

Onramp to the Internet for Seniors: Beyond Email

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Abstract: The number of older Americans is rapidly increasing and these individuals have unprecedented opportunities to improve their quality of life. However, one valuable option, the Internet, is passing many seniors by. The Internet can provide older adults with many valuable services, but in particular it can provide increased social interaction, which can relieve some of the isolation that many seniors feel. Unfortunately, many older adults have had limited exposure to the Internet and have been unable to take advantage of the opportunities it can offer. This purpose of this instructional design project was to develop and evaluate a senior-friendly introduction to online communication. The Web-based instructional design module focused on audio calls and text messaging, providing senior learners with background information and how-to instruction. The project was also designed to test and evaluate best practices for providing older adults with effective instruction by incorporating design elements and technologies to allow full accessibility for those suffering from age-related physical and cognitive decline. Project testing showed that the design elements and technologies used to specifically address the needs of older learners were successful in helping older adults to learn and to embrace the new technologies presented.

Introduction

America's older adults enjoy a far greater quality of life than at any time in the past, experiencing better health care, social services and greater options for lifelong learning. Unfortunately, many seniors are being left behind in one area that can improve their quality of life even further: the Internet. The Internet can give seniors unprecedented opportunities to learn, communicate, and explore. It can also provide a lifeline for those seniors, faced with illness and physical infirmity, who no longer enjoy the mobility they once did.

In particular, older adults could greatly improve their quality of life by making use of the Internet for remote social interaction. Text messaging and audio calls can provide older adults with the ability to communicate with friends and family easily and cheaply,

increasing their social interactions and reducing social isolation. However, many seniors left the workplace before computer use and the Internet became ubiquitous and subsequently they have had little opportunity to formally learn about these tools. Some seniors may rely on family and friends for instruction or more formalized courses, but often instruction for seniors is not tailored to their particular needs by providing accessibility and design for those with visual and hearing degeneration, mobility difficulties and for those suffering from cognitive decline. As a result, many seniors may not be receiving effective instruction and may therefore not be using computers and the Internet as pervasively as they could. This means that many older adults are missing out on valuable opportunities for social interaction made possible by the Internet because of limited access to senior-friendly training. Without appropriate training, seniors will be excluded from the rich world of opportunity offered by the Internet.

The purpose of this instructional design project was to develop and evaluate a multimedia instructional module to teach older adults about Internet communication. The study focused on strategies to teach older adults how to use Skype for text messaging and audio calls while incorporating technologies and design elements specifically tailored to enhance learning for this population. The module was designed to be non-threatening for the novice senior computer user and accessible to those who may suffer from age-related physical and cognitive decline. Various techniques were used to present the material and enhance retention. Particular attention was paid to presenting instruction in a clear, non-distracting manner with complete accessibility for those individuals with physical and cognitive degeneration.

The development and evaluation of this module provided insights into the best practices for training older adults in use of the Internet. Results from the small group testing will be used to improve the module and create a template for future modules focusing on different aspects of Internet use for older adults. Ultimately, this module could be a subset within a larger project that would guide novice senior computer users to develop skills for all areas of Internet use with senior-friendly design. This larger project would serve to provide older adults with skills necessary to use the Internet effectively, and as a result, would give them yet one more opportunity to improve their well-being and quality of life.

Background

Older adults are using the Internet far less than those younger. The Pew Internet & American Life Project (2006) found that only 28% of Americans age 70 and older go online compared to significantly higher percentages of those who are younger. However, older adults can greatly benefit from using the Internet and improve their quality of life and their well-being. Shapira, Barak and Gal (2007) found that older adults participating in a computer class showed a distinct increase in quality of life compared to those in a comparison group participating in non-computer related activities. These researchers noted that participants in their Internet course for older adults experienced personal empowerment, enhanced interpersonal communication, and a sense of accomplishment from participation. Other researchers were also able to replicate this increase in well-

being. Chaffin and Harlow (2005) discuss how seniors are more likely to experience health problems that can increase the risk of being homebound and isolated, but they note that email and the Internet can alleviate social isolation and increase communication and contact with others. The researchers reported that as social isolation decreases, well-being increases.

There seems to be general agreement, however, that older adults should be provided with assistive devices and particular accommodations for using the Internet to address cognitive and physical decline (Chaffin & Harlow, 2005; VanBiervliet, 2004). These devices and accommodations can significantly enhance seniors' experience with computers and the Internet. Researchers have also determined that seniors can benefit from tailored training when learning how to use the Internet. Mellor, Firth, & Moore (2007) stated that seniors learning to use computers and the Internet benefit from consistent access to technical support, a slower pace of learning and repetition of instruction. They also noted that paper-based, step-by-step instructions are critical for success and emphasized that there are no online self-help guides currently available that are appropriate for this population.

To enhance retention and learning for this population, researchers have developed recommendations for techniques that can address the particular needs of senior learners. Van Gerven, Paas, and Tabbers (2006) recommend focusing on efficient use of cognitive resources by reducing the amount of cognitive steps in learning. The researchers recommend limiting distracting elements such as popups, banners and background music, which consume cognitive resources that could be focused on more vital learning tasks. Similarly, Krump & Krasovec (2007) note that simplifying sentences for audio presentation, slowing presentation speeds and increasing prosody are all important aspects that should be considered for any multimedia project targeted to older learners. For senior learners with visual impairments, researchers recommend fewer screen icons (Chaffin & Harlow, 2005), and increased font sizes and high contrast text (VanBiervliet, 2004). Dickinson, Eisma, Gregor, Syme, & Milne (2005) also cited the importance of tailored training. In their study they found the failure of one Internet course designed for senior learners to have been caused by materials with language that was too technical and detailed, lack of hands-on experience, and coverage of too many aspects of the Internet at once.

Although seniors may have more challenges learning how to use the Internet, they do seem interested in using it, and once trained, become active users. The Pew Internet & American Life Project (2004) found that seniors were just as enthusiastic as younger users once they were online. In addition, Burwell's (2001) description of the Chicago's Woodson Regional Library Internet classes for seniors reveals a successful program that was popular and well received by participants. Enrollment was twice what was expected and participants were extremely enthusiastic and engaged. This demonstrates that there is a strong desire among many seniors to learn about the Internet, but a face-to-face course such as the one at the Woodson Regional Library naturally has limitations based on location and time. A Web-based course could provide this same opportunity for senior training, but would reach a far greater audience.

Methodology

The instructional design module for this study was designed to provide senior learners with instruction on Internet communication options other than email: text messaging and audio calls. Skype was used as the software to demonstrate these communication techniques. The module gave learners the opportunity to explore Skype and these communication tools so that they could include them in the repertoire of Internet skills, increasing their options for enhanced communication using the Internet. Design ensured accessibility for those with age-related cognition degeneration and physical challenges such as difficulty with mobility, hearing loss and reduced vision, and was intended to be non-threatening for the novice computer user. The module required participants to have only minimal computer and Internet skills.

Module Development and Design

The module was Web-based and created using Apple iWeb 06. Screen capture videos were produced using SnapzPro and were closed captioned using Media Access Generator (MAGpie) software from the Carl and Ruth Shapiro Family National Center for Accessible Media (NCAM). The module had three primary sections: contacts, text messaging and audio calls. A video for each section presented step-by-step instructional how-tos. Each how-to video clearly demonstrated the basic functionality of the technology and how it should best be used. Essential hardware and software were also discussed, as well as cost. Embedded test questions were included in each section and correct answers and feedback for all embedded test questions were provided to enhance understanding and retention.

Based on research of best practices to enhance learning for senior learners, the module endeavored to provide senior-friendly instruction. Jargon and technical language was kept to a minimum and the presentation of material was designed to be at a moderate pace so learners would have ample time to understand and digest information. Distracting elements such as pop-ups, banners and musical soundtrack were avoided to enhance retention of information. Navigation in the module was clear, simple and consistent, allowing participants to easily backtrack to earlier sections for review and advance forward through the module. Required participant interaction was minimal and no complex mouse or keyboarding skills were required of participants. All multimedia elements were programmed to autoplay, eliminating the need for participants to start these elements manually. Embedded test items were designed to require only simple clicking to answer questions and submit answers. Typing and keyboarding skills were not required for any part of the module.

Graphic elements were kept to a minimum in an attempt to create clear, simple and non-distracting design. Images were used in the module, but were deliberately selected to be senior-focused in order to encourage senior connection with material. Images in the module featured an older adult (80 years of age) using a headset, keyboard and mouse. The intention for these images was to encourage seniors to identify with the images and visualize themselves in the same position, successfully interacting with the computer.

This design choice was an attempt to combat the myth held by many seniors that technology is the exclusive purview of the young.

To address the accessibility needs of those learners with hearing or vision impairment, all portions of the module included duplicative audio and visual elements. All videos were closed captioned and visual elements were enhanced with audio narration. All text elements were at least 14-point font or larger to increase legibility. Closed captioning for the screen capture videos was designed with high-contrast text and 18-point font to enhance legibility.

One-on-One Evaluation

Formative evaluation of the module consisted of two parts to test the module's effectiveness: one-on-one evaluation and small group testing. The one-on-one evaluations were conducted remotely and participants had their own computers and broadband Internet access. Two one-on-one evaluation sessions were conducted. In order to obtain evaluation from different ages and computer experience, one participant for the one-on-one evaluation was aged 80 with minimal computer and Internet experience and the other was aged 65 with a moderate level of Internet and computer experience.

Subjects for the one-on-one evaluations were asked to participate in an interview after completion of the module and questionnaire. The interview collected qualitative data on module design to gain specific details on areas of difficulty and was used to improve the module before the small group testing. Participants were asked seven open-ended questions to identify areas of difficulty and to solicit suggestions for improvement. These interviews were semi-structured and conducted in an informal setting via telephone.

Small Group Testing

The small group testing was conducted at the University of Hawaii's College of Education in a classroom with MacBook laptops equipped with external mice and headsets. There were 14 participants recruited from local social organizations. All test participants were age 65 and over and all had regular access to a computer and broadband connection. Most participants had some exposure to the Internet and basic computer functionality, but little experience with text messaging or audio calls on the Internet.

Instruments

The module was evaluated by collecting both qualitative and quantitative data. The data collected evaluated the participants' attitudes on using Skype's communication tools, opinions on the module's design and effectiveness of the module. Tests, questionnaires and interviews were used to collect data from the participants.

Participants were asked to complete a pre-test that served to collect quantitative data on their entry-level understanding of the material. The pre-test was designed to take less than twenty minutes to complete and contained sixteen multiple-choice and true/false

questions. As participants proceeded through the module they also completed embedded tests to reinforce their understanding of the material as they engaged in the instruction. Embedded test items included feedback to enhance learning and retention, and were grouped and presented after each of the three sections of the module. There were three to six multiple-choice and true/false questions for each embedded test. Participants completed a post-test at the conclusion of the module to document learning achieved. The post-test took no more than twenty minutes to complete and consisted of sixteen multiple choice and true/false questions.

After completing the module, participants were asked to complete a satisfaction questionnaire. The questionnaire collected quantitative data on participant attitudes toward communication on the Internet, the module and demographic data. This paper-based instrument consisted of eight questions to collect information on demographics and previous computer and Internet experience, thirteen Likert-scale questions on participants' opinions of various aspects of the module, and one open-ended question asking for suggestions for improvement. All data collected through tests and questionnaires was anonymous to maintain participant confidentiality. An identifier was used to link pre-test, post-test and questionnaire answers, but this identifier was not linked to individual participants.

Findings and results

Project testing showed that accessibility and design elements that specifically addressed the needs of older learners were successful in helping older adults learn. It also demonstrated that older adults were eager to learn new technologies for communication and enthusiastic about incorporating these new technologies into their lives.

Participants in the study were all highly educated and demonstrated enthusiasm for services available on the Internet. Most of the participants were 65-70 years old, however, the oldest participant was over 85 years old. Of the participants in the small group test, 71% held advanced degrees. Many participants (78%) felt comfortable using a computer, 86% of participants had their own computer and all had regular access to the Internet. Two of the participants had used text messaging in the past and three had experience making audio calls on the Internet. All participants were eager to learn new computer skills and 83% felt that the Internet had services that were of value to them.

A comparison of pre- and post-test results showed that participants' correct responses increased for thirteen out of fourteen objectives (Figure 1). For one objective the pre-test and post-test results were identical. The question for this objective required participants to correctly identify five steps for text messaging. In the pre-test the list of options included the step 'Press the Enter Key,' however, the post-test included both this step and an additional incorrect option, 'Press the Send Button.' Most participants who answered the question incorrectly on the post-test selected this incorrect option, indicating that there was insufficient instruction in the module on this step of the text messaging process. For six objectives, 100% of participants identified the correct answer in the post-test and

for an additional seven objectives over 85% of participants identified the correct answer in the post-test.

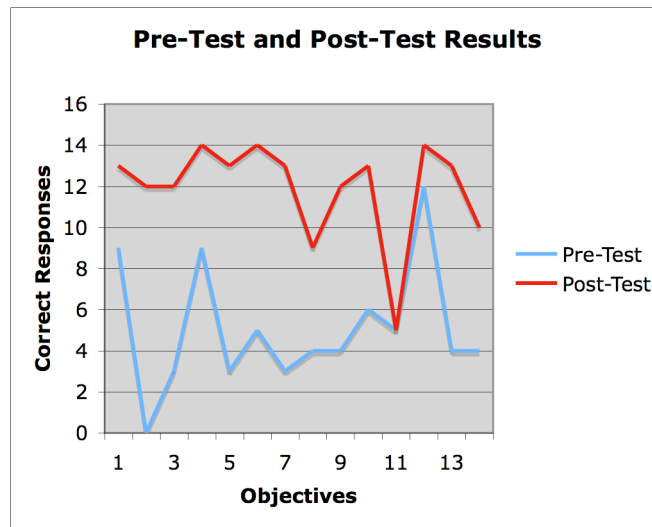


Figure 1. Pre- and post-test results for performance objectives.

Two terminal objectives were created for the module, one for text messaging and one for audio calls. Questions for testing these two terminal objectives were included in both the pre-test and post-test for all participants. Results for the terminal objectives were somewhat problematic. The text messaging terminal objective showed some improvement for the majority of participants, with six participants receiving the same pre-test and post-test scores for this terminal objective and seven participants receiving a higher score on the post-test than on the pre-test (Figure 2).

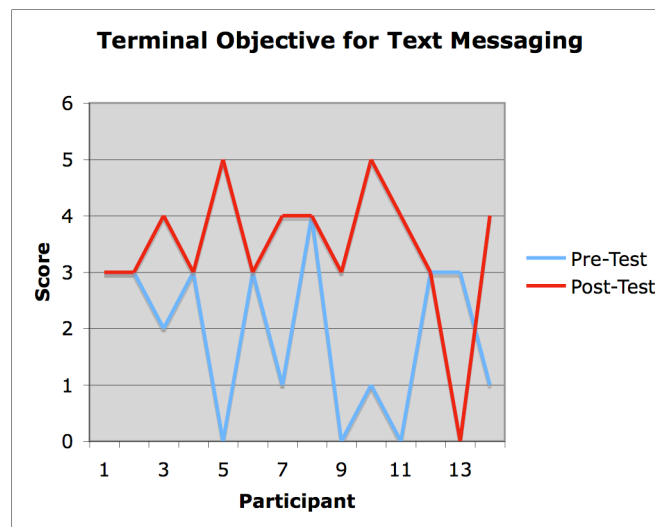


Figure 2. Pre- and post-test results for text messaging terminal objective.

One participant scored higher on the pre-test than on the post-test for the text messaging terminal objective. For the audio calls terminal objective, two participants scored higher on the pre-test than on the post-test, two received the same score for the pre-test and the post-test, and ten received a higher score on the post-test (Figure 3).

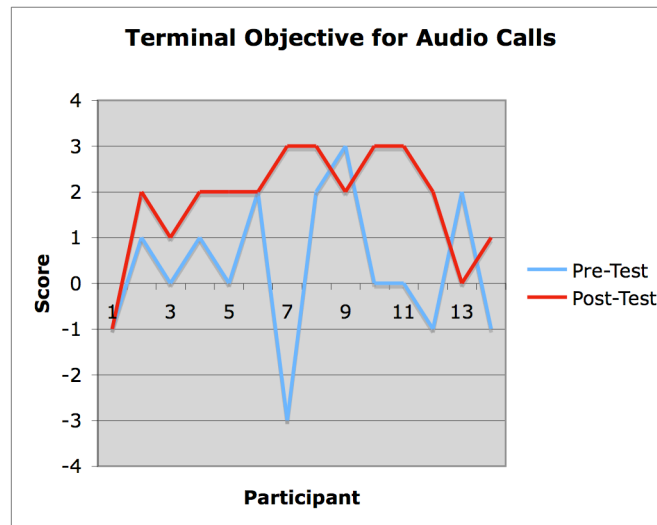


Figure 3. Pre- and post-test results for audio calls terminal objective.

Many responses to the terminal objectives both in the pre-test and post-test revealed some confusion by participants on the question format. Participants were asked to identify steps for text messaging and audio calls and order the steps appropriately. Some participants simply checked the steps and did not indicate the sequence while others ordered all steps in the question, even those not appropriate for either text messaging or audio calls. It can be inferred from these results that the format of the questions for these terminal objectives created significant confusion for participants and that alternate structure for testing the terminal objectives may provide more accurate assessment of participant learning.

Overall, participant responses to the module were extremely positive. All participants agreed that the instruction was clear. Reaction to the techniques used to provide accessibility for visual and hearing difficulties was equally positive. Two-thirds of participants (67%) felt that the closed captioning was useful and 93% did not have any difficulty hearing the information presented in the module. An equal percentage (93%) reported that they did not have difficulty understanding the audio information. Only 7% of participants reported having difficulty seeing the information presented in the module and 14% felt that text was too small.

In general, participants felt that the length of the module and the pacing was appropriate. Most (86%) did not feel that the module was too long and 69% felt that the pace of instruction was not too slow. Participants demonstrated gains in both the cognitive and affective domain with 71% of the participants reporting that they felt comfortable using

the technologies they learned and 77% reporting that they were enthusiastic about using them.

Conclusions

Results from the study supported many of the findings by earlier studies on older adult learning. Participants overwhelmingly felt that the pacing was appropriate and that the instruction was clear. This supports the results by Mellor, Firth, & Moore (2007) who found that adult learners can benefit from a slower pace of learning and repetition of instruction as well as results from Van Gerven, Paas, and Tabbers (2006) and Krump & Krasovec (2007) who recommend reducing distracting elements and simplifying audio presentation. The deliberate avoidance of technical jargon in the module and the resulting positive response of participants to the clarity of instruction mirrors findings by Dickinson, Eisma, Gregor, Syme, & Milne (2005) who cited excessive technical language to be detrimental to learning for older adults.

Design elements to enhance accessibility for participants with visual and hearing difficulties also support earlier studies on older adult learning. The minimum 14-point font used in the module and the high contrast text used for closed captioning allowed accessibility for most participants and supports results found by (VanBiervliet, 2004). The success of accommodations for those participants with hearing difficulties, such as reducing audio cues and eliminating soundtrack in audio instruction supports the findings of Chaffin & Harlow (2005) and VanBiervliet (2004).

This study found results similar to the Pew Internet & American Life Project (2004) and Burwell (2001) in regards to senior attitudes and enthusiasm for computer training. Participants were highly enthusiastic and engaged during the small group testing. After the testing session was finished, participants remained behind to discuss the technologies and their experiences with the module. Many seemed interested in learning about other ways that the Internet could enhance communication with family and friends or provide additional beneficial services. This response to the module and the technologies seems to indicate that older adults have the ability and the desire to embrace opportunities provided by the Internet particularly when provided with senior-friendly and senior-focused training.

Participants in this study were particularly well educated and enthusiastic about learning new computer skills; therefore, they were predisposed to approach the module and the new technologies with enthusiasm and diligence. These well-educated participants, 71% reported holding advanced degrees, may have been more inclined and prepared to learn the material than those with less formal educational experience. In addition, participants with less interest in learning new skills or those who value Internet communication less might not be as engaged in the material. Chaffin and Harlow (2005) found that older adults demonstrate motivation to learn when presented with material that can satisfy perceived needs and interests.

Difficulty with question structure by participants during formative evaluation of the module shows that question format for older adults could be a potential area of further study. Multiple-choice questions consisting of a sentence with a blank to be filled in appeared to be particularly problematic for older adults, particularly those over 70. In addition, some participants identified complex numbering and identification of required steps from a list as a particular problem in the satisfaction questionnaire. This may indicate that older adults may be unfamiliar or uncomfortable with particular types of question structure. Research into the types of question structures more comfortable for older adults may result in better learning outcomes and more accurate results from formative evaluation.

It also appears that this population may respond better to interviews for formative evaluation instead of written responses. Few participants left substantial comments for the open-ended question in the satisfaction questionnaire; however, many were eager to discuss the module and their experience with it after completion of the small group test, offering comments and suggestions that were not included in the satisfaction questionnaire. This was supported by the experience with the one-on-one evaluations where interviews were conducted after completion of the module. A significant number of valuable comments were obtained through these interviews. Participants were willing to discuss their experience with the module and voice suggestions for improvement and cite areas of difficulty at length, providing rich insight that was missing from the satisfaction questionnaire. Formative evaluation for this population may be more effective if it is augmented with interviews rather than relying on surveys alone.

Another area for further study may focus on the media used for formative evaluation. Initial development of the module planned for all formative evaluation to be presented as paper-based items. It was felt that older adults would feel more comfortable with paper-based rather than electronic format for evaluation. As such, participants for the one-on-one evaluations completed the pre-test, post-test, embedded test items and satisfaction questionnaire in a paper-based format external to the module. Comments from participants in the one-on-one evaluation, however, indicated that the amount of evaluation items was found to be onerous rather than instructive or engaging.

Based on this feedback, the module was redesigned prior to the small group testing to include the embedded test items electronically within the module. Questions and feedback remained essentially the same, but they were presented in an electronic format instead of paper-based. Design of the embedded questions reflected the module goals of simplicity and required minimal interaction by participants. As a result of this module modification, participants in the small group testing did not seem to have the same adverse response to the evaluation items as those in the one-on-one evaluations. Observation of participants during testing showed that they were very engaged when interacting with the embedded test items and two participants commented that these items were 'fun.' Although initial research seemed to indicate that older adults would benefit from paper-based test items, it appears that participants in this particular study appreciated the electronic format for formative evaluation, finding it more engaging and less onerous than paper-based materials.

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