Exploring How Problem Solving in Technology-Rich Environments Can Be Used to Design Responsive Programming

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Exploring How Problem Solving in Technology-Rich Environments Can Be Used to Design Responsive Programming

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Other members of our project team include

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  - Stephen Reder, Gloria Jacobs
- Multnomah County Library, Portland, OR USA
  - Cindy Gibbon
  - Patricia Moran
  - Matthew Timberlake
  - Vailey Oehlke

COABE Conference 2016 Dallas, TX
What is the Program for the International Assessment of Adult Competencies (PIAAC)?

- Designed to measure skills of the adult working-age population nationally and internationally
  - examine conditions and factors impact skills growth, maintenance, or loss over a working-age life cycle
  - provide international comparison to better understand U.S. global competitiveness
  - benchmark how well education and training systems are meeting emerging skill demands
This session is in a PIAAC strand

- Use of Education and Skills Online
  - First hand data collection
  - A valid and reliable assessment tool from PIAAC developed by ETS

- Think about Problem Solving in Technology Rich Environments (PSTRE) in relationship to libraries
  - Advancing Digital Equity in Public Libraries: Assessing Library Patrons’ Problem Solving in Technology Rich Environments

Welcome & Introduction

Literacy, Language, and Technology Research Group

Commitment to building literacy and language pathways to economic and social justice

Projects centered on the acquisition of literacy, digital literacy, health literacy, and additional languages among adults

Housed within an Applied Linguistics Department

Work with local and national partners: American Institutes for Research, University of California San Francisco, Center for Vulnerable Populations, WIC of Oregon, Minnesota Literacy Council, Digital Inclusion Network or Oregon, Literacy for Every Adult (LEAP)

Multidisciplinary group of faculty, students, community groups and others
Welcome & Introduction

Multnomah County Library

Empowering our community to learn and create

Free Access for All  A Trusted Guide For Learning  Leading Advocate for Reading

Reflect and Serve a Diverse Community  Reimagine Library Service and Spaces

Champion Reading  Build Digital Literacy by providing access, training and technology to everyone

Welcome & Introduction

- What are your roles in adult education?
  - Teacher?
  - Program administrator?
  - Policy maker?
  - Researcher or evaluator?

- What settings/systems do you work in?
  - K-12?
  - Community college?
  - CBO?
  - Government?
  - University?

COABE Conference 2016 Dallas, TX
How did we come to collaborate?

Shared Commitment to Promoting Digital Equity for all

Literacy, Language, and Technology Research Group
• Broadband Technology Opportunities Program (BTOP)
• Digital Literacy Acquisition Research Project

Multnomah County Library
• history of supporting life long learning
• Major hub for technology access and training
• over one million Wi-Fi sessions last year

Our Collaboration Has Given Rise to

• Digital Inclusion Network (Portland, OR)
  • a collection of city, community, and county wide groups
  • committed to developing a digital equity plan
  • designed to provide affordable and accessible computer/Internet access and training to all
  • drawing local connections around issues of access and equity
ADULTS, COMPUTERS AND PROBLEM SOLVING
WHAT’S THE PROBLEM?
Results from the Survey of Adult Skills

Labour force participation rates among adults who reported having no experience in using digital devices are 15 percentage points lower, and their wages are 6% lower, compared to adults who had basic problem-solving skills using digital devices.

From PIAAC Gateway http://piaacgateway.com/infographics/
Libraries are institutions that re-imagine library services and spaces to...

Support interest-driven lifelong learning
Provide hubs for Internet access and digital literacy training
Deliver services using technology

Are a constant presence in the community

Purpose of this Project

Extend national work on digital literacy acquisition to inform local efforts
Bring libraries into the PIAAC conversation
Maximize resources and meet community needs around lifelong learning and access

Education and Skills Online: Problem Solving in Technology-rich environments
Project Aims

- Library patrons take the PSTRE
- Data collected help explore implications for the library
  - instruction/training
  - website and electronic resources
- With the results we’re asking ourselves
  - Are we...
    - offering instruction on the right topics?
    - Helping learners at the most useful point of need?
    - Targeting services to the right patrons?
    - Who are we missing?
    - Are we offering useful outreach programs within the communities of most need?
    - Are the library’s interfaces accessible to the community?

Digital Equity in Libraries

- Collaborating with Staff to survey patrons
- Assessing Library Staff PSTRE
- Assessing Patrons PSTRE
- Examining Digital Problem Solving Skills within common library tasks
- Conducting a cross-walk of common library tasks in relationship to PSTRE scores
- Designing Library Programming to Meet Needs

Understanding Library Patrons’ Ability to Problem Solve Digitally
Examining A Learners’ Digital Skills in a Library Setting

Learner’s Goal: To access Consumer Reports to determine which stereo is a good buy.
Turn and Talk

- What digital literacies were required to accomplish this task?
- What challenges might your learners face in this digital environment?
- How does the need to teach these skills play out in your context?
Digital Skills

- Understanding of how library publications can be accessed
- What actions lead to periodicals (vs. blog posts or other material)
- Skimming and scanning
- Attention on the task (not on pop-ups)
- Reading the screen for relevant information
- Once getting to the periodical, searching within it for relevant information
- Scanning search results & refining search terms to narrow down topic
- Side menus to further hone in on up-to-date information
- Navigating between two tabs

Other Skills

- Being persistent
- Staying focused on goal at hand
- Recognizing when to switch strategies and try something else
- Starting broadly then narrowing down
- Being efficient with time (so when the material is found, there's time to read it)
- Decision making: what to attend to and what to let go of

What does this project investigate?

- Support for...
  - instruction/training of digital skills
  - presentation of library website and other electronic resources
Library Survey to Select Individuals to take the PSTRE

What is the highest level of education you have completed?
- No formal education
- Primary Education
- Secondary education without a diploma
- Secondary Education (i.e., High School diploma, GED or equivalent)
- Some Post-Secondary Education (including community, technical or vocational)
- 4-year College or University degree
- Beyond a college or University degree

Which of the following best describes your current employment status?
- Full-time employed (including self-employed)
- Part-time employed (including self-employed)
- Unemployed (not employed and looking for work)
- Unemployed and not looking for work (e.g., student, retired, homemaker, permanently disabled)
- Apprentice or intern
- Other: ____________________________

Do you have the skills to do what you need or want to do online?
- Yes
- No

Are you able to use a mouse to (click all that apply) ...
- highlight to select a sentence or a word
- drag and drop an object into a folder
- copy and paste a sentence or a word

When I'm trying to do something online...
- I can usually figure it out
- I can figure it out but it's really hard
- I almost always get stuck
- Other: ____________________________

What do you use the library website for?
- Renew books
- Place holds
- Find classes/programs
- Get eBooks
- Find information
- Watch a movie
- Get help from a librarian
- Manage my library account
- Get a reading recommendation
- Get audio books
- Find where library branches are located
- Find out how to contact the library
- I don't use the library website.

What computer or Internet skills would you like to improve?
## Library Survey to Select Individuals to take the PSTRE

How easy or difficult do you find it to do the following activities using the library website (or library resources such as people or databases)? It counts if you do these activities on the library computer, at home or on your mobile device. Choose one answer for each row:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Very Easy</th>
<th>Somewhat Easy</th>
<th>Somewhat Hard</th>
<th>Very Hard</th>
<th>Not something I do at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get help with my resume</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Get help with my child's homework</td>
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<td></td>
</tr>
<tr>
<td>Find something to watch, read or listen to</td>
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<td>Find opportunities to volunteer</td>
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<td>Find health information</td>
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<tr>
<td>Find a library class or program</td>
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<tr>
<td>Find social service information</td>
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<tr>
<td>Use the internet for fun</td>
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<tr>
<td>Find help preparing taxes</td>
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<tr>
<td>Get help from a librarian</td>
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<tr>
<td>Get a reading suggestion</td>
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<tr>
<td>Research family history</td>
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<td></td>
</tr>
<tr>
<td>Use online encyclopedias or databases</td>
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</tr>
<tr>
<td>Look for obituaries</td>
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</tr>
</tbody>
</table>

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**Highlight Check:** Click the link below and follow the instructions on the new page. Don’t close this window, you will need to come back.

Link: [https://sites.google.com/a/pdx.edu/ltr/highlight](https://sites.google.com/a/pdx.edu/ltr/highlight)

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### Hidden Highlight Page!

Using your mouse, highlight the blank area next to the number 1 below this paragraph and before "The end." Copy the text you find there, then go back to the survey page and paste the text into the "Highlight Check" answer box.

### Hidden Highlight Page!

Using your mouse, highlight the blank area next to the number 1 below this paragraph and before "The end." Copy the text you find there, then go back to the survey page and paste the text into the "Highlight Check" answer box.

1. [You found the hidden text! Copy this and paste back on the survey page. Nice work! The end!](#)
How are we collecting PSTRE data?

- Created principled adaptations of the Education and Skills Online test administration to specifically meet our project needs.

Using Education and Skills Online to Meet Our Needs

- Literacy
- Numeracy
- Problem Solving in Technology Rich Environments
- Background Questionnaire

Costs about $12.00 US Per Test

Made Up of All Constructed Response Items
Examining the Skills Required to Complete Common Library Tasks such as:

- Job searching
- Homework help
- Getting material to watch/read
- Family history
- Volunteering in the library or in the community
- Finding a Class/program and participate in it
- Finding medical information
- Finding social services
- Recreational Internet use
- Taxes

PSTRE Score Report

What do the Problem Solving in Technology-Rich Environments Questions Measure?

The Problem Solving in Technology-Rich Environments questions measure how well you use different types of technology to solve everyday problems and complete tasks to successfully meet your goals. They also measure how well you understand and use information in different environments, such as e-mail, Web pages, or spreadsheets. In this test, a problem is any situation where you don’t already have a good idea about how to achieve a goal. This may be because the strategy to use is not obvious to you or because you have never tried such a task in the past. As you have more practice in meeting different goals using technology, those tasks that were once problems will become automatic and routine for you.

Most adults use problem-solving in technology-rich environments skills to find information or answer questions, use online tools and functions that can make tasks easier, and communicate with others. For example, you are using these skills when you:

- Read and answer emails from friends or co-workers
- Search for a website with information about treatment for a medical issue
- Use a spreadsheet to set up a budget and keep track of spending
- Help a friend figure out how to install a new software program
- Set up folders on your computer to organize your emails or files
- Evaluate whether information on a Web page comes from a reliable source
Below Level 1:

- complete tasks in which the goal is explicitly stated and for which the necessary operations are performed in a single and familiar environment.

- solve problems whose solutions involve a relatively small number of steps across a large number of actions.

From p. 90 of OECD Skills Outlook 2013: First Results from the Survey of Adult Skills
**Problem Solving: Level 1-Description**

**Level 1 Task:**
- involves sorting e-mails into pre-existing folders. An e-mail interface is presented with five e-mails in an Inbox. These e-mails are responses to a party invitation to keep track of who can and cannot attend a party.

- The item requires the test-taker to “Categorize a small number of messages in an e-mail application in existing folders according to a single criterion.”

*From p. 90 of OECD Skills Outlook 2013: First Results from the Survey of Adult Skills*

**Problem Solving: Level 2-Description**

**Level 2:**
- complete problems that have explicit criteria for success, a small number of applications, and several steps and operators.

- monitor progress towards a solution and handle unexpected outcomes or impasses.

*From p. 90 of OECD Skills Outlook 2013: First Results from the Survey of Adult Skills*
Problem Solving Sample Item: Level 2

- several steps and operators required to return a purchased item
- monitor progress towards a solution and handle unexpected outcomes or impasses.

From Education and Skills Online Sample Items

Problem Solving: Level 3 Description

Level 3:

- complete tasks involving multiple applications, a large number of steps, impasses, and the discovery and use of ad hoc commands in a novel environment.
- establish a plan to arrive at a solution and monitor its implementation as they deal with unexpected outcomes and impasses.

From p. 89 of OECD Skills Outlook 2013: First Results from the Survey of Adult Skills
Problem Solving Sample Item: Level 3

- managing requests to reserve a meeting room on a particular date using a reservation system
- The task involves multiple applications, a large number of steps, a built-in impasse, and the discovery and use of ad hoc commands in a novel environment.
- The test-taker has to establish a plan and monitor its implementation in order to minimize the number of conflicts.
- In addition, the test-taker has to transfer information from one application (e-mail) to another (the room-reservation tool)

From Education and Skills Online Sample Items

Three Levels of Proficiency

- Level 1: Sort emails into pre-existing folder using given criterion
- Level 2: Respond to a request by locating information in a spreadsheet and e-mailing the requestor
- Level 3: Manage requests to reserve meeting room using a reservation system. Discover schedule conflict, e-mail to decline the request
PSTRE Assessment

Library Staff

- # Scoring Below Level 1: 3
- # Scoring Level 1: 3
- # Scoring Level 2: 21
- # Scoring Level 3: 2

Total number of participants = 27

PSTRE Assessment

Library Patrons

- # Scoring Below Level 1: 3
- # Scoring Level 1: 6
- # Scoring Level 2: 20
- # Scoring Level 3: 26

Total number of participants = 55
Results: What do they mean?

- How do these data challenge perceptions of the PSTRE skills of library patrons and staff?
  - Most library staff score at level 2
  - Most patrons score at level 2, some at level 1 and below
  - Very few staff and patrons score at a level 3
  - Need to be more collaborative as staff and patrons work together

- What assumptions do we carry into program design that these emerging data either challenge or confirm?
  - Advanced problem solving skills in the PSTRE are equally hard for all ??
  - Advanced problem solving in the library is not identical to problem solving digitally or more generally ??

What Do Library Staff Say about PSTRE?

Do you think there is a relationship between the problem solving skills this assessment includes and the ways patrons problem solve in the library? If so, what is the relationship?

- There are many processes in wayfinding and research in libraries that require you to use several skills at once. And the web and email are hard enough for many people, but when you add in the complexities of the library web site and catalog, it is that much more complicated.
What Do Library Staff Say about PSTRE?

Do you think there is a relationship between the problem solving skills this assessment includes and the ways patrons problem solve in the library? If so, what is the relationship?

• The interface here was unfamiliar, and to that extent, it might be similar to what patrons experience using technology and other resources at the library.... Especially since we have so many different databases and digital content providers- and all the interfaces look different...

What Do Library Staff Say about PSTRE?

Do you think there is a relationship between the problem solving skills this assessment includes and the ways patrons problem solve in the library? If so, what is the relationship?

• So many of the questions patrons have about technology are related to performing a function or using a program or browser that is unfamiliar to them. It’s a lot of "I can’t make this thing do X, can you help me?" or "I don’t know how to do X at all, can you help me?" which is very much related to the doing of X being either an unfamiliar task or a familiar task in a novel environment.
What Do Library Staff Say about PSTRE?

Do you think there is a relationship between the problem solving skills this assessment includes and the ways patrons problem solve in the library? If so, what is the relationship?

- Most definitely. I think they way they can navigate the assessment shows how comfortable they may be solving problems or asking for help at the library. Some may have a fear for learning these programs because it is very intimidating.

What Do Library patrons say about the PSTRE?

- Job seekers
  - Thanked us for the opportunity & said it helped them pinpoint what skills they need for the workplace
  - Found the items valuable, helped them see that they could figure it out if they kept at it
  - Took their time, were responsive to requests such as “let the groups who needed to reserve the conference room know whether it is available or not”
  - Took time to try to email each of the requestors individually, even though the interface wouldn’t function that way
Limitations of ESO for our purposes (PSTRE Only)

• Data provided includes
  • Score from 0-400
  • Level that score corresponds (below level 1, level 2, level 3)

• Lengthy to administer
  • Can start and stop
  • Incentives provided

• Finding subjects/patrons
  • Must read at a high level, enjoy taking tests, self-reflective

• Restrictive browser requirements
  • Must use Firefox

• Created adapted background questionnaire & score reports
  • Corresponded to what we were looking to find out

• NO accommodations for individuals with disabilities
  • Spanish test is available but language is highly academic and is not appropriate for many patrons

Using Education and Skills Online to Meet Our Needs

• We’re adapting use of the PSTRE tool in a principled way (and YOU can too!)
  • Accept the limitations
  • Have a sound rationale for choices

• Why?
  • Public libraries need more data that can inform in meaningful ways
  • Aligning results to success of patrons informs both research and practice

• Pioneering Effort
  • We’re the first to try this, and we’ll keep you informed
Using ESO data to Meet YOUR Needs

- Given what we shared...
  - How might ESO or PSTRE assessment tools meet your programming needs?
  - How might you seek to adapt (or customize) the ESO tool?
  - Why would you need to make adaptations?
  - What are the limitations?

Learn More About our Project

Advancing Digital Equity in Public Libraries

Funded by the Institute of Museum and Library Services (IMLS), Portland State University (PSU) and Multnomah County Library (MCL) will collaborate on a two-year research project to improve library practices, programs, and services for adult patrons—especially economically vulnerable and socially isolated adults, seniors, English learners, and others lacking basic digital literacy skills. This project provides the opportunity to administer the “Problem Solving in Technology Rich Environments” (PST-R) survey developed by the Program for the International Assessment of Adult Competencies (PIAAC) of the Organisation for Economic Co-operation and Development (OECD).

www.pdx.edu/linguistics/pstre
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