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Topics in Technical Communication: User Research and Usability

With Professor Tori Sadler

Heuristic Evaluation: Team Aggregate

Our team re-examined the automated checkout system with the goal of revealing usability issues based on the *Ten Usability Heuristics* by Jakob Nielsen. A couple of us returned to the library to re-examine the checkout system to fill in holes in our information.

In this report, the ten usability heuristics will appear as paragraph headings in bold font.

Visibility of system status

Initially, the system status is mainly indicated by the LCD monitor being turned on and displaying a message that tells the user to “Please scan your library card” (see Figure 1: Welcome Screen). It is further indicated by lights glowing on the laser wand and the laser grid pattern that shows (see Figure 2: Laser grid).

One usability issue is that the system requires additional hand-made signs to inform users about its status. The signs inform users that they are looking at the “Self Checkout” (see Figure 1 and Figure 4). I doubt the system designers envisioned the need for cut-out signs to enhance the welcome screen.

Figure 1: Welcome Screen

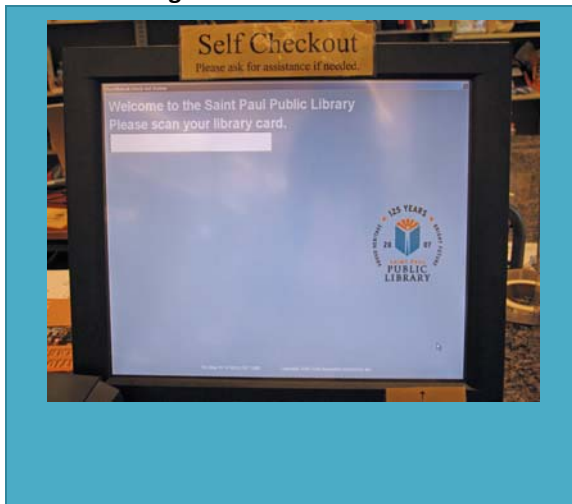
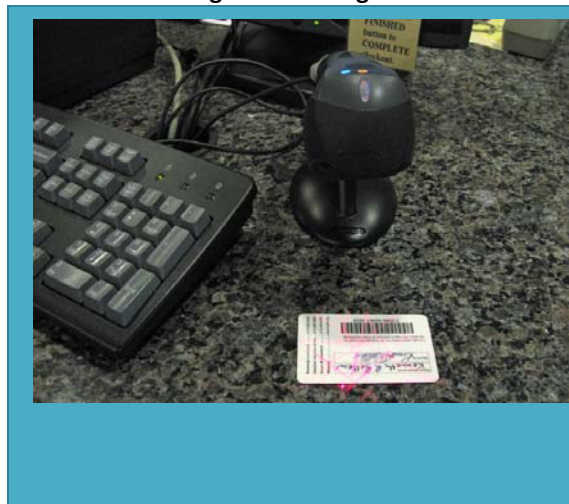


Figure 2: Laser grid



Once the user has scanned his or her card, the system keeps the user informed of progress by updating the screen, depending on the user's actions. His or her name is added to the screen to let the user know that his or her information is being accessed (see Figure 3).

The system utilizes beeps to inform the user that input was received. Input includes items scanned and screen touching feedback. However, the system is limited to one audio tone. It uses the same tone for input-acknowledgment as it uses to indicate an error has occurred. For instance, the system beeps when an item is successfully scanned, and it beeps if you accidentally scan the ISBN number instead of the barcode. It will also beep if the scanned item cannot be located in the database. This results in items being removed from the library that have not been scanned into the system.

Figure 3: User name on screen

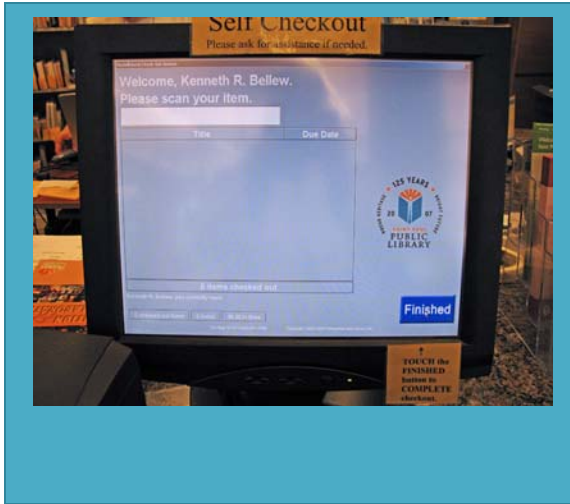


Figure 4: Hand-made sign



Match between system and the real world

The system uses concepts with which most are familiar in local society. Computer interfaces, touch screens and even laser scanning wands are in common use. The system seems to be designed with as little wording as possible to make it easier for non-readers, non-English readers and those with little patience for reading instructions. However, the librarian told us that it would be helpful if the system offered Spanish and Hmong language options for the interface. The system has no option to select a language for the interface.

We also noticed that the laminated signs were not created with ease of use for non-English speaking users. For example, the sign shown in Figure 1 informs the user to “Please ask for assistance if needed.” The three-syllable word “assistance” could have been rendered as “help,” which would be more easily translated by less-language-proficient users. Also, the hand-made sign shown in Figure 4 uses awkward capitalization. This may confuse those who are learning to read English.

User control and freedom

If the user arrives at a screen unexpectedly or wishes to exit, the system provides the “Finish” or “Cancel” touch-screen button. These two buttons are used consistently through the experience.

An undo button would be nice to have. This would be helpful if you accidentally scanned an item that you had not intended to check out.

Consistency and standards

The system does a fairly good job of presenting menus that look familiar to users accustomed to computer software and internet pages. The exit options are always located in the same location in the lower right corner.

Sometimes, it could be more clear that something is a button. For example, to access the menu to pay a fine, the user must touch the screen on the rectangle that shows the fine amount (see Figure 9). It is not clear that this area is a button. Contrastingly, the buttons to “Pay Online” are very clearly buttons. They are distinguished by having a beveled-appearance and being a darker blue (see Figure 5).

Figure 5: Amount of fine

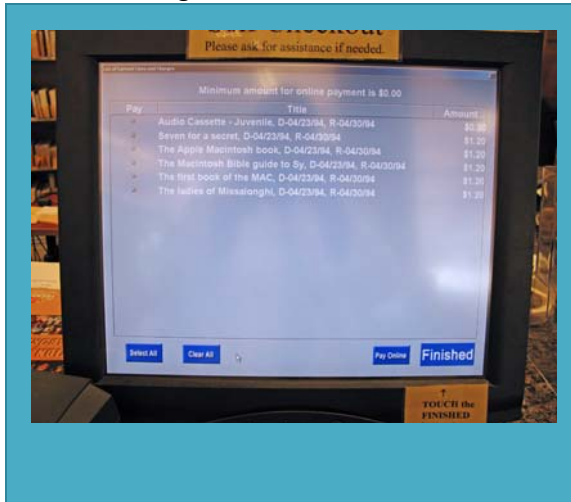


Figure 6: Security-bracket removal for media items



Error prevention

The general use of the system requires few complicated tasks. The user's name is displayed on screen, so the user knows he or she is not checking out items on someone else's account. Most transactions will consist of the user pushing his or her library card beneath the scanner and then passing the checkout item beneath the scanner and repeating until finished. However, the system has several areas where errors can go undetected. For example, if the user does not understand that the security case must be removed from the media, the item can be taken home with the security device remaining on the item. The security device (see Figure 6) does not have alarm-activation capabilities; therefore, unless the staff notices that the security devices are not removed, the user will later discover that he or she cannot open the media.

Another major area affected by lack of error prevention has already been mentioned- The same audio tone is used to announce errors and successes. The library staff mentioned that this is

the most common error experienced. The staff only notices the problem when items are returned that were never checked out properly. The only attempt by the system to capture this error is the receipt that is printed. However, this requires the user to examine the receipt for errors prior to leaving the library.

Our team noticed that when we purposefully entered a wrong digit for his credit card, it informed us that the card number was invalid.

Recognition rather than recall

After an item is scanned, the system displays the item title and due date on screen. This helps the user to recall whether or not an item (in his or her stack of books or media) has already been scanned. The receipt prints at the conclusion of the transaction (see Figure 7). This matches most user's expectations of getting a receipt for a transaction. The due dates, which can vary depending on the item type (book or media) is also printed on the receipt. In this way, the user does not need to write down what items are checked out and when they are due.

It would be easier for the user if the receipt sorted the items by due date first and alphabetically second. This would allow the user to gather all items due on a specific day more easily.

As mentioned in more detail in the next section, the repetitive actions that occur once the card is scanned reduce the need for user recall. The user may almost blindly whiz through the scanning of items without taking much notice of the system.

Figure 7: Receipt printer

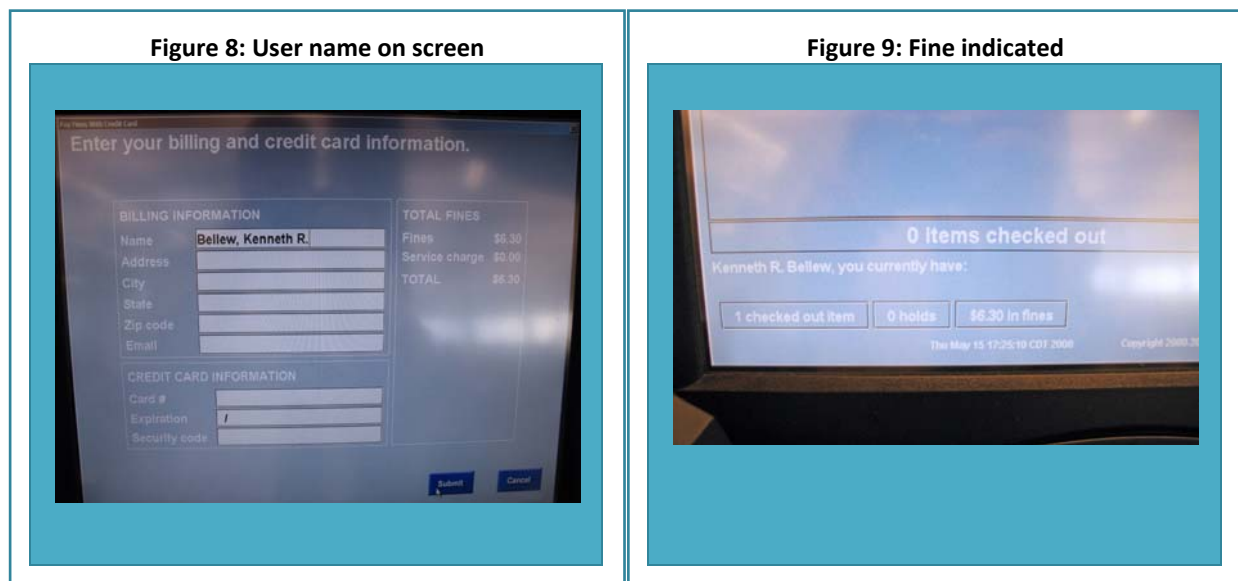


Flexibility and efficiency of use

The main accelerator noticed was that items could be processed iteratively. In other words, after successfully scanning the first item, the user was not required to take any action that deviates from repeating the same action over and over. In this way, many items can quickly be

scanned into the system. This repetitive action reduces time spent by the user to understand what is happening next. It also potentially causes the user to ignore screen errors.

This ease of use also creates potential errors. The media items can be scanned whether or not the security cases have been removed. This may result in the user taking items out of the library without removing the security device. Books can be passed under the scanning wand without being recorded by the system. This may result in the user taking items out of the library without checking out the items.



While checking out material, if the user owes a fine greater than \$10.00, the transaction cannot conclude. The system provides the option to pay the fine at the checkout terminal. This keeps the user from needing to change locations (it does not force the user to go to a customer service desk).

It would be more convenient if the system accepted more forms of payment. For example, PayPal is increasingly common and is one of the most common forms of payment used online. Also, there are many young people who cannot get a credit card who have a PayPal account.

If the user must pay a fine, he or she can select the touch-screen button labeled “\$XX.XX in Fines” (where X represents the fine amount – see Figure 9). In the next menu (Figure 8), the user is given the option to Pay Online. As the user enters information, it appears on screen, allowing the user to know if it is entered correctly. However, this creates a privacy issue. The screen uses an enormous font that can be seen by most from over 10-feet away (see Figure 8). When I performed the task, I was anxious about my credit card number being so visible. Even the card’s security code was displayed. I would suggest that the security code appear in asterisks. I understand that the card number appearing in asterisks would create input errors, but the security code is short enough that it does not require immediate visual validation.

Another option to improve security would be to face the screen toward the back wall of the staff desk. This allows the staff to see what is happening while providing increased privacy for the user. Another option would be to install polarizing security screens that restrict viewing from angles; however, this would also keep the staff from seeing if an error occurs or if the items are actually being checked out.

Aesthetic and minimalist design

The check out system achieves minimalism by reducing the words that appear on the screen to the essential wording only. The positive outcome is that it reduces complexity. The user is not confused by the need to read extensive documentation to use each screen. The system seems intuitive, especially for users who are accustomed to computer interfaces (who are, most likely, its main consumer).

However, as mentioned earlier, the staff determined that the simple interface and minimum information on the welcome screen is not sufficient communication, and they added signs to the system (see Figure 1 and Figure 4).

Help users recognize, diagnose, and recover from errors

For the checkout system, error recovery consists of one or two sentences explaining the course of action required. If more instruction is needed, the system informs the user to seek help from the library staff.

If the user enters the wrong menu, the cancel or finish button provide ways to exit the screen. For example, if the user presses the button to pay a fine, he or she can select the cancel button (see Figure 8). A back button placed in the upper left corner would also be helpful. Most users are accustomed to finding a back button in this location.

Help and documentation

There was no help menu on screen. As previously mentioned, when help required more than two sentences, the system encouraged the user to seek help from the staff. The staff were always quick to help with issues regarding the scanner.

A help system would be beneficial; however, it would also slow down the checkout. In a busier library, this could increase costs, as more systems would need to be added to handle patron load.

If signs are needed to guide the user, Spanish and Hmong-language signs could be added.

(see next page for severity ratings)

Severity evaluation

Severity rating:

1 = Showstopper

2 = Major

3 = Minor

4 = Cosmetic

+ = Good

Frequency:

A = Always occurs or present

B = Occurs most of the time

C = Occurs occasionally

D = Seldom occurs

Heuristic Evaluation Principle	Issue	Severity	Suggestion	Frequency
Visibility of system status	Interface requires hand-made signs to guide users to use system.	3	Determine if this information needs to be added to welcome screen	A
Visibility of system status	System is illuminated and has message informing user what to do	+		A
Visibility of system status	Same beep for errors and acknowledgment	2	Use a different beep for errors	C
Match between system and the real world	Other languages not available	2	Add Spanish and Hmong options for the one or two sentence messages	A
Match between system and the real world	Hand-made signs have big words and awkward capitalization	3	Revise signs	A
Match between system and the real world	GUI uses familiar screen and buttons	+		A
User control and freedom	GUI has exit buttons that guide the user	+		A
User control and freedom	GUI has no undo feature	3	Consider revision for next software revision	A
Consistency and standards	GUI places buttons in the same locations for all menu screens	+		A
Consistency and standards	It is not clear that some buttons are buttons	3	Consider revision for next software revision	A
Error prevention	Task require simple intuitive steps	+		B
Error prevention	User can take media out of library without removing security device	2	Add alarm activation to security device	C
Error prevention	Same beep for errors and acknowledgment	2	Use a different beep for errors	C
Error prevention	The system does not allow the user to enter wrong credit card information	+		A
Recognition rather than recall	The system records the item title on the screen so the user can see what has been checked out already	+		A
Recognition rather than recall	The receipts remind the user what was checked out	+		A
Recognition rather than recall	The receipt should print with the items sorted by due date	4	Consider revision for next software revision	A

Flexibility and efficiency of use	Items can be scanned iteratively	+		A
Flexibility and efficiency of use	Ability to pay fines at checkout system speeds patrons through checkout	+		A
Flexibility and efficiency of use	The system should accept PayPal	4	Consider revision for next software revision	A
Flexibility and efficiency of use	The system should not display the credit card and security code in a way that is so visible to other patrons.	2	Consider revision for next software revision. Turn screen toward staff desk or install polarized viewing screens.	A
Aesthetic and minimalist design	Using few words reduces complexity	+		A
Aesthetic and minimalist design	In some cases, not enough words are used	3	Consider revision for next software revision	A
Help users recognize, diagnose, and recover from errors	Short sentences guide the user on task	+		A
Help users recognize, diagnose, and recover from errors	Consistently placed exit buttons allow users to leave screens	+		A
Help users recognize, diagnose, and recover from errors	Adding a "Back" button in the upper left corner would be helpful	4	Consider revision for next software revision	A
Help and documentation	The system could use a help system	3		A
Help and documentation	Hand-made signs are needed to explain the system	3	Add sign information to Welcome screen	A
Help and documentation	The system is so simple and intuitive, help is rarely needed	+		B
Help and documentation	If signs are needed, various languages could be added to guide patrons	3	Update signs	A