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Blueprint for Designing Digital Problem Solving Tasks

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PIAAC's Problem Solving in Technology Rich Environments (PSTRE) assessment tasks provided limited means to observe a range of digital problem solving skills an individual uses when navigating the technology rich environment in a library. As a result, the research team developed five tasks and an observational protocol that would allow us to examine digital problem solving more precisely. These tasks and metacognitive scaffolding prompts and protocol were developed and refined with the Multnomah County Library's website resources in mind. The research team encourages other libraries to adapt the tasks and observational protocol, or to develop a new and different observational protocol inspired by the design principles offered. This protocol offers other libraries a useful tool for understanding patron's online problem solving strategies and introduces metacognitive scaffolding prompts that suggest what libraries can do to support digital problem solving development.

Design Principles for Creating Digital Problem Solving Tasks

- Task design needs to be based upon the actual investigation of how learners in the library work on the Internet.

- Task design needs to be grounded in observations and pertinent data of learners engaged in actual problem solving in technology rich environments such as using the library's website.

- Task performance may be enhanced by adopting a scaffolding orientation and point-of-need instructional supports to assist learners in various problem solving steps.

- Task design is grounded in learning-by-doing, working through an iterative process of trial and error, discovery, and experimentation.

- Task design is grounded in capturing a learners' efficacy, growth and progression.

- The task design should involve complex, multi-step problems that the learner cares about with some level of choice that is relevant to the learner.

Four Cognitive Dimensions of Digital Problem Solving from PIAAC's PSTRE framework

a. Setting Goals and Monitoring Progress

b. Planning, Self-organizing

c. Acquiring and Evaluating Information

d. Using Information

Observing digital problem solving processes

<u>TASK 1</u>: **Find the Overdrive e-book *My Beloved World* by Sonia Sotomayor. Check it out and open it so that you can read it on your computer screen.**

- **Setting goals, monitoring progress**
    - Do I understand the task?
    - Can I find Overdrive?
    - Am I checking in to determine if I found what I was looking for?
    - Did I find the right title, author, and format?
    - How do I check out the correct format (e-book) to read on my screen?
- **Planning, self-organizing**
    - How do I begin?
    - How am I going to search?
    - What do I do if my search doesn't work the way I thought it would I'm confused about what to do next?
    - Is there a menu or function to help me find what I'm looking for?
    - Which key words do I use to conduct the search (title, author, look through the Overdrive interface)?
    - Is there anything specific to e-book searching I can draw from past experiences?
    - Which icons refer to e-book, print book, and audio-book?
    - How do I narrow my search or conduct an advanced search to find the e-book format for this title?

- **Acquiring and evaluating information**
    - Did my search get me to what I was looking for? Do I need to begin again?
    - Can I find the information I'm looking for on the page?
    - Can I interpret the information on the screen accurately?
        - o Can I tell the difference between a print book, an e-book, and an audio book?
        - o Can I see whether I've found the English or Spanish version?

- **Using information**
    - Can I figure out how to check the item out?
    - Can I log into my library account to check out the title?
    - Can I download the title to my desktop?

Task 2: Find resume help at a time and location convenient for you. Write down the date, time and location.

- **Setting goals, monitoring progress**
  What kind of help of resume help?
    - What times and locations are convenient for me?

- **Planning, self-organizing**
    - Did I preview the website for menus and search features?
    - How do I look for resume help on the library website?
        - o Do I use the menu structure or do I use the search bar to conduct a search?
        - o What keywords would I use for this specific search?

- Did I narrow my options using the library location menu to narrow my search?

- **Acquiring and evaluating information**
    - Did a find a listing of resume help sessions?
    - Did I find sessions that were on dates, times, and locations that work for me?
    - Did I read the class description to make sure the session is right for me?

- **Using information**
    - Do I need to sign up for this class, or do I just attend?
    - Can I find out how to sign up?
    - Can I complete the registration process online?

Task 3: Find a volunteer opportunity at the library for someone who likes to play chess and wants to work with the public. What is the minimum age for that volunteer to be eligible?

- **Setting goals, monitoring progress**
    - What do I need to know/look for concerning the volunteer opportunity?
    - Does the opportunity I found involve playing chess and working with public?
    - What is the age criteria?

- **Planning, self-organizing**
    - Am I going to use the menu structure or the search bar to search?
    - How do I find volunteer opportunities?
    - What key words would I use?
    - How do I find opportunities that involve chess and working with the public?
    - How do I find the minimum age to volunteer for the opportunity?

- **Acquiring and evaluating information**
    - Did I locate the section of the website that lists volunteer opportunities?
    - How do I use the structure of the website to find opportunities that involve chess   and working with the public?
    - Did I understand the description of the volunteer opportunity?
    - What is the information about minimum age for volunteers?

- **Using information**
    - How would I go about becoming a volunteer in this program?
        - Who do I need to contact?
        - What orientation or training do I need to attend?
        - Where do I go to begin volunteering?

Task 4: Find a librarian who can give you reading suggestions on true crime. Ask that librarian for a reading recommendation. Instead of giving your name, use the word TEST.

- **Setting goals, monitoring progress**
    - How can I communicate directly with a librarian using the website?
    - Where do I go on the website to find a librarian who can give me reading suggestions based on my interests?
    - What do I enjoy reading; what genres of reading material interest me?

- **Planning, self-organizing**
    - How can I use the menu structure or search bar to locate a librarian who can give me a reading suggestion?
    - How do I interpret the descriptors in the menu structure or search bar to find the information I'm looking for?
    - What keywords do I use to get the information I need?

- **Acquiring and evaluating information**
    - How do I use the structure of the website to find a librarian and ask for a suggestion?
        - Is the librarian I found an expert in the genre I'm looking for a suggestion within?
        - How do I know the librarian's expertise and what I'm looking for is a good match?
        - What descriptors can I come up with that align with the true crime genre?
        - Is there more than one librarian who could assist me with this request?

- **Using information**
    - What information is most important to communicate to complete the request?
    - How can I communicate my request to the librarian?
    - What information do I need to provide to the librarian to make a request?

Task 5: Go to the MedlinePlus database and find the symptoms of Zika virus.

- **Setting goals, monitoring progress**
    - Why should I use a database to search for health information?
    - Can I only search databases through the library's website?

- **Planning, self-organizing**
    - How do I navigate to the Medline Plus database? Is there more than one way?
    - Do I need to search for the Medline Plus database in order to search within it?
    - How do I know that I've found the Medline Plus database?
    - How can I use the menu structure or search bar to get to the information I need from Medline Plus?

- **Acquiring and evaluating information**
    - Once I've located the MedlinePlus database, where do I find the search box or how do I navigate the content to locate what I'm looking for?
    - Once I've located the Medline Plus database, what key words do I use to get the information I need?
    - How do I know the symptoms I found are reliable/accurate? Should I search another source to be sure?

- **Using information**
    - Did I find an article that tells about the Zika virus?
    - Did I find symptoms of Zika virus within the article located?

Task 6: Think back to the last week. Is there a time when you needed help answering a question or learning something new? Is there something you're curious about or something you've always wondered about? Is there something you've always wanted to know how to do?

1. What was the question or what did you want to learn?
2. How could you use the library website to answer that question?
3. Do you need to find more information or learn a new skill?
4. Find an answer to your question or locate a library resource that could help you answer your question to learn what you want to learn.

- **Setting goals and monitoring progress**
    - Can I come up with a question or an interest?
    - How do I formulate the information need and/or question?
    - How do I narrow my focus, or revise my direction in order to find out about my topic, meet my information needs and/or answer my question?

- **Planning, self-organizing**
    - How do I use the structure of the library's website to begin my investigation?
    - How can I use the menu structure or search bar to get to the information I need?
    - Do I know what key words to use to conduct my search?
    - Do I need a book (if so what kind)? Do I need an article (if so what kind)?
    - Do I need to locate a library program or class (if so what and where is the program or class)?

- **Acquiring and evaluating information**
    - Does the resource I found help me answer my question or fit my information need?
    - What additional/related information do I need to find to help me understand?
    - Do I know whether my question has been answered or the information need has been met?
    - Is the information I found reliable/trustworthy? Should I search another source to be sure?

- **Using information**
    - Do I have enough resources?
    - Does the search lead to more questions or information seeking?
    - What is my plan to use the information?

How did the PSTRE framework guide development of theses digital problem solving tasks?

A focal point was the library's desire to make the library website's tools more easily navigable and useable so that patrons could be more successful. A variation of what libraries have done in the past in relation to the usability testing approach in gauging patrons' knowledge and abilities was also taken into consideration in the design of the observational protocol. Some of the key inquiries guiding the development of the five library tasks were as follows:

i.   How can an observer or librarian learn more about how learners approach and interact with the library's website and tools provisions?

ii.   Given the understanding that how library users approach and interact with the library's website and tools may be different when compared to the library staff's approaches, vocabularies, creating different sets of expectations and strategies is an important facet to take into consideration when developing the range of tasks.

iii.   When conducting observations, it is necessary to have a mechanism in place that documents individual performance; this observational tool of library tasks encourages documentation of an individual's level of skill, knowledge, and abilities.

What can be learned by observing as individuals complete digital problem solving tasks?

i.   What level of skills are the library patron's bringing when using the library's website?

ii.   Are patrons' online problem solving skills actually serving the patrons well when encountering online environments, resources, and services?

iii.   What are the processes that can be observed as an individuals' uses the library website?

iv.   What happens when the patron attempts to download an e-book or place a book hold or enroll in a library class or attempts to engage in any of the library website's offerings, services, and resources, since the basic tools that libraries rely on patrons using are technology enriched tools (online catalog, various interfaces library data bases)?

This blueprint makes the principles behind task design known so other libraries and adult educators can create their own tasks; and observe digital problem solving processes.

The observational protocol of library tasks is a very important feature as it can be used as a tool by other libraries to actually learn more about their own patron's problem solving skills, the benefits, affordances, limitations, and constraints of their own websites, and the tools that libraries offer to their patrons. Some important lessons we have learned include:

i.   Two patrons working together allows them to vocalize their mental processes and tell us why they are approaching the task in the way that they are. These collaborations may be helpful when observing or during training/instruction.

ii.   Any observer working with and individual adult learner had an important role in the scaffolding process. When a learner got stuck, the observer could assist them in figuring out where to go next. This scaffolded assistance should not be telling the learner(s) exactly what to do, but instead the observer suggests a different way of looking at the problem or reminding them of a different approach to help them get over the roadblocks or to rethink their approach in order to get to a successful outcome.