



A Pilot Study of Computer Auto-Personalization at American Job Centers

J. Bern Jordan, Gregg C. Vanderheiden
University of Maryland, College Park, Maryland

Maureen Kaine-Krolak
Raising the Floor – U.S.

Vera Roberts
OCAD University, Toronto, Canada

jbjordan@umd.edu, greggv@umd.edu, maureen@raisingthefloor.org,

vroberts@ocadu.ca

Abstract

The Global Public Inclusive Infrastructure auto-personalization project aims to create a system that allows people to easily discover and set up assistive technology and other computer accommodations and features to meet their individual needs and preferences. As a first trial, a prototype of the auto-personalization system was tested with 11 participants at an American Job Center (AJC). Participants were all customers at the AJC. They used near-field communication cards to set up the system in different ways and tried job search-related tasks of their own choosing. Participants were all positive about their use of the auto-personalization system—all reported they would like to use the system again at the AJC and most listed other places they would like to be able to use it. Following this study, two computers with the auto-personalization system installed were placed at the AJC for continued customer use.

Keywords

Automatic personalization, assistive technology, access feature, computer, settings

Introduction

Information and communications technology (ICT) is becoming more and more integral to daily life: at home, at school, at work, and in the community. However, not everyone is able to use these technologies and access to ICT has not kept up with the proliferation of platforms. It used to be possible to avoid using technology in daily life, but technology use is quickly becoming essential to participation in most activities (Vanderheiden et al. 108).

As a result, many people are falling behind or at risk of being excluded because they cannot access the technology they encounter. There are about 56.7 million people with disabilities in the U.S., and the number of people with disabilities is increasing as the population is aging (Brault 5). There are also many people who do not consider themselves as having disabilities, but who have difficulty using technology due to challenges related to literacy, digital literacy, or aging.

There are some tools and strategies available today to help people facing barriers using ICT, but solutions are not currently available for all. Even for those for whom solutions do exist, many do not know that a solution exists or how to search for them (Ding et al. 161). Also, access solutions are often available only on some devices but not others (e.g., PC but not Android or macOS), and they are often difficult to configure and set up (Vanderheiden et al. 507-508).

The Global Public Inclusive Infrastructure (GPII) has been established to work on these and related issues to ensure that people with disabilities can all access the ICT that is becoming ubiquitous and they are increasingly encountering in their daily lives.

Auto-Personalization

Auto-personalization is one of the three pillars of the GPII. With GPII auto-personalization as envisioned, a person could have an interface they can use and understand on

any computer (and eventually any technology) they encounter. The person would present a personal key (e.g., a USB device, NFC card, fingerprint, etc.) that is used to fetch and apply the user's setting preferences to the computer, launching and configuring any assistive technologies and access features that the person needs. In this manner people can have computers instantly set up for them without even having to know how to do it manually.

American Job Centers

American Job Centers (AJCs) are the first, real-world test of the GPII auto-personalization system. American Job Centers are a federally funded network of more than 2500 career centers located across the country. Along with providing free access to computers and the Internet, job centers offer their customers an array of no-cost services that can include assistance in exploring careers, finding a job, building a resume, researching training options, and learning about federal, state and local support services available.

As reported by AJC staff and observed on site visits, AJC customers include individuals with limited or no previous experience in using computers, as well as those with extensive experience. Staff reported that some customers are very tech savvy, but that many others are uncomfortable or even fearful of technology. Despite efforts to improve outreach and services for people with disabilities, AJC staff also reported continued challenges in enrolling people with disabilities and encouraging individuals to self-identify as having a disability, in order to receive more information and services.

The U.S. 2014 Workforce Innovation and Opportunity Act (WIOA) has increased emphasis for American Job Centers to be both physically and programmatically accessible to people with disabilities. However, many centers are currently not well equipped to provide programmatic access. In a report funded by the U.S. Department of Labor, only 44% of AJCs

were determined to be fully accessible in the programmatic domain compared to 92% in the physical domain (Chamberlain et al. vii). Because the GPII auto-personalization system may be a potential solution to help improve the programmatic accessibility of AJC computing resources, we wanted to test its use by AJC customers.

Methods

The purpose of the study was to get feedback from people using initial implementations of the GPII auto-personalization system to do their own computing tasks. The researchers wanted to know how people felt about the system and to see if there were additional features and uses that people might identify. In the study, researchers used both interviews and direct observation.

Participants were recruited with posters and information sheets in a southern California job center and by on site recruitment to fill open study timeslots. Potential participants answered a short screening questionnaire. No participants were screened out of the study. In total, 11 job center customers (4 female, 7 male) took part in the observations and interviews. Three additional individuals were scheduled but did not show up for their respective sessions. Sessions were approximately 1 hour long. Participants were given \$25 for participating in the study.

When participants arrived for their study session, they went through a consent process. Participants were informed that the auto-personalization project was part of a federal grant that involved developing a new system to help make computers easier to use—for people with disabilities and also for mainstream users. Participants were told that they could carry out any computer tasks of their choice that were typically conducted at job centers, but they would be using the auto-personalization tools and instructions while doing so. They were also informed that they would be asked to provide feedback during and at the end of the session.

Participants sat at an all-in-one computer (Sony VAIO Tap 21) with a built-in near-field communication (NFC) card reader. The computer ran Windows 10 with a prototype version of the GPII auto-personalization software on it. The software would make changes to system settings in response to NFC cards. Next to the computer was a sign with instructions on using the NFC cards to enact the changes. Figure 1 shows a picture of the experimental setup.

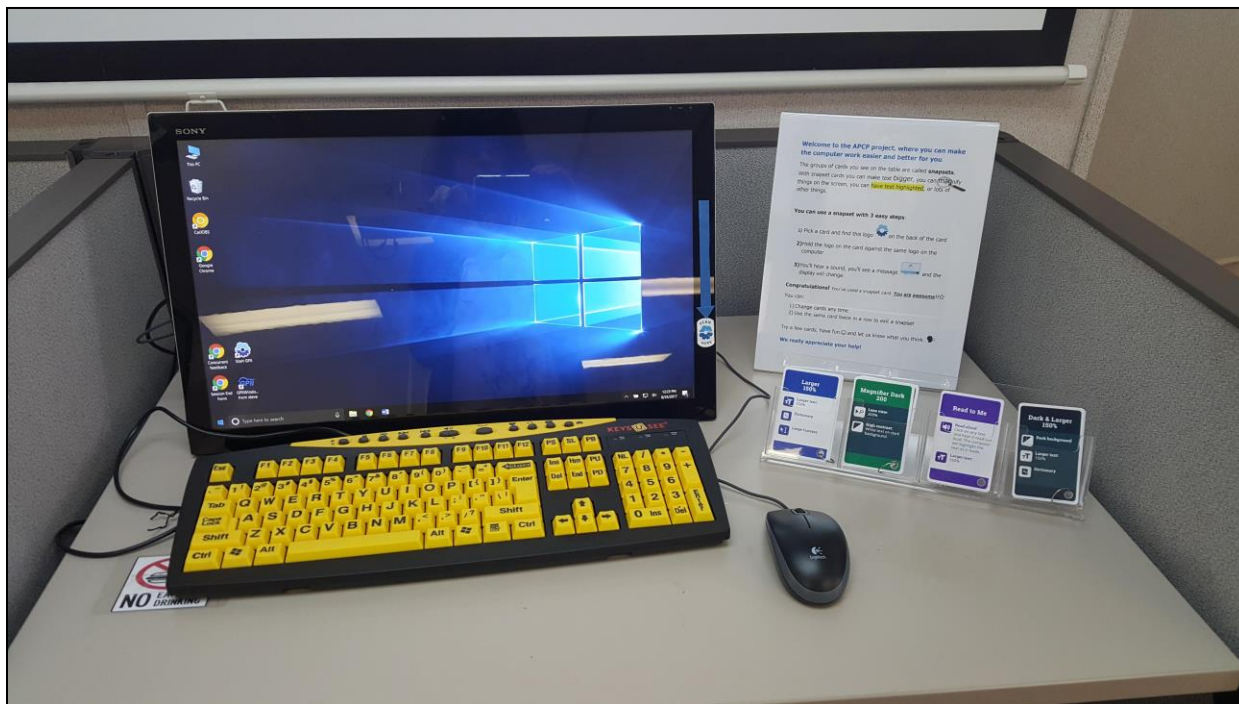


Fig. 1. The experimental setup of an all-in-one computer with NFC cards and instructions on using the auto-personalization system nearby.

Also, next to the computer was a rack of 11 NFC cards in four logical groupings. In each group, cards had coordinating color schemes and were joined together in the lower right corner with a ring through a hole in each card. Participants could thus fan out the cards in a group to look them over. Each NFC card was labeled with a name and the major features that the card enabled or changed. The NFC cards and access features used in the study are listed in Table 1.

Table 1. NFC cards in the study and the features that each enabled.

Name	Logical Group Color	Screen Scaling (DPI) settings	Windows high-contrast theme settings	Windows Magnifier settings	Enabled Chrome extensions
Larger 125%	Blue	125%	None	None	Google Dictionary
Larger 150%	Blue	150%	None	None	Google Dictionary
Larger 175%	Blue	175%	None	None	Google Dictionary
Dark & Larger 125%	Black	125%	White on black	None	Google Dictionary & High Contrast
Dark & Larger 150%	Black	150%	White on black	None	Google Dictionary & High Contrast
Dark & Larger 175%	Black	175%	White on black	None	Google Dictionary & High Contrast
Read to Me	Purple	150%	None	None	click2speech
Magnifier 200	Green	None (100%)	None	Lens view, 200%	Google Dictionary
Magnifier 400	Green	None (100%)	None	Lens view, 400%	Google Dictionary
Magnifier Dark 200	Green	None (100%)	White on black	Lens view, 200%	Google Dictionary & High Contrast
Larger + Magnifier 200	Green	175%	None	Lens view, 200%	Google Dictionary

During the sessions, all of the applicable Chrome web browser extensions were introduced to the user the first time that an NFC card with the feature was used:

- Google Dictionary (by Google), which provides definitions and pronunciations for words.
- High Contrast (by Google Accessibility), which offers contrast settings for web pages.
- click2speech (by Zsolt Nagy), which allows users to click web pages to have parts highlighted and read to them through text-to-speech.

Additionally, researchers introduced the Mercury Reader Chrome browser extension (by <https://www.postlight.com>) to participants during each session. Mercury Reader provides a customizable article view by removing ads and other distractions from web page articles.

Once participants were ready to begin their session, they were encouraged to undertake job search-related computer tasks of their choosing. Verbal instruction was kept to a minimum, with the researcher referring participants to the instructions near the computer.

After a participant had tried a feature and explored the computer with it, the researcher asked for feedback on how participants felt about the settings. User ratings were entered on a tablet or desktop computer, outside of the researcher's view.

At the end of the study session, participants were asked a few questions about the usefulness of the system and what additional features they might like to see.

Results

During the screening, four participants self-identified as having disabilities. Two of them mentioned difficulty seeing—the other two mentioned disabilities that would not ordinarily affect use of a computer. Three additional participants, who did not identify as having a disability, volunteered that they would need to bring glasses or potentially use a magnifier during their sessions because they might otherwise have difficulty using a computer. During the screening, participants answered a few questions about some difficulties that people might have with computers. The results are in Table 2.

Table 2. Participant (n = 11) responses to the three survey items about computer use.

Difficulties with computers	Never	Sometimes	Often	Always
I find it hard to see print on the screen	2	7	2	0
I find it hard to read English	11	0	0	0
I find web sites are too busy/complex	2	5	1	3

During the study sessions, participants were not required to try every NFC card. However, to encourage participants to try more types of cards, the researcher cued participants to, “perhaps try another set of cards,” if participants had only tried one group initially. On average during a session, participants tried 5.8 of the NFC cards (S.D. = 1.33) out of the 11 that were available. Ten of the 11 participants tried at least one card from all four groups. All participants also tried the Google Dictionary and Mercury Reader browser extensions.

After trying out settings from an NFC card or other feature, participants answered a short two-question survey. The first question was, “How much do you like using the last display setting?” on a 5-point scale with anchors “I don’t like it” (1) and “I would use it often” (5). Most of the time, participants answered the short survey just once for each feature or group of NFC cards. However, participants would sometimes try an NFC card or feature and dismiss it immediately without taking the survey. Figure 2 shows the responses from the job center customer participants to the question. Every participant was able to find at least one NFC card with settings that they gave a maximum rating of 5. Participants tended to give favorable ratings with an average rating per NFC card or feature of 4.2 (S.D. = 2.17).

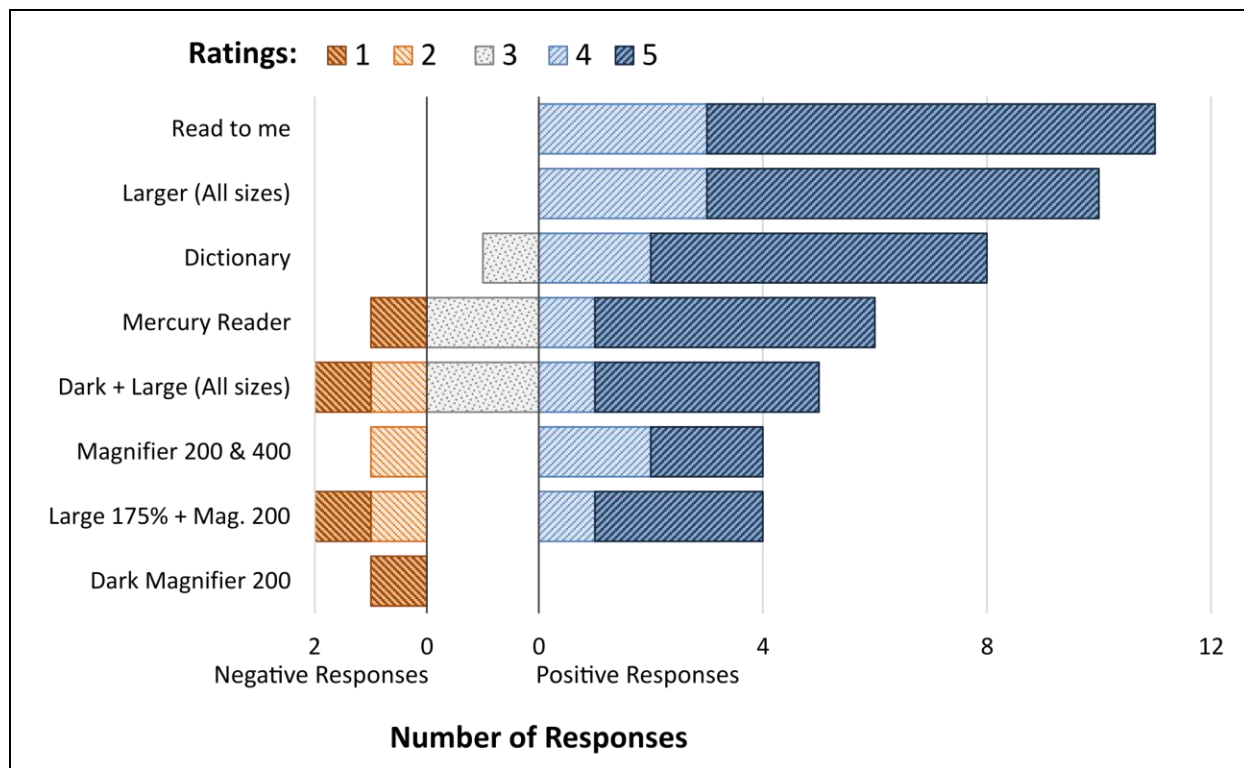


Fig. 2. A diverging stacked bar chart showing the number of responses ($n = 11$) to the question: “How much do you like using the last display setting?” for the tested NFC cards and features.

Participants neither tried every card nor answered the survey for every card that was tried.

The second question of the short survey about particular NFC cards or features was, “Does your last setting make it easier or harder to use this computer?” There were three potential responses: “It makes it harder to use,” “It doesn’t make a difference,” and “It makes it easier to use.” The two questions of the survey were strongly correlated (Pearson $R = 0.758$).

At the end of each session, participants were asked several questions about how useful the system was to them. All participants said that they would want to use the system again at the job center. Ten of the eleven participants also listed other places where they might want to use. Places frequently mentioned by participants in their comments were home (mentioned by 64% of the participants), work (45%), and libraries (27%). Other locations mentioned included schools, airports, public kiosks, and everywhere. When asked what parts of the system participants found

useful, two features were mentioned by 5 or more study participants: (1) text-to-speech with highlighting and (2) enlarging or magnifying the text on the screen. One participant, after learning that the system was going to be available at the job center in the future remarked, “There’s going to be a line to use this.” Another participant said, “This is so much fun!”

There were three participants who specifically mentioned during the screening or session start that they felt they had very limited computer skills or found computers to be confusing. These three individuals were able to use the NFC cards with minimal cueing after reading the instruction sheet, and successfully used the computer for basic job-search related tasks.

Staff also had some interesting insights regarding the system after they tried it. Two staff members who had regular customer contact estimated that at least half of their customers required their assistance in using computers in general. These two staff members said that they felt it would be easy for them to demonstrate the auto-personalization features to those customers. One of the staff members took a researcher behind the AJC registration desk and pointed out that many of the customers then seated at computers in the AJC were squinting and leaning forward. “This is going to help a lot of people,” remarked the staff member.

Discussion

The initial feedback of the GPII auto-personalization prototype has been positive, with all participants responding that they would like to use the system again at the AJC. Participants liked that the settings were easy to apply. Many of the participants were not previously aware of the many features and extensions that could be applied to the operating system and web content. Nearly all of the participants thought of different places at work and in the community where they would like to use the GPII auto-personalization system.

The AJC was an interesting place for a first pilot. It provided a good venue for people without disabilities and with mild disabilities. With its constant turnover, it was also a good place to test and improve our introduction and awareness measures. However, there were limitations on the range of users, and the duration of their interaction with the system. Customers at AJCs are not typically users of assistive technologies, and many who have challenges using technology for various reasons do not self-identify as having a disability. The favorite features of AJC customers (larger text and text-to-speech with highlighting) are not representative of the breadth of assistive technology features and settings that must be available for others who wish to use GPII auto-personalization. Because sessions were focused on participants' first encounters with the system, we do not yet know how usage might change with time and experience.

The auto-personalization system has the potential to address the primary challenges or disabilities characteristic of AJC customers when trying to use computers as described by AJC staff and affiliates: low literacy, low digital literacy, cognitive, learning, or intellectual disabilities, mental health disorders, and English as a second language. Other potential benefits of an auto-personalization system include:

- Improving accessibility for AJC customers on all GPII-enabled computers (including those at home, work, or in the community).
- Enabling portability so preferences set up at any one location can easily appear on any GPII-enabled computer.
 - Customers are not limited to the few accessible workstations that sites may have.
 - Customers do not have to manually change settings on each computer they encounter.
- Reducing staff time needed to assist customers making computers work better for them.

- Helping AJCs to accommodate a wide variety of customers without the need for staff to individually learn about, install, and support all the different assistive technologies.
- Promoting independence, confidence and a sense of agency for individuals who may otherwise have difficulty using computers.

Since concluding the observational study, the researchers have placed two GPII-enabled computers at the AJC. These placements have the same setup as in the experiment: an all-in-one computer with a rack of NFC cards and instructions nearby. From these placements, we would like to learn about continued and organic usage of the GPII auto-personalization system.

American Job Centers offer just one view of the efficacy of an auto-personalization system. There are also plans for future pilots of the GPII auto-personalization system across the country in a community college, select high schools, in several libraries, and additional AJCs. Through these pilots, we hope to learn more about the diversity of use of the auto-personalization system. We also hope to gauge the impact of the GPII auto-personalization system on the use of computers in home, school, and community settings.

Features are being added to the GPII auto-personalization system as part of the project. Soon, the system will offer support for personalization—where people can adjust and save their own settings for a one-size-fits-one experience. To this end, the project team is developing software tools that people can use to explore and adjust settings that might be helpful. A capture tool is also being developed that will capture applicable settings that people might already have set up on their personal computers. The captured settings would then be portable and could be applied to other computers with the system installed. These additional features will be implemented in future pilots and will also be introduced in systems already placed.

Conclusions

The GPII auto-personalization system was given positive reviews by AJC customers and staff in this early pilot. With additional pilots at AJCs and other locations, we hope to learn more about auto-personalization to develop a better system. We hope to learn how to better support how people with disabilities learn about assistive technology, features, and settings that would be useful and how to easily apply those settings to computers they use at home, work, and in the community.

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