

# Training Older Adults to Use Automatic Teller Machines



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The present study assessed the success of several instructional programs in teaching the use of automatic teller machines (ATMs). Fifty-six older adults (aged 61 to 81) participated in the study, randomly assigned to each of four, 14-member groups. The description group received only a general overview of an ATM; the text guide group received written instructions for performing various transactions on an ATM; the pictorial guide group received written instructions accompanied by pictures of corresponding ATM screens; and the online tutorial group completed a step-by-step tutorial on a simulated ATM. Participants practiced on an ATM simulator. They were tested after a 24-h interval on their ability to perform familiar transactions on an unfamiliar ATM simulator and to perform completely novel transactions. Accuracy was best for the online tutorial group, intermediate for the text and pictorial guide groups, and worst for the description group. These data demonstrate both the importance of providing older adults with ATM training and the fact that the type of training influences the level of performance. The online tutorial, which provided specific practice on the task components, best facilitated acquisition and transfer performance.

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## INTRODUCTION

Technological innovations occur at a rapid pace. In the financial realm, for example, the transfer of money has been revolutionized by credit card scanners in stores, direct deposits, telephone banking, and automatic teller machines (ATMs). However, new technologies are only as successful as they are easy to use by all members of the user population. The number of adults over 60 years of age ("older adults") is increasing and is expected to rise as a proportion of the population into the 21st century. Human factors researchers and practitioners must

ensure that older adults are provided with the necessary information and training to use current and future technologies successfully (Fisk & Rogers, in press).

The purpose of the present research was to investigate factors that could lead to the optimization of training for the users of ATMs. An understanding of the training needs of older adults to effectively use ATMs will be beneficial for other ATM users and for older adults desiring to use other technologies.

### *ATM Training Research*

A minimal amount of research has been devoted to understanding how best to train individuals to use ATMs. Perhaps this dearth exists because bank officials do not see a need for such

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training. An informal survey of 13 banks in a large metropolitan area revealed that only 2 (15%) provided a brief pamphlet describing the functions of their ATMs. Officials at the remaining 11 banks (85%) told us that they did not provide any instructional materials for using ATMs. Many expressed the opinion that ATMs are trivially easy to use and so intuitive that training is unnecessary. However, research suggests otherwise, especially for older adults.

Evidence for the importance of training older adults to use ATMs comes from four sources. First, older adults do not use ATMs as often as do other age groups (Gilly & Zeithaml, 1985; Rogers, Cabrera, Walker, Gilbert, & Fisk, 1996). Second, older ATM users have special difficulties compared with the general population, such as not understanding instructions, making more errors, and having to do more backtracking in the system (Hatta & Iiyama, 1991). Third, a training study conducted by Adams and Thieben (1991) revealed that, for adults over age 50, even the best training method (demonstration plus definition training plus sequence training) yielded only 55% perfect performance. Fourth, older adults are willing to use ATMs if they are first provided with training (Rogers, Cabrera, et al., 1996).

### *Overview of Experiment*

The purpose of our study was to evaluate several approaches for training older adults to use ATMs. In accordance with the instructional design literature, we designed three instructional programs that had the potential to be successful ATM trainers for an older adult population: a text guide, a pictorial guide, and an online tutorial. The type and amount of information about how to perform a transaction were equated across the three conditions; only the instructional delivery differed. We compared the groups receiving these training programs with a "description only" group that received only a description of the types of transactions that could be conducted on an ATM.

The structure of the experiment was as follows. Participants received and studied the in-

structions for their training group and then performed 20 transactions on a simulated ATM. Thus, in addition to receiving specific instructions, participants practiced using the system. Performance was also measured after a 24-h interval to assess retention of the acquired knowledge.

Participants were then asked to perform transactions on a new ATM simulator with a different physical layout and some novel functions. Transfer was assessed in two ways. *Surface transfer* was assessed by having the trainees perform familiar transactions on the new ATM. Thus they had to transfer their knowledge to a system with different surface features. *Far transfer* was assessed by having trainees perform novel transactions on the new ATM (e.g., purchase a lottery ticket). Transfer in this sense requires success in applying general knowledge about how an ATM works to unfamiliar tasks.

Based on previous data (e.g., Adams & Thieben 1991), we were certain that any training (i.e., text guide, pictorial guide, or online tutorial) would be superior to no training (i.e., description group). However, we anticipated that the online tutorial would yield the best performance for several reasons. First, the tutorial provided hands-on, interactive experience with the system. Second, it provided specific practice on some of the consistent components (Fisk & Rogers, 1991; Schneider & Shiffrin, 1977) of the task (e.g., entering a personal identification number, or PIN; taking the card; or taking the receipt). Third, the tutorial provided the equivalent of worked examples and thus reduced the cognitive load of the trainee (Sweller, Chandler, Tierney, & Cooper, 1990).

## METHOD

### *Participants*

Fifty-six individuals (31 women and 24 men) who had never used an automatic teller machine participated in the study. Lack of ATM experience was determined through telephone screening. Participants ranged in age from 61 to 81 years (mean = 69.9). Their education level ranged from no high school to a doctoral degree,

with a mean of 4.7 (where 4 = *some college* and 5 = *college graduate*). The average health self-rating was 4.8 on a scale of 1 (*poor*) to 6 (*excellent*). Participants received \$40 for their participation.

Fourteen participants were randomly assigned to each of the four instructional groups. There were no significant differences in sex, age, education, or health rating among the groups, all  $p$ 's > .38. The four groups also did not differ in perceptual speed, general verbal ability, or working memory capacity, all  $p$ 's > .16. All participants were required to pass both a near and a far vision test, with the criterion set at 20/40 (corrected or uncorrected).

### Materials

Participants were trained on a computer-simulated automatic teller machine (ATM1) designed to simulate the ATM of a particular bank and having all the standard features and options of the majority of ATMs. A second simulated ATM (ATM2) was designed to test transfer of learning. The two simulators had the same features (e.g., deposit slot, keypad, receipt slot), but the layout of the features differed. In addition, ATM2 had options that are not offered at ATMs but that will likely be offered in the future, such as buying lottery or concert tickets or checking the gold exchange.

A survey assessing attitudes toward computers and ATMs was administered before and after the experimental manipulation, and an exit interview was conducted. These data are discussed in Rogers, Fisk, et al. (1996).

Participants used a computer mouse to perform transactions on the simulated ATMs. The indicator on the computer screen appeared as a hand with the index finger extended. The mouse had to be moved so the finger was pointing to the desired button, graphic, object, or keypad number, and then the mouse button had to be clicked. Participants were given extensive mouse training prior to using the ATM simulators (for details, see Rogers, Fisk, et al., 1996).

There were four instructional groups:

1. *Description*. Participants read a basic description of how ATMs work. This condition was designed

to mimic the information a new user is likely to receive from a bank.

2. *Text guide*. Participants read the basic description plus a guided text that described the physical features and layout of the ATM1 simulator and provided step-by-step instructions for completing each transaction type (fast cash, other withdrawals, deposits, transfer of funds between accounts, and obtaining account balance information).
3. *Pictorial guide*. Participants read the basic description and received a pictorial guide that explained the same material as the guided text; however, the explanations were in outline rather than paragraph form and were accompanied by pictures of ATM1 screens. The pictures showed the appearance of the simulator at each step of a transaction and included arrows indicating the relevant screen location or button.
4. *Online tutorial*. Participants read the basic description; in addition, they completed an interactive online tutorial that led them step by step through the five simulated transaction types described in the text and pictorial guides. Text boxes were presented on ATM1 screens with an arrow pointing to the button to be clicked.

### Procedure

Participants completed three two-h sessions. Ability tests were administered at the start of each session. Mouse training was completed in Session 1. In Session 2 participants read their assigned instructional materials or completed the tutorial. The instructional materials were removed, and participants then completed 20 practice transactions on the ATM1 simulator. Session 3 consisted of the retention and transfer tests (described later). At the end of the experiment, participants were given a brochure with tips for using ATMs, including safety and record-keeping.

For each transaction a text window appeared on the screen telling the participant what transaction to perform (e.g., "Withdraw \$25 using FastCash"). The participant was required to click a button to dismiss the window before proceeding. (If, at any time during the transaction, participants forgot the task, they could press H for "help" and would be reminded of the transaction.) An ATM card appeared on the screen, and the participant clicked on it to begin the transaction. All participants were assigned a

PIN of 1234, which had to be entered on the simulated keypad. All transactions proceeded as they do for actual ATMs; deposit envelopes, receipts, and cash appeared as appropriate on the screen.

Participants indicated that they had completed the transaction by pressing F for "finish." This allowed us to determine when participants believed that they had completed the transaction but had not taken their card, receipt, and/or cash. A new window would then appear containing the next transaction assignment. Participants were instructed that accuracy was more important than speed. There was no time pressure; participants could rest between transactions.

The order of transactions did not vary across participants. Initial practice consisted of four blocks of five transactions (20 total transactions). Blocks 5 and 6 tested performance after a 24-h retention interval. Blocks 7 and 8 tested surface transfer, in which participants used ATM2 to perform the same types of tasks they had completed on ATM1; thus the primary differences involved the layout of the components (e.g., the keypad, the receipt slot). Blocks 9 and 10 tested far transfer, in which the participants were asked to use ATM2 to perform completely novel transactions, such as buying concert or lottery tickets, paying bills, or checking the price of gold.

### *Design*

The between-subjects independent variable was instructional group (description, text guide, pictorial guide, or online tutorial). Within-subjects variables were transaction type (fast cash, withdrawal, deposit, transfer, or account information) and block (initial practice: Blocks 1 through 4; 24-h retention: Blocks 5 and 6; surface transfer: Blocks 7 and 8; far transfer: Blocks 9 and 10). The primary dependent variable was accuracy. Additional analyses were conducted on menu navigation performance and on successfully remembering to take the ATM card, receipt, and/or cash.

## RESULTS

Transactions were recorded as correct if participants (a) selected the appropriate menu item at each screen, (b) took their receipt, (c) took cash for withdrawals, and (d) took their ATM card after completing the transaction. PIN entry errors and incorrect dollar amounts were not considered errors; this was done to avoid penalizing participants for failure to remember arbitrary values. In addition, participants were not penalized for canceling transactions and starting over, as this is an appropriate error correction method for ATM use.

### *Initial Practice*

An initial question of interest was how well older adults would perform on the ATM1 simulator in the absence of any instructions. The description group received the descriptive information provided by some banks but no instructions. They correctly completed only 23% of the first five transactions. The three groups that received instructions performed somewhat better. The pictorial guide group was 34% correct, the text guide group was 36% correct, and the online tutorial group was 44% correct. Thus those who received some training performed better,  $t(54) = 1.88, p = .066$ , but only the online tutorial group performed significantly better than the description group,  $p < .05$ .

The accuracy data for the four blocks of initial practice on ATM1 are presented in Figure 1. The online tutorial and pictorial guide groups improved significantly, and equivalently, from Block 1 to Block 4, both  $t's(1) = 2.11, p < .05$ . Practice did not significantly improve performance for either the text guide or the description groups, both  $p's > .10$ . At the end of practice (Block 4), the online tutorial group was superior to the description group,  $p < .05$ , and the pictorial guide group was superior to the description group,  $p < .10$ .

### *24-Hour Retention*

In the second session of the experiment, each participant completed two blocks of transactions

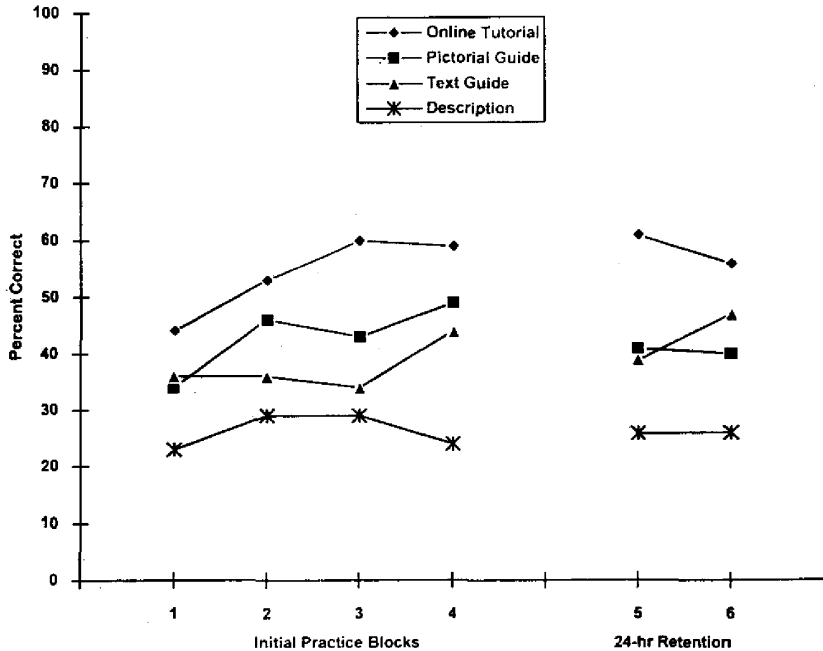


Figure 1. Percentage of correct transactions across the initial practice and 24-h retention blocks for each instructional group.

on the ATM1 simulator, which allowed us to assess 24-h retention. A comparison of Block 4 (end of practice) with Block 5 (beginning of retention) revealed no significant change in performance for any of the groups (see Figure 1). Thus a 24-h interval did not result in a significant degradation in performance for any of the instructional groups.

#### Transaction Types

The five transaction types (fast cash, withdrawal, transfer, deposit, and account information) differed in terms of the number of menu selections required—that is, fast cash required only one menu selection, account information

required three menu selections, a withdrawal required four selections, a transfer required five selections, and a deposit required six selections. A Transaction Type  $\times$  Instructional Group ANOVA revealed a significant main effect of transaction type,  $F(4, 208) = 15.08, p < .0001, MS_e = .04776$ . The successful completion rates for the transaction types were account information, 57%, fast cash, 44%, deposit, 39%, withdrawal, 38%, and transfer, 26%. Note that performance was less accurate for deposits, withdrawals, and transfers, which required more menu selections. Although account information required more menu selections than fast cash, participants did not have to remember to take their cash.

Collapsing across transaction types, the instructional group main effect was not significant,  $p = .11$ . However, post hoc comparisons revealed that the online tutorial group was significantly better than the description group for withdrawal,  $p < .003$ , transfer,  $p < .01$ , and account information,  $p < .02$ . The online tutorial group was superior to the text guide group for account information,  $p < .038$ .

### Componential Analysis

We were interested in separating successful menu navigation from remembering to take the card, receipt, and cash. These data are presented in Table 1, averaged across all ATM1 transactions (i.e., the first six blocks). Post hoc contrasts revealed no significant instructional group differences for menu navigation. However, note that accuracy was relatively low, approximately 64%. Thus participants in all groups were making errors in selecting the correct sequence of menu items required for the intended transaction.

Differences between the online tutorial and description groups were evident for remembering to take the card, receipt, and cash: took card,  $p < .09$ , took receipt,  $p < .10$ , and took cash,  $p < .06$ . All differences in remembering final task components favored the online tutorial. These components received specific practice in the online tutorial.

### Surface Transfer

To assess the success of surface transfer (i.e., same transactions, new layout), we compared

performance for the final 10 transactions on ATM1 with the first 10 transactions on ATM2 (see Figure 2). An ATM Type (ATM1 transactions, ATM2 transactions)  $\times$  Instructional Group ANOVA revealed no significant effects, all  $p$ 's  $> .18$ . A post hoc comparison for the online tutorial group revealed that the difference evident in Figure 2 was significant,  $p < .06$ . The first five transactions of surface transfer performed by the online tutorial group on ATM2 were only 37% correct, whereas the latter five transactions were 57% correct (comparable to 59% correct observed for final performance on ATM1).

Thus although the change to a new simulator was initially disruptive for the online tutorial group, the disruption was short-lived. Transferring from one version of an ATM to another did not significantly disrupt performance for the other groups (see Figure 2).

### Far Transfer

To assess far transfer, we compared performance for the final 10 transactions of ATM1 with the novel ATM2 transactions (see Figure 2). An ATM/Transaction Type (ATM1 transactions, ATM2 novel transactions)  $\times$  Instructional Group ANOVA revealed a significant main effect of ATM/transaction type,  $F(1, 52) = 8.00$ ,  $p < .007$ ,  $MS_e = .02789$ . This effect did not interact with instructional group,  $p = .73$ ; as is clear from Figure 2, all the groups performed more poorly on the novel transactions of the far transfer condition. The main effect of instructional group had a significance level of  $p = .09$ ; post hoc contrasts revealed that only the difference between the online tutorial and description group was significant,  $p < .03$ .

## DISCUSSION

The present study compared the benefits of different instructional programs for ATMs. Adults of all ages have difficulty using ATMs or choose not to use them at all (Rogers, Cabrera, et al., 1996). We have focused on training older adults, but our findings have implications for training all novices to use ATMs and for training

TABLE 1

Percentage of Participants Successfully Performing Each Transaction Component for ATM1

	Menu Navigation	Took Card	Took Receipt	Took Cash
Online tutorial	64	89	87	77
Pictorial guide	64	68	63	60
Text guide	65	73	63	55
Description	61	66	61	48

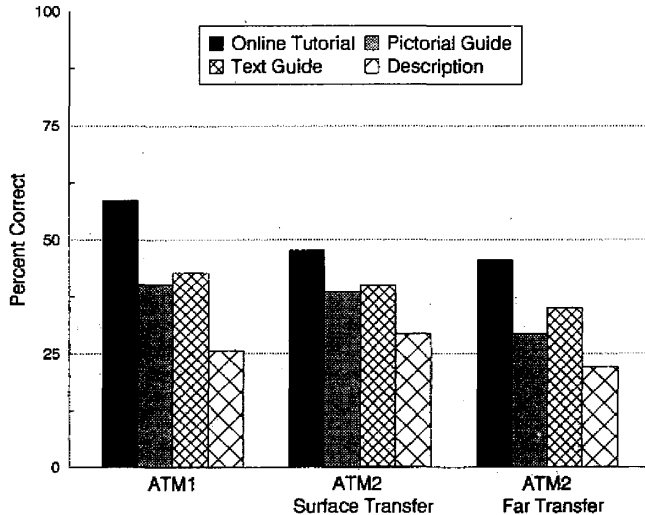


Figure 2. Percentage of correct transactions for ATM1 (Blocks 5 and 6), surface transfer (Blocks 7 and 8), and far transfer (Blocks 9 and 10).

older adults and other novices to use other types of technology. ATMs are representative of many technologies currently available. They contain hierarchical menus, as do many computer systems, on-screen programming devices, and telephone answering systems. They are dynamic and interactive, also like many other systems. New systems are being developed that would attach a computer box to a television and allow it to function as a computer, a Web browser, a "movie on demand" system, or even an ATM.

The specific problem of older adults and ATM usage (as it exists) may well disappear with time, as future generations of older adults learn to use the systems earlier in life. However, problems with new technology will likely be long-lived. New technologies will arise, and the next generation of older adults will have to acquire the knowledge and skills for those technologies. Thus our understanding of optimum training procedures for older individuals will continue to be beneficial.

The most effective type of training seems to be

that which provides hands-on experience and specific, consistent practice on critical task components. The accuracy data for initial practice, retention, and transfer suggest that the online tutorial yielded the highest level of performance. The online tutorial provided the equivalent of worked examples (Sweller et al., 1990) and gave participants hands-on experience with the system. Perhaps most important, the tutorial provided repeated practice on the consistent components of the task, such as entering the PIN, removing the ATM card, and taking the cash and receipt at the end of each transaction. As a result, participants in the online group performed more transactions correctly than did those from the other groups; furthermore, they maintained their advantage even for completely novel transactions on an unfamiliar ATM.

Providing only a description of an ATM (i.e., the description group) clearly resulted in the lowest levels of performance. These participants were at a disadvantage throughout practice and retention and at transfer. Simply having a brief

description of the system and being allowed to practice with it did not result in good performance. Unfortunately, as inadequate as the description condition was in facilitating performance, this condition is better than most current bank practices. New customers receive their ATM cards, their PIN, and at most a brief description of the ATM, but they have no opportunity to practice using the system. The lack of any instructions or practice opportunity may account for the fact that only 33% of older adults choose to use an ATM (Rogers, Cabrera, et al., 1996). The results also clearly demonstrate that, at least for older adults, there is a need for ATM training.

Throughout practice, retention, and transfer, the performance of the text and pictorial guide groups was similar to and intermediate between that of the online tutorial and the description groups. Thus having a detailed explanation of how to perform transactions was helpful, though not as helpful as having actually performed the transactions by means of a tutorial program. From a practical perspective, text and pictorial guides may be easier and more cost-effective to distribute to bank customers than online tutorials. However, banks could provide demonstration ATMs in their lobbies that could be used for training and customer familiarization.

One of the benefits for all the groups was an increase in the willingness of individuals to use ATMs (see Rogers, Fisk, et al., 1996, for more details). Prior to their ATM experience in the study, only 28% of the individuals expressed interest in using an ATM. After the study, 60% reported that they would like to use an ATM. Such an increase suggests that the opportunity to receive training—or at least to practice with the system—may reduce older adults' hesitancy to adopt ATM technology. Additionally, after their participation, the older adults were more confident about their ability to use an ATM, which might lead to performance improvements.

The current study provides informative data about the benefits of an online tutorial for training older adults to use an ATM. However, participants' performance was far from perfect, in-

dicating that the training can be improved. Several avenues can be explored, such as part-task training, the inclusion of instructions for error recognition and recovery, knowledge of results, and reminder instructions or cue cards. Moreover, future research should assess the long-term retention of training across intervals longer than 24 h, the success of transfer from the ATM simulator to real-world ATMs, and the potential for differences in training benefits for individuals with different levels of cognitive ability.

In addition to demonstrating the need for the development of improved training programs, the present data have implications for improvements in ATM design. Even after fairly extensive training and exposure to the ATM, participants were still making 35%-40% errors in navigating through the menu structure of the system. This fact suggests, first, that ATMs are not inherently easy to use and, second, that design improvements might increase usability. Anecdotal evidence from these ATM users suggests that when they realized that they had made an error, they were unable to correct it. There was also confusion of the "cancel" and "incorrect" buttons. These types of problems could, and should, be minimized through design improvements in ATMs.

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