

Project SHINE: Evaluating Mobile Based Learning Resources for Novice Tutors

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Abstract: The Students Helping in Naturalization of Elders Project of Honolulu is part of a national service-learning initiative that helps elderly immigrants pass the naturalization examination for United States citizenship. Service learning volunteers commit to ten weeks of service and enter into the program with little to no experience teaching English as a Second Language. The researcher designed a website to provide a repository of just-in-time English as a Second Language tutoring resources for mobile devices. Therefore, the purpose of this usability study was to examine the ease of use of this website on mobile devices. The researcher recruited participants from the University of Hawai'i at Mānoa student clubs and organizations with a stated mission of learning through community service. Participants answered questions about how they use mobile devices. A mobile device fitted with a wireless camera rig captured the gestures of the participants in authentic mobile environments on the campus of the University of Hawai'i at Mānoa. Three cycles of iterative design took place over a three-month period. Thirteen participants indicated that the mobile website was well organized, had pleasing design elements, and the site was easy to use. Participant feedback and suggestions contributed to the website's final design.

Introduction

The Students Helping in Naturalization of Elderly (SHINE) project in Honolulu helps elderly immigrants pass their naturalization examination for United States citizenship. SHINE recruits student volunteers to help immigrants learn English as a second language (ESL) with a goal of greater communicative competence. Project SHINE tutors receive only two hours of orientation and training before they begin working with elders. During on-site training, tutors have access to a cache of donated paper-based supplemental teaching materials in limited quantities.

In 2011, Eugenia Wang conducted a needs analysis showing SHINE Project volunteer tutors perceived a gap in tutor preparation. Participants were asked “Do you feel that SHINE staff could have done anything more to equip you for tutoring?” Tutors answered they wanted help

with lesson planning, instruction on general to specific topics, the naturalization process, immigration law, and teaching English to different level learners to feel more prepared (Wang 2011).

I created a low-bandwidth HTML5 website that hosts SHINE teaching resources so that tutors can have SHINE content in hand on their mobile devices. Chen & Kessler described mobile devices as “ideal tools to foster learner autonomy and ubiquitous learning in informal settings...provided that the technological affordances of the device have been fully explored with the students (2013)” p.138. With that in mind, tutors can focus more on their task of teaching ESL in the SHINE classroom. Resources on the site include the official SHINE field tutors’ handbook, 100 civics questions flashcards, and basic lesson planning. I provided example lessons for learners of all levels, instructing from general to specific topics, the naturalization process, and teaching groups of different level learners.

Since very little research examines the efficacy of short-term or novice tutors using mobile devices to teach ESL, the purpose of this usability study was to examine the website’s ease of use by novice users. I recruited from a pool of individuals most closely resembling SHINE’s target volunteer demographic of student volunteers.

The primary research questions that drive this usability study are:

1. How easy is it to navigate the website using the controls provided?
2. How easily do users find the resources they are looking for?

Literature review

With mobile learning (m-learning) still in its infancy, Second Language Acquisition (SLA) researchers have developed a pedagogical framework called Mobile-Assisted Language Learning (MALL). This framework focuses on both the learners’ mobility as well as how they use a device to learn a language. The rationale and underlying pedagogical and theoretical conceptual framework of the MALL model in SLA stems largely from decades of Computer-Assisted Language Learning (CALL) research. Stockwell (2013) cites some emerging principles in MALL design such as mobile activities distinguished in terms of the affordances and limitations of both the device and the learning environment. Principals include limiting the practice of multitasking and distractions and providing learners with a mechanism for momentum in the learning process. Simply by limiting tasks and activities into smaller, more salient chunks, learners have a greater awareness of their *anywhere and anytime* mobile learning environment.

Jarvis and Achilleos argue that the constructivist pedagogical frameworks of MALL, such as the negotiation of meaning should focus more on the use of the mobile device rather than on the assisted learning (2013). Thus, the authors reframed MALL as Mobile Assisted Language Use (MALU) because the mobile device is more of a medium than a tool for learning a language.

Kim & Kwon (2013) found that designers of mobile ESL apps, although seemingly effective with their learner-centered approach, lacked focus on the socially situated nature of MALL. Thus, the design of my website focuses on the socially situated interactions between the Shine learner and the SHINE tutor.

Pellerin's 2013 study examined how the use of mobile technology can promote authentic oral language learning as well as new forms of language assessment. The study found that using mobile devices promoted the development of second language (L2) production and encouraged authentic experiences using the L2 in interactions. This transparency facilitated the L2 learning process between the learner and the instructor. Pellerin (2013) also found that learners who employ L2 self-assessments had regulated their cognitive load. By revising their output and reflecting on their oral competencies (metacognition), the learners were at the center of the learning process.

Wong describing seamless learning as the integration of learning experiences across formal and informal learning context combined with individual and social learning in the physical world and cyberspace (2011). With the pervasive use of mobile devices, students now have access to learning wherever and whenever they need. The goal of seamless learning is to empower and stimulate students to learn rather than being required to do so.

In the field of mobile web design, the emergence of Responsive Web Design (RWD) is largely due to an abundance of devices with different screen sizes and resolutions. RWD delivers content to as wide a range of users as possible while still considering features of Universal Design (UD) and user accessibility. When compared to a Fixed-Width Design (FWD) website, Smith's 2014 study found that RWD websites had faster page load times and retained ease of use across four (4) different layouts.

Dundar defines usability as "the extent to which a product can be used with effectiveness (number/percentage of completed tasks within allotted time, number of errors), efficiency (time to complete a task) and satisfaction (subjective user attitude) in a specified context of use." (2013, P.213) Since the traditional means of usability testing in desktop environments is neither possible nor practical with mobile devices, the author calls for the implementation of a Guided-Based Usability Evaluation Model over the current Research-Based Web Design & Usability Guidelines. Bader & Pagano's 2013 research study cites the growing popularity and practice of evaluating mobile apps in the field rather than in traditional laboratory settings. In real-world environments, the authors identified more issues and types of issues than in the lab.

Project design

I chose to build the SHINE tutor resources website with Codiqa, a web-based HTML5 editor (see Figure 1 below). Codiqa is an all-in-one wireframes prototyping tool for creating mobile web applications and mobile websites through the export to HTML5 function. Codiqa uses the HTML5 open web standard that supports drag and drop elements designed specifically for Android and iOS. Wireframe refers to a simplified view and design principle that only shows the absolute minimum elements necessary to show what it does, not how it looks (Brown, 2010). I used Codiqa's built-in web-emulator to test the website's functionality across multiple phone and tablet resolutions and orientations (see Figure 1 below). The emulator's functionality allowed me to share the website with peers on their PCs and mobile devices throughout the development of the project. Codiqa sharing functions automatically generates persistent shared links and quick response two-dimensional bar codes (QR codes) for ease of peer access, testing, and review.

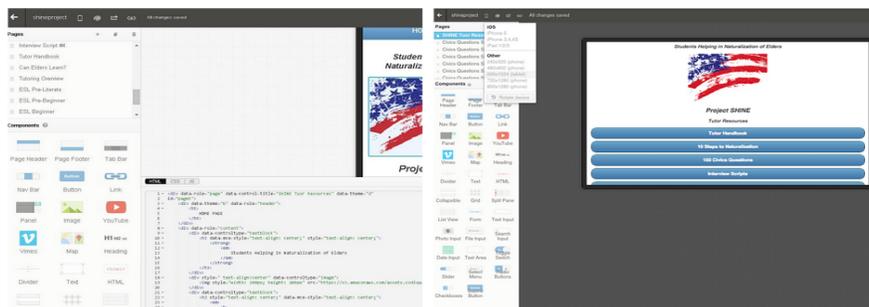


Figure 1. Codiqa HTML5 web-based editor and emulator

Design of the Mobile Website

The early design of the SHINE tutor's website originally features links to outside websites such as Google translate for Chinese Language and Culture. Early testing and SME feedback showed that outside links proved to be a distraction for both tutors and learners. Instead, the design of the website focused on providing only the most essential commonly used resources that would be used in the SHINE classroom. I purchased the flag design's licensing rights from vectorstock.com for one dollar.

Homepage and Tutor Handbook

The first iteration of the SHINE mobile website's homepage was designed as a hub or starting point for all subsequent navigation by the user (see Figure 2. below). Users can easily navigate

to the *Tutor Handbook*, an Infographic on the 10 steps to naturalization from the USCIS, *100 Civics Questions* flashcards, interview scripts, a page with information about the SHINE program, a Find your Representative, and a SHINE user survey feedback form. The first navigable item on the site’s home page links to the tutor handbook (see Figure 2 below). The tutor handbook contains 9 subsections. The first link in the tutor’s handbook is entitled *Can Elders Learn?* (see Figure 2 below).

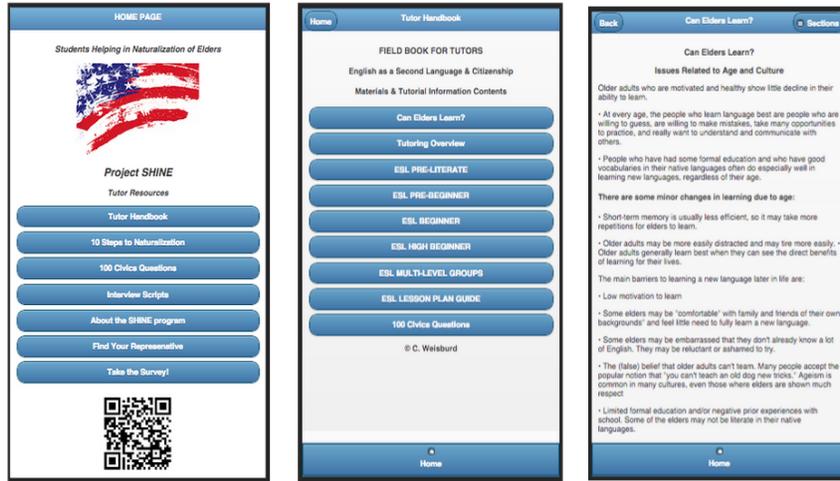


Figure 2. Homepage, Tutor Handbook and Can Elders Learn Page

The Tutoring Overview section (see Figure 3 below) is designed to introduce the tutor to teaching different levels of ESL learners from pre-beginner to high-beginner (see Figure 3 below), as well as how to work with multiple learners in a group setting (see Figure 3 below).

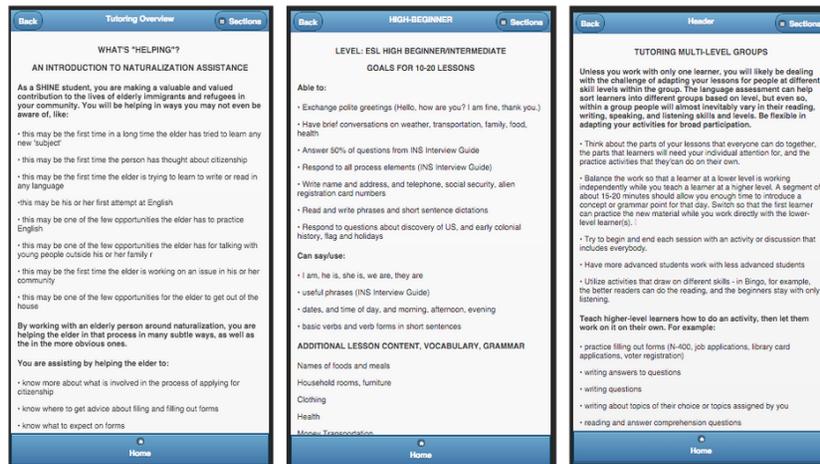


Figure 3. Tutor Handbook’s Overview, High-Beginner and Multi-level Groups

The 100 civics questions flashcards section is the final item listed in the SHINE tutor's handbook section. The civics questions were placed in nested drop-down boxes for ease of use and quick access for the tutor (see Figure 4 below). I limited each civics page to 10 questions per page. There were 10 pages in total. Persistent navigation items across all civics question pages included a back in history button in the uppermost left hand corner of the page and a *more* button in the uppermost right hand corner that revealed all available sets for ease of navigation. A linear navigation link was placed at the bottom of each page's question that linked to the next numerically ordered page.

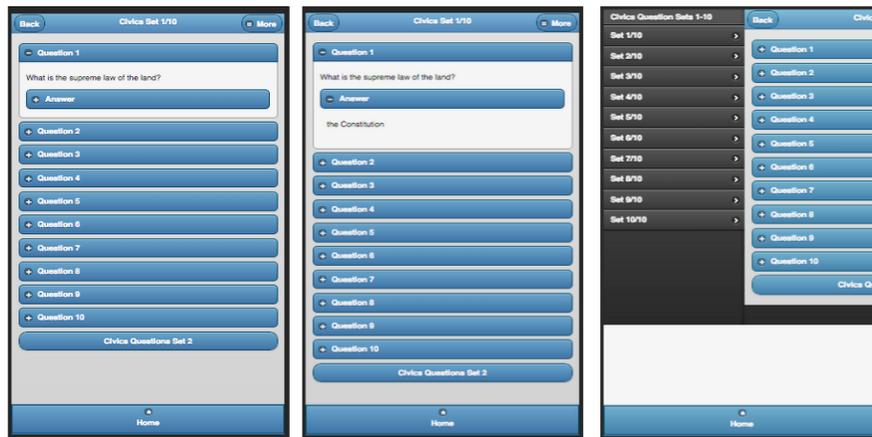


Figure 4. Civics Questions

Design of the usability rig

The design of this usability study aimed to provide participants with an authentic, or as close to real-world mobile user experience as possible while allowing for an untethered testing session at any location. In order to meet these goals, I designed a mobile usability-testing data collection system that would meet or exceed current commercially available mobile usability hardware and protocols. This mobile usability rig features a wireless camera oriented above a Blackberry Passport smartphone (see Figure 5 below), which participants used to test the website. This researcher attached the camera and phone to an aluminum-articulating arm, thereby allowing participants to use the testing device in any orientation. A live feed transmits from the camera viewing the participant's device to this researcher's Blackberry Z30 mobile phone to observe screen activity and monitor recording. Each device can record high-quality audio via native voice recording software and stereo microphones.



Figure 5. Mobile usability rig with BlackBerry Passport.

Another feature of the mobile usability system is how this researcher collected and logged interview data for analysis. Once on-site with a participant I was able to enter their responses using a BlackBerry Playbook 4g LTE tablet to access a coded Google Survey and facilitator script.

Design of the usability protocol

Steve Krug's 2009 *Rocket Surgery Made Easy* and the 2000 *Don't Make Me Think* was the guiding source of my epistemological framework used in this usability study. Krug's ease-of-use principles center on keeping web site design both simple and logical, sparing the participants any unnecessary confusion in navigation. Tasks for participants include the use of essential navigation features such as getting to and from the homepage to other locations such as the tutor handbook and its subsections, the SHINE information page and naturalization interview sections. Other tasks asked participants to navigate to the 100-civics questions section of the site, using persistent navigation links such as the back button and the homepage link at the bottom of each page.

Methods

Population

Participants in this study were University of Hawai'i (UH) at Mānoa students. I recruited from student clubs and organizations that had stated missions of learning through community service. I sent emails to representatives of the UH Honors program, fraternities, sororities, and the East-West Center student affiliates and scholars. Representatives then forwarded my recruitment email to individual members. The majority of the participants were 18-24 (see Table 1 below).

Table 1. Participant's Age

Age	Participants
18-24	78%
25-34	22%

Note. n=13

There was nearly a 50/50 split between participants seeking a bachelor of science and a bachelor of arts (see Table 2 below).

Table 2. Participant's Major

Major	Participants
Bachelor of Science	56%
Bachelor of Arts	44%

Note. n=13

The majority of the participants were 3rd, 4th and 5th-year students. First and second-year students seemed under-represented (see Table 3 below).

Table 3. Participant Demographic Information.

Standing	Participants
5th Year in Program	23%
4th Year in Program	38%
3rd Year in Program	23%
2nd Year in Program	0%
1st Year in Program	15%

Note. n=13

Setting

I conducted interviews in comfortable locations chosen by participants. These sites included areas students often frequent in between classes or in their free time (see examples below in Figure 6). When first meeting with participants, I explained how the mobile usability rig afforded us the freedom to conduct the testing in any setting. Participants expressed appreciation for being able to sit, stand, lie down, or even walk around without having an observer looking over their shoulder while testing.

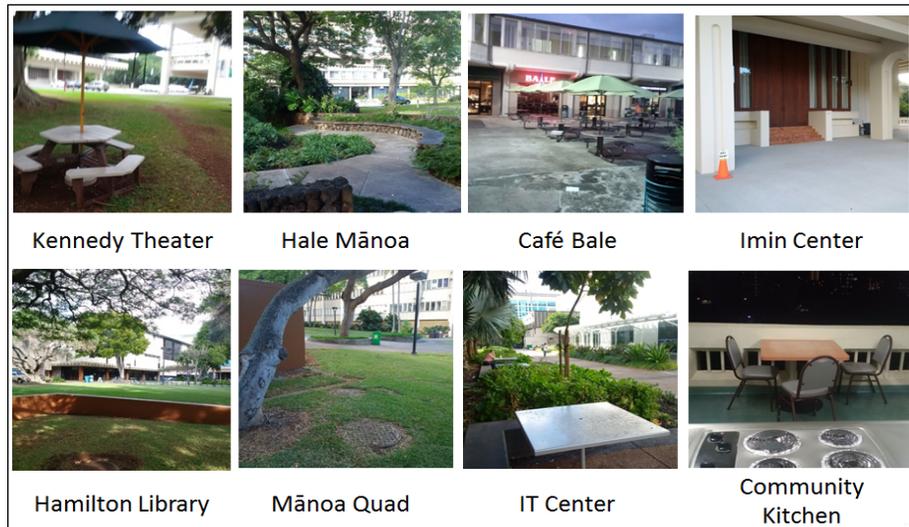


Figure 6. New IRB compliant testing locations

Procedure

I asked participants to perform a series of tasks based on a usability protocol and to rank the difficulty of each task using a ranking system of zero-to-three. Zero (0) indicated a task was completed with no effort. A ranking of one (1) indicated that the participant easily overcame a minor problem. A ranking of two (2) indicated that the participant had to backtrack, or the task took more time than they expected. Finally, a ranking of three (3) showed that the participant experienced problems and could not complete the task. Usability sessions took place on the campus of UH Mānoa in public spaces. Usability interviews were conducted on the campus of UH Mānoa with nine (9) participants during the first week of February 2015. I interviewed another four (4) participants approximately two-weeks later.

Results

Task analysis of round one

Tasks for participants include the use of essential navigation features such as getting to and from the homepage to other locations such as the tutor handbook and its subsections, the SHINE information page and naturalization interview sections. Other tasks asked participants to navigate to the 100-civics questions section of the site, using persistent navigation links such as the back button and the homepage link at the bottom of each page. All of the participants expressed satisfaction when asked if the navigation was fast enough for them.

During the first round of testing, all 9 of group one’s participants completed the usability protocol tasks. Out of the 27 tasks completed by participants, six tasks ranked with a minor problem while the remaining 21 received ranks of zero effort (see Table 4 below). Of the six tasks that had minor problems, participants reported that the tutor handbook’s sections of different level learners had too much text and the interview guide section was confusing (see Figure 7 below). Participants were not sure what to expect when they navigated to the “interview scripts” section. Some participants speculated that the interview section contained interviews of individual who had passed their naturalization interview (see Figure 7 below).

Table 4. Overall Task Rankings Round One

Difficulty Ranking	Total
0= Zero Effort	78%
1= Minor Problem	22%



Figure 7. Round One’s Problem pages

Design revisions

The first major revision was the re-ordering of the links on the Homepage and the addition of the “Can Elders Learn” as the first navigable item. More than one participant suggested that section on elder’s ability to learn should be put first because of the common misconception that elders cannot learn without a great deal difficulty. Further revisions to the site’s design after round one included the renaming of navigation links. Interview Scripts was renamed “Naturalization Interview Guide” and “Multi-Level Level Learners” was renamed to “Working with Groups” to alleviate issues of ambiguity, such as the tutor handbook and 100 civics questions alongside the homepage link located at the bottom of each page. Participant’s overwhelmingly negative feedback to large bodies of text prompted the site-wide consolidation of text into dropdown menus.

Task analysis of round two

During round two of usability testing, all 4 participants completed 100% of the usability protocol tasks. All of the participants agree the speed of navigation was fast enough. Out of the 27 tasks completed by participants, only one task ranked with a minor problem of navigating the “ESL High Beginner” page (see Figure 8 below). Although the participant thought that there was “too much information on one page,” no revisions were made because of the page’s content. The other remaining 26 tasks received ranks of zero effort (see Table 5 below).

Table 5. Overall Task Rankings Round Two

Difficulty Ranking	Total
0= Zero Effort	96%
1= Minor Problem	4%

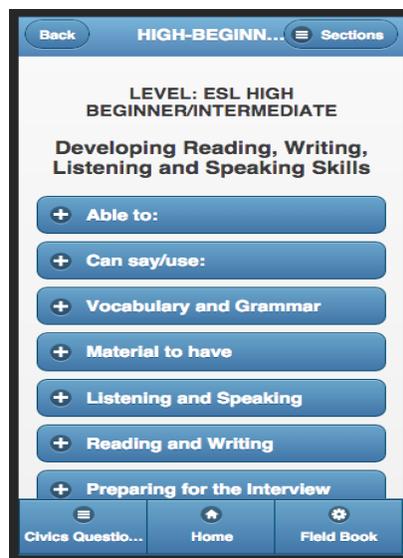


Figure 8. Final Version of the ESL High Beginner page

Exit interviews

Problems

When asked what part of the website was confusing, five out of nine participants from round one directed their critique at the interview section. Participants cited the ambiguity in labeling conventions and stated a need for context on how to exactly to use the interview page in the course of an interview. When asked what else should be in the SHINE Mobile Website, two

participants mentioned the naturalization interview section. Both participants suggested the inclusion of a simple prompt directing the reader how to use the scripts or how to “set the scene.” When asked what kinds of people would have problems with this web site, most participants speculated that elders would have an issue. Since the site was designed for volunteer tutors helping elders, this concern does not present an issue. Another participant said that an elder could navigate this site, but they would just require more time to get themselves oriented. When asked what kinds of problems those people might have, three participants said that lack of experience would be a barrier. When asked what they like least about the website, the majority of the participants thought that the tutor handbook had “way too much information presented at one time for a normal user to handle.” One participant mentioned the possibility that a person with a condition known as “sausage fingers” would have a hard time on the testing device because the buttons were so small. When asked if a tablet would be more suitable, the participant indicated yes.

Ease of use

When asked if the site seemed easy or difficult, participants all indicated it was easy. One participant commented, “everything is right there, everything I expected...I don't have to go to another page.” When asked what made it easy, participants pointed to the website’s simple layout, how information is presented in small chunks, and lots of bullet points, directing them to what was important. One participant said, “I feel like it's all like organized and you're not having to constantly navigate, it's all in your tab, if I want to find out what the questions are, it's all in the tabs.” Another mentioned, “Quick, intuitive, colors similar to ones I've already used like Facebook, which is good because people are comfortable spending time on sites like that.” Another cited an RWD feature, citing “the buttons are big, and the span across the device so it's hard to miss them.” When asked what their impressions were of the website, all participants stated that it was easy to use, well organized, intuitive, and extremely fast. When asked what they liked best about the website, participants mentioned the sites intuitive organization, the convenience of each resource that are no more than three navigations steps away from each other, the colors, and how the site flows. They mentioned how they found what they expected to find the majority of the time. Another participant thought the site was extremely easy, and the website could be mastered in less than 90 seconds.

Discussion

Paper-based to digital content

Adapting the SHINE corpus of ESL tutoring resources for use on mobile devices was important because of the implications for both the tutor and the learner of English for United States citizenship. Learners in the SHINE program are in the process of redefining their national

identity while learning a second language. SHINE learners need volunteer tutors whose pedagogical techniques can account for a learner's level and ability. All of the participants were able to complete their tasks at approximately the same intervals. The high success rate of this usability study's tasks can be attributed to participant's minimum of 3-4 years of experience using the web on mobile devices. Adherence to Stockwell and Hubbard's (2013) principal of mobile learning such as limiting distractions and packaging content in bite-size chunks made up most of the final revisions on the SHINE mobile website.

Revisions

Major revisions were made at the end of round one. Even though the content was not part of the participant's particular schema or domain of knowledge, if there was more than one scrolling page of text, participants thought they could get lost on the page. When content was repackaged into labeled drop-down bars, the participants did not feel overwhelmed or display signs of cognitive overload (see Figure 9 below). Even after the consolidation of pages, most of the participants automatically checked the scroll-ability of each page to assess the amount of content on a page.

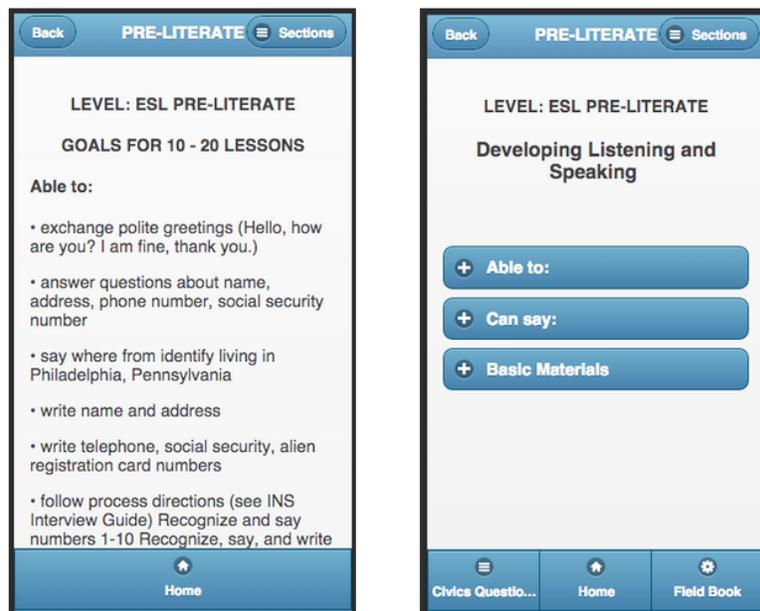


Figure 9. Before and after revisions addressing issues of excessive scrolling

Future Directions

This student project was developed via a M.Ed. Learning Design and Technology program at the University of Hawai'i at Mānoa College of Education where I hope to continue my research in the field of mobile learning in the Fall 2015 Learning Design and

Technology Hybrid Ph.D. program. I plan to address questions such as 1) Do mobile usability studies conducted in the field identify more issues than lab-based studies? 2) Do participants provide more contextualized feedback when using the mobile devices in authentic mobile environments? 3) What are the current methods and modes used by learners on a mobile device?

Conclusion

The SHINE mobile website I developed for this final project is a tool developed for a very narrow demographic, the volunteer tutor. Yet, it is my hope that anyone, anywhere, at anytime will take advantage of these easy to use mobile resources. When the SHINE's mobile tutoring website goes live next semester, if a person has a mobile device, SHINE's resources can help anyone teach English for United States citizenship.

This study was important in the field of usability testing, because instructional designers everywhere are always finding new ways of using mobile technologies to engage all types of learners. Nevertheless, the capturing and analysis of these innovations in mobile environments as compared to that of a computer lab environment or remote testing presented its own unique challenges. The greatest hurdle I overcame during the course of this study was in making the entire testing experience easier for participants. With traditional remote usability testing on mobile devices, participants had to navigate to consent forms, fill out pre and post surveys, and install third party software on their devices and/or PCs before they can even begin testing process. The protocol I developed for this project has participants sign a consent form before they begin a guided usability testing session at the location of their choice.

Whether it is an eBook, PDF, or a doc file, learners are clearly adopting mobile devices as a first line means of consuming their digital content. Instructional designers and usability testers can now get out of the lab and develop their products in the environments where they are being used.

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