Knowledge of results as a method for teaching older adults how to text

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Knowledge of Results as a Method for Teaching

Older Adults How to Text

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Abstract

Building and maintaining relationships is an important occupation at every age because relationships add meaning and purpose to our lives while strengthening our being and warding off depression and isolation. The use of text messaging as a main mode of communication to maintain relationships is becoming increasingly more popular. Some believe that a communication gap exists in society between the older adult population and their younger generation counterparts. As stated in the Centennial Vision, occupational therapists have a duty to provide interventions that meet society’s changing needs. The purpose of this study was to examine the effectiveness of using knowledge of results (KR) to teach text messaging inscription to an older adult population. Twenty-one older adults (mean age 71 years) were randomly assigned to one of three groups; 100% KR, 50% KR, or 0% KR. Results indicated that participants who received KR performed better than participants who did not receive KR (p < 0.05). Furthermore, a trend suggests that individuals who received reduced frequency KR (50% KR) performed better than those who received constant feedback (100% KR). As occupational therapists, it is important to establish “just-right challenges” to elicit successful performances. Therefore, more research is needed to determine the most favorable frequency of KR to facilitate the acquisition, retention, and generalization of a novel cognitive-based skill.
Knowledge of Results as a Method for Teaching Older Adults How to Text.

Occupational Therapy is concerned with engaging individuals in meaningful occupations to enhance their everyday lives. These meaningful occupations are the essence upon which Occupational Therapy was built nearly 100 years ago. An aspect that makes our profession unique is the encompassment of the client’s mind and body, including the person’s perception of meaning that help define his or her life. One aspect that helps define a person’s life is his or her relationships with others. It can be argued that relationships both define and strengthen one’s being. As such, Occupational Therapy’s role in facilitating healthy relationships is often overlooked but is essential for building rapport between the older adult and younger generation.

As Occupational Therapy approaches its centennial birthday, we as therapists need to strive on what our profession was built upon, while also adapting ourselves to society’s changing needs. These include creating occupations that are meaningful and purposeful to the individual while also developing treatment interventions that are current and reflect the way our culture constructs and preserves relationships. One way to preserve relationships is through frequent contact with one another in order to stay close and connected. While face-to-face contact may be the preferred method of older adults to maintain relationships with their children and grandchildren, distance whether physical, emotional, or mental can prevent this from occurring. One way to overcome this distance is to communicate via text messaging.

Text messaging, as a main mode of communication, is becoming increasingly more popular among the younger generation. According to senior research specialist Amanda Lenhart of Pew Internet & American Life Project, 75% of 12-17 year olds now own cell phones (2010). In regards to cell phone usage by today’s teens, Lenhart states, “[cell] phones have become
indispensable tools in teen communication patterns” and also reports, “88% of teen cell phone users are text-messagers” (2010). Because of this, it is imperative that older adults also learn to text message; in doing so, the older adults stand an increased ability to stay connected to their younger counterparts. The American Geriatrics Society (AGS) stated that “older adults can continue to gain support, care, respect, status, and a sense of purpose by interacting with younger people and younger people can learn from the experience, cultural meaning, stability, and continuity of older people” (American Geriatric Society, 2005, p. 2). Empathy and kinship between individuals develops as understanding develops. The key to understanding one another is through communication.

As we age, it is essential to sustain meaningful relationships with our peers as well as forming new relationships with younger people. The AGS purports that healthy relationships enhance self-esteem and provides personal satisfaction in the lives of older adults. Being active in the community and within one’s family can improve an individual’s quality of life by warding off depression and isolation. Maintenance of social networks can often be challenging as we age because of distance, and disability. Additionally, the social networks of older adults become smaller and smaller as time passes due to the death of others (American Geriatric Society, 2005); therefore it is imperative for older adults to develop meaningful relationships with younger people in order to uphold these networks. Occupational Therapy serves the role in facilitating methods to preserve an individual’s social support system. According to Quadagno (2005), a social support system offers emotional support, such as love and comfort, and instrumental support such as help with handling occupations of daily living.

Age-related cognitive changes are inevitable and can affect an individual’s ability to engage in social interactions and maintain interpersonal relationships (Quadagno, 2005). These
cognitive changes can lead to decreased confidence and deter individuals from social participation. Occupational therapy can combat this trend by promoting strategies and interventions that exercise the mind and thereby keep it sharp. As stated in the Occupational Therapy Practice Framework (OTPF), “Communication Management” and “Social participation” are areas of occupation that therapists’ need to address. Communication management is defined as, “Sending, receiving, and interpreting information using a variety of systems and equipment” (OTPF, 2008, p. 631). Therefore, it is the role of an occupational therapist to teach these various forms of communication systems, such as text messaging on a cellular phone, to clients in order for them to successfully manage their communication with others. Social participation within the family is defined as, “Engaging in [activities that result in] successful interaction in specific required and/or desired familial roles” (OTPF, 2008, p. 633). This further supports the role of an occupational therapist in facilitating familial relationships by making communication more achievable for their clients.

One of the roles of an occupational therapist is to also help individuals improve their functioning in occupations of daily living, therefore enhancing an individual’s quality of life. A study conducted by Netuveli and colleagues (2005) examined quality of life in relation to maintaining relationships. The study consisted of 11,234 participants aged fifty years or older, living in England in 2002 and examined the effects of longstanding illness, social context, and current socioeconomic circumstances on an individual’s quality of life as determined by the CASP-19. The CASP-19 is a 19-item scale that measures quality of life over four domains including: control, autonomy, self realization, and pleasure. Netuveli and colleagues found that quality of life was improved in older adults when they were able to maintain trusting relationships with family and friends.
The findings by Netuveli et al. are important because it is essential for occupational therapists to help their clients develop strategies that will reinforce these social and familial relationships. One intervention method could be to introduce the use of cell phones and text messaging. Text messaging could enable individuals to sustain these trusting relationships by allowing communication to be quick and portable.

As stated by the American Occupational Therapy Association (AOTA), “Living life to its fullest™” is what the occupational therapy profession stands for and how occupational therapists affect the clients they serve. One part of living life to its fullest includes an individual’s feelings of social usefulness. An individual’s perception on his or her value to society is an important factor that impacts his or her health.

Grunewald and colleagues (2009) investigated how feelings of social value and usefulness change over the course of older adulthood and how these perceptions contribute to disability and mortality. This study consisted of 1,189 participants from three community-based cohorts in the United States. Data were collected at baseline and at three and seven years. The independent variable was perceptions of usefulness as measured by an individual’s response to the question, "How often do you feel useful to your friends and family?" The dependent variable was mortality rate and survival time. Their findings indicate that older adults who were able to maintain high feelings of social usefulness lived healthier lifestyles, had lower mortality rates, and also engaged more in social activities. These findings suggest that occupational therapists should develop treatment plans that involve improving their client’s social value perceptions in order to help their clients live full and satisfying lives. This includes, helping clients seek out social activities and encouraging them to form social ties that can influence their own self value.
These social ties can further be enhanced by frequent communication and it should be the role of an occupational therapist to help facilitate these relationships.

The world is becoming increasingly more technological with each passing year. With these advancements comes new information for individuals to learn and absorb. A study conducted by Slegers and colleagues (2009), examined how efficiently older adults were able to use common technological devices such as operating a CD player, a telephone, an ATM, a train-ticket vending machine, a microwave-oven, an alarm clock, a smart card charging device, and a telephone voice menu. They also examined the cognitive functions that play a role in learning and using these devices as measured by the Letter-Digit Substitution Test (LDST), Visual Verbal Learning Test, Concept Shifting Test (CST), and the Motor Choice Reaction Time test. The study consisted of 191 participants aged 64-75 years of age who were living in the United Kingdom. Findings from this study indicate that an individual’s cognitive flexibility and speed of information processing can predict their performance outcomes. For example, individuals who performed better on the CST, which measures cognitive flexibility, and the LDST, which measures general cognitive speed, performed better when using a CD player, telephone, and ATM machine. This study implies that there are many everyday devices that already exist that are difficult for older adults to successfully access. Older adults need more time and more outside help from others to master these technological devices. Occupational therapists should be innately prepared to teach older adults how to use common technological devices, such as cell phones, in order for them to maintain their autonomy and adapt to the changing times. As AOTA’s centennial vision states, we need to ensure that the profession of occupational therapy will meet the occupational needs of society; this includes enhancing our clients’ abilities to access and use contemporary communication technology.
Another method to promote a healthy mind is through teaching older adults novel cognitive tasks associated with communication technology. It is not uncommon for older adults to have less exposure to technology. Therefore, they have less confidence when using technological items (Quadagno, 2005). One useful tool to facilitate skill acquisition necessary for older adults to enhance engagement in communication is teaching them text messaging through the use of knowledge of results (KR).

Knowledge of results is a dimension of augmented feedback. Schmidt and Lee (2005) define augmented feedback as “feedback that is added to that typically received in the task (also called extrinsic feedback)” (p. 462). According to Schmidt and Lee (2005), “KR is verbal, terminal feedback about the outcome of the movement in terms of the environmental goal” (p. 367). This type of feedback often involves information about how well one performed compared to the goal of the task. Information provided with KR often involves an error score. For example, if when practicing archery the arrow misses the bull’s eye, KR would indicate how far the arrow was from the bull’s eye. According to Schmidt and Lee (2005), “KR is considered to have informational, motivational, and associational functions” that enhance learning (p. 396).

Knowledge of results provides information to the participant on what to do next, KR energizes the participant and keeps the learner alert, and KR provides associations between stimuli and movements (Schmidt & Lee, 2005).

The effectiveness of knowledge of results feedback is based on the Schema Theory as developed by Richard Schmidt in 1975. This theory suggests that schemas or rules are formed after experiencing the functioning of our bodies and these rules can be learned and internalized for future motor performances. Schmidt’s theory is centered on the idea of the generalized motor program (GMP) which suggests, “that a motor program for a particular class of actions is stored
in memory and that a unique pattern of activity will result whenever the program is executed” (Schmidt and Lee, (2005), p. 193). After a GMP is selected and the movement is carried out, four types of information are available for memory: initial conditions (bodily position, weight of object), parameters used (modified GMP for that specific movement), augmented feedback about the movement (KR), and the sensory consequences about the movement (how it felt, looked, and sounded) (Schmidt and Lee, 2005). This theory suggests that the more one practices, the stronger his or hers schema becomes, which in turn, leads to an improved performance.

Knowledge of results can be manipulated into various schedules consisting of different frequencies for delivering KR. Feedback after every trial is considered 100% whereas feedback after every other trial is considered 50%. There have been many studies that investigated the effectiveness of skill acquisition when using a reduced frequency of KR, for instance, either 50% or 33% KR (Jarus, 1995; Lai and Shea, 1998; Lance and Burke, 1974; Lee, White, and Carnahan, 1990; Schmidt, Young, Swinnen, and Shapiro, 1989; Winstein and Schmidt, 1989; Young and Schmidt, 1992; Rice, 2003). The majority of these studies found that if provided with a reduced amount of KR while learning the task, the actual performance is less than compared to if given feedback after every trial, however, the opposite is true upon retention. That is, during the retention phase, where participants were asked to reproduce the skill they ‘learned’ during the acquisition phase, participants who practiced with less KR (e.g., 50% or 33%) recalled the motor skill better than those who received constant KR (100%). According to Salmoni, Schmidt, and Walter (1984), participants receiving constant KR tend to rely too much on the feedback to guide performance whereas when provided with reduced KR, participants tend to internalize and use more cognitive processes for evaluating their performance, resulting in enhance recall.
A study by Rice (2003) investigated the effects of various amounts of feedback on motor learning in sixty-one well elderly individuals. Participants were randomly assigned to one of four groups: 100% KR easy task, 100% KR hard task, 33% KR easy task, and 33% KR hard task. The task was a visual motor task and involved having the participants turn a knob in order to match a target on the computer screen. The acquisition phase had thirty-three trials in which KR was provided after every trial (100% KR) or after every third trial (33% KR). Following a ten minute break the retention phase was assessed and no KR was provided to any of the four groups. Following another ten minute break, a transfer phase was administered which included a different visual motor task, but required the same skill practiced in the acquisition and retention phases. The results revealed that in the transfer phase, the 33% KR hard task group demonstrated better performance across all trials than the other three groups. This indicates that KR provided after every third trial when acquiring a new motor skill, results in a greater ability to transfer the learned skill to a novel but similar task.

A study by Bower (2010) aimed to determine whether KR was an effective method when teaching text message inscriptions to middle-aged adults. This study included forty participants aged forty to sixty-five years who had not had any prior experience with text messaging. The participants were randomly assigned to one of three groups: 100% KR, 50% KR, and a control group (no KR). On the first day of the study the acquisition phase was delivered. Participants were presented with twelve different “G-rated” phrases six times each for a total of seventy-two trials. The following day, a retention phase was administered and participants were tested on the same twelve phrases as learned in the acquisition phase, but this time without KR. Following a ten minute break, a transfer phase was assessed to determine whether the participants could generalize what was learned during the acquisition and retention phases. Results indicated that
overall, the 50% KR group performed better than the other two groups. During the retention phase, participants in the 50% KR group performed better, which hints that this group relied more on their own memory and internal processing when making a decision than did the 100% KR group. The two groups that received KR performed better than the control group during the retention and transfer phases which may indicate that the KR groups found their occupation to be more meaningful than did the control group.

Whereas it has been demonstrated that reduced KR during an acquisition phase appears to enhance retention and the generalization of that skill in older adults (e.g., Rice, 2003) and that the provision of KR appears to be effective in teaching text messaging to middle-aged adults (e.g., Bower, 2010), the purpose of this study to is to examine the effectiveness of using knowledge of results to teach text messaging to an older adult population. The hypothesis of this study is that participants who receive KR will demonstrate an enhanced ability to accurately identify the meaning associated with text messaging. It is also hypothesized that participants who receive 50% KR will perform better in the retention and transfer phases than the participants who received 100% KR. This study is an extension of Bower (2010) and will use the same protocol as Bower (2010), only this study is investigating the effectiveness of KR in acquiring text messaging skills in an older adult population.

Methods

Participants

There were twenty-one participants for this study, sixteen female and five male. All participants reported to be Caucasian. In addition, sixteen participants were right hand dominant whereas five participants were left hand dominant. The mean age of participants was seventy-one years with a standard deviation of 8.09 years. The inclusion criteria for participants
included: individuals aged 60 or older; scored 18 or higher on the Mini-Mental State Examination (MMSE), through verbal report, have not had experience with text messaging; and be free from any neurologic or physical impairments that would adversely affect their ability to participate in this research. The average score for participants on the MMSE was 28.57 with a standard deviation of 2.27. Of the twenty-one participants, four were recruited from a local long term care facility, two from an assisted living facility, and fifteen from the local community.

Apparatus

A Toshiba AMD Turion-X2 laptop computer with a custom developed inscription program was used to deliver the independent variable (knowledge of results). The custom software was developed on Microsoft Visual Basic Version 6.0. The participant was given the choice of using either the computer touch pad or a mouse.

Procedure

This study was approved by the institutional review board at the authors’ institutional affiliation. Informed consent was obtained from all individuals prior to participating in the study. Data for each participant were collected over two days and each data collection session took 30 minutes to complete. There were three groups for this study. The first group received feedback after every trial (100% KR), the second group received feedback after every other trial (50% KR), and the third group did not receive any feedback after every trial (control). The participants were randomly assigned to one of the three groups from custom developed software using permuted randomized blocks with 10 participants being assigned to the control group and 40 participants being assigned to one of the two KR groups.

For the first day of the experiment (the acquisition phase), participants were seated in front of the laptop computer and were be presented with twelve different “G-rated” sayings for
six trials each for a total of seventy-two trials. On the second day of the experiment (the retention phase), participants were tested on the exact same phrases but without feedback. The participants were only exposed to each phrase once for a total of twelve trials. A transfer phase was also assessed on the second day of the experiment following a ten minute break after the retention phase was completed. The purpose of this phase was to determine whether the participants could generalize what they had learned earlier in the previous two phases. The transfer phase involved identifying the correct sequence of text abbreviations that represented a sentence. There was a total of six sentences provided each appearing only once. Each sentence in the transfer phase included a word or phrase that was included previously in the acquisition or retention phases. In the transfer phase, there was one correct spelling of the text word among the three options.

**Statistical Data Analysis**

The number of correct responses was summed for each word and the response time to choose an answer was averaged across all six trials for each word. For the first hypothesis a 3x12 (Group x Trial) ANOVA was performed for average time and for sum of correct responses, respectively. Included in the acquisition phase analysis were trials 1, 7, 13, 19, 25, 31, 37, 43, 49, 55, 61, and 67. For the retention and transfer phases, ANOVAs were calculated for each group (100% KR, 50% KR, and the control group) on the factors of average time and sum of correct responses, respectively. Follow up Tukey’s pairwise comparisons were used to determine whether any differences existed between the three groups for both the acquisition and retention phases.

**Acquisition Phase**
For all three groups during the acquisition phase (100% KR, 50% KR, and the control group), there was no significant difference for how long it took the participant to respond to the prompt, however, there was a significant difference with the participant choosing the correct word (Table 1). Similarly, there was no significant interaction between the factors of group and trial for average time during the acquisition phase (Table 1). There was, however a significant group x trial interaction on correctness (Table 1). Figure 1 illustrates the average time of response across the acquisition phase trials and Figure 2 represents the sum of correct responses across the acquisition phase trials. Note that in Figure 2, the control group demonstrated a classic learning curve, whereas the groups with KR appeared to demonstrate accurate performances from the early trials of the acquisition phase.

It was hypothesized that participants who received KR would display an enhanced ability to accurately identify the meaning associated with text messaging. A Tukey’s pairwise comparison revealed that while there was a significant difference between the control group and the 50% KR group and between the control group and the 100% KR group, there was no significant difference between the 50% KR group and the 100% KR group (Table 2).

Retention Phase

During the retention phase, there was a significant difference on the factor of group for the correct responses, but not with average time (Table 3). A Tukey’s pairwise comparison revealed a significant difference between the control group and the 50% KR group as well as a significant difference between the control group and the 100% KR group. However, similarly in the acquisition phase, there is not a significant difference in number of correct responses between the 50% KR group and the 100% KR group (Table 2). Note the trend that reduced KR (50%
KR) group yielded a smaller $p$-value than the 100% KR group. Also, participants who received KR performed better than those who did not receive KR (Table 4).

Transfer Phase

For all three groups during the transfer phase (100% KR, 50% KR, and the control group), there was no significant difference between the groups and how long it took participants to select the word. Additionally, there was no significant difference between all three groups and word correctness (Table 5). During the transfer phase, each group performed nearly at the same level (Table 4).

Discussion

The purpose of this study is to examine the effectiveness of using knowledge of results to teach text messaging inscription to an older adult population. As previously mentioned, KR has been shown to be effective in facilitating simple motor skills in children, young adults, and the elderly. In addition, Bower (2010) demonstrated that KR was effective at teaching text messaging inscription to a middle-aged population.

The first hypothesis was supported in that the use of KR enhanced the ability to accurately identify the meaning associated with text messaging inscription in older adults. Both the 50% KR and 100% KR groups performed better than the control group. Therefore, these results reveal that KR can bolster the skill acquisition of text messaging inscription in older adults. In addition, though not statistically significant, during the retention phase, the 50% KR and 100% KR groups took less time to choose the correct phrase. Overall, the 50% KR group performed better than the other two groups in the acquisition and retention phases. This trend echoes what has been shown in previous literature, specifically reduced knowledge of results.
have been found to more successful in facilitating learning than continuous (e.g. 100% KR) knowledge of results (Winstein & Schmidt, 1990; Lai & Shea, 1998; Rice, 2003; Bower, 2010).

The second hypothesis was partially supported in that participants who received 50% KR displayed better performance during the retention phase than the participants who received 100% KR but not during the transfer phase. During the retention phase, the trend was that the 50% KR group performed better than the 100% KR group for selecting the correct word in a shorter amount of time. Again, there was a trend that participants in the reduced KR group (e.g. 50% KR) retained the skill more than the participants in the continuous KR group (e.g. 100% KR) during the retention phase but the trend did not carry over into the transfer phase. This trend is perhaps because participants in the 50% KR group relied more on their own memory and ability to recall during the different trials without feedback during the acquisition phase compared to the 100% KR group (Schmidt, Young, Swinnen, & Shapiro, 1989; Winstein & Schmidt, 1990; Jarus, 1995; Lai & Shea, 1998; Rice, 2003; Bower, 2010).

The results of this study are very similar to the study conducted by Bower in 2010 which investigated the effectiveness of using KR to teach text messaging inscription to a middle-aged population. During the acquisition phase in both studies, there was no significant difference for how long it took the participant to choose the correct word, but there was a significant difference with the participant choosing the correct word. In addition, both studies found there was no significant interaction on the variable of average time between the factors of group and trial, however there was a significant interaction on the variable of correctness between the factors of group and trial. Both studies hypothesized that participants who received KR would display an enhanced ability to accurately identify the meaning associated with text messaging and both studies found a significant difference between the control group and the 50% KR group and
between the control group and the 100% KR group but not between the 50% KR group and the 100% KR group. Therefore, both studies revealed KR improved the ability of middle-aged and older adults to accurately identify the meanings associated with text messaging inscriptions.  

The results from the retention phase of the current study were also very similar to the results in Bower (2010). For all three groups, both studies found a significant difference in sum of correct responses and group, but not with average time and group. Similar to the results from the acquisition phase, both studies found a significant difference between the control group and the 50% KR group, as well as between the control group and the 100% KR group but there was no significant difference between the 50% KR group and the 100% KR group. Both studies exposed the trend that reduced KR (50% group) yielded a smaller p-value than the 100% KR group. Also, both studies revealed that participants who received KR performed better than those who did not receive KR.  

A major difference between the current study and Bower (2010) were the results of the transfer phase. The purpose of this phase was to determine whether the participants could generalize what they had learned earlier in the previous two phases. Bower (2010) found a significant difference between all three groups (control, 50% KR and 100% KR) and word correctness. However, in the current study, no significant difference was found revealing that all three groups performed nearly at the same level during the transfer phase. This most likely occurred because the older adult population in the current study was not as capable as their middle-aged counterparts in Bower’s (2010) study to generalize their newly learned skill to the novel task. There are several possibilities for this. First, the participants in the Bower study were community dwelling middle aged adults (mean age 52 years), whereas the mean age of the participants in this current study was approximately 71 years. Additionally, a proportion (need
to state how many) of the participants in this current study were either living in long term care facilities or in assisted living environments. It is possible that the mean age difference of nearly 20 years could have a deleterious effect of learning a cognitive skill, but probably more likely is that the current participants who were institutionalized were arguably more compromised than those community dwelling participants in the Bower study. There may be a corollary between the ability to live independently and one’s ability to learn a novel cognitive skill, such as texting. Neither study found a significant difference on between the groups and the time it took the participant to select the word.

The results of the current study reflect the findings of Salmoni, Schmidt, and Walter (1984) in the respect that participants who received reduced feedback (50% KR group) during the acquisition phase of a novel task performed better than participants receiving constant feedback (100% KR group) because it is thought that participants who received reduced KR relied more on their cognitive processes, rather than relying on constant feedback, resulting in enhanced ability to recall. Similarly, findings from a study by Rice (2003) demonstrated that reduced KR during the acquisition phase appears to enhance retention and the generalization of that skill in older adults. The findings during the retention phase of the current study echo the findings in Rice (2003) that reduced KR enhanced the recall ability of older adults, but not during the transfer or generalization phase. It is possible that, while elderly adults are quite capable of learning and retaining certain cognitive skill, the ability to actually generalize this new found skill has proved to be a challenge. It may be that the task in the respective transfer phases was too ‘different’ from what was learned in the acquisition phase; and as such, the ability to carry over the same skill into a similar, but not identical situation was too cognitively difficult.
Implications to Occupational Therapy

Occupational therapists encourage individuals to engage in meaningful occupations to enhance their everyday lives. As previously mentioned, a person’s relationships with others help to define their daily roles and their lives. It is important that older adults maintain healthy relationships that will improve their self-esteem and provide personal satisfaction while warding off depression and isolation. With the technological advances in our current society, it is important for older adults to understand the meaning of text messaging inscription in order to facilitate and maintain positive relationships with the younger generations. As occupational therapists, we need to consider all areas of occupation including “Communication Management” as defined by the Occupational Therapy Practice Framework (2008). It is not to be overlooked by our profession to teach our older adult clients various forms of communication, such as text messaging, to bolster relationships with their grandchildren and great grandchildren and add meaning and purpose to their familial roles. It can be argued that a communication gap exists between the older adult population and the younger generation. It is the role of the occupational therapist to help bridge that gap so we are in compliance with AOTA’s Centennial Vision in that we are “meeting society's occupational needs” (2007, p. 613).

In addition, it is important that occupational therapists are using the just-right challenge to promote the best outcomes for their clients. Occupational therapists possess the skills necessary to teach older adults a novel task and the use of KR can be used to facilitate the acquisition, retention, and generalization of that skill. By using 50% or 100% KR or somewhere in between, occupational therapists can grade accordingly for their individual clients when teaching a novel motor or cognitive task to allow them to be successful.

Limitations
The first limitation is that the results of the current study do not represent all ethnic populations. Of the twenty-one participants, all were Caucasian. The second limitation was the small sample size. The results of this study are based on twenty-one participants being distributed across three separate groups. It is probable that a Type II error occurred between the 50% KR group and the 100% KR group.

Future Directions

More research is needed to establish the efficacy of the use of KR to teach older adults text messaging inscription within the realms of occupational therapy. In future studies, there should be more participants, along with more ethnic diversity among the participants. It would also be important to verify to most effective level of KR during the acquisition phase of teaching text messaging inscription. For instance, would the use of 33% KR or 25% KR lead to better results when teaching an older adult population text messaging inscriptions? More research is needed to determine the most favorable frequency of KR when teaching a novel cognitive-based task.

Conclusion

In conclusion, this study found that using knowledge of results enhanced the ability of older adults to recall text messaging inscriptions but not to generalize the inscriptions acquired. Although not statistically significant, the participants who received reduced feedback performed better than those who received constant feedback, seemingly because they were relying on their own memory and cognitive processes during trials of no feedback instead of relying on feedback consistently for assistance through the task. Findings of this study demonstrate that knowledge of results can facilitate learning and retention of text messaging inscriptions in older adults and can therefore support healthy communication between those who use text messaging.
Specifically, this may bolster the relationships that older adults have with the younger generation by allowing them to more effectively communicate with them through use of text messaging.
References


Bower, A. (2010). Knowledge of Results as a Method for Teaching Middle Aged Adults Text Message Inscription. Unpublished manuscript, Department of Occupational Therapy, The University of Toledo, Toledo, Ohio.


Table 1

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*Analysis of Variance Table for the Acquisition Phase.*
Table 2

*Tukey’s pairwise comparison for the acquisition and retention phases for the dependent variable of sum of correct responses.*

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<td>.000</td>
</tr>
<tr>
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<td>Control</td>
<td>100% KR</td>
<td>.000</td>
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<td>100% KR</td>
<td>.417</td>
</tr>
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<td>50% KR</td>
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</tr>
<tr>
<td></td>
<td>Control</td>
<td>100% KR</td>
<td>.049</td>
</tr>
<tr>
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<td>50% KR</td>
<td>100% KR</td>
<td>.356</td>
</tr>
</tbody>
</table>
Table 3

*Analysis of Variance for the Retention Phase.*

<table>
<thead>
<tr>
<th>Phase Source</th>
<th>Dependent Variable</th>
<th>Type III Sums of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Ave Time</td>
<td>2.734</td>
<td>2</td>
<td>1.367</td>
<td>.127</td>
<td>.882</td>
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<tr>
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<td>Correct</td>
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<td>2</td>
<td>32.733</td>
<td>7.256</td>
<td>.005</td>
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<tr>
<td>Error</td>
<td>Ave Time</td>
<td>194.407</td>
<td>18</td>
<td>10.800</td>
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<tr>
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<td>Correct</td>
<td>81.200</td>
<td>18</td>
<td>4.511</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Ave Time</td>
<td>2181.932</td>
<td>21</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Correct</td>
<td>1276.000</td>
<td>21</td>
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Table 4

Mean and standard deviation for average time and correctness for the retention and transfer phases.

<table>
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<tr>
<th>Phase</th>
<th>Dependent Variable</th>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>n</th>
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</thead>
<tbody>
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<td>Retention</td>
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<td>Control</td>
<td>10.212333</td>
<td>4.2663490</td>
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<td>3.1679944</td>
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<td>100% KR</td>
<td>9.837187</td>
<td>2.7083704</td>
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<td>Correctness</td>
<td>Control</td>
<td>4.40</td>
<td>1.517</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50% KR</td>
<td>9.00</td>
<td>2.390</td>
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<td>2.138</td>
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<td>Transfer</td>
<td>Average Time</td>
<td>Control</td>
<td>19.882667</td>
<td>8.7511649</td>
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<tr>
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<td>50% KR</td>
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<td>5.8006222</td>
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<td>6.7628058</td>
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<td>Control</td>
<td>2.60</td>
<td>1.517</td>
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<td>1.753</td>
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</tbody>
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Table 5

*Analysis of Variance Table for the Transfer Phase.*

<table>
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<tr>
<th>Phase Source</th>
<th>Dependent Variable</th>
<th>Type III Sums of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Ave Time</td>
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<td>2</td>
<td>.097</td>
<td>.002</td>
<td>.998</td>
</tr>
<tr>
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<td>Correct</td>
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<td>2</td>
<td>.046</td>
<td>.015</td>
<td>.986</td>
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<tr>
<td>Error</td>
<td>Ave Time</td>
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<td>18</td>
<td>47.889</td>
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<td>3.143</td>
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</tr>
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</tbody>
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Figure 1. Average Time for Responses.
Figure 2. Average Sum of Correct Responses.