Findings and Recommendations Report for TigerPrint Mobility Print Instructions for Kiosk Printers

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Executive Summary

This report details a usability study of the TigerPrint Mobility Print instructions for Kiosk Printers located in Auburn University's (AU) Ralph Brown Draughon (RBD) Library. This study was conducted by three Master of Technical and Professional Communication (MTPC) students to determine the usability, effectiveness, and areas of improvement for the Mobility Print instructions.

Our research team recruited 5 first-time users of the Mobility Print instructions and conducted tests from October 24–October 26, 2023. We applied a mixed-methods approach by combining task-based scenarios with a think-aloud process, a pre- and post-test questionnaire, and a Microsoft Product Reactions Card assessment. Data was collected through quantitative and qualitative methods using video, audio, and screen recording technology; timekeeping; real-time observation and notetaking; and questionnaire feedback. This allowed our team to identify key issues and generate recommendations for improving the Mobility Print instructions.

Research findings indicate that participants felt theTigerPrint Mobility Print instructions and printing system were useful, usable, and allowed them to easily download the software to begin the printing process; however, participants also experienced several errors that caused significant delays on tasks. The findings are prioritized using the following categories:

- Level 1 – Frustrated participant and caused significant delay on a task
- Level 2 – Had a minor effect on usability
- Level 3 – Caused no significant impact on performance, but participant indicated a preference
- Level 4 – Caused no significant impact on performance, but was noted as a frustration by test moderators

The table below details high priority (Level 1) findings. For detailed findings, see Table 2.

Level 1 - Frustrated participant and caused significant delay on task	Participants did not understand what happened in their system once the Ricoh profile/app was downloaded
	Confusion about whether the app/profile was successfully installed
	Participants did not know they needed to select the file name on the Pay Station to allow them to print
	Instructions had too many words

The team also identified less substantive issues that could be addressed to boost overall usefulness and user engagement with the instructions, identified in Table 2. This report details research-based recommendations for improving the usability of the Tigerprint Mobility Print instructions, as well as a mock-up for the improved instructional document.

Introduction

Paula Dala, Director of Service Delivery at Auburn's Office of Information Technology (OIT), and Erica Seymore, Manager of the OIT Service Desk, approached our research team to request a usability test on the TigerPrint Mobility Print Instructions for Kiosk Printers. According to Dala and Seymore, the OIT Service Desk had seen an increase in student complaints about the printing instructions for the large Ricoh Kiosk Printers in Ralph Brown Draughon (RBD) Library on Auburn University's (AU) main campus in Auburn, Alabama. The most frequent complaints indicated that the TigerPrint instructions were difficult to understand and follow, the Mobility Print feature was unreliable, and the printing process took too long. To investigate these issues, our group conducted a high-fidelity usability test on the TigerPrint Mobility Print Instructions for Kiosk Printers.

Figure 1. *TigerPrint Mobility Print instructions pasted above the Kiosk Printers in RBD Library.*

The purpose of this usability test was to evaluate the capability of the TigerPrint Mobility Print Instructions to guide users through the printing process using their mobile devices. These instructions are specifically designed to guide first-time users through the installation process of the Ricoh Print Queue profile app on their wireless device and initial Mobility Print setup (see Fig. 1). Keeping in mind the three key complaints reported by students, our research team created a task-based scenario usability test designed to mimic what our target audience (Auburn University students) would encounter while interacting with the Mobility Print instructions for the first time.

Our usability testing (accompanied by think-aloud methodology), data collection, findings, and recommendations were prepared in accordance with usability testing best practices and guidelines found in Barnum's (2021) *Usability Testing Essentials.* The data generated from the tests addressed the key issues that Dala and Seymore reported. Recommendations were then made to improve the wording and functionality of the TigerPrint Mobility Print Instructions, thereby working to minimize confusion and lessen the total print time for students.

Testing Methodology

This section includes the research team's test objectives, a general profile of participants, as well as detailed explanations of the testing methodology used with all participants during the 45–50-minute sessions.

Test Objectives

The research team established three primary test objectives to determine the following:

1. **Average use time for first-time users**
   The research team assessed how long it takes for a first-time user of Mobility Print to successfully print a document using the Mobility Print instructions.

2. **Sources & causes for error in the Mobility Print instructions**
   Data was collected on what errors first-time users experienced while printing (if any). Additionally, areas where the Mobility Print instructions succeeded/failed in guiding users through the printing process were also noted.

3. **User sentiments while printing**
   Additional data was collected on users' feelings regarding the usefulness of the printing instructions and the overall printing experience.

General Profile of Participants

This usability test was specifically designed to evaluate the usability of the TigerPrint instructions for *first-time* Mobility Print users. In addition to this requirement, participants had to be current Auburn University students, at least 18 years old, and own a mobile device.

The background questionnaire was circulated as a Google Form, and formatted so that participants who had previous printing experience with TigerPrint Mobility Print would not be required to complete the pre-test questionnaire, included as an additional section on the Google Form. The only requirement for participation in the test was no prior printing experience with Mobility Print. 2 of 5 participants had previously used TigerPrint services; however, they had never used Mobility Print, so these participants were not rejected. This choice was made in order to more accurately reflect Auburn University's students' background with printing.

A total of 5 participants were recruited. Table 1 lists participants' basic comfortability with technology, as well as their printing experience.

Participant #	How would you describe your level of comfort with technology?	How would you describe your experience with printers/printing technology?
P1	Moderately comfortable	I have some experience with printers/ I print occasionally
P2	Very uncomfortable	I have some experience with

		printers/ I print occasionally
P3	Very comfortable	I have a lot of experience with printers/ I print frequently
P4	Very comfortable	I have some experience with printers/ I print occasionally
P5	Very comfortable	I have little printing experience/ I print rarely

Table 1. *Participants' comfortability with technology and printing experience.*

Usability Evaluation Methods

Our usability test implemented a mixed-methods approach that included a background/pre-test questionnaire, four task-based scenarios, a product reactions card assessment, and a post-test questionnaire, all of which were accompanied by a think-aloud process, excluding the background/pre-test questionnaire. According to Barnum (2021), a think-aloud process encourages participants to share their thoughts while interacting with a product. Although voicing thoughts aloud is not “normal” for most people, this additional insight into participants’ interactions with the printing instructions helped the research team understand more about participants’ experiences. These combined methods enabled our research team to gather qualitative and quantitative data regarding the overall user experience with the TigerPrint Mobility Print Instructions.

Following the completion of scenarios 1–4, a Product Reaction Cards assessment was conducted (Barnum, 2021) to assess participants’ feelings regarding their printing experience using the TigerPrint Mobility Print instructions. Additionally, participants completed a pre- and post-test questionnaire designed to solicit additional feedback regarding their background/prior experience with printing, as well as their impressions about the instructions after testing. The pre-test questionnaire was not a part of the think-aloud process; however, participants were asked to voice their thoughts aloud while selecting Product Reaction Cards and completing the post-test questionnaire.

Pre-Test Questionnaire

Before engaging in the usability test, participants were required to sign a consent form and complete a background/pre-test questionnaire. The pre-test questionnaire was delivered via Google Forms and collected information about participants’ demographics, prior printing experience, general level of comfort with technology, and expectations for the printing process. This questionnaire was crucial for drawing important conclusions regarding test results and participants’ level of comfort with technology. This helped the research team better understand how different demographics engaged with the TigerPrint Mobility Print Instructions.

Task-Based Scenario Usability Test

According to Barnum (2021), for small studies to reap useful results, participants must be given specific tasks to perform. These tasks are embedded within scenarios, realistic descriptions

framed around users' goals (p. 19). Four task-based scenarios formed the core of the usability test. Our team created real-world scenarios in order to replicate students' use of the Ricoh Kiosk Printers in RBD under specified time constraints (e.g., printing an English paper before class begins). These task-based scenarios prompted participants to utilize different print preferences (e.g., printing in color, double-sided/duplex, single-sided/simplex). For a full description of the task-based scenarios, see the Test Procedure section of this report.

Product Reaction Cards Assessment

Following completion of the four task-based scenarios, participants underwent a desirability test using Microsoft's Product Reaction Cards, created to understand the illusive, intangible aspect of desirability resulting from users' experience with a product (Barnum, 2021). Participants were seated before the complete set of 118 Product Reaction Cards (see Appendix F) and asked to select any combination of positive, negative, or neutral cards that characterized their printing experience. Participants were asked to point to each chosen card, narrate the word, and explain their choice. This assessment took very little time to administer, but produced valuable data and gave the research team a rich understanding of participants' printing experiences.

Post-Test Questionnaire

The final component of our usability test was a post-test questionnaire, administered via Google Forms and emailed to participants. This questionnaire used a Likert scale (Barnum, 2021) and open response questions to gather immediate feedback regarding participants' printing experience and their evaluations of the usefulness of the TigerPrint Mobility Print instructions. This testing mechanism was extremely useful for identifying specific areas of improvement and understanding potential alternatives for information display.

Team Member Roles & Data Collection Tools

During usability testing, group members assumed the following roles:

Kaitlin Coyle: Video Moderator (Moderator C)
Anna Mathis: Test Moderator 1 (Moderator A)
Colleen May: Test Moderator 2 (Moderator B)

The research team used a variety of data collection devices for the usability study including a DSLR camera and lavalier microphone to record video footage and capture participants' verbal think-aloud process. Additionally, participants were also asked to activate their screen-recording function, so the research team could reference this data. Moderator A and Moderator B used their smartphones, personal laptops, and pen and paper to record notes during the sessions.

In their notes, Moderator A and Moderator B recorded time on tasks, nonverbal cues/body language that was not captured in video footage, and information displayed on the Pay Station screen (not visible to the DSLR camera). These notes supplemented the video, audio, and screen recordings. Moderator B was also responsible for administering the Product Reactions Card assessment and post-test questionnaire. Moderator C managed all technological aspects

of the test, including the DSLR camera, lavalier microphone, and importing of all video, audio, and screen recording footage.

Each team member contributed to the data collection and data analysis process, as well as the development of this recommendations report. Moderator A was responsible for analyzing participants' screen recording footage, while Moderators B and C were responsible for analyzing usability footage. Each team member drew conclusions about the instructions' major usability issues, and a final meeting was held to assign each usability issue a priority level.

Data Collection Methods

For quantitative data, the research team assessed the amount of time participants spent on each task-based scenario, the average time spent on the printing process, and errors that participants experienced while printing. Google Forms and Sheets were used to consolidate and organize data gathered during the test, as well as the pre- and post-test questionnaires (Barnum, 2021).

For qualitative data, the research team gathered participant comments, responses from pre- and post-test questionnaires, and information from participants' think-aloud processes during the usability test and Product Reaction Cards assessment. Information from the Product Reaction Cards assessment was organized to show commonalities and how many times certain words were chosen by each user.

Location and Length of Evaluations

Usability testing was conducted on the 3rd floor of RBD Library at Auburn University. The same Ricoh Kiosk Printer was used for all five tests (the printer directly in front of the OIT Help Desk). The Product Reaction Cards assessment and post-test questionnaire were conducted at a small table nearby. All tests were conducted between Tuesday, October 24 and Thursday, October 26, 2023.

This usability test was designed as a field test so that participants could be observed interacting with the TigerPrint Mobility Print Instructions in their natural environment. Barnum (2021) states several advantages to field testing, including being able to observe the "artifacts that support users in their tasks" (p. 84). Because the primary goal of the usability test was to assess how well the TigerPrint Mobility Print Instructions guided participants through the printing process, a field test was chosen to evaluate how participants might adapt their environment to assist them in the printing process, if errors arise.

The total length of each session was approximately 40–50 minutes and included the following:

- Introduction, Consent Form Reiteration, Study Explanation (10 minutes)
- Task-Based Scenarios with Think-Aloud Process (20–30 minutes)
- Product Reaction Cards and Post-Test Questionnaire (10 minutes)

Results / Findings

Introduction

The following results and findings were compiled from the background and pre-test questionnaire, the task-based scenario usability test with a think-aloud process, the Product Reaction Cards assessment, and the post-test questionnaire. This study provided our research team with quantitative and qualitative data, enabling us to record and rank the top usability problems encountered by participants while using the TigerPrint Mobility Print instructions for Kiosk Printers.

Several positive findings were discovered from the Product Reaction Cards assessment and post-test questionnaire. A majority of participants expressed that downloading the Ricoh Print Queue profile/app was easy; some also noted that the printer was more “usable” once they figured out how to use it. Another key positive finding during the task-based scenario usability test was once participants figured out how to print, they found the process much easier a second time and grew less reliant on the instructions. However, our findings also uncovered a series of usability errors concerning the functionality and wording of the TigerPrint Mobility Print instructions.

Results from Collated Findings and Severity of Usability Problems

Upon analyzing the video recordings from the testing sessions, our research team compiled the top 15 usability problems noted by Participants 1–5, scoring each on a scale of 1–4 based on level of severity. Specifications for the severity score can be viewed below. Based on our collated findings (see Table 2), 4 usability problems scored a Level 1 in severity and affected 3 or more participants, while 6 usability problems scored a Level 2 in severity and affected 2 or more participants. 67% (or 10/15) of the problems recorded had an impact on participants’ performance and usability.

Severity Score

- Level 1 – Frustrated participant and caused significant delay on a task
- Level 2 – Had a minor effect on usability
- Level 3 – Caused no significant impact on performance, but participant indicated a preference
- Level 4 – Caused no significant impact on performance, but was noted as a frustration by test moderators

Usability Problem	# of Participants Affected	Severity
Participants did not understand what happened in their system once the Ricoh profile/app was downloaded	4	1
Confusion about whether the app/profile was successfully installed	4	1

Participants did not know they needed to select the file name on the Pay Station to allow them to print	3	1
Instructions had too many words	3	1
Confusion about the different QR codes on the instructions and the Pay Station	2	2
Participants did not understand what to do after downloading the Ricoh profile/app	4	2
Confusion about how to enter Auburn credentials when prompted	4	2
Confusion about the difference between a profile and an app	4	2
Inconsistent wording for print setup options (simplex/duplex vs. one-sided/double-sided)	3	2
Participants did not set their print settings correctly and printed their documents incorrectly	2	2
Participants expressed lack of confidence in QR codes	2	3
Confusion about the difference between a Kiosk, printer, and Pay Station	1	3
Instructions are not numbered	1	3
Participants believed the cost of printing was expensive	1	3
Participants did not know the cost of printing until they were prompted to print on the Pay Station	5	4

Table 2. *Collated findings, ranked by severity. Adapted from Usability Testing Essentials (Barnum, 2021).*

Pre-Test Questionnaire Results

Tables 3 and 4 display participant responses to the pre-test questionnaire. All participants indicated that they print either weekly or biweekly and that they expected their ideal printing experience to take 5–10 minutes. 4 out of 5 participants also indicated that they usually print using Wi-Fi or wireless printing methods, suggesting that participants had experience with wireless printing services. All participants indicated that if they were unsure of how to print something, they would consult printing instructions.

	How often do you print documents?	How much time do you expect your ideal printing experience to take?	What is the maximum amount of time you would dedicate to printing a document before seeking

			assistance?
P1	Weekly	10 minutes	5 minutes
P2	Bikweekly	5 minutes	20 minutes
P3	Weekly	5 minutes	10 minutes
P4	Weekly	5 minutes	15 minutes
P5	Biweekly	5 minutes	10 minutes

Table 3. *Pre-test questionnaire results.*

	When printing, what methods do you usually use to print?	**If you were unsure of how to print something, what would you do?**
P1	Wi-Fi or Wireless Printing	Consult printing instructions Ask a close friend Use Google
P2	Wi-Fi or Wireless Printing USB-Printer Connection	Consult printing instructions Ask an IT specialist Ask a close friend
P3	Wi-Fi or Wireless Printing	Consult printing instructions Ask an IT specialist Ask a close friend Use Google
P4	Wi-Fi or Wireless Printing	Consult printing instructions Consult a user guide Use Google
P5	USB-Printer Connection	Consult printing instructions Use Google

Table 4. *Pre-test questionnaire results continued.*

Task-Based Scenario Usability Test Results

General Findings

Upon starting the task-based scenario usability test, participants expressed confusion over which instructions they were being asked to use. Though our research team specified that we were testing the TigerPrint Mobility Print instructions, many were confused given their choices of 4 QR codes on the instructions and 2 additional QR codes on the Pay Station. In fact, 2 out of 5 participants either scanned the wrong QR code or used a different QR code than instructed.

Participant 1 initially scanned a QR code in the bottom right-hand corner of the instructions, which directed them to provide feedback on the print system. Participant 1 then scanned the “Preload Funds” QR code before finally scanning the correct code for downloading the Ricoh Print Queue profile/app. Participant 5 scanned a QR code on the Pay Station which directed them to an online version of the Mobility Print instructions (see Fig. 2). The key difference between the two sets of instructions, as noted by Participant 5, was that the online version included photos for each step and additional explanation for downloading the Ricoh Print Queue profile/app.

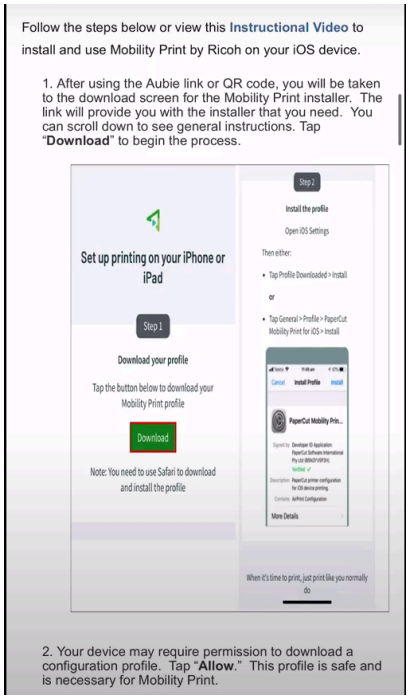

Figure 2. *Participant 5's mobile Tiger Print Mobility Print instructions.*

Another key area of confusion occurred during the second task-based scenario when participants tried to locate their recently downloaded Ricoh Print Queue profile/app. Overall, participants were unsure of where to go once they downloaded it; they were also unaware that the profile/app was running in the background of their mobile device. The instructions do not tell users the next step after downloading. Rather, they instruct users to “locate your document on your device.” 3 out of 5 users also reported that the instructions had too many words. Additionally, 3 out of 5 users were unaware that they needed to select the print file name on the Pay Station interface in order to print.

Time on Tasks

Table 5 depicts the time (in minutes) participants spent on scenarios 1–4, as well as the cumulative time spent on the task-based scenario usability test. Participant 2 spent the most time on the cumulative test, while Participant 5 spent the least amount of time, with a recorded difference of 13:19. The average test completion time was 16:28.

Participant #	Scenario #1	Scenario #2	Scenario #3	Scenario #4	Total Test Time
	First Impression of Instructions	*Downloading Ricoh Print Queue*	*First Time Printing*	*Second Time Printing*	

P1	0:30	3:22	7:00	3:56	**14:48**
P2	1:48	1:48	18:05	2:18	**23:59**
P3	0:47	0:56	13:01	1:54	**16:38**
P4	0:40	3:26	9:11	2:58	**16:15**
P5	1:22	2:16	4:36	2:26	**10:40**
Average	**1:01**	**2:21**	**10:22**	**2:42**	**16:28**

Table 5. *Time on tasks.*

The difference between time on tasks was likely impacted by the participants' level of comfort with technology (see Fig. 1), the number of times the participant referred to the instructions (see Fig. 2), and the number of times the video moderator intervened to provide assistance (see Appendix E). Participants 4 and 5 expressed they had prior experience with the old AU printing system. Though there are distinct differences between the current and former printing systems, it is worth noting the correlation between performance time and prior experience among these two participants.

Level of Comfort with Technology vs. Total Test Time

Figure 3 compares participants' overall level of comfort with technology (inquired during the pre-test questionnaire) versus the cumulative time to complete the test.

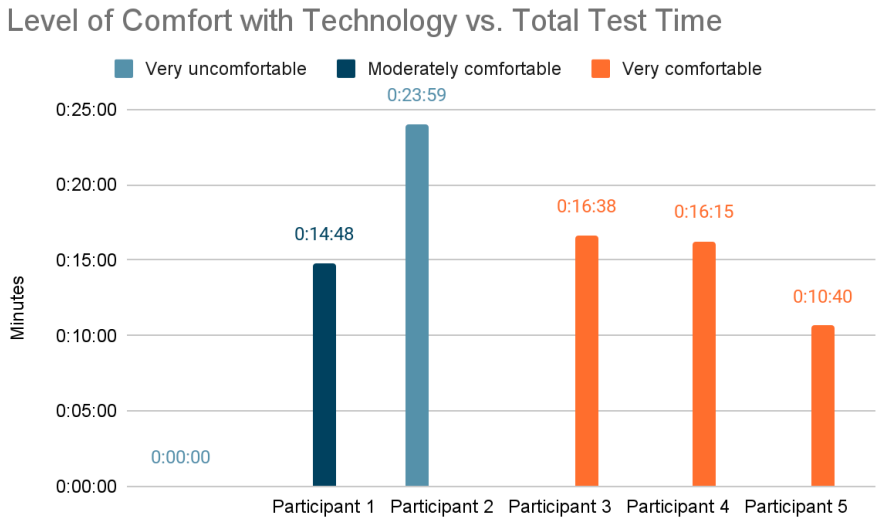

Figure 3. *Participants level of comfort with technology versus total time completion for scenarios 1-4.*

Participants 3, 4, and 5 expressed that they were “very comfortable” with technology. Participant 2 reported they were “very uncomfortable” with technology—consequently, this participant had the highest cumulative test time. Participant 1 reported being “moderately comfortable” with technology, yet had the second lowest cumulative test time, surpassing Participants 3 and 4 who rated themselves higher in comfortability.

Figure 4 compares the number of times Participants 1–5 referred to the TigerPrint Mobility Print Instructions with the cumulative test time.

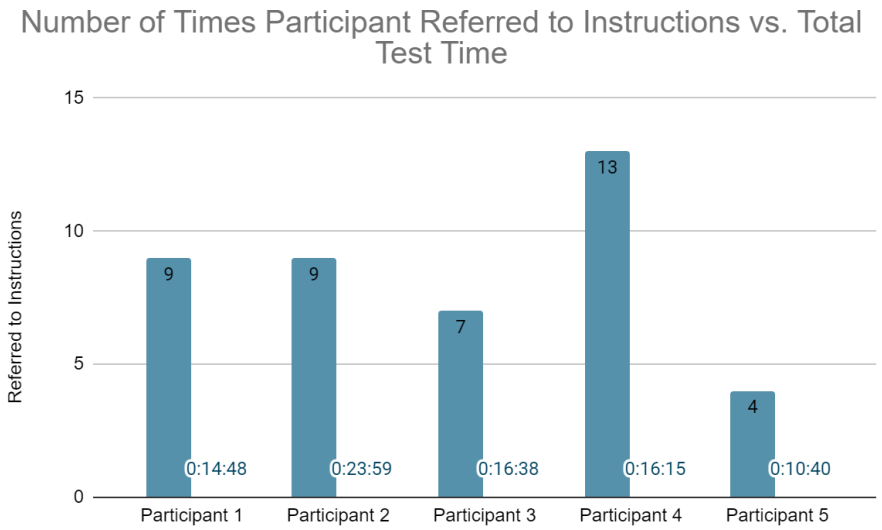

Figure 4. *Number of times participants referred to the instructions versus total test time.*

According to Figure 4, Participant 5 referred to the instructions the least amount of times and had the lowest total test time. It should be noted that Participant 5 used a different set of instructions than instructed (see Fig. 2). For this reason, our research team was unable to record the number of times Participant 5 formally referred to the instructions until the video moderator intervened during Scenario 3.

Participants 1 and 2 referred to the instructions 9 times, while Participant 3 referred to them a total of 7 times. With a total of 13 views, Participant 4 referred to the instructions the most, yet had the third lowest total test time. Given the lack of correlation between the two variables, our team found that the instructions did not help the participants complete each task more efficiently.

Specific Findings

Scenario 1

Using think-aloud methodology, participants were asked to state their initial impressions of the TigerPrint Mobility Print instructions (see Table 6). 2 out of 5 participants expressed that the instructions were “a lot of words.” 2 out of 5 participants also presumed that the instructions seemed “simple” and/or “straightforward.” Additionally, 2 out of 5 participants commented on the QR code and expressed dissatisfaction in having to use it.

	What is your first initial impression of the TigerPrint Mobility Print instructions?
P1	“My first impressions–it’s a lot of words.”
P2	“I already don’t like that I have to scan something” *(in reference to using their phone to scan the QR code on the instructions).* “It seems simple. It’s only 5 steps.”
P3	“Seems straightforward enough. QR codes have a habit of going wrong on Samsung devices.”
P4	“It’s very organized in the way it’s divided. I like the different columns. It looks like it would be easy to get everything I need.”
P5	“It’s a lot of words. Immediately, I don’t want to read all these words…”

Table 6*. Participants' first initial impressions of the TigerPrint Mobility Print instructions.*

Scenario 2

During scenario 2, participants were asked to download the Ricoh Print Queue profile/app on their mobile device and let us know when they had finished doing so. 4 out of 5 participants used the QR code located on the Mobility Print instructions, while Participant 5 scanned a QR code on the Pay Station which brought him to a mobile version of the instructions. Unlike the print version, the mobile version of the instructions featured images that corresponded to each step, though the wording of both sets of instructions were identical.

Participant #	Scenario #2 *Downloading Ricoh Print Queue*	Device Type
P1	3:22	Apple
P2	1:48	Apple
P3	0:56	Android
P4	3:26	Apple
P5	2:16	Apple

Table 7. *Scenario 2 time completions versus participants' device type.*

There was a marked difference in wording and the way the profile/app was displayed on Apple vs. Android interfaces. Android users downloaded the PaperCut Mobility Print app, whereas Apple users downloaded the Ricoh Print Queue profile. 4 out of 5 participants used an Apple device, while 1 participant used an Android device (see Table 7). Participant 3 (the Android user) downloaded the app in 56 seconds, which was significantly faster than the other participants. Participant 4 took the longest at 3:26. Participants 1, 2, 4, and 5 (Apple users) were unsure of when/if they had successfully installed the profile; they expressed confusion about where the profile had gone once they downloaded it, because it did not appear as a formal app on their screen. These 4 participants were also confused about the difference between a profile and an app.

Scenario 3

During scenario 3, participants were told that they had 30 minutes to print a double-sided 4-page essay for their English literature course. Table 8 reveals that participants used three different modes for accessing the email containing the essay: Outlook mobile app, Outlook web, and the default mail app for their iPhone. Our team noted that Participant 2, who accessed their email through Outlook web, had the most difficulty locating the printing options.

Participant #	Device Type	Accessed Email Via…
P1	Apple	Outlook Mobile App
P2	Apple	Outlook Web Version

P3	Android	Outlook Mobile App
P4	Apple	Default Mail App for iPhone
P5	Apple	Outlook Mobile App

Table 8. *Participants' device types and programs/applications used to access email.*

One thing to note is that during the printing process, Participant 5 accidentally printed their essay backwards. They selected "flip horizontal" in their print settings, causing the essay to appear mirrored (see Appendix I). The instructions may need to clearly specify which print settings participants need to apply.

Table 9 reveals participants' success/fail rates with the payment process. Blank spots indicate participants did not attempt to pay with the specified payment method, while "✔" indicates the *successful* attempts. "✘" marks indicate failed payment method attempts. Table 9 shows that no participants successfully paid using their TigerCard. Participant 2 had the most failed attempts (two in total) and had to preload funds as a last resort. Participant 3 had one failed attempt using their TigerCard and switched to a credit/debit card. Participant 2, who used the preloaded funds option, indicated that they did not look at the other side of the Mobility Print instructions (labeled "Preload Funds.") From the data in Table 9,our research team gleaned that the instructions ought to be more clear about the payment process.

Participant #	**Scenario #3**			**Scenario #4**			**Total Attempts**
	TigerCard	*Credit / Debit*	*Preloaded Funds*	*TigerCard*	*Credit / Debit*	*Preloaded Funds*	
P1		✔			✔		***2 successful***
P2	✘	✘	✔			✔	***2 failed*** ***2 successful***
P3	✘	✔			✔		***1 failed*** ***2 successful***
P4		✔			✔		***2 successful***
P5			✔			✔	***2 successful***

Table 9. *Participant payment methods and success/fail rates. Blank spots indicate that the participant did not attempt to pay with the specified payment method.*

Another thing to note is that the wording for print settings on the Pay Station and Ricoh Print Queue profile/ app are inconsistent. The Pay Station lists print settings as “simplex” and “duplex,” whereas the profile/app displays them as “double-sided” and “single-sided.” Participants expressed confusion over what “duplex” and “simplex” entailed. In addition, 3 out of 5 participants did not know they had to press the print file name on the Pay Station before they were allowed to print.

Participant #	**Scenario #3** *Print a 4-page, double-sided essay*	**Scenario #4** *Print a one-page colored copy of AgriBuisness Flyer*	**Total**
P1	$1.40	$0.50	$1.90
P2	$1.40	$0.50	$1.90
P3	$0.40	$0.50	$0.90
P4	$1.40	$0.50	$1.90
P5	$0.40	$0.50	$0.90

Table 10. *Total cost of printing for each participant.*

Table 10 reveals the total cost of printing for each participant. During scenario 3, Participants 3 and 5 spent a total of $0.40 to print the 4-page double-sided essay, while Participants 1, 2, and 5 spent a total of $1.40. Table 11 illustrates the TigerPrint printing prices for black & white and color in accordance with single-sided (simplex) and double-sided (duplex) printing. Participants 1, 2, and 5 did not change their print settings to black & white prior to printing. Thus, the total cost to print their test document was higher than the other participants.

Participants were also unaware of the total cost of printing until they were being prompted to pay on the Pay Station. Based on these findings, our research team noted that 1) the instructions ought to indicate the difference in print cost, and 2) the instructions need to notify users to check their default print settings to ensure they do not accidentally pay for color if printing in black & white.

	Black & White	**Color**
Single-sided (Simplex)	$0.17	$0.50
Double-sided (Duplex)	$0.20	$0.70

Table 11. *TigerPrint printing prices. Information obtained from [Auburn University Office of Information Technology](#).*

A final thing to note during Scenario 3 is when participants were prompted to login to their Ricoh app/profile, 4 out of 5 participants expressed confusion about whether to use their

Auburn credentials—specifically, whether they needed to include their full email address or only the first seven characters. Although Participant 5 did not verbalize this, his screen recording indicated that he had 2 failed login attempts for this exact reason. Our research team noted this in our medium-priority (or Level 2) recommendations.

Scenario 4

Scenario 4 was meant to assess participants' printing time after the initial print setup process, as well as their feelings about their second time printing (see Table 12). The results of Scenario 4 revealed that participants printed much more quickly after the initial setup, and felt that their second time printing was much easier than the first.

It is important to note, however, that Participant 2 (who used the Outlook web version on their Apple device) forgot to download the AgriBusiness Flyer and printed it as a smaller image (see Appendix I). What our research team concluded from this finding is that the instructions may need to provide clearer directions on how to send documents to the printer.

Participant #	**Scenario #4** *Printing for a second time (AgriBuisness Flyer)*	**Comments**
P1	3:56	"This should be easier because I have done this before."
P2	2:18	"That went much more smoothly."
P3	1:54	"The other one printed readily. Why is this one taking so long? Is this a toner printer? Oh, there we go! Huzzah!"
P4	2:58	*N/A*
P5	2:26	"Ok, and it's in color and it looks good."

Table 12. *Time it took participants to print after the initial print setup, as well as comments.*

Production Reaction Cards Results

Following the completion of the task-based scenario usability test, participants were presented with a selection of 118 product reaction cards and asked to choose 3-5 cards that best described their printing experience and experience with the TigerPrint Mobility Print instructions. The Product Reaction Cards assessment was adapted from Microsoft's desirability toolkit (see

Appendix F) and provides participants with a ratio of 60% positive words versus 40% negative or neutral words (Barnum, 2021). Table 11 presents the primary words chosen by participants, grouped by frequency and positive and negative groupings.

Words	Number of Times Chosen	Categorization
Useful	2	Positive
Usable	2	Positive
Confusing	2	Negative
Time-consuming	2	Negative
Essential	1	Positive
Complex	1	Negative
Gets in the way	1	Negative
Rigid	1	Negative
Frustrating	1	Negative
Unapproachable	1	Negative
Understandable	1	Positive
Convenient	1	Positive
Time-saving	1	Positive
Reliable	1	Positive
Innovative	1	Positive
Fast	1	Positive

Table 13. *The number of times certain product reaction cards were chosen by participants, organized by positive and negative groupings.*

The results of the Product Reaction Cards assessment revealed that participants believed the instructions and printing process were useful and usable, but also time-consuming and confusing. Participants were also instructed to engage in a think-aloud process during the Product Reactions Cards assessment (see Appendix G). Participant 4 noted that while the instructions were understandable, if participants were short on time and not actively reading them, they understood how other participants might encounter frustration.

It is also important to note that during the think-aloud process (see Appendix G), Participant 3 expressed that TigerPrint prices were “expensive” and asked if “expensive” was an available

product reaction card to choose from. Participants 1, 2, and 3 had markedly different opinions of their printing experience than did participants 4 and 5 (see Appendix C & G), which was attributed to their indicated level of comfort with technology.

Post-Test Questionnaire Results

The post-test questionnaire was administered as a Google Form and used a Likert scale that allowed participants to assess their level of agreement/disagreement with the proposed statement (Barnum, 2021). The scores were then averaged among all participants. Tables 14, 15, 16, and 17 display participants' responses. Participants were also asked to engage in a think-aloud process as they completed the form (see Appendix H).

	I felt very confident following the printing instructions. *(1 = strongly disagree – 5 = strongly agree)*	**Overall, understanding the TigerPrint Mobility Print instructions was...** *(1 = very difficult – 5 = very easy)*	**Downloading the Ricoh Print Queue profile app was…** *(1 = very difficult – 5 = very easy)*
P1	2	2	2
P2	1	1	5
P3	4	1	5
P4	5	4	4
P5	4	4	4
Average	**3.2**	**2.4**	**4**

Table 14. *Post-test questionnaire results.*

Table 14 revealed that participants felt neither comfortable nor uncomfortable following the printing instructions; however, 3 out of 5 participants noted that understanding the TigerPrint Mobility Print instructions was difficult, suggesting room for improving the usability and usefulness of the instructions. 4 out of 5 participants, however, did express that the instructions' ability to guide them though downloading the Ricoh Print Queue profile was easy.

	Locating my documents and sending them to the printer was... *(1 = very difficult – 5 = very easy)*	**How likely are you to use the TigerPrint Mobility Print services again, if you did not receive any aid through the process?** *(1 = very unlikely – 5 = very likely)*	**Please rate your overall satisfaction with your printing experience.** *(1 = very dissatisfied – 5 = very satisfied)*

P1	3	1	2
P2	5	3	2
P3	5	1	2
P4	5	2	4
P5	5	3	4
Average	**3.6**	**2**	**2.8**

Table 15. *Post-test questionnaire results continued.*

Table 15 revealed that, overall, participants did not have trouble locating their documents on their mobile devices. Participants did express, however, that they would not be likely to use TigerPrint services again if 1) there were no instructions to guide them through the process or 2) they did not receive any aid from the video moderator (see Appendix E). 3 out of 5 participants expressed dissatisfaction with their overall printing experience, while 2 out 5 were satisfied.

	What, if anything, caused you frustration?	**If you could change anything about the current TigerPrint Mobility Print instructions, what would you change?**
P1	I didn't know what a profile was, and when told it was an app I think I expected an app on the phone. But also finding the place to enter the code confused me.	I would make them simpler.
P2	Having to follow a new set of instructions to put money on the printer.	More instructions on the screen rather than paper, combine printing instructions with payment instructions
P3	Kiosk instructions were unclear and could not edit properties from the kiosk.	Make it clear that the app is working in the background and you do not have to print directly from the app.
P4	Slow reaction time of the kiosk.	Clearer payment instructions in terms of ways to pay.
P5	Switching browser apps.	Make it accessible with any browser app to download.

Table 16. *Post-test questionnaire results continued.*

Table 16 displayed participants' suggestions for improving the TigerPrint Mobility Print instructions, as well as the primary processes/areas where participants experienced the most frustration. 2 out of 5 participants expressed that the instructions did not provide clear payment options. During the think-aloud process (see Appendix H) Participant 2 noted that the payment process could be improved if the “Preload Funds” section of the instructions were connected to the Mobility Print section (see Appendix D & Fig. 1).

	Would you recommend TigerPrint services to other students if they have never printed on campus before?	**If you answered "no" or "maybe" to the previous question, please explain why. If you answered "yes" type N/A.**
P1	Yes	If they have access to an easier printer, I would not recommend using TigerPrint.
P2	Maybe	I would only recommend if they have time to figure it out. If they’re in a crunch, they probably won’t have the time or patience
P3	Maybe	They are going to need spare time to figure out what is going on.
P4	Yes	N/A
P5	Yes	N/A

Table 17. *Post-test questionnaire results continued.*

Table 17 displays whether or not participants would be likely to recommend TigerPrint services to other students on campus. 2 out of 5 participants stated that there was a possibility they would recommend TigerPrint services to other students; however, they suggested that students would need additional time to understand the instructions and the printing process. 3 out of 5 participants said they would recommend TigerPrint; however, one participant noted that they would not recommend TigerPrint if students had access to an “easier printer.” It is also important to note that Participants 4 and 5 had experience with the old TigerPrint system.

Recommendations

Introduction

In response to the findings from our task-based scenario usability test, Product Reaction Cards assessment, and post-test questionnaire, our research team compiled a series of recommendations to improve the TigerPrint Mobility Print instructions (see Appendix D). The following recommendations respond to our collated findings of the top usability problems encountered by participants, including areas of confusion and significant delays (see Table 2). Each recommendation has been categorized based on level of priority and will be shared with Mrs. Dala and Mrs. Seymore from the Office of Information Technology (OIT). Following these recommendations, our team has created a mock-up of the revised TigerPrint Mobility Print instructions, which we also plan to share with the OIT staff.

High Priority

1) Create separate sub-steps for installing the Ricoh Print Queue (Step #2) for Android and Apple users.
    a) Modify the wording of the instructions to inform Android users to download the PaperCut Mobility Print app. Inform Apple users to download the Ricoh Print Queue profile.
    b) Clearly instruct Apple users that the word “Verified ✔” with a green check mark will appear in their system settings once the profile has been successfully installed. Notify Apple users that the profile will *not* appear the same way an app would on their screen.
    c) Instruct Android users that they need to click on the “Tap here and check the Mobility Print Service is on” to ensure that the app is running in the background.
    d) Instruct both Apple and Android users that once the profile/app has been successfully installed and/or verified, no further action is needed. The profile/app will run in the background during the printing process.
2) Create a final step (after Step #5) to inform users to **select the file name** on the Pay Station in order to print their document.
3) Move the QR code for the mobile version of the instructions, located on the Pay Station, to the top part of the printed Mobility Print instructions for clarity. Label this QR code as “View mobile instructions here.” These instructions will contain images to guide users through each step and will appease those who found the print instructions too wordy.

Medium Priority

1) Revise Step #2 by creating a larger title in bold above the QR code that reads: “Scan here to download the Ricoh Print Queue profile/app on your device.”
    a) Specify the different print settings under Step #2 as the following: For double-sided, select **duplex.** For single-sided, select **simplex.** Include a note for double-sided (duplex) printing to **flip on short edge.**
2) In Step #4 (see Appendix D), notify users that they will need to use their Auburn credentials (*only* their 7-character username) to login to the Ricoh Print Queue profile/app.
3) Remove the extra QR codes and only display QR codes that direct users to download the Ricoh Print Queue profile/app or that direct them to the mobile version of the instructions.

Low Priority

1) Explain the difference between a Kiosk Printer and Pay Station. This can be done by including photos of the Pay Station and Kiosk Printer.
2) Number the steps on the instructions (the original instructions include a bulleted list but no numbered steps).
3) Clarify the cost of printing on the instructions so that users are aware of printing costs before reaching the payment stage. Include the printing costs for printing in both black and in color

Should any questions arise regarding the test methodologies, findings, or recommendations, please feel free to contact us:

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Mock-up: MOBILITY PRINT INSTRUCTIONS FOR KIOSK PRINTERS

Scan the QR code below to view Mobility Print **instructions on your mobile device**:

Cost of TigerPrint Services

	Black & White	*Color*
Single-sided (Simplex)	$0.17	$0.50
Double-sided (Duplex)	$0.20	$0.70

Step 1: Check that you are connected to AU WiFi.

Step 2: Scan the **QR code to the right** to download the Ricoh Print Queue profile/app or visit aub.ie/mobilityprint.

Apple Users: Select and download the **Ricoh Print Queue profile** and follow the prompts on your screen to install. The profile will not appear as an app; print services will run in the background.

Once the word **"Verified ✔"** in green appears, **no further action is needed**.

Android Users: Select and download the **PaperCut Mobility Print App.** Once downloaded, select **"Tap here and check the Mobility Print Service is on"** to ensure the app will run in the background.

Once completed, **no further action is needed.**

Step 3: Locate your document on your device. If printing from your email, access the document via your **default mail app.** (For optimal printing, access this email via the Outlook Mobile app.)

Be sure to **download** the document before sending it to the printer.

Step 4: Select **Print.** Then select **Ricoh Printer** as your desired printer. When prompted, enter your **7-character Auburn username and password.**

Step 5: Indicate your desired print settings.

NOTE: if printing in **black & white**, check that **Print in Color** is turned **off.** Then select **Print.**

Step 6: You will receive an email from Tigerprint@auburn.edu with a **print release code.** Enter the 6-digit print release code **on the Pay Station touchscreen**.

Step 7: Press the file name on the Pay Station touchscreen to release the print job. Then follow the prompts to enter your payment method.

NOTE: You may pay via TigerCard, credit/debit, or preloaded funds. Paying via credit/debit on the Pay Station **will place a $10 hold** on your payment method that will expire after 24–48 hours. For instructions on preloading funds, see the far-right column.

Appendices

Appendix A: Orientation Script

For each test conducted, team members will assume the following roles:

- Kaitlin Coyle: Video Moderator (Moderator C)
- Anna Mathis: Test Moderator 1 (Moderator A)
- Colleen May: Test Moderator 2 (Moderator B)

The consent form, participant background questionnaire, pre-test questionnaire, and print-test documents will be sent to each participant via email prior to the test date. The consent form will be offered as a regular, signable sheet of paper, while the background and pre-test questionnaire will be sent as a Google Form. The post-test questionnaire will be sent to participants via email as a Google Form following the end of the task-based scenarios and think-aloud process.

The test moderator will be responsible for note-taking during the session. The post-test moderator will be responsible for recording time on tasks during the scenarios and will facilitate the Product Reaction Cards assessment and post-test questionnaire.

For the following script, Anna Mathis will serve as Moderator A, and Colleen May will serve as Moderator B. Kaitlin Coyle will oversee all audio and video recordings of the sessions and will assume the role of Moderator C to conclude the session.

Moderator B (Colleen): Thank you for your willingness to participate in our usability test of the TigerPrint Mobility Print Instructions. Before we begin, we will need to ensure that you have filled out the consent form, background questionnaire, and pre-test questionnaire, which you should have received by email. Have you had a chance to complete these forms?

[*If the participant has not completed one or more forms, instruct them to do so at this moment. Provide the form(s) via email if necessary*. *The Consent Form can be provided on paper.]*

Moderator B (Colleen): Thank you for completing those forms! We would also like to check that you have received 2 Print-Test Documents, which will be used to perform the task scenarios. Have you received these via email?

[*Pause for a response. Provide the documents via email if necessary.*]

Moderator B (Colleen): Wonderful! Before we begin, we would like to reiterate our intentions behind this recording session. Please know that details from the audio, video, and screen recording will *only* be used by our research team and by the Office of Information Technology. Your demographic information will be kept anonymous in both the study and written report. Your participation is voluntary. Should you wish *not* to continue, you may leave at any time during the session. We would also like to remind you that you will be fully reimbursed for all printing costs

that may accrue while participating in the study. Following the end of the session, we will also provide you with a small incentive as a token of our appreciation. Do you have any questions?

[*Pause for questions, and provide clarity if needed.*]

Moderator B (Colleen): The video moderator (Kaitlin) will now assist in setting up your microphone and starting the screen recording process on your mobile device. Once she has completed the setup, she will begin recording the session.

Moderator A (Anna): To briefly explain this study, our team is conducting a usability test of the TigerPrint Mobility Print Instructions for Kiosk Printers. Please understand we are not testing *your* skills or ability to print. During this test, you will be read four different task scenarios. You will be asked to engage in a think-aloud process as you perform each task. In other words, we would like you to voice your positive *and* negative thoughts as you interact with the Mobility Print instructions. We realize verbalizing your thoughts is not 'normal,' but doing so will help our team get insight into your experience, so that we may know what works well and what does not. Some example statements could be, "I like this because…," "This is confusing because…," "This is not what I expected when I clicked on this…," or "I sure wish these instructions would explain this…" You may also consider narrating your thoughts by saying something like, "Okay, now I am going to do step two…the instructions say to press the 'OK' button…" The video moderator (Kaitlin) may ask questions or remind you to share your thoughts during the session if you fall silent.

Moderator C (Kaitlin): During the session, we will provide you with one task scenario at a time to perform. I will read these aloud to you. Please ensure your screen-recording session is still active. Are you ready to begin?

[The video moderator will need to periodically check/ensure that the participant's screen recording functions are active during the scenario.]

> **Scenario One (3 minutes).** You are a newly enrolled student at Auburn University and have never printed before. You walk over to one of the Kiosk Printers in RBD Library and skim the Mobility Print instructions. Tell us: What is your initial first impression of the instructions?
>
> **Scenario Two (3 minutes).** You are a student taking an English literature course at Auburn. It is currently 1:30 p.m. and you just remembered that you must turn in a physical copy of your essay for today's class, which starts at 2:00 p.m. You forgot your laptop, but have a copy of the essay on your phone, and know that Auburn has mobile device printing options. Use the Mobility Print instructions to download the Ricoh Print Queue profile app on your phone. When you have completed downloading the app, let us know.

Moderator C (Kaitlin): Please ensure that your screen-recording function is active before we begin the next scenario.

> **Scenario Three (8 minutes).** It is now 1:40 p.m. and your class, located in the Haley Center, starts at 2:00 p.m. Use the Mobility Print instructions to print your essay front and back (double-sided) from your mobile device. Let us know when you have completed printing.

[Let the participant attempt to print for a maximum of 8 minutes. If they have not figured out how to print by the end of the 8-minute mark, the video moderator will intervene. If they are having trouble with the payment process, direct them to the following link to preload funds onto their account: tigerprint.auburn.edu.]

Moderator C (Kaitlin): Please ensure that your screen-recording function is active before we begin the next scenario.

> **Scenario Four (5 minutes).** You are the public relations officer of Auburn's AgriBusiness Club and need to print a promotional flier so that the president can approve the design. Use the Mobility Print instructions to print a one-sided, colored copy of your flier from your mobile device. Let us know when you have completed printing.

Moderator C (Kaitlin): Thank you for completing those tasks! The video moderator (Kaitlin) will now help you end the screen recording session and send the recording to one of us via AirDrop. Once you have completed this, please follow the post-test moderator (Colleen) for the final portion of our study.

[*Pause to let the video moderator (Kaitlin) stop the screen recording and help the participant send it to one of the team members. At this point, the video moderator (Kaitlin) will also move the camera so that it is recording the participant during the post-test activities.*]

Moderator B (Colleen): For the final portion of our study, we now invite you to participate in a Desirability Test using the Microsoft Product Reaction Cards located on the table. There are 118 cards in total. Please take a moment to browse, and then select any combination of positive, negative, or neutral cards that best characterize your experience today. We recommend choosing 3-5 cards, however, feel free to choose as many as you are comfortable with. We ask that you point to each chosen card, narrate the word, and then explain why you chose that particular word.

Moderator B (Colleen): Thank you for participating in the Product Reaction Cards assessment! As a final task, we ask that you please fill out the post-test questionnaire, which you should have received by email as a Google Form. We ask that you narrate your thoughts aloud as you complete the form. When you have completed the questions, please press "submit," and let us know when you have done so.

Moderator B (Colleen): Thank you for completing the post-test questionnaire! The video moderator (Kaitlin) will now end the recording session, and collect your microphone.

[*Pause to let the video moderator (Kaitlin) stop the audio and video recordings.]*

Moderator C (Kaitlin): On behalf of our team, we want to thank you again for participating in this usability test! Here is your $1.00 reimbursement for printing costs. As a token of our appreciation, we would also like to offer you a small incentive from Panera Bread or one of the library vending machines.

Appendix B: Detailed Participant Profiles

Participant #1
Gender: Female
Age: 22
Mobile Device Type: Apple
Email App: Outlook mobile
Standing at AU: Graduate Student - Masters
Comfort with Technology: Moderately comfortable
Experience with TigerPrint: No
Printing Experience: I have some experience with printers/I print occasionally

Participant #2
Gender: Male
Age: 22
Mobile Device Type: Apple
Email App: Outlook web browser (on Safari)
Standing at AU: Graduate Student - Masters
Comfort with Technology: Very uncomfortable
Experience with TigerPrint: No
Printing Experience: I have some experience with printers/I print occasionally
Experience with TigerPrint: None

Participant #3
Gender: Male
Age: 23+
Mobile Device Type: Android
Email App: Outlook mobile
Standing at AU: Graduate Student - Masters
Comfort with Technology: Very comfortable
Experience with TigerPrint: No
Printing Experience: I have a lot of experience with printers/ I print frequently

Participant #4
Gender: Female
Age: 23+
Mobile Device Type: Apple
Email App: Apple iPhone default mail app
Standing at AU: Graduate Student - PhD
Comfort with Technology: Very comfortable
Experience with TigerPrint: Yes
Printing Experience: I have some experience with printers/ I print occasionally

Participant #5
Gender: Male
Age: 23+
Mobile Device Type: Apple
Email App: Apple Outlook mobile
Standing at AU: Graduate Student - Masters
Comfort with Technology: Very comfortable
Experience with TigerPrint: Yes
Printing Experience: I have little printing experience/ I print rarely

Appendix C: TigerPrint Mobility Print Instructions

The original printing instructions posted above the Kiosk Printers in RBD Library (see pg 3) are not numbered; however, they have been transcribed and numbered here for ease of reference throughout the report.

Step #	Mobility Print	Web Print	Preload Funds
1	Install the Ricoh Print Queue profile on your device (phone, tablet, or laptop) by scanning this QR code or visiting aub.ie/mobilityprint	Log in to tigerprint.auburn.edu with your Auburn username and password	Preloading funds for TigerPrint on your Papercut account can make things quick and convenient when printing! Paying for each print job individually from the kiosk will place a $10 hold on your method of payment that will expire after 24-48 hours. Preloading funds to your Papercut account will allow you to avoid any holds.
2	For further instructions on installing, please visit aub.ie/mobilityprintkb	Select “Web Print” from the left hand menu	To load funds, log in to tigeprint.abuburn.edu with your Auburn username and password
3	Locate your document on your device and select “Print.” Select Ricoh Printer as your desired printer	Click “Submit a Job”	Select “Add Credit” from the left hand menu
4	Once your document is processed, you will receive an email with your release code. This code will be the same every time you print	Indicate the amount of copies you’d like to print and click “Upload Documents”	Chosen an amount to add to your account and click “Add value”
5	To print your document(s), you can swipe your Tiger Card at one of the quick-release printers, or log in to a kiosk using your Auburn credentials, or print release code.	Drag and drop your documents into the box or click “Upload from computer” to browse for your documents. Once done, click “Upload & Complete"	Enter in your credit card, debit card, or banking information, then click “Pay Now”

6		Once your document is processed, you will receive an email with your release code. This code will be the same every time you print	Once your funds are loaded, you will see the amount on your “Summary” page, as well as on a TigerPrint kiosk when signed in
7		If you have pre-loaded funds on Papercut, you can locate a PrePay printer and swipe your TigerCard to print your document(s)	These funds will allow you to use the Prepay printer on campus by simply swiping your Tiger Card

Appendix D: Interventions Chart

During the creation of the task-based scenario usability test, the research team conducted a pilot test to determine the average time participants might take during the test. Our research team determined that participants would be allotted 45 minutes to complete the entire test.

Based on our assessment of each individual task-based scenario, we determined that participants would be allotted a maximum of 3 minutes to complete Scenarios 1 and 2, 8 minutes to complete Scenario 3, and 5 minutes to complete Scenario 4. If participants did not complete the tasks within the specified time frames—or if the participant asked for help—the video moderator was permitted to intervene at their discretion. The number of interventions are displayed in the table below.

	Number of Times…			
Participant #	**Video Moderator Intervened**	**Participant Asked for Help**	**Participant Was Directed Back to Instructions**	**Participant Referred to Instructions**
P1	1	0	0	9
P2	8	5	3	9
P3	4	0	1	7
P4	0	0	1	13
P5	0	2	1	4

Note: *The number of times the video moderator directed participants back to the instructions was not included in the number of times that participants* referred *to the instructions—this section details the number of times participants referred to the instructions on their own.*

Appendix E: Product Reaction Cards/Words

Product Reaction Words				
Accessible	Creative	Fast	Meaningful	Slow
Advanced	Customizable	Flexible	Motivating	Sophisticated
Annoying	Cutting edge	Fragile	Not Secure	Stable
Appealing	Dated	Fresh	Not Valuable	Sterile
Approachable	Desirable	Friendly	Novel	Stimulating
Attractive	Difficult	Frustrating	Old	Straight Forward
Boring	Disconnected	Fun	Optimistic	Stressful
Business-like	Disruptive	Gets in the way	Ordinary	Time-consuming
Busy	Distracting	Hard to Use	Organized	Time-Saving
Calm	Dull	Helpful	Overbearing	Too Technical
Clean	Easy to use	High quality	Overwhelming	Trustworthy
Clear	Effective	Impersonal	Patronizing	Unapproachable
Collaborative	Efficient	Impressive	Personal	Unattractive
Comfortable	Effortless	Incomprehensible	Poor quality	Uncontrollable
Compatible	Empowering	Inconsistent	Powerful	Unconventional
Compelling	Energetic	Ineffective	Predictable	Understandable
Complex	Engaging	Innovative	Professional	Undesirable
Comprehensive	Entertaining	Inspiring	Relevant	Unpredictable
Confident	Enthusiastic	Integrated	Reliable	Unrefined
Confusing	Essential	Intimidating	Responsive	Usable
Connected	Exceptional	Intuitive	Rigid	Useful
Consistent	Exciting	Inviting	Satisfying	Valuable
Controllable	Expected	Irrelevant	Secure	Simplistic
Convenient	Familiar	Low Maintenance		

Adapted from Microsoft's Desirability Toolkit (Barnum, n.d.).

Appendix F: Product Reaction Cards Additional Data

Participant #	Words Selected	Comments
P1	Essential, useful, complex, time-consuming	"It was useful, I mean it did the job." "It was complex, I think, because it was multi–there were many steps in that process." "And I'm going to add a fourth one. It was definitely essential because people need to print things and that's an essential need."
P2	Time-consuming, confusing, usable, gets in the way	"It was time-consuming because I had to download the software, and then find the software and figure out how to get everything together and sent to the right place. And then I had to put funds onto my Tiger–or whatever that was. I'm still not even sure what I did." "I was very confused the entire time… but after I did get the first things, then it was okay. So, I guess confusing at first, but then usable." "Now, I feel like I could use it pretty easily, but I don't think I want to use it a lot, because it was kind of a lot, and I feel like I would mess it up." "Technology always gets in the way—in my way—but this especially. There's no way I would have figured out how to get my paper in on time."
P3	Rigid, frustrating, usable, unapproachable	"I'd also say, despite the frustration, and the rigidness, it's still usable, because at the end of the day, I did print, and I did have enough time, theoretically, to get over to the Haley Center." "Is expensive an option? I don't see it, but I wish it was here."
P4	Understandable, Confusing, Useful, convenient	It was understandable. The process when you read it was very easy to follow…I could understand, though, if you were short on time and not reading all of the instructions, it might not be as understandable."

		“I’m going to pick confusing, but just for that last line…the last step in the mobility [instructions.]” “Is there a ‘helpful’ one?” “Useful. It was very useful. Not having used the printer before, I liked having instructions on how to do it.” “And I’d say it was convenient in the sense that I didn’t have to Google any subsequent steps I’d have to take to print.”
P5	Time-saving, Reliable, Innovative, Fast	“It’s way faster to print with this system than the old way where you had to email the documents. There were like 9 other steps you had to do…so, it’s much faster. It’s much more intuitive than the kind of round-about way that it was before.” “I’m going to say reliable because it worked both times. Printers are, you know, notorious for not printing when you want them to and breaking in weird ways and stuff.” “I’m going to say ‘innovative,’ because it’s a new system, so that’s innovative. It’s at least different in the way that it was before, and it seems like it was an improvement on the printing system. It makes it easier and faster.”

Appendix G: Post-Test Questionnaire Think-Aloud

The following chart displays participants' think-aloud processes and comments as they were completing the post-test questionnaire.

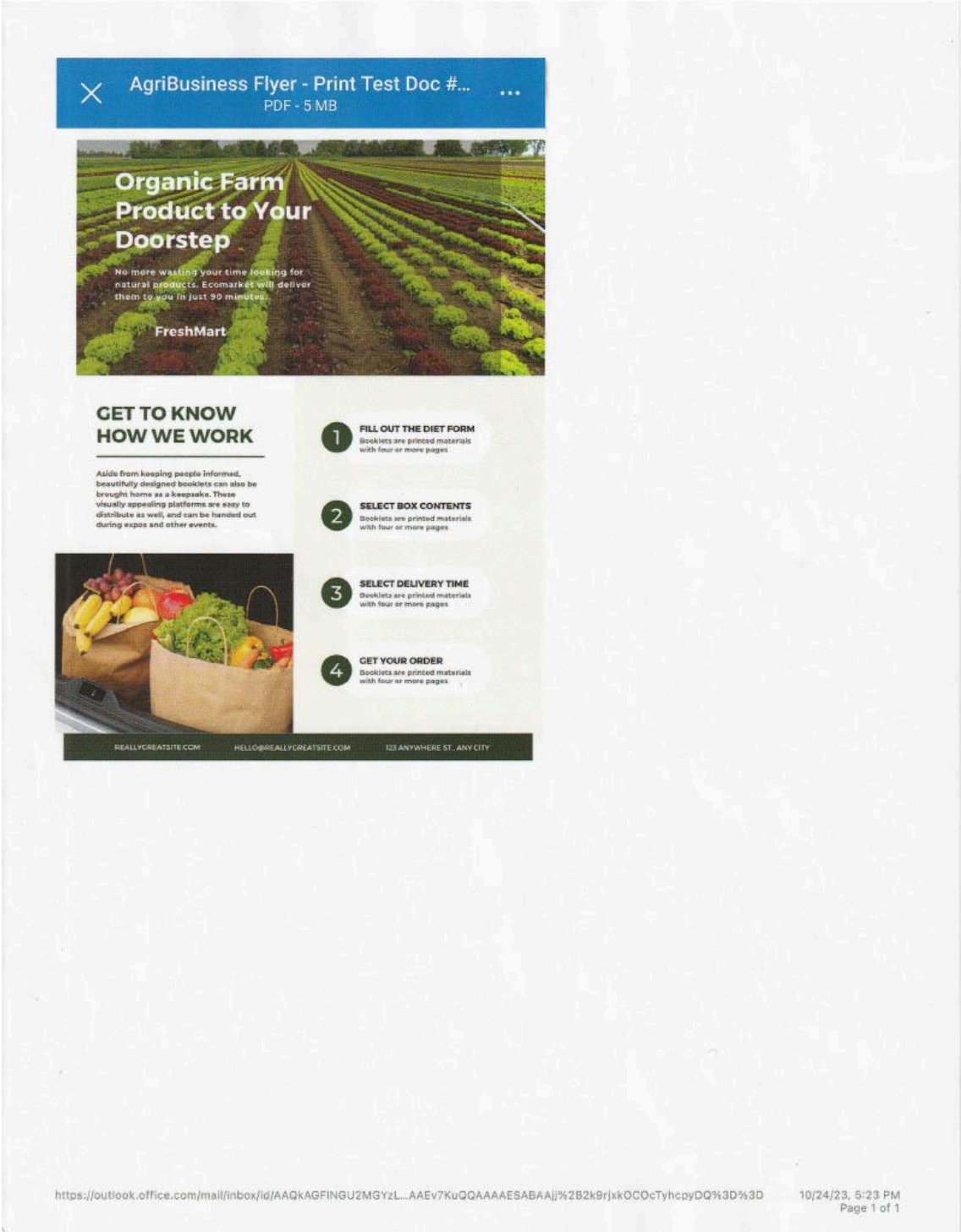
P1	"I would make *[the instructions]* simpler. I don't know what that means. I don't know if you can make them simpler, I think it may just be the actual TigerPrint system itself that is not simple, but overall, it did its job–just took me a second." "I'm somewhat dissatisfied, not going to lie. I don't know that I would eagerly approach these bad boys again."
P2	"I was not very confident at all. I felt like I had never used a printer before in my life." "The wording was kind of–I don't like how there's like three different things next to each other. The Mobility Print instructions are connected to the Preload Funds instructions, but it seems like they should be connected in some way, if it's going to help me." "That was easy *[downloading the Ricoh Print Queue profile]* even though I didn't really know what I did." "I would make it that you know you have to press the file because I probably would have sat there for like 20 minutes not knowing what to do. There should be more instructions on the screen and less on the paper because I'm having to go back and forth a lot."
P3	"Downloading the app was very easy, but actually understanding it was rough, because it doesn't give you a heads up that you actually go into your file and actually print from 'direct'." "So, in terms of TigerPrint Mobility Print Instructions, what would I change? Um, make it clear that the app is working in the background and that you don't necessarily have to print it directly from the app, because there are a lot of apps out there that require you to print through them." "Please rate your overall satisfaction with the printing experience. You know, actually, once I figured out what was going on, it was satisfying, especially on that second print—it actually worked."
P4	"Downloading the Print Queue was easy, except for not knowing if it downloaded for sure or not."

	"If anything caused me frustration, it was just the slow reaction of the Kiosk but not the instructions." "Would I change anything about the instructions? Clearer payment instructions, or like, ways to pay." "Would I recommend it? Yes, because it was simple to understand for a first-time user."
P5	"I mean, it was pretty easy to just…so, I skipped over most of the instructions. I skipped past all of the words and just went to the pictures, and I thought that those explained it pretty easily. It was like a picture of what your screen would look like and the button you should press, right? And so then, you just follow the link, and it brought you to that page." "I wouldn't say that anything really caused me frustration. I'm trying to think…the most difficult thing, I think, was downloading the thing *[the profile/app]* just because I was in the wrong browser… So, if there's a way to make it compatible with any other browser, that would be good." "Would you recommend TigerPrint to students if they have never printed on campus before? I would, especially if someone had printed in the old way and was like, 'Oh I just print wherever because it's easier.' I feel like it's actually a lot easier now. So, I would recommend it." "How likely are you to use the TigerPrint Mobility Print services again if you did not receive any aid through the process? I'm going to say 3—neither likely nor unlikely—but that's just because I have a way to print for free. So, I'm going to print that way instead of using this, because you have to pay. But if I was just in the library and needed something right away, I would use it, because of the convenience of having it conveniently located."

Appendix H: Print-Test Documents Printed by Participants #2 & #5

The following documents display how participants #2 and #5 printed their documents during the task-based scenarios.

Participant #2: AgriBusiness Flyer (Scenario 4)



Participant #5: Essay (Scenario 3)

Student 1

Student

ENG 313

13 April 2021

Professor

The Unattainable American Dream

Arthur Miller's play, Death of a Salesman, explores themes of the idealized American Dream. The play follows Willy Loman, a salesman, his wife, Linda, and two sons, Biff and Happy. Willy's American Dream equates to corporate success, money, as well as providing for and buying his family the latest appliances. Miller's play suggests the promise of the American Dream through the Loman family. Willy and Biff represent the "darker" side of this dream, the deceit and consequences of such high aspirations, while Happy and Ben represent the "happier" side, the illusions and idealizations of it.

Willy Loman, the protagonist, depicts the deceitful American Dream. He considers himself a "well-liked", "bigshot" salesman, so he depicts himself as so to his wife, Linda, especially when she asks him to work in New York due to his deteriorating health, and he repeats "I'm vital in New England" (1050-51,1021). However, Willy truly isn't "vital" as the company has placed him on commission pay, he cannot afford his home appliances, he travels 700 miles to make money, and his clients call him a "walrus" (1048, 1036). Willy continually insists that he is "well-liked" and has a huge reputation, obsessing over attaining the American Dream so much that he is dishonest with his children about his success (1032-34). In a flashback, Willy says to his sons, "I never have to wait in line to see a buyer. 'Willy Loman is here!' That's all they have to know, and I go right through" (1034). Because of this, he inadvertently teaches them that

dishonesty equals success. This may not have been his intention as a father, but it is how his actions translated.

Willy's dishonesty about his character has also caused his desperation. When Howard fires him, Willy asks Charley for money, a recurring action due to his commission pay, but also because he does not want Linda to know his struggles (1064-65, 1072). His desperation worsens when he repeatedly attempts suicide by "smashing up" his car and inhaling gas fumes from a "rubber pipe" connected to the water heater (1049-50). Willy has become so desperate to achieve the American Dream, to be a successful salesman, that by the end of the play, he commits suicide to attain a $20,000 life insurance policy for his family. Willy believes the money received after his death and the "popularity" of his funeral will depict a successful American Dream to his sons (1091). Unfortunately, this does not happen, as only four people attend his funeral.

Biff portrays the promise of the idealized American Dream, but also its failures and struggles. Willy has "alienated" Biff because he did not follow in his footsteps. Biff made $28 working on a farm in the west, but Willy does not believe farm work is hard work, nor enough money to be "successful" (1022). Willy only believes achieving the American Dream is possible in the corporate world, as he states to Linda regarding Biff, "I'll get him a job selling. He could be big in no time" (1023). Willy's fixation on corporate America deters Biff from his own success, but Biff's recognition of Willy's dishonesty about his success also causes his "alienation." In high school, Biff was a star football player and "well-liked" because he believed it was the key to success, something he learned from Willy. Biff's turning point from Willy's misguided teachings is when he finds out about Willy's affair with "the woman" and he calls his father a "phony" and a "fake" (1086-88). Biff is never the same after this because he realizes that his father prioritizing personality over hard work has led him to fail in his American Dream.

Biff blames his father's misguided teachings on why he has failed. In the play, we learn that Biff has semi-kleptomaniac tendencies as he steals footballs, a gold fountain pen from Bill Oliver, as well as a suit from Kansas City (1082, 1094). Biff states, "I stole myself out of every good job since high school... because you [Willy] blew me so full of hot air I could never stand taking orders from anybody! That's whose fault it is!" (1094). Biff blames his American Dream failures on Willy's misguided teachings, and as a 34-year-old, Biff begins to reject Willy's teachings, attempting to achieve his own form of the American Dream, but not yet succeeding.

Happy also portrays the American Dream of the Loman family, but ironically, portrays the happier side. He has everything the American Dream consists of—a job in sales, a nice car, an apartment, and a constant string of women (1027-28). Happy learned all of Willy's teachings—be "well-liked" and have good looks—as he portrays in flashback scenes repeatedly asking his father, "I'm losing weight, you notice, pop?" (1034). This shows his obsessive concern with looks and people's perception of him. Unfortunately, he also learned Willy's lesson of dishonesty equating to success. Although Happy tells everyone he is the "assistant buyer" at his sales job, Biff points out that he is really "one of the assistants to the assistant" (1094). This unrealistic portrayal of his success draws dangerous parallels between Happy and his father. In a conversation with Biff, Happy states that he feels "lonely" (1027). Appearances suggest he has achieved the American Dream, but he is arguably going down the same dark path as his father. After Willy's death, Happy states, "It's the only dream you can have—to come out number-one-man. He fought it out here, and this is where I'm gonna win it for him" (1099). Everyone else recognizes that Willy's idealized American Dream led to his downfall, but Happy does not.

Ben, Willy's brother, also portrays the happy, idealistic promise of the American Dream. Ben achieved riches easily, seeking his father in Alaska; however, because he navigated

incorrectly, he arrived in Africa, falling into riches in the diamond mining business (1042-43). Willy looks up to Ben because of this, but also sees how Ben emulated their father, and while appearances suggest he has achieved success, he may have done so in a questionable manner. In a flashback, Ben wrestles Biff, knocking him to the ground, and pointing his umbrella in his eye, before stating, "Never fight fair with a stranger, boy. You'll never get out of the jungle that way" (1044). This hints that Ben did not achieve his success "fairly", perhaps, even, by stealing, making it quite problematic that Willy looks up to him. Willy does not consciously realize Ben's questionable actions, instead choosing to see him as successfully achieving the American Dream, looking to him for guidance. In the same flashback, Willy says to his sons that Ben is "a great man" suggesting how much he idealizes Ben's wealth, but also how he sees him as a role model (1043). He uses the illusion of Ben in his mind, due to his mental illness, to justify his suicide. When Willy argues why committing suicide for his life insurance policy would be a good idea, Ben states, "That's a point, William. And twenty thousand—that is something one can feel with the hand…" (1091). Ultimately, Willy's fantasy of Ben contributes to his idealization of the American Dream by persuading him that the life insurance policy money will ensure Willy's family finally achieves that dream, giving him a false sense of hope.

Miller's play suggests the promise of the American Dream through the Loman family. Willy and Biff represent the "darker" side of this dream, the deceit and consequences of such high aspirations, while Happy and Ben represent the "happier" side, the illusions and idealizations of it. However, because Willy has idealized the American Dream so much, he has allowed it to consume his life—in the person he has become, through his dishonesty, loneliness, desperation, and the ideals passed down to his children. Willy allowed his American Dream thinking to dominate his life so much, that in the end, it ultimately led to his downfall.

Appendix I: General Participant Comments

	Scenario	Comments
P1	2	"It's a profile? I don't know what a profile is."
		"On my settings, it says profile downloaded, and so, I think, I need to install it? But then it says installed–so I think that it should be able to work."
		"Okay, there's a password required, so is this my school username, perhaps?"
		"Which printer will it go to? This one? *(points to the Pay Station)* No, this. *(points to Kiosk Printer).* Do I have to turn on a printer first? This is showcasing how stupid I am."
	3	"I'm sorry, this is taking a while."
	4	"There's like a lot of steps to this, I'm not going to lie."
		"So, I will say, I wish that this said *(points to the Pay Station)* the name of the file, because it just says Outlook. Maybe that's me being silly."
P2	2	"Alright, it's installed. Done. I think."
	3	"Ugh, I have to type in my username and password again–that's annoying."
		"There's no way I would get this paper in time, let me tell you."
		"I pressed print, nothing is happening."
		"Oh yeah, I wasn't reading the instructions, hold on."
		(Presses 'Print' button on Pay Station several times) "The Print option is still not coming up."
		"I have funds on my Tiger Card, but it only says 'press the button below to pay with a credit card.'"

P3	3	"Alright, so, use Mobility Print, okay. Your job needs authentication. So, I am currently typing in my username and password. It does not say whether I need the @auburn.edu." "Oh, Lord…very frustrating. I hate janky technology." "Ok, I'm assuming that means duplex? Because I have no—it doesn't say 'front and back' here." *(referring to the Pay Station)* "I'm going to assume that's what that is." "If we can't change the file natively on the Kiosk *[Pay Station]*, then something needs to change on that… if we can't alter whether it's printing simplex or duplex, or we can't determine whether it's going to be in color or not, then what's the point? Like, it's not difficult to edit a PDF after it's been sent to a printer."
P4	2	"I think I did, I think it downloaded, I just don't know where to find it once it's downloaded, unless it was on my screen. It did say 'done' after I clicked 'install.' The instructions on the QR code say, 'When it's time to print, just print like you normally do.' So, I think it's downloaded. I just don't know for sure, for sure."
	3	"To print your document, you can swipe your Tiger Card, or login to a Kiosk Printer…" *(looks back down at the interface.)* "So, I don't have a Tiger Card. This part is confusing, too." "This *[Pay Station]* interface is also confusing, which I don't know if—oh, wait. Do I have to click this? Oh. So, you have to click it to print it." "Oh, wow. That took longer than it needed to take." *(after swiping their debit/credit card three times on the Pay Station)* "Like it says…like, to pay, I guess. You enter your print release code to open this part *(gestures to the Pay Station)*, but then you have to select the file. And then to print it, you have to do like a credit card or swipe your TigerCard. Like, this part, *(gestures to last part of printed instructions)* it just seems like it's redundant, I guess. You can login using your Auburn credentials or print release code, but you already did that up here."
P5	2	"Um, so it seems to have downloaded in my browser… I'm not sure where it downloaded actually. I need to try this again." "I think I've missed something. Oh, I have to use Safari to download. That's the thing. I use a different browsing app usually." "If I go to settings…'Profile downloaded.' Okay. 'Install.' Okay, so I think it has installed now."

3 “So, I’m going to find that email. ‘Essay.’ ‘Share file,’ and ‘print.’ Ricoh Printers is the only Auburn one, so I’m going to assume that’s right. But it needs a username and password. I’m assuming that’s my Auburn username and password? I don’t know if I need to do @auburn.edu or not. It was probably in the instructions that I didn’t read, though.”

4 “Okay, and it’s in color and it looks good.”

Appendix J: Test Procedure

The following details the test procedure that occurred during the task-based scenario usability test for each of the five participants.

Overview/Briefing (10 minutes)
Moderator A welcomed each participant and ensured that they completed the consent form, background questionnaire, and pre-test questionnaire. Moderator B confirmed that the participant had received an email with the 2 print-test documents, reiterated the intentions behind the audio, video, and screen-recording session, and ensured each participant that their private information (name, phone number, email) would not be shared. Moderator A gave a brief explanation of the study and informed the participant to think out loud while performing each task-based scenario. Moderator B clarified that the participant will be instructed to perform one task scenario at a time by Moderator C.

Scenario 1 (approximately 2–3 minutes)
Scenario One. You are a newly enrolled student at Auburn University and have never printed before. You walk over to one of the Kiosk Printers in RBD Library and skim the Mobility Print instructions. Tell us: What is your initial first impression of the instructions?

Scenario 2 (approximately 3 minutes)
Scenario Two. You are a student taking an English literature course at Auburn. It is currently 1:30 p.m. and you just remembered that you must turn in a physical copy of your essay for today's class, which starts at 2:00 p.m. You forgot your laptop, but have a copy of the essay on your phone, and know that Auburn has mobile device printing options. Use the Mobility Print instructions to download the Ricoh Print Queue profile app on your phone. When you have completed downloading the app, let us know.

Scenario 3 (approximately 8 minutes)
Scenario Three. It is now 1:40 p.m. and your class, located in the Haley Center, starts at 2:00 p.m. Use the Mobility Print instructions to print your essay front and back (double-sided) from your mobile device. Let us know when you have completed printing.

Scenario 4 (approximately 5 minutes)
Scenario Four. You are the public relations officer of Auburn's AgriBusiness Club and need to print a promotional flier so that the president can approve the design. Use the Mobility Print instructions to print a one-sided, colored copy of your flier from your mobile device. Let us know when you have completed printing.

Product Reaction Cards (approximately 5 minutes)
Following completion of the four task scenarios, Moderator B explained the Product Reaction Cards assessment and prompted the participant to select 3–5 cards that best characterized their printing experience. Participants were asked to voice their thoughts aloud while selecting their cards.

Post-Test Questionnaire (5–10 minutes)
After the Product Reaction Cards assessment, the participant completed the post-test questionnaire, which they received via email. Once they finished, Moderator C (the video moderator) thanked the participants for their cooperation and offered them a small incentive as a token of our appreciation.

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