International Online Journal of Educational Sciences, 2016, 8 (1), 87 - 97

iojes
www.iojes.net

International Online Journal of Educational Sciences

ISSN: 1309-2707

Interactive Whiteboard-Based ATM Use Training for Older Individuals

Oktay Akbaş[1], Meltem Baturay[2], and Yakup Söker[3]

[1]*Kırıkkale University, Faculty of Education, Department of Educational Sciences, Turkey,* [2]*İpek University, Distance Learning Research & Implementation Center, Turkey,* [3] *Graduate School of Social Sciences, Turkey*

ARTICLE INFO

Article History:
Received 05.07.2015
Received in revised form 24.11.2015
Accepted 06.12.2015
Available online 30.01.2016

ABSTRACT

The aim of the present study is to provide interactive whiteboard-based ATM use to older individuals and to evaluate the results of this training. The study employed both quantitative and qualitative research methods and the data was collected through a personal file, ATM performance evaluation scale, semi-structured observation form and Cognitive, Affective and Psychomotor (CAP) perceived learning scale. The study found that after the training, the vast majority of participants were able to carry out basic transactions, including withdrawing cash, checking their balance and retrieving their bank cards from actual ATM machines; ATM use training was successful when specially developed software and an interactive whiteboard were used to simulate an ATM. It was observed that the training eliminated participants' fear and mistrust towards ATM machines and that the participants developed their skills in using the ATM machines. The training was found to have been very rewarding, showing the participants that they could finally use ATMs.

© 2016 IOJES. All rights reserved

Keywords:
ATM, Usability, older individuals, interactive whiteboard

Introduction

Developments in the field of information and communication technologies have affected the fields of education, communications, trade and business. Government-supported projects have aimed to educate and inform individuals in different age groups and professions and of low socio-economic status regarding the use of these new technologies. The National Action Plan prepared and released by Turkey's State Planning Organization (SPO) encourages:

- The provision of computer training to the cognitively impaired;
- The provision of opportunities for technological skills training to the elderly;
- The development of computer, digital and audio technology-based instructional materials to meet the needs of audio-visually and physically impaired elderly individuals (SPO, 2007:49).

Use of these technologies has become a necessary part of daily life, and lack of information and experience may not only leave individuals behind in terms of opportunities and experience, but they may also be exposed to abuse as well as financial loss. Therefore, there is an alarming need to raise awareness on and provide experience in the use of these technologies. While "old literacies" such as basic literacy are still necessary to perform effectively in information-based jobs, there is a growing need for training in "new literacies" and "new basic skills" such as numeric skills, information technology skills, computer literacy and related life skills (Mayo, Pace & Zammit, 2008). However, the motivation for learning how to use new technologies may be affected by a great variety of factors, including age, experience, competence limitations, cultural structure, economic issues and social policies (Günüç, Odabaşı & Kuzu, 2012).

[1] Corresponding author's address: Kırıkkale University, Faculty of Education, Department of Educational Sciences, Kırıkkale Turkey
Telephone: +90 318 357 24 86-88/1401
Fax:+90 318 357 24 87
e-mail: oktayakbas@hotmail.com
DOI: http://dx.doi.org/10.15345/iojes.2016.01.008

© 2016 International Online Journal of Educational Sciences (IOJES) is a publication of Educational Researches and Publications Association (ERPA)

Rogers, Meyer, Walker and Fisk (1998) have pointed out that older individuals are faced with a wide range of new technologies in their daily lives. One of the technologies is the Automatic Teller Machine (ATM), the use of which has become a daily necessity for individuals of all ages (Petrie, 2001). A study by Czaja (1997) found that older adults show greater resistance to using ATMs than younger people. According to Tarakanov-Plax (2005), who explored ATM use among individuals aged 55-100 years, non-use was based on such factors as personal safety issues, the fee required for ATM cash deposits and the complexity of language and design of the ATM interface. On the other hand, older people have expressed a willingness to learn how to use an ATM if training is provided (Rogers, Cabrera, Walker, Gilbert & Fisk, 1996).

Older individuals living in Turkey are in a similar situation. Most of them being retirees, they are provided by their bank with ATM cards to use to withdraw their pensions. Unfortunately, most of them are unable to use these machines and are often abused by another individual. Some do make limited use of ATMs to withdraw cash and check their balances, but they refrain from using other available functions such as currency conversion, stock-market-related transactions and payment or transfer of funds. Older people often have problems identifying the card slot and correct keys, reading the on-screen instructions and recalling their passwords. Due to a general decline in their cognitive and physical abilities, they may be unable to complete the necessary steps required for a transaction, and having experienced many failures using ATMs, they put up psychological barriers as well. Researchers have reported that the elderly feel mistrust, insecurity and a lack of privacy when using ATM machines (Coley, Wright, Park & Ntuen, 1997; Chan, Wong, Lee & Chi, 2009).

In order to remove barriers before older ATM users, some researchers have examined the effects of new ATM screen designs on usability (Chan et al., 2009), whereas others have explored the effectiveness of different types of training, such as blocked or random practice (Jamieson & Rogers, 2000). The current study provided interactive white board training in ATM use to a group of older individuals on a university campus and then observed their performance at an actual ATM.

The Need of ATM Training

Close to three-quarters of the population over age 55 are said to use ATMs (Ergil, 2011). The remaining one-quarter who are unable to use these machines are exposed to many problems and possible threats in the course of their daily lives. In order to access their pensions, retirees in Turkey face hours-long waits in bank offices if they are unable to access their accounts through ATMs. Providing ATM use training is vital, particularly for the older individuals; however, no such training is offered by the banks or the government.

Interactive Whiteboard Training for ATM Use

Interactive whiteboards are used for teaching and training people in a great many fields. Wall, Higgins and Smith (2005) state that interactive whiteboards are effective tools for use in initiating and facilitating the learning process and ensuring student participation. The British Educational Communications and Technology Agency, BECTA (2009), mentions enhanced motivation; improved participation and cooperation; easier handling of complex concepts with the help of clearer, more effective and dynamic presentations; and appeal to students with different learning styles among the advantages of interactive whiteboard training, and Cuthell (2003) adds improved information and communication technology skills to the list of benefits to students (Cuthell, 2003). In their literature survey, Smith, Higgins, Wall and Miller (2005) summarize the benefits of interactive whiteboards as follows: flexibility and multiple facets, effectiveness in multimedia use; support for the lesson plan; diverse resources; development of information and communication technology skills; and more interaction and student participation in classes.

Davies, Stock and Wehmeyer (2003) suggest that teaching a person to perform community-based activities is best accomplished by instructing the person in an environmentally valid situation; however, this approach is impractical for teaching ATM use, as the machines are not intended for this type of training and there is a risk that the card will not be returned to the user in the case of an error. Given this situation, a "real simulated learning setting" is required to provide training to older individuals. In this case, "real" means that the setting must not be simplified or somehow made easier, but must fully represent the actual functioning of the original machine (Davies et al., 2003). In this respect, interactive whiteboards are readily available tools for training the older individuals in ATM use. When used with an appropriate software

program, the whiteboard offers a readable screen with keys representing the same interface as an actual ATM, thus providing a similar audio-visual experience as.

The aim of the present study was to provide interactive whiteboard training in ATM use to older individuals and to evaluate the results. The study aimed to answer the following research questions:

1. How do older individuals perform in actual ATM use after the training?
2. What are the main factors affecting the performance of training participants?
3. How do participants evaluate their learning?

Method

The Instruments

Quantitative and qualitative information was collected using the following four instruments:

Personal file. Personal files were comprised of demographic information on each participant**.**

ATM performance evaluation scale. This scale, developed by the researchers in the form of a checklist, was comprised of different performance indicators (functions and sub-functions) and used to evaluate the capacity of participants to perform basic ATM skills. Indicators were developed based on an earlier needs analysis conducted by telephone in which prospective participants were asked the following questions: "Do you use an ATM?" "If so, what types of functions do you make frequent use of?" Have you had any problems using these functions?"

Semi-structured observation form. In order to determine the factors affecting participants' ATM performance, a semi-structured observation form was prepared and the trainer and researchers filled in it after they observed the training and performance processes of the participants. The training sessions were videotaped, transcribed and analyzed.

Self-evaluation form (CAP perceived learning scale). The CAP Perceived Learning Scale developed by Rovai, Wighting, Baker & Grooms et al. (2009) was adapted by the researchers so as to provide better clarity and comprehension for the older individuals and then used to collect data regarding participants' perceived cognitive learning. In the adaptation process, firstly, original scale items were translated into Turkish by the researchers. Translated items were reviewed by the field experts and according to their opinions; some corrections were made by the researchers. After that, the items were reviewed again by the language experts. The Cronbach Alpha reliability value of the original CAP scale was 0.79, whereas the Cronbach Alpha of the adapted version used in this study was 0.69. In the light of data obtained throughout the adaptation process, it can be said that the scale is valid and reliable.

The Participants

Initially, the researchers, accompanied by a police officer, approached older individuals in front of ATMs, in mosques and in parks and asked if they wanted to participate in the training and research. Besides, with the assistance of the director of the Kırıkkale office of the Turkey Retired Employees Association Desk, association members were contacted, and volunteers were chosen to participate in the study. The ones who wanted to participate in the study had serious problems in using ATM. They mostly asked other people to help them in front of the ATM. A total of 150 pre-interviews were conducted with these individuals; however, despite their initial eagerness, when contacted for the training, they declined to participate. As stated by Fraenkel and Wallen (2000), this type of "convenience sampling", i.e. selection of people who are easy accessible, has the obvious advantage of being convenient. Demographics of participants are given in Table 1. Participants were provided transportation to and from the university campus where the training took place.

Table 1. Demographic information of the participants.

		Frequency
Sex	Female	10
	Male	7
Age	<40	1
	41-50	8
	50-60	5
	>61	3
Education (completed)	High School	5
	Primary School	11
	None	1
Physical Handicap	Yes	0
	No	17
Eyeglasses	Yes	10
	No	7
Literacy	Yes	15
	No	2
Previous Problems with ATM Use	Yes	1
	No	16

Interactive Whiteboard-Based ATM Design

Interactive whiteboards are used extensively in training and education. This study used an interactive whiteboard to present all steps in an ATM transaction – entering an ATM card in the card slot, entering the password, selecting the desired transactions (checking the balance, withdrawing the required amount), completing the transaction – in a step-by-step approach with visual and audio clues. Participants interacted with the whiteboard, which used a touch screen to simulate an actual ATM screen. As the participants progress through the simulated transactions, the interactive screen provided them with the instructions needed to perform the same transactions at an actual ATM. A simple animation was used to simulate cash coming out of the ATM slot, and a reminder appeared on the screen instructing users to remember to take their cash before leaving the machine.

Development of interactive whiteboard-based atm use-training software. ATMs of different banks were examined prior to programming the whiteboard ATM interfaces, and it was decided to simulate the design of the ATM belonging to a bank commonly used for monthly pension accounts of retirees, the target group of the training. Photographs were taken of the ATM and of the interface details, including keys, card slot, receipt slot and cash slot, and cash withdrawal operations were performed several times to gain a better understanding of the experience.

Each step of the cash withdrawal and other transaction procedures were photographed, and an algorithm was developed to capture each detail, from insertion of the card into the ATM card slot to the retrieval of the card from the slot following completion of the transaction. Next, algorithms were added for other circumstances, such as entering the wrong password, card capture after entering the wrong password three times, card retrieval without performing a transaction and cancelation of a transaction.

Next, Adobe Flash CS3 Version 9.0 program was used for drawing the interfaces and the software coding. The whiteboard images were initially sketched on paper and then developed as vector-based images that could be easily enlarged. The drawings were encoded step by step while constructing the algorithms using the visual programming language Actionscript 2.0.



Figure 1. Photos taken by the researchers prior to software development

In order to help the users to experience the feel of an actual ATM while training with an interactive whiteboard, special care was taken to construct visuals with depth and dimension and to animate the key pad and control key area, selection keys to the left and right of the screen and the cash, receipt and card slots appropriately. Visual warning lights and audio warning signals were used to increase the realistic appearance of the program.

Once the software was completed, the program was tested, and each step was evaluated using a checklist developed by the researcher. 15 volunteers tested the software and provided feedback, and some improvements were made on the interface based on their comments prior to its implementation.



Figure 2. The whiteboard interface.

The Implementation

The training was implemented in three stages: presentation/demonstration, practice and evaluation. Participants were provided with transportation to the university campus for the first two stages of the training, which was conducted over a two-hour period with a limit of five participants per session so as to allow participants to maintain their concentration for more effective and efficient training. After informing the participants about the training and the evaluation procedures, the researchers began by presenting the training material using an interactive whiteboard with an ATM interface that simulated that of the bank from which retirees withdraw their monthly retirement pensions. Three basic actions were demonstrated – inserting a bank card into the ATM card slot, checking the account balance, and withdrawing cash – and participants were then asked to practice each action three times using the interactive whiteboard. For the third stage of the training, participants were driven back to the city to perform the same transactions at an actual ATM machine. Participants were expected to use the ATM themselves without any guidance from the researchers, who observed the participants' performances and completed the performance indicators checklists accordingly. As emphasized by Davies et al. (2003), the final measure of effectiveness of simulation cannot be determined until the skill is evaluated in the community setting. After completing their ATM transactions, participants were asked to evaluate the training using the CAP Perceived Learning Scale (Rovai et al., 2009), which was read to them by the researchers. (Participants also filled out a demographics form prior to the training implementation.)



Figure 3. Participants practicing on the interactive whiteboard.



Figure 4. Researchers observing while a participant practices on an ATM.

Data Analysis

Quantitative data was analyzed by using frequency in the SPPS 15 Pocket Program. Frequencies were calculated, and the results are presented in tables 2 and 3. Qualitative data was evaluated the method 'content analysis'. As stated by Yıldırım and Şimşek (2006), content analysis is used to access the concepts and relations that will explain the collected data by organising it under common themes that may be easily interpreted and understood. For the analyzing of qualitative data, findings were presented according to observation forms and categorized based upon the results of the study. Opinions of the observers were given in the findings and discussion

Results

The results of the ATM Performance Evaluation Scale, Self-Evaluation form (CAP Perceived Learning Scale) and ATM performance observations were calculated and analysed. The ATM performance evaluation scale data was examined, and according to both experts, with the exception of 1 participant, all the participants were able to correctly enter the ATM card in the machine; 3 participants were unable to correctly enter their passwords; and 12 participants were able to give the appropriate response to the question, "Would you like a receipt?", whereas 5 were unable to do so. In some cases, the reviewers provided different responses to the questions on the scale, as follows: number of participants able to use the "correct" key to correct a wrongly entered password (Reviewer 1: 5, Reviewer 2: 4); number of participants able to find the withdraw cash key on the account menu (Reviewer 1: 10, Reviewer 2: 13); number of participants able to correctly answer the question "What is the available balance?" (Reviewer 1: 14, Reviewer 2: 13); number of participants able to "Press the correct key to withdraw cash" (Reviewer 1: 12, Reviewer 2: 10); number of participants able to successfully perform the function "indicate the amount you would like to withdraw or enter another amount using the keypad" (Reviewer 1: 10, Reviewer 2: 11); number of participants able to successfully perform the functions "press the enter key to withdraw the amount

requested", "retrieve cash from ATM", "retrieve receipt when indicated" and "retrieve bank card" (Reviewer 1: 14, reviewer 2: 13); and number of participants showing "confidence regarding use of other keys on the main menu" (Reviewer 1: 11, reviewer 2: 11).

Table 2. ATM performance evaluation scale (Frequency)

Performance Indicators	1.Observer		2. Observer	
Entrance Functions	Yes	No	Yes	No
1. Inserting the ATM card into the card slot	16	1	16	1
2. Correctly entering the password on the keypad	14	3	14	3
3. Choosing the right option for the receipt function	12	5	12	5
4. Re-entering a password that was entered incorrectly	5	2	4	3
5. Reacting calmly to withholding of ATM card, proceeding to next steps	0	2	0	3
Withdrawal functions				
6. Finding the withdrawal key on the menu.	10	7	13	4
7. Pointing out the correct balance available when asked.	14	3	13	4
8. Pressing the withdrawal key and selecting the correct amount.	12	5	10	7
9. Using the 'other' option to enter the amount.	10	7	11	6
10. Entering the right amount and pressing the 'enter' key.	14	3	13	4
11. Retrieving cash from the ATM	14	3	13	4
12. Taking the receipt, if required.	13	4	13	4
13. Taking the card from the card slot.	14	3	14	3
Self-confidence regarding the use of other functions on the ATM				
14. Developing the confidence to implement other functions on the menu	11	6	11	6

In addition, when warned that the card would be seized after the password was wrongly entered 3 times, some participants appeared confused and waited for help from the trainer (Reviewer 1: 3, Reviewer 2: 3).

At the end of the training, the vast majority of participants were observed to be capable of performing basic functions of withdrawing cash, checking balances and retrieving their cards from the ATM. The degree of success was higher for the functions of inserting the bank card, entering the pin code and requesting a receipt than for the sub-functions of withdrawing cash, with the most mistakes observed in attempts to key in a desired amount of cash withdrawal.

The trainee and researchers observed participants during the training in order to identify the factors affecting their ATM performance. Findings of these observations are noted below:

"According to my observations, functional literacy was the basic factor affecting the success of the interactive whiteboard ATM training. Of the three people I observed as being unable to completely fulfil their goals, one had never attended school, another had only attended 3 years of primary school, and the third had a very low level of literacy. As could be expected, basic literacy as well as technological literacy were both influential factors." (R1)

"I think an important factor was the ability of participants to understand what they read. The language used during the learning-teaching process is also important. Trainers should use a non-academic language that participants can understand." (R2)

"When teaching ATM use to the older people it is more important to present to a situation that is identical to the actual situation; even if the interface used in training resembles an actual ATM, if it is not completely identical to it, participants will not facilitate a relationship between the machine and the participants. This is due to physiological reasons as well as low levels of computer literacy." (R3)

In addition to basic literacy and computer literacy, the age of the trainee was also observed to be a factor in their success.

"I can say that trainees under age 70 were more successful (than older trainees)." (R1)

"Especially for older individuals, learning by using the actual tools is important. For physiological reasons, older individuals have difficulties learning, and they forget quickly; therefore, creating a 'real' context for ATM training through the use of a simulated environment such as an interactive-whiteboard may be more effective." (R3).

"Not providing an opportunity for practice and hurrying are reasons why older participants had difficulties." (R2)

Personal characteristics can also be said to have affected the performance of participants.

"I think factors such as openness to learning and self-confidence also have an effect. I observed that one of the participants who was not able to fully achieve the goals was very excited during the interactive whiteboard classroom training and was unable to interpret the instructions out of fear of making a mistake." (R1)

Based on the results of the observations, it can be concluded that basic literacy is the underlying factor in the success of interactive whiteboard-based ATM training. In addition, computer literacy, age of the trainee and personal characteristics such as openness to learning and self-confidence also have an effect on training success.

Table 3 presents the results of participants' self-evaluations conducted after the training regarding their perceived levels of learning. At the end of the training, self-evaluation forms (CAP Perceived Learning Scale) were administered to participants. A total of 13 participants agreed or agreed completely with the statement "I can visualize what I learned in the training"; 11 participants disagreed or disagreed completely with the statement "I cannot explain to my friends what I learned in this training"; and 14 participants said they would be able to use the physical skills they learned in the training when withdrawing their next month's pension.

In total, 12 participants agreed completely and 5 agreed with the statement, "After finishing this training my fear and mistrust of the ATM machine changed; 12 agreed completely and agreed completely with and 4 did not respond to the statement, "I can criticize the tools and methods used in the training"; 15 participants stated that they felt more confident about withdrawing money from an ATM following the training; 2 participants agreed and the remaining disagreed with the statement, "After finishing the training my skills in using an ATM (withdrawing money, checking the balance) did not improve," whereas the remaining participants disagreed; 8 participants agreed completely and 8 others agreed that they could transfer their ATM use skills to others following the training; and 14 participants agreed completely or

agreed with the statement, "After taking this training I feel more knowledgeable and skilled regarding ATM use."

Table 3. Perceived learning levels of participants (Frequency)

	Disagree Completely	Disagree	Undecided	Agree	Agree Completely	Blank	Total
1. I can visualize what I learned in the training. (Cognitive)	1	0	3	5	8		17
2. I cannot teach my close friends what I learned in this training. (Cognitive)	7	4	1	2	3		17
3. I can use the physical skills (withdraw cash, check balance) that I learned in this training to withdraw my pension next month. (Psychomotor)	1	1	1	3	11		17
4. After this training, my fear and mistrust about ATM machines have changed. (Affective)	1	0	0	5	11		17
5. I can criticize the tools and methods used in this training. (Cognitive)	1	0	0	2	10	4	17
6. I have more trust in myself after what I learned in the training. (Affective)	1	0	1	2	13		17
7. My skills in using an ATM (withdrawing cash, checking the balance) have not improved after this training. (Psychomotor)	10	5	0	1	1		17
8. I can show the ATM use skills I learned in this training to other older individuals. (Psychomotor)	1	0	2	6	8		17
9. I feel more knowledgeable and capable regarding ATM use after taking this training. (Affective)	0	0	3	5	9		17

According to the results of the self-evaluation (perceived learning), the most promising outcome of the training was that it changed participants' fear and mistrust regarding ATM use. However, participants felt less confident about their ability to transfer what they learned in the training to those around them or to criticize the tools and methods used in the training. The self-evaluations showed the vast majority of participants were less fearful and felt much more self-confident and capable regarding using the ATM. However, they felt less successful regarding the higher cognitive functions of transferring their knowledge to others or being able to criticize the training tools and methods.

Discussion

This study evaluated the effects of using interactive whiteboard-based ATM to train older adults. After the training, the vast majority of participants were able to carry out basic transactions, including withdrawing cash, checking their balance and retrieving their bank cards from actual ATM machines. Participants had greater success in such transactions as correctly inserting their cards, entering their PIN codes and requesting a receipt, but were less successful in the sub-transaction al steps required to withdraw cash. Participants were especially observed to make mistakes when using the keyboard to enter the correct amount of money to be withdrawn.

Overall, the study found that ATM use training was successful when specially developed software and an interactive whiteboard were used to simulate an ATM, as training with an actual ATM would be impossible. This finding is in line with the literature that has reported similar benefits with interactive

whiteboards and other devices with automatic touchscreens. Advantages of interactive whiteboards mentioned in the literature include enhanced student motivation; improved student participation; easier handling of complex concepts with the help of clearer, more effective and dynamic presentations; and greater interaction with improved information technology (Cuthell, 2003; BECTA, 2009; Wall, Higgins & Smith, 2005; Smith, Higgins, Wall & Miller, 2005).

Functional literacy may be considered the basic factor affecting the success of interactive whiteboard-based ATM training. In addition to this variable, computer literacy, age and personal characteristics such as the trainee's openness to learning and self-confidence may have an effect on training outcomes. Mayo, Pace and Zammit (2008) mention both basic literacy and new literacies such as information technology is required for effective performance; Begnall (2004) and Günüç, Odabaşı and Kuzu (2012) include cultural make-up and experience in addition to age are as influential factors.

According to the self-evaluations, the training eliminated participants' fear and mistrust towards ATM machines. Participants were observed to have developed their skills in using the ATM machines; however, higher cognitive behaviours such as being able to transfer the learnt skills to others in their environment and criticize the tools, methods and techniques used in the training were less developed. The finding that training removed participants' fears and mistrust of ATMs is in line with the findings of earlier studies, such as Coley, Wright, Park and Ntue, (1997) and Chan, Wong, Lee & Chi (2009). This finding can be attributed largely to the use of an interactive whiteboard as the basis for ATM training.

It has been suggested that older people require extensive training and exposure before they become fully proficient in the use of new technologies (Jamieson & Rogers, 2000). In the present study, the researchers observed that the participants enjoyed the training, were eager to participate fully, and liked having the training take place in a university-campus environment. They unabashedly and with great enthusiasm repeatedly practiced the interactive-whiteboard-based application. The training was very rewarding, showing them that they could finally use ATMs. In this way, the use of a computer to simulate the ATM helped them to regain their self-esteem. This high interest and enthusiasm in using the interactive whiteboard application might have contributed to their success in the training.

The results of this study should be considered preliminary, as generalization of the study findings is limited by the small number of participants and trials. Further studies may be carried out with larger groups of participants and more trials. In addition, studies may be conducted to determine the long-term effects and retention levels of the information acquired through the training.

References

BECTA (2009). *What the research says about interactive whiteboard?* Retrieved October 11, 2013 from http://dera.ioe.ac.uk/5318/1/wtrs_whiteboards.pdf.

Chan, C. C., Wong, A. W., Lee, T. M., & Chi, I. (2009). Modified automatic teller machine prototype for older adults: A case study of participative approach to inclusive design. *Applied Ergonomics, 40*(2), 151-160. doi:10.1016/j.apergo.2008.02.023

Coley, K., Wright, S., Park, E. & Ntuen, C. (1997). Optimizing the usability of automated teller machines for older adults. *Computers ind. Engng, 33*(1-2), 209-212. doi:10.1016/S0360-8352(97)00076-4

Cuthell, P., J. (2003). *Interactive whiteboards: new tools, new pedagogies, new learning?* Retrieved on 23,11 2012 from http://www.virtuallearning.org.uk/changemanage/iwb/

Czaja, S. J. (1997). Computer technology and the older adult. In Helander, M.G., Landauer,T.K., Prabhu, P.V. (Eds.), *Handbook of human–computer ınteraction*, (pp. 797–812). Amsterdam: Elsevier Science B.V

Davies, D., Stock, S., & Wehmeyer, M. (2003). Application of computer simulation to teach ATM access to individuals with intellectual disabilities. *Education and Training in Developmental Disabilities, 38*, 451-456.

Ergil, İ. (2011).*Yaşlıların dünyası araştırması*. Türkiye Yaşlı Bilimleri ve Teknolojileri Vakfı, 30 Mayıs 2013 tarihinde http://www.tuyev.org/haberler/index.php?haber_id=5 adresinden erişilmiştir.

Fraenkel, J.R & Wallen, N.E. (2000). *How to design and evaluate research in education,* New York: Mc Grawhill Companies Inc.

Günüç, S., Odabaşı, H., F., & Kuzu, A. (2012). Yaşam boyu öğrenmeyi etkileyen faktörler, *Gaziantep Üniversitesi Sosyal Bilimler Dergisi, 11*(2) 309 -325.

Jamieson, B. A., & Rogers, W. A. (2000). Age-related effects of blocked and random practice schedules on learning a new technology. *Journal of Gerontology: Psychological Sciences,* 55B (6), 343–353. doi: 10.1093

Mayo, P., Pace, P. J., & Zammit, E. (2008). Adult education in small states: the Case of Malta. *Comparative Education.* 44(2), 229-246. doi:10.1080/03050060802041746

Petrie, H., (2001). Accessibility and usability requirements for ICTs for disabled and elderly people: a functional classification approach. In Nicolle, C., Abascal, J. (Eds.), *Inclusive design guidelines for hcı.* (pp. 29–60). London and New York: Taylor & Francis, .

Rogers, W. A., Cabrera, E. F., Walker, N., Gilbert, D. K., & Fisk, A. D. (1996). A survey of automatic teller machine usage across the adult lifespan. *Human Factors, 38*, 156–166. doi: 10.1518/001872096778940723

Rogers, W. A., Meyer, B., Walker, N., & Fisk, A. D. (1998). Functional limitations to daily living tasks in the aged: A focus group analysis. *Human Factors, 40*, 111–125. doi: 10.1518/001872098779480613

Rovai A. P., Wighting, M. J., Baker, J. D., & Grooms, L. D. (2009). Development of an instrument to measure perceived cognitive, affective, and psychomotor learning in traditional and virtual classroom higher education settings. *The Internet and Higher Education, 12*(1), 7-13. doi:10.1016/j.iheduc.2008.10.002

Smith, H., Higgins, S., Wall, K., & Miller, J. (2005). Interactive whiteboards: boon or bandwagon? A critical review of the literature. *Journal of Computer Assisted Learning, 21*(2), 91-101. doi: 10.1111/j.1365-2729.2005.00117.x

SPO (2007). Türkiye de yaşlıların durumu ve yaşlanma ulusal eylem planı. 18, 10, 2012 tarihinde http://www.tuyev.org/haberler/index.php?haber_id=5. adresinden erişilmiştir

Tarakanov-Plax, A. (2005). *Design concept for ATM machine accessible for the elderly users in Israel.* Proceedings of the International Conference on Inclusive Design. Royal College of Art, London, 5–8 April 2005.

Wall, K., Higgins, S. & Smith, H. (2005). The visual helps me understand the complicated things': Pupil views of teaching and learning with interactive whiteboards. *British Journal of Educational Technology, 36*(5) 851–867. doi: 10.1111/j.1467-8535.2005.00508.x

Yıldırım, A. & Şimşek, H. (2006). *Sosyal bilimlerde nitel araştırma yöntemleri*. Ankara: Seçkin Yayıncılık.