a researcher or practitioner might ask when considering which framework to consult are:

- *What do I want to know about the learner or research participant?*
- *Am I looking for information about essential skills needed for commanding a digital device, or more broadly framed characterizations of what a learner or participant might eventually do with those skills?*

These steps can help you decide which framework will work best for your purposes.

1. **Determine the end goal.** Consider the tasks, instructional strategy, resource use, or end goal that requires using digital skills.
2. **Consider the options.** Review the frameworks and consider which one, given their different levels of specificity, is most appropriate. Think about specificity of the skills described, the approach used to organize and describe the skills, and the recommended context for applying the skills (e.g., workplace, school, daily life).
3. **Select relevant standards, skills, and/or competencies.** Align components of the relevant frameworks to the skills you identified as needed for learner engagement in the digital tasks; these are the skills that you want to ensure learners possess.
4. **Explain what's needed.** Use the language of the framework to describe those skills.

The final step might be to plan on how you will assess the digital skills, if needed. The next section describes the assessment process in detail. See more detailed descriptions of digital skills frameworks in this white paper published by World Education.

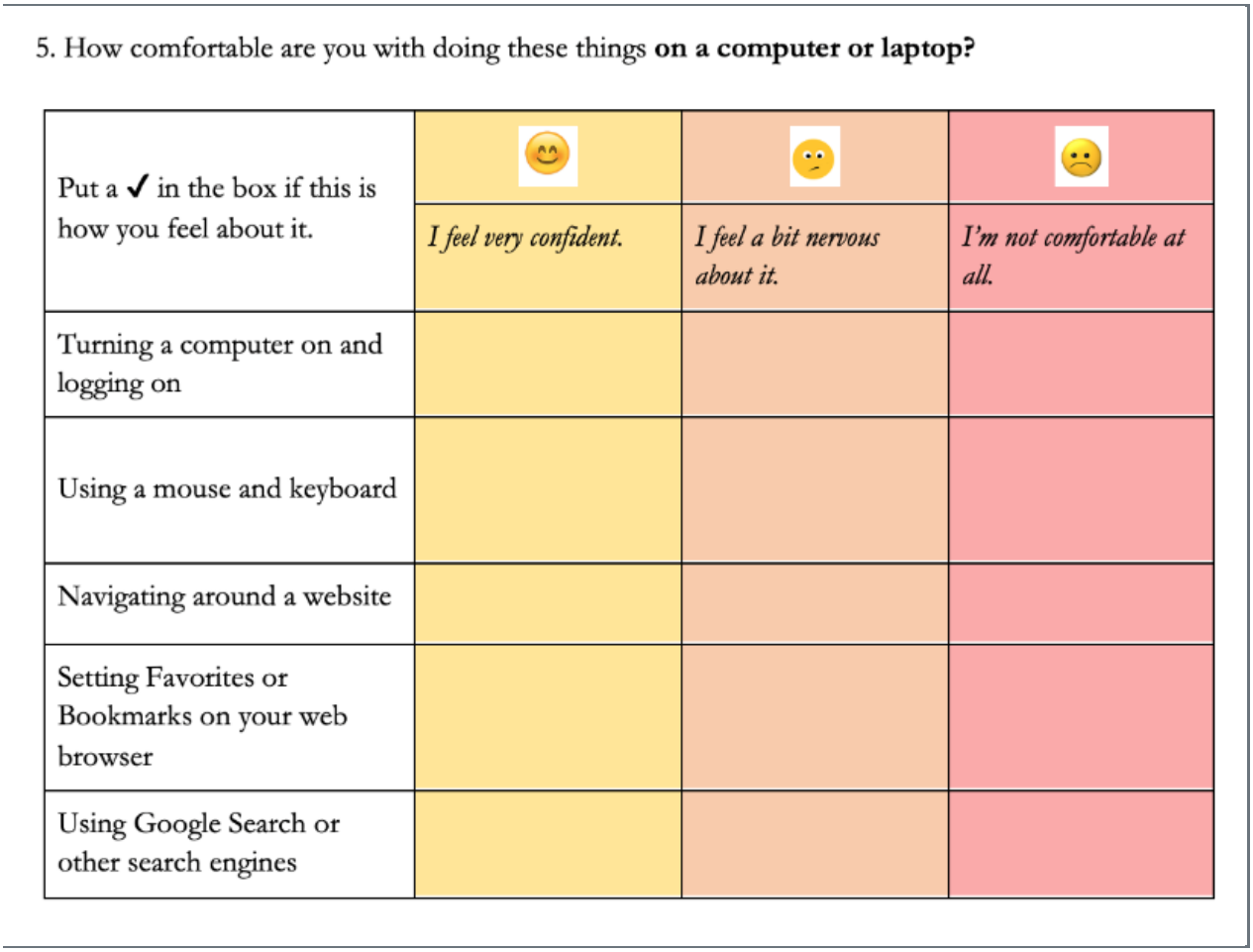
Assessment

After identifying the skills required for engaging in a task or making use of a resource, you may want to assess to see if learners have those skills. Such assessments can help you identify digital skills needed and shape pre-teaching before participants engage with your project. Alternatively, an assessment can serve as a baseline to see if engaging in the task or using resources has helped learners strengthen the depth or range of their digital skills.

There are three noted strategies for conducting digital skills assessments in adult education: (1) self-assessment, (2) making use of skill-based assessments like the commonly used battery of Northstar Digital Literacy Assessment modules, and (3) creating performance-based assessments using the framework most suitable for describing the skills you want to measure.

Self-Assessment

Though they are not valid measures of skill (van Laar et al., 2020), self-assessments or skills inventory surveys give learners an opportunity to reflect on their current technology use and the skills that make that use possible. There are a few examples of digital skill self-assessments in adult education today. Figure 5 shows an excerpt of one of them, a self-assessment used in World Education's English Now! Project.



5. How comfortable are you with doing these things **on a computer or laptop?**

Put a ✓ in the box if this is how you feel about it.	😊 *I feel very confident.*	😕 *I feel a bit nervous about it.*	☹️ *I'm not comfortable at all.*
Turning a computer on and logging on			
Using a mouse and keyboard			
Navigating around a website			
Setting Favorites or Bookmarks on your web browser			
Using Google Search or other search engines			

Figure 5. English Now! Digital skills self assessment https://edtech.worlded.org/mlearning-resource/digital-literacy-self-assessment-tool (World Education, 2022a)

Through use of the tool, learners can report on the apps and devices that they use, the frequency of that use, and how comfortable they are with them. This information can serve as a starting point for understanding learners' skills.

Similarly, professional development leaders at the Outreach and Technical Assistance Network (OTAN) in California and System for Adult Basic Education Support (SABES) in Massachusetts have integrated self-assessment into their professional development as a way to help educators identify areas of

strength and need. The collective work informed the open access self-assessment included in the IDEAL Distance Education and Blended Learning Handbook (Vanek et al., 2020), as pictured in Figure 6.

Computer Skills Assessment for Teachers

Adapted from digital literacy self-assessments developed by SABES Program Support PD Center and the Outreach and Technical Assistance Network (OTAN)

This self-rating form is comprehensive and suitable for use in helping teachers determine their own technology competencies. You may want to use the items here as a guide to develop your own checklist that focuses on the skills required by the particular distance education program you are offering.

Access to Technology

1. Do you have a device for teaching that you can use at your local agency, satellite locations, and/or home (if needed)?
2. Do you have access to high-speed internet at your local agency, satellite locations, and/or home (if needed)?
3. Do you have access to other technology needed for the distance education program (e.g., smartphone, tablet, software, applications)?

For each of these areas below, please indicate your skill level integrating these tools/skills into teaching activities and your interest in attending professional development on this topic using the scales below:

	My skill level integrating these tools/skills into learning activities	My interest in attending PD on this topic
1	I have no experience, or I do not feel comfortable with this tool/skill.	Not interested
2	I have used this before a few times, or I am somewhat comfortable with this tool/skill.	Somewhat interested
3	I use this skill/tool fairly regularly or I feel comfortable with this tool/skill.	Interested
4	I use this skill/tool regularly or I feel very comfortable with this tool/skill.	Very interested

Figure 6. Excerpt from Appendix D: Computer Skills Assessment for Teachers (Vanek et al., 2020)

Though not widely used in the U.S., The *Digital Competence Framework for Citizens* (DigComp), an initiative driven by the European Commission and integrated into the SDEI and Maryland frameworks, offers a self-assessment aligned with the DigComp framework. The self-assessment prompts users to consider their skills in five areas: information and data literacy, communication and collaboration, digital content creation, safety, and problem solving (Digital Skills Accelerator, 2022).

These self-assessment tools can be used by practitioners and researchers to gain insight on learner skills and competencies. Learners may find engaging in such assessments less invasive than a standardized or performance assessment. Indeed, self-assessments are generally designed to be measures that support agency and promote self-directed learning.

Online Standardized Assessment: Northstar Digital Literacy

(Note: The author worked on the Northstar initiative as a consultant to Literacy Minnesota for the first several years of the initiative.)

Northstar Digital Literacy Assessment is a popular online standardized digital skills assessment currently in use across adult education contexts. A coalition of adult education and workforce development agencies collaborated to author the Northstar assessment modules in the mid-2000s in response to increased demand for supporting the needs of job seekers during the recession. The goal of the initiative was two-fold:

1. to provide the means by which organizations offering digital skills development could better understand the needs assessment to support instruction, and
2. to give job-seeking learners an opportunity to demonstrate and describe their digital skills. The online assessments measure proficiency in 14 basic skill areas that align with the standards lists pictured in Figure 1.

The assessment modules in the categories **Essential Computer Skills** and **Essential Software Skills** measure a learner's ability to perform discrete, specific tasks. The items in each of the assessments in these categories are fairly simple, requiring responses that match a short set of possible answers. The items in the assessments in the **Using Technology in Daily Life** are more complex, building on the skills demonstrated in the other categories and requiring an application of a combination of those skills and extended knowledge about technology use (e.g., critical analysis of sources, appropriate use of different social media).

The battery of assessments is available free-of-charge online at www.digitalliteracyassessment.org and through customized URLs used by agencies holding licenses to offer Northstar Digital Literacy certificates through a proctored assessment process. A diverse set of over 2,500 public, nonprofit, and private agencies representing libraries, adult education, workforce development, and businesses offer this certification.

The Northstar battery of assessment modules is widely used. It is easy to access and navigate, presents assessment items framed in relevant contexts for adult learners, and is written in plain, accessible language.

Performance-based Assessments

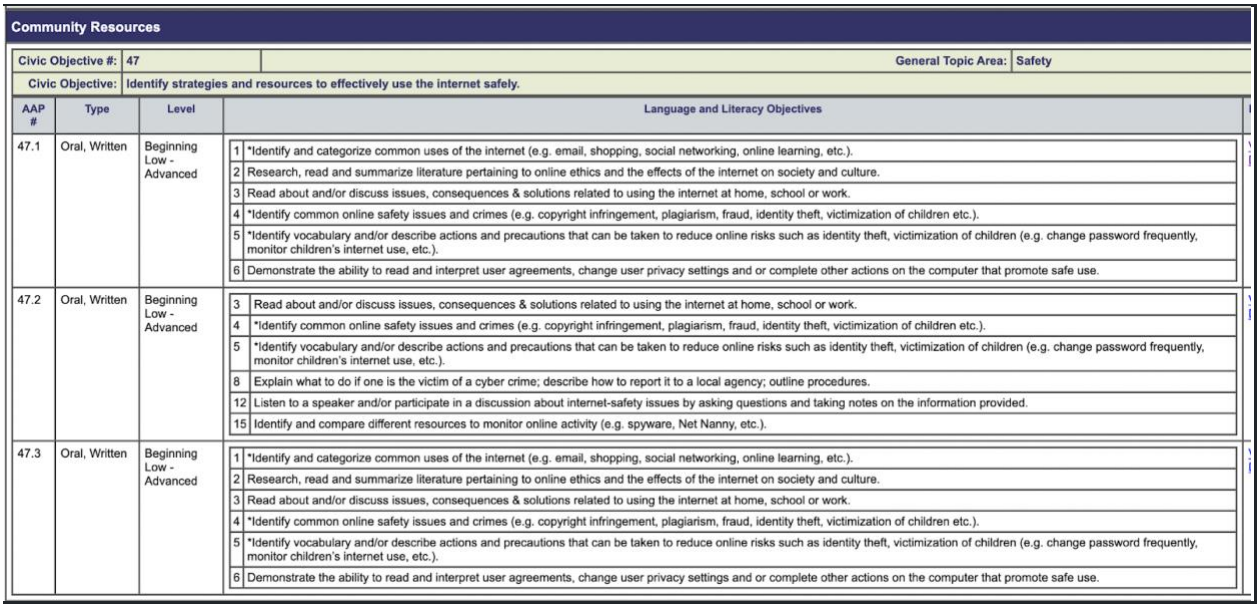
Using digital technologies for tasks at school, work, and daily life requires a creative combination of skills that learners can use in many settings; this makes valid assessment of digital literacy complicated. It is challenging to test what learners can do in multiple contexts or diverse scenarios through assessments that “reward ‘correct’ answers to clearly defined questions” (Vista, 2018, p. 2). An alternative strategy is performance-based assessment, defined as "testing methods that require students to create an answer or product that demonstrates their knowledge and skills" (US Congress, 1992, p. 203). Performance-

based assessments make it possible to assess skills and knowledge that cannot be assessed in multiple-choice items (Lane, 2015).

For assessing digital literacy, the goal of performance assessment is to track and review progress by engaging students in authentic tasks viewed as valid representation of their digital skills (van Laar, 2020). There are a number of ways to design these assessments, including tasks that require: students to construct rather than select a response, direct demonstration of skills observed by an evaluator, a focus on problem solving, or generation of work for portfolios (Elliot, 2010; Stanley, 2014). Skills are often tracked through a rubric or lists of skills the learner needs to demonstrate or exhibit.

An example of performance-based assessment for digital literacy in adult education are the assessments used by California adult education agencies to assess civics education through Civic Objectives (CO) and related Additional Assessment Plans (COAAPs).

The COAAPs, included in the CASAS technical assistance site (CASAS, 2022) were designed to support Integrated English Literacy and Civics Education (IELCE). These objectives are informed by federal and state policy and guidelines and practitioner input. The three performance checklists that make up these assessments illustrate how digital skills are embedded within the instruction and assessment tasks. CO 47, for example, includes several digital skills embedded into a list of more holistic skills needed to "Identify strategies and resources to effectively use the Internet safely" (see Figure 7).



Community Resources

Civic Objective #:	47	General Topic Area:	Safety
Civic Objective:	Identify strategies and resources to effectively use the internet safely.		

AAP #	Type	Level		Language and Literacy Objectives
47.1	Oral, Written	Beginning Low - Advanced	1	*Identify and categorize common uses of the internet (e.g. email, shopping, social networking, online learning, etc.).
			2	Research, read and summarize literature pertaining to online ethics and the effects of the internet on society and culture.
			3	Read about and/or discuss issues, consequences & solutions related to using the internet at home, school or work.
			4	*Identify common online safety issues and crimes (e.g. copyright infringement, plagiarism, fraud, identity theft, victimization of children etc.).
			5	*Identify vocabulary and/or describe actions and precautions that can be taken to reduce online risks such as identity theft, victimization of children (e.g. change password frequently, monitor children's internet use, etc.).
			6	Demonstrate the ability to read and interpret user agreements, change user privacy settings and or complete other actions on the computer that promote safe use.
47.2	Oral, Written	Beginning Low - Advanced	3	Read about and/or discuss issues, consequences & solutions related to using the internet at home, school or work.
			4	*Identify common online safety issues and crimes (e.g. copyright infringement, plagiarism, fraud, identity theft, victimization of children etc.).
			5	*Identify vocabulary and/or describe actions and precautions that can be taken to reduce online risks such as identity theft, victimization of children (e.g. change password frequently, monitor children's internet use, etc.).
			8	Explain what to do if one is the victim of a cyber crime; describe how to report it to a local agency; outline procedures.
			12	Listen to a speaker and/or participate in a discussion about internet-safety issues by asking questions and taking notes on the information provided.
			15	Identify and compare different resources to monitor online activity (e.g. spyware, Net Nanny, etc.).
47.3	Oral, Written	Beginning Low - Advanced	1	*Identify and categorize common uses of the internet (e.g. email, shopping, social networking, online learning, etc.).
			2	Research, read and summarize literature pertaining to online ethics and the effects of the internet on society and culture.
			3	Read about and/or discuss issues, consequences & solutions related to using the internet at home, school or work.
			4	*Identify common online safety issues and crimes (e.g. copyright infringement, plagiarism, fraud, identity theft, victimization of children etc.).
			5	*Identify vocabulary and/or describe actions and precautions that can be taken to reduce online risks such as identity theft, victimization of children (e.g. change password frequently, monitor children's internet use, etc.).
			6	Demonstrate the ability to read and interpret user agreements, change user privacy settings and or complete other actions on the computer that promote safe use.

Figure 7. Civics Objective (CO) 47 from the California IELCE technical assistance site (CASAS, 2022)

Additional examples can be seen in CO 48 "Effectively use online tools to learn, communicate and collaborate with others" and CO 73 "Demonstrate the language and literacy skills necessary to effectively participate in workforce training and work in information and communication technologies."

Though performance-based assessments can be more labor intensive than the other assessment strategies this brief discusses, they offer a unique approach to directly assess learner skills and knowledge. Practitioners and researchers can use performance-based assessments to directly observe learner engagement with digital technologies to establish a baseline of skills or note growth over time.

Considerations for Assessment

As with frameworks, considering how to use assessment strategies depends on what researchers or instructors need to know about the adult learners they are supporting or trying to better understand. They should ask, what is the purpose of the assessment: to figure out whether learners have skills and knowledge to participate in certain instructional activities? To measure skills growth? To document skills as part of research or reporting?

It's also important to consider the impact of an assessment activity on the learner. Does the assessment have the potential to benefit the learner? Or is its purpose only to provide information to researchers? If it's the latter, then strategies chosen should minimize time spent and difficulty of the task.

Conclusion

Practitioners and researchers share a need to better understand the digital skills and competencies of adult learners. This brief has introduced popular frameworks and assessment strategies that have been developed specifically for use with adult learner audiences. Each is designed to be used in various ways and settings. They include diverse resources to help instructors use technology to support adult learning to meet individual learners' needs.

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