Utilization of Computer Technology to Facilitate Money Management by Individuals with Mental Retardation

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Abstract: This report describes final results of an initial investigation of the utility of a specially designed money management software system for improving management of personal checking accounts for individuals with mental retardation. The software provided users capacity to store and retrieve common payees, automatic posting of checks to the register, automatic balancing, and check printing. The research was designed to examine technical merit and feasibility of the automated checkbook management system for use by individuals with mental retardation. An initial “proof of concept” software-based functional prototype was developed and tested with 19 adults with mental retardation. Participants were trained on the use of the money management prototype and on traditional checkbook usage. A within-subjects experimental design was used to evaluate the utility of the system. Results of the experimental evaluation indicate that when using the software, the number of errors made in check writing, check recording, and checkbook balancing by users with mental retardation was significantly reduced as compared to the traditional manual method ($p < .001$). This finding was particularly promising given the limited amount of time available for training subjects on the use of the software prototype.

Living independently is a goal expressed by many people with mental retardation and the people who provide residential and living supports to this population. There are a host of skills required to live independently and to the degree that a person with mental retardation cannot independently perform such skills, it is necessary to provide supports, either from other people or through use of technology. Money management skills have long been recognized as among those skills that are necessary for independent living for which people with mental retardation require considerable support (Martin, Rusch, & Heal, 1982). A number of research studies have shown that individuals with mental retardation can acquire some basic money management skills, including checkbook use (Jitendra & Nolet, 1995; LaCampagne & Cipani, 1987), though most of this literature has focused on teaching students with mental retardation functional strategies (e.g., ‘one-more-than’ technique or ‘next highest’ strategy) to improve independence in making cash purchases (Browder & Grasso, 1999; Colyer & Collins, 1996; Denny & Test, 1995; Schloss, Kobza, & Alper, 1997). Notwithstanding, however, the success of such instructional efforts, many people with mental retardation continue to rely on others to handle their financial affairs (Wehmeyer & Metzler, 1995) and research examining ways to use technology to decrease the dependence of people with mental retardation on others would be beneficial.

Increasingly, computer technology is being used to assist people with mental retardation...
to acquire a variety of skills needed for greater independence and autonomy, including language acquisition (Holzberg, 1995), menu planning (Stock & Davies, 2001), independent Internet access (Davies, Stock, & Wehmeyer, 2001), and time management skills (Davies, Stock, & Wehmeyer, 2002). This article reports evaluation of the application of specially designed software to simplify complex money management skills of checkbook balancing and check writing so as to increase the independence of people with mental retardation in this task.

There are a number of potential benefits to utilizing computer technology to provide supports regarding financial and money management for individuals with mental retardation beyond just enhanced autonomy. An automated system can help ensure, for example, that bad checks are not written or that checks are not written for non-budgeted items. In addition, common payees (e.g., rent, phone bill) can be stored in the program and accessed with just a few actions. All these features can help enable individuals with mental retardation with critical money management capabilities.

**Method**

**Research Design**

The study was designed to assess the effectiveness of a specially designed money management software prototype for improving personal financial management skills necessary for checkbook usage by individuals with mental retardation. The basic hypotheses tested were that the money management system would reduce errors made in check writing, transaction recording, and checkbook balancing. Participants’ performance accuracy on checkbook tasks was compared 1) using the money management prototype and 2) using a traditional manual checkbook approach. A complete within-subjects design was utilized (Campbell & Stanley, 1963). All participants engaged in both conditions of the experiment. Participants were trained on the use of the money management software system prior to participating in the study. Order of the experimental conditions was randomized to ensure that any order effects would be controlled. Therefore, half of the subjects performed a set of predetermined tasks using the traditional checkbook method first and half performed a task set on the prototype system first. Two sets of tasks with the same number of steps and similar difficulty were developed for the study. Each set of tasks consisted of writing four checks, recording those checks in a checkbook register, recording a deposit in the register, and maintaining an accurate balance. Matching of task set to experimental condition was randomized to ensure that any differences in difficulty between the two task lists would be controlled and therefore would not impact task performance.

**Participants**

Study participants were adults with mental retardation recruited from a non-profit agency that served adults with developmental disabilities. The lead researcher briefed agency staff to provide an overview of the research project and to enable them to identify appropriate candidates for participation in the study. A pre-screening form was completed for all persons served by the agency that staff thought would be appropriate for the study. The pre-screening form asked staff members to respond to questions related to whether the individual currently had a checking account in his or her own name, how much help was needed to perform basic checking account tasks, and whether the person might be interested in engaging in skill training in this area. Nineteen individuals were identified as candidates for participation. Each person was then asked if he or she would like to participate by a staff member, and all 19 candidates agreed to participate. All such participants were living in an apartment in the community, either alone or with a roommate, at the time of the research. There were a total of 11 males and 8 females with ages ranging from 22 to 57. Informed consent was obtained from all participants prior to their engagement in research activities. This consent also provided permission to use Wechsler Adult Intelligence Scale-Revised (WAIS-R) test scores as part of the study. WAIS-R scores ranged from 58 to 75 (Mean = 66.1). Scores were not available for three of the participants, all of which were identified as having mild levels of mental re-
tardation. All participants were paid an honorarium for their participation.

**Device Design**

The money management prototype was designed to simplify tasks required to successfully write checks and maintain a correctly balanced register, without requiring the user to read, write, add or subtract. To facilitate check writing, the capability was provided for a parent, teacher or other caregiver to build a list of common payees and associate an icon with each payee. To write a check, the user pressed the “Write Check” button (displayed with an identifiable icon), which would then display a blank check onscreen. Selecting the “Pay To” button on the check then would display a list of icons representing the individual’s common payees. For example, the payee representing the local grocery store might have a picture of a bag of groceries for the icon. In addition to the name of the payee, an amount could be stored as well as a memo. With this information, the user could complete his or her rent check, for example, by selecting an icon of a house. The onscreen check would then have the check number, payee name, amount, and even a memo filled out on the check. The user could then select a print button to print either an actual check, or a sample check that could then be used to copy information onto a real check. Deposits were handled similarly; with the capability provided to store common deposits and represent each different deposit with an icon. In that case, the user would select the “Deposit” button (represented by a deposit slip icon) and complete an onscreen deposit slip. Register entries were made automatically when a check was completed and sent to the printer or when a deposit slip was printed. In this way, deductions for each check written as well as additions for each deposit were calculated by the prototype and displayed on the register.

**Procedures and Experimental Variables**

Each participant was trained on the type of tasks used in the experiment on both the money management software system and the traditional check writing approach. Once each participant was trained on each system (most participants already had checking accounts and, to some degree, had used their checkbook and check register), the study was initiated. Participants performed a series of check writing tasks with the traditional check writing method and the other series of tasks using the money management method as determined by the randomization procedures described previously. Each set of tasks consisted of writing a series of checks and recording them in a checkbook register. Additionally, participants recorded a deposit to the checkbook register. For each transaction, participants were handed a slip of paper with the payee and amount for each check, and amount and description for each deposit. When participants performed the task set with the traditional checkbook approach, they were allowed to use a calculator to help with checkbook balancing.

Dependent measures on which we collected data were errors made by the study participants in 1) writing correct check amounts, 2) properly recording checks and deposits in the register, and 3) maintaining a correct balance.

**Data Collection Procedures**

Participants engaged in study activities either at their residence or at the offices of the service-providing agency. In all cases, participants received both test sessions (money management software and traditional) at the same location during the same test session. Time blocks of approximately 90 minutes were scheduled for sessions. The same experimenter administered all phases of evaluation to all participants according to a pre-defined script. This ensured consistent presentation of tasks to all participants under all conditions.

Given the participant population, we felt it was important to ensure that all participants experienced “success” during both the money management and traditional test phases. To ensure success, the experimenter followed along as subjects performed each step of the task set. As errors were made, prompts were given to the person, pointing out the error and helping the participant correct the error. This help was not provided until after errors were committed. Errors were recorded as they occurred. This enabled participants to experience success following an error while still al-
following the errors to be recorded. In most cases, check writing and recording errors were also observable by reviewing the printed checks, registers, and handwritten checks and registers.

**Results**

Data collected was analyzed using SPSS. A Sandler’s A-statistic test was used to test for mean differences between the money management approach and the traditional checkbook method. This test is derived from Student’s t-ratio and is useful when using correlated samples (Runyan & Haber, 1979). This section provides a detailed description of results.

**Comparison of Checkbook Errors**

Number of errors in check writing, transaction recording, and checkbook balancing were recorded during performance of each experimental condition. Examples of check writing errors included forgetting to fill in any of the key areas (e.g., payee, amount, written amount, date). Spelling errors were not counted as errors. In some cases, participants were unable to write out the amount of the check (e.g., twenty-five). This was also considered a check writing error. Examples of errors in check recording included improperly recording check information (e.g., forgetting to write check number, payee, amounts in proper columns, etc.). If an incorrect balance was recorded in the register, this was counted as a balancing error but not as a recording error. This delineation kept the dependent variables of transaction recording and checkbook balancing independent. A checkbook balancing error was counted any time the participant arrived at a balance other than the correct balance. Figure 1 shows the mean number of errors for money management usage and the traditional checkbook approach for each of the dependent measures.

There were significant differences in observed means for all three error measures. When using the money management check writing approach, there were significantly fewer errors ($p < .001$) in writing checks (Mean = 1.11; $SD = 1.56$) as compared to the traditional manual method (Mean = 3.95; $SD = 2.92$). When recording checks into the register, participants made significantly fewer errors ($p < .001$) with the money management approach (Mean = 0.11; $SD = .32$) as compared to the traditional method (Mean = 5.30; $SD = 3.14$). Finally, performance errors when using money management (Mean =

![Figure 1: Average performance errors by experimental condition (*) $p < .001.$](image)
Comparisons of Performance Time and Amount of Help/Prompting Required

There were a number of other incidental measures recorded during the evaluation to provide additional data to help explain results. The overall time required to perform each experimental condition was recorded to allow a gross comparison of performance time. When using the money management prototype subjects averaged 14.68 minutes to complete the task set. When using the traditional manual method, subjects averaged 27.42 minutes. This difference was noteworthy. However, no statistical comparison was performed because this variable was not controlled. For example, when participants asked for help, help was provided without measuring the amount of time the help required.

Number of requests for help or prompts required by participants in performing experimental tasks was also recorded. These measures were difficult to compare given that instances of help are qualitatively different. Therefore, these data were not intended to provide a quantitative measure of help needed by subjects. When using money management software, participants required some sort of help or prompt an average of 5.0 times. When performing the task set with the traditional approach, subjects required help or prompting an average of 6.1 times.

Discussion

Results of this study indicate that use of a money management software program can be an effective tool to enable people with mental retardation to perform financial management tasks more independently. When using the money management software system, all three dependent measures yielded significantly fewer performance errors. Participants performed significantly better on all three measures of success.

Before examining these findings further, we would note certain limitations that must be taken into account when interpreting study findings. First, there was a relatively small sample (N = 19) involved in the study. Second, we did not attempt to improve the performance of participants on the traditional checkbook procedure, but instead made sure that participants understood how to perform the task (e.g., how to write a check, enter a deposit, balance a register). It is likely, given findings from the review of the literature presented earlier, that instruction in these tasks could improve performance. However, we would also note that a great many people without disabilities choose to use computer-based money management software because of its ease of use, independent of whether they can independently perform specific tasks involved.

Check writing, the first measure of success, was performed more accurately when using the money management software prototype. There are a variety factors that may explain this result. First, the money management system reduced number of steps involved in writing checks. When using the money management software, the date was filled in automatically based on the internal clock in the computer. In addition, typing errors were eliminated when filling out the payee because participants could select from a pre-stored list, with correct spelling already input. The only error that was possible in filling out the payee was incorrectly selecting the payee from the pre-stored list. Associating icons with the stored payees also appeared to aid proper selection, particularly for participants who had difficulty reading. For example, one person was described by the agency staff as someone who was very good with numbers but who had a very difficult time reading. This person was very successful in operating the money management system (3 total errors) as compared to manual check writing (12 total errors).

Another advantage of the money management software system that contributed to fewer errors was the feature that automatically writes out number amounts in written form that corresponds to the dollar amount entered on the keypad. Many participants were unable to write out the proper number amounts without assistance. In some cases, participants left the area where the number amount should have been written blank. The prototype software program was successful in
simplifying the check writing process by reducing the number of opportunities for errors in filling out checks and by providing an effective user interface that was operable by individuals with mental retardation.

The money management software system was even more effective at reducing number of check recording errors, as the observed difference in mean errors was most dramatic for transaction recording errors. This was most likely due to the fact that the money management system automatically posted checks and deposits to the register when they were completed. Therefore, the only possible errors in check recording were whether or not the check or deposit amount was incorrectly entered, or if the wrong payee or deposit description was selected from the stored list. Many participants had difficulty properly recording checks in the register due to a number of factors. Often, check descriptions were written in the wrong row, check numbers were omitted, and transaction amounts were not written in the correct column. Automatic posting of transactions to the register proved to be of help to subjects.

Finally, there was a significant difference in one of the “bottom line” measures of checkbook accuracy: correct balancing. When using the money management software, participants had significantly fewer errors than when using the traditional method, even when they were assisted by use of a calculator. The primary explanation for this difference was that the money management system automatically updates the checkbook balance after checks are sent to the printer. Accuracy of the checkbook balance using the traditional approach was subject to human error and represents the primary source of difficulty for some individuals with mental retardation, that is, difficulty with addition or subtraction.

Also of interest was the success at money management usage experienced by a few persons in the sample with multiple disabilities. For example, one person was legally blind. He did not have a checkbook because of his limited ability to write legibly. He was able to operate the money management software system by getting very close to the display on the computer screen and pressing the appropriate buttons and icons (using a touch-screen window). The money management software system offered him an opportunity to experience a level of independence and control over personal finances that would not have been possible otherwise. Another participant was deaf. Agency staff signed training instructions to her. The experimenter demonstrated the process for writing a check (using the software) one time and the person “jumped right in” and was able to successfully write the next check. This case exemplified the ease at which participants learned how to use the money management prototype. Some other participants had very limited reading and writing skills. Icons used on the buttons and on the selectable Payee and Deposit Descriptions were very helpful for these persons. All participants with multiple disabilities were successful at writing checks with the money management prototype.

Use of the money management software was very well received by both participants and agency staff providing supports to these people. Some participants stated that they wanted “come back every Saturday to do the checkbook computer.” When surveyed regarding whether agency staff members believed that the money management software system could aid people with mental retardation with checkbook management and thus possibly achieve greater levels of independence, 92% stated that they believed the money management system would have this effect.

In summary, this study indicated that the money management software system (since renamed MoneyCoach) is an effective tool for simplifying the complicated task of checkbook management and thus enhancing the potential for increased independence of individuals with mental retardation. Although we did not measure other variables, we believe that use of computer technology to enable a person to do for him- or herself what someone else has previously done for them will, in the long run, enhance individual self-determination as well as increasing autonomy and independence. Moreover, given the wide social acceptance of computer-based money management software use, such software designed for use by people with mental retardation can serve as a means of enhancing social acceptance for this population.
References


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