

# A Journey Through the Digital World: Fostering Digital Problem Solving Among Adult Learners

Tyler H.J. Frank, Clark College

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## Abstract

To meet the demands of the 21st century, adult learners must display a range of sophisticated strategies for dealing with the digital world. With the switch to online instruction over the last months this need is only greater. In this article, I describe specific activities I implement with adult learners in a math and science class to help them develop these essential abilities while also enhancing their learning toward the content outcomes.

**Keywords:** adult basic education, digital literacy, digital problem solving, problem solving in technology-rich environments

Since switching to completely online classes because of the pandemic, more than ever I have noticed my students leaving the learning management system (LMS) in my courses to explore the internet for additional information on the topics we're learning. My department, whose classes serve as both high school equivalency and developmental education, has committed to using only open educational resources, which means that students do not buy a textbook, and for fully online classes all the information for the class is located on the LMS. Many students simply go where they find the information that makes the most sense to them; they are learning from the

curriculum I have placed on our LMS, but they're also learning from information they discover on the internet. In a sense the internet has become a part of the curriculum of my classes whether I like it or not. And if that's the case then I must help my students wrestle with and make sense out of this new expanded curriculum: the entire internet.

The students who can do this are demonstrating motivation and metacognitive awareness of their own level of understanding. Those traits are necessary for becoming self-directed learners, something that needs to be fostered among adult learners. Some students, though, are not searching the internet to answer their questions

about the class's content. Many of these students may not have the experience, confidence, or even skills to do that. Some don't own a computer and are borrowing one from the school just to be able to take online classes. Consequently, these students would benefit the most from a focus on how to navigate the internet strategically and assess the information they encounter. In the 21st century, everyone must navigate the digital world, learn new tools and platforms on demand, and parse out the fake, from the misleading, from the biased, from the authoritative.

To successfully confront these challenges, which may feel like just one more demand on already overwhelming to-do lists, teachers need manageable ways to address them. I am going to share relevant frameworks that inform my teaching in this regard and then activities I use in one of my classes to help my students grow more sophisticated and adept in three pivotal, but overlapping, types of interactions with the digital world: (1) exploring and navigating, (2) using new tools, and (3) evaluating information.

## Relevant Frameworks

I identified these three interactions as pivotal for my own work with adult learners not only through my teaching experience but also through participating in research around adult digital problem solving and reading relevant literature and frameworks.

As a graduate student I participated in the research project called Advancing Digital Equity in Public Libraries. This research allowed me to observe vulnerable adult library users as they made their way through digital tasks. The "Blueprint for Designing Digital Problem Solving Tasks," one of the deliverables from this project, outlines tasks from finding reliable information about health

issues to getting resume help, offering specific questions which can be used to guide and scaffold learners along the way (Castek et al., 2018). I adapt these suggestions for my classes.

The Program for the International Assessment of Adult Competencies (PIAAC) has developed assessments to measure Problem Solving in Technology-Rich Environments (PS-TRE). The four cognitive dimensions from PIAAC's PS-TRE framework provide an organizational approach for thinking about what students need to be able to do: set goals and monitor progress; plan and self-organize; acquire and evaluate information; and use information (Vanek, 2017). This framework has also informed my understanding the most important interactions for adult learners to master in the digital world. The activities I describe here engage learners across all four dimensions.

The International Standards for Technology and Education (ISTE, 2020) Standards for Students are also helpful for considering the varying roles of an expert problem solver in the digital world. The activities I deploy in my classes invite students to take on roles such as "knowledge constructor," "empowered learner," and "global collaborator." I believe the three interactions I will focus on here are core abilities to taking on these various roles.

## The Frameworks in Action

I apply these frameworks in a fully online, integrated math and science high school completion course to allow my students to work toward the learning outcomes of the class while simultaneously developing and honing their skills interacting with the digital world. These activities engage students in three actions in the digital world: exploring and navigating, learning new tools, and evaluating information.

## Exploring and Navigating

Since many of my students are already exploring the internet for supplementary information for class, I have created a series of activities to incentivize that while emphasizing a metacognitive, strategic, and evaluative approach. I organize this series of navigating and exploring activities into three broad steps: accompanying students into the digital world, incorporating choice for students, and finally student reflection.

### **Step 1: Accompanying Learners into the Digital world**

First, learners need low-stakes opportunities to begin searching for information and I need formative assessments to understand how to help them. I give my students a brief survey asking about their access to the internet, the device(s) they will be using for the course, how successful they usually are when trying to find information online and what they do if they are struggling to answer a question online. Through this I learn about my students' access to technology and their self-perceived efficacy.

Next, I ask the students to select one of the course objectives that is unfamiliar and find some information about it for a discussion post. I make it clear that they don't have to "learn" it yet, because we'll be doing that all quarter. They just find out what it's about. Through this discussion I can see if students are comfortable sharing links, or even searching at all, allowing me to reach out early to students who may need assistance with digital literacy skills. This early discussion about course outcomes also sets the tone for the class as a community of learners, where everyone contributes helpful knowledge to the community and learns from each other – a key approach in classes where students necessarily bring a diverse range of skills for the digital world.

### **Step 2: Preparing Learners to Choose Paths for Exploration**

To help my students think explicitly about the strategies they are using and reflect on the planning and self-organizing cognitive dimension of PS-TRE (Vanek, 2017), I ask them to describe their "journey" while navigating the internet and searching for information. As a midterm review discussion board, I ask the students to pick a class topic that has been challenging and search for more information about it online, thus offering some support to them in the goal-setting cognitive dimension as well (Vanek, 2017). I ask them to list all the "stops" on their "journey" searching for information on the topic they selected along with their reasons for stopping or moving on from each. Even though I can't actually observe them as they solve problems in the digital world, as the *Blueprint for Digital Problem Solving Tasks* suggests (Castek et al., 2018a), this activity offers me a window into their world, while both encouraging them to think metacognitively and reminding them to study for the midterm. With leading questions and responses as I engage in their conversation in the discussion board, I can offer new ideas and strategies as well as help further their thinking. Conversations generally center on the usefulness of the math they find but can also lead into whether websites are trying to sell subscriptions or products or have lots of ads and distracting clickbait. One of my main goals is to make explicit all the implicit questions expert digital problem solvers ask themselves. Example questions from the *Blueprint for Digital Problem Solving* can be very helpful and easily adapted to this activity:

- Are you checking in to determine if you found what you were looking for?
- Which keywords did you use to conduct a search?
- Does the resource you found help you answer your question or fit your information needs?

- Does the search lead to more questions or information seeking (Castek et al., 2018)?

### ***Step 3: Helping Learners Reflect on Their Journey***

Students write a review of one website, app, or YouTube channel as the final step of this process. They rate the resource on the helpfulness of its information and the ease of navigating it to find that information. They write their final review in a Google Doc and share it with their classmates. This artifact serves as an assessment of their evaluation of online resources and allows me to share their expert-student perspectives on online resources with students in other math classes. I also give them the same survey from the beginning of class to measure the development of their perceptions of themselves and their conscious strategies.

### **Using New Tools**

PIAAC recognizes three aspects to problem solving in technology rich environments: the task, the cognitive dimensions, and the technology used (Vanek, 2017). I believe the third aspect, technologies, deserves focused attention. As the ISTE (2020) Standards for Students point out, using digital tools to accomplish goals is necessary for becoming an empowered learner. Therefore, I design activities for students to develop their skills with specific digital tools. For example, I incorporate Google Docs into the class since students have school Gmail accounts and it is a common, useful tool. I apply a gradual release of responsibility with Google Docs. The first activity is low stakes, simply asking them to open a Google Doc and include two pieces of information that will be used for an activity. This allows me to see early if students can access Google Docs and understand how to navigate and edit. I can contact any students who don't include their information and work with them to ensure they can do both of those in the future.

In the coming weeks, students must access a Google Doc shared by the class to solve one assigned problem related to the week's topics and check on one of their classmates' solutions. From this they learn how a Google Doc can be used to collaborate as they can all see each other's answers and work together to make sure they have completed that week's problem set. This assignment mirrors one used in other math classes at my institution, thus preparing my students for potential future classes.

Finally, the students write the website reviews (described above) in a Google Doc and share them with their classmates. Thus, by the end of the quarter they are comfortable creating a shared doc for collaborative work, similar to what we use the entire quarter. Learning a platform such as Google Docs, or many of the other countless digital tools which could be introduced in a similar manner, gives students a powerful tool to use in their own work whether they need to organize information, collaborate, or publish something such as a resume. And beyond those, students can use a platform they understand well as an analogy for learning new ones they encounter in future explorations.

### **Evaluating Information**

Barely a day goes by without news of more misleading -- sometimes dangerous -- information traveling around the internet. Everyone needs to continue developing the critical lenses necessary for evaluating the information they find on the internet, one of the cognitive dimensions of PS-TRE (Vanek, 2017). Additionally, the ISTE (2020) Standards for Students point out that this ability is fundamental to a learner's role as a knowledge constructor. While I ask the students to evaluate a website for their review, I offer them further development in information evaluation since it

is fundamental for understanding when one has accomplished their goal in an information search. Additionally, I believe it would be irresponsible to send them searching the internet for information without providing them with the necessary tools. I use the A.S.P.E.C.T. framework (an acronym for six steps of analysis: authority, sources, purpose, evenness, credibility, and timeliness) developed by Clark College librarians as a student guide for evaluating the reliability and usefulness of information. The online guide includes multiple example questions to be used in each of the six steps (Clark College Libraries, 2020). I introduce the A.S.P.E.C.T. framework, then ask students to apply it by learning about two weird-sounding animals: one fake (the Pacific Northwest Tree Octopus) and one real (the furry lobster). They have to decide which information is trustworthy and which is not by applying the framework.

As the term continues, I ask students to apply the framework to information I provide, or they find, and to explain their conclusions. So, by the end of the quarter they are more naturally applying

the principles of the framework and critiquing the information they find, making it easier for them to recognize when they have arrived at information that satisfies their needs.

## Where to Go from Here?

To help adult learners not just survive, but thrive, in the 21st century digital world, I believe teachers must engage them in the practices and thinking of a savvy digital problem solver. This means using activities such as the ones I've described above, but also continually searching for new paths, perhaps bringing a critical lens to how users' supposedly "private" information is used by platforms that students are asked to use (such as Google). This does not mean sacrificing time from course objectives, but instead embedding students' learning of the objectives within digital problem solving. Many students are already exploring the digital world, while others are uncertain where to begin. Still others aren't yet adept enough to deal with potential pitfalls along the way. It's time to begin accompanying them on some of these journeys.

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