Knowledge of results as a method for teaching middle aged adults text message inscription

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Knowledge of Results as a Method for Teaching

Middle Aged Adults Text Message Inscription

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Abstract
Communication is an important aspect of any relationship. Text messaging has become extremely popular with the younger generation when communicating with others. The middle aged population may not understand how to text message, or understand the meanings behind each word that their children or grandchildren use when communicating with each other. Therefore, it is highly important that the middle aged population understands the slang of text messaging, or they may have problems communicating with the younger generation. The purpose of this study was to investigate if knowledge of results (KR) is an effective method to teach middle aged adults text message inscription. Forty participants, both male and female, participated in this study. Results from this study indicate that participants who received KR performed better than participants who did not receive KR (p < .05). There is a trend that reduced KR (e.g. 50% KR) yields better results than 100% KR, which coincide with other studies that have found similar results. Occupational therapists are qualified to teach the middle aged population text messaging, and providing KR appears to facilitate, acquiring, retaining, and generalizing their skill. More research is needed to determine, more precisely, optimal frequency of KR for most efficient learning within this cognitive-based task.
Knowledge of Results as a Method for Teaching Middle Aged Adults Text Message Inscription

The purpose of this study is to see if knowledge of results (KR) is an effective method for teaching middle aged adults text message inscription. Knowledge of results has been shown to be effective in facilitating the learning of simple motor skills in young children, young adults, and the elderly. We are interested in seeing if KR will work with the middle aged population in learning text messaging. It is important that middle aged people learn the younger generation’s language in order to communicate effectively with them. Understanding intergenerational communication is important because relationships are highly based on communication, and if middle aged people do not understand the slang of text messaging, they may have problems communicating with the younger generation. According to Obler, Salthouse, and Schaie (1989, 1988, 1993), vocabulary increases as we age, especially for people who are continuously involved in education. Occupational therapy can help older people learn how to read the younger generation’s language and understand the context of new words.

The study of intergenerational communication is based on major perspectives and theories, such as: The Life-Span Developmental Perspective, Intergroup Theory, Communication Accommodation Theory, and The Communication Predicament Model of Aging. It is important to understand the background information of intergenerational communication in order to understand how people communicate with each other.

The Life-Span Developmental Perspective has been explored at numerous conferences by the Department of Psychology at West Virginia University (Baltes, Reese, & Lipsett, 1980). The life-span developmental perspective can be summarized in 4 basic components. The first component of this perspective is that development continues throughout the life span; there is no
end point in terms of developmental plateau, or of ultimate decline (Williams & Nussbaum, 2001). People are continuing to learn new information every day, regardless of their age.

Development is multidirectional and is the second component of the life-span developmental perspective. Williams and Nussbaum (2001) stated “we should not expect to experience universal patterns of growth during any one period of life. Likewise, we should not expect to experience universal periods of decline” (p. 5). We are constantly learning new information and forgetting previous information that we’ve learned. Relationships also change throughout the life-span. Several relationships experience increased intimacy, while other relationships may experience a loss of intimacy. This is one reason why it is important for middle aged people to learn text messaging so that they will be able to communicate effectively with the younger generation.

The third principle of the Life-Span Development is recognized as a gain and loss dynamic. Williams and Nussbaum stated (2001) “competencies can be achieved in one communicative area while anxieties emerge in another” (p.6). Older adults may feel secure with their vocabulary skills, but may feel weary when trying to learn the slang of text messaging, because it can be like learning a new language.

The final component states that the person and the environment are being influenced by each other. This statement attempts to resolve the debate if genetics play a role on how people communicate effectively with each other, or if the environment shapes the person’s communication skills. Both are an important part of human development. According to Williams and Nussbaum (2001) “communication between people who are developing quite differently in terms of their physical, cognitive, or psychosocial selves, and who have experienced quite different life events in unique historical contexts presents a rather large
interactive challenge” (p.7). It is important that older people learn new ways to communicate with the younger generations so they can continue to be in successful relationships with them.

The second theory of intergenerational communication is based on Intergroup Theory. This theory states that identity can be either personal or social. According to Turner (1982) personal identity is based on someone’s personality and behavior. Their social identity is based on group membership. According to Tajfel (1978, 1981) we divide our social world into groups and social categories, and favor the groups that are similar to our groups.

For example, these groups can be based upon gender differences, nationality differences, and support of different teams in sporting events. Another group example could be young adults who understand how to use text messaging, and who understand the slang of text messaging; versus older adults who do not. Younger adults may feel unique that they know the slang and how to use it correctly through text messaging, while the older generation struggles to understand text messaging. If older people do not understand text messaging, or are not willing to learn how to communicate effectively when using it, then that may facilitate degradation in effectual communication with the younger generation.

The third theory for intergenerational communication is the Communication Accommodation Theory (CAT). This theory explains how people modify their speech based on situational, personal, or interactional variables. When people wish to signal intergroup solidarity they converge their speech toward their peers. People make their speech and communication patterns more like their peers, so that they can understand each other. When people wish to signal outgroup members, they diverge their speech patterns away from their peers, so that the outgroup members will be able to understand them. According to Williams and Nussbaum (2001), “approximation is said to occur when interactants focus their attention on their partner’s
speech styles. Most importantly, approximation occurs in response to perceptions or expectations about the other person’s speech style” (p.12). Each generation has some lexical and stylistic features that differentiate them from each other. For example older people may have used the word “groovy” to represent something that they personally value. The younger generation may use the word “sweet” for what they personally value. The English language is continuously changing, and it is important for the older generation to keep up with the younger generation in order to foster effective intergenerational communication.

Another important part of the CAT is having the ability to decode, or figure out what is being said which is called interpretive competence. Williams and Nussbaum (2001) stated “changes in vocabulary, modifications of pitch and tone, placing emphasis on certain keywords, or staying within certain easy-to-understand topic areas are examples of this interpretive competence” (p. 12). For example, a younger person may try to explain to an older person that the term “bad” is positive. The older person may have a difficult time trying to learn the youth slang, and might misinterpret the term for something else.

The final theory for intergenerational communication is The Communication Predicament Model of Aging (CPM). This theory states that stereotypes may lead to problematic speech. This perspective focuses mainly on problematic intergenerational communication between the young and elderly. According to the CPM when a younger person meets an older person, they both may be stereotyping each other. Stereotyping each other could cause speech behavior problems. For example, a younger person may think that the older person has hearing problems, and may talk slowly and loudly to them in the belief that in doing so will increase the probability of the older person being able to understand what the younger person is trying to
communicate. Stereotyping an older person who might have hearing impairments could cause overaccommodation in the conversation with the youth and older person.

It is important that youth and older people do not stereotype each other in order for effective communication to take place. It is important for parents and grandparents to be able to communicate with the younger generation. Learning the slang of text message, can help bridge the gap of communication between youth and their parents and grandparents.

In today’s society cell phones are extremely popular. According to Wikipedia (2007b), most cell phones provide a short message service (SMS) which allows the mobile user to send and receive short messages also known as text messages. However, text messaging was originally designed as a part of the Global System for Mobile Communications (GSM), and was invented to alert the mobile user on incoming voice mails. Interestingly, the general consensus of the early cell phone developers did not expect mobile users to use text messaging for personal use. However, text messages are gaining in popularity and in 2004 500 billion messages were sent (Wikipedia, 2007b). The first text message was sent from Neil Papworth in the United Kingdom on December 3, 1992, by using the Vodafone (Orbitel 901 handset) GSM Network. In 1993 Riku Pihkonen, an engineering student at Nokia, typed the first SMS on a GSM phone.

Initial growth of sending and receiving text messages was slow, and in 1995 on average only .4 messages per GSM customer were used each month. One reason why the SMS growth took a while to expand in popularity was because the phone companies could not decide on how to charge these customers, especially those who use prepay services (Wikipedia, 2007b). At the end of 2000, each customer on average sent 35 messages.

The Short Message Service Centre (SMSC) stores and forwards messages that are sent until the recipients receive the message. If the recipient cannot be reached, the
SMSC will store the message and send it later (Wikipedia, 2007b). Short messages can be transmitted through different telephony protocols such as Signaling System #7 (SS7) (Wikipedia, 2007c). Voice Over Internet Protocol news (VOIP) defines telephony as “technology associated with the electronic transmission of voice, fax, or other information between distant parties using systems historically associated with the telephone” (Voice p.1, 2005). Messages are limited by the signaling protocol to 140 bytes, which allows for 160-7 bit characters, 140 8-bit characters, or 70 16-bit characters to be translated. Signaling protocols are “used to set up the majority of the world’s public switched telephone network telephone calls” (Wikipedia, p.1, 2007c). Larger messages can be sent over multiple messages and start with the headline “UDH”, which stands for user data header that contains segmented information. Once a long text message is sent, the recipient’s phone gathers the messages and presents the message as one long message. Six to eight segments are the maximum for most cell phones, and long messages are billed as multiple text messages. The recipient can change the ring tone on their cell phone according to their particular taste when they receive a text message (Wikipedia, 2007b).

Text messages are widely used for delivering content such as news alerts, logos, financial information, and ring tones. Some text service websites also offer a “free premium” which allows registers to receive free text messages when items go on sale at the company. Also text messages are becoming more popular with television shows. More viewers are voting by sending text messages to television networks, such as FOX with “American Idol”, and NBC’s “Deal or No Deal”. In Finland, some TV channels offer SMS chat, which allows customers to send messages and then their messages, will appear later on in the broadcast (Wikipedia, 2007b).

There have also been contests held between expert Morse code operators and expert SMS users. Morse code is used for transmitting messages, by using letters from the alphabet and
numbers to express various long and short signals (Wikipedia, 2007a). Morse code consistently wins because its interface allows for a faster way to input text. It is possible that mobile phone manufacturers may build Morse code into the mobile phone. The interface would translate the input into text so that the recipient would not need to know Morse code in order to read it (Wikipedia, 2007b).

In order for us to determine whether KR is an effective method for teaching middle aged adults text message inscriptions, it is important that we understand the background behind knowledge of results and its importance. Knowledge of results is a dimension of augmented feedback. Schmidt and Lee (1999) define augmented feedback as “information provided about the task that is supplemental to, or that augments, inherent feedback” (p. 325). According to (R.A. Schmidt & Lee, 1999) “this type of feedback involves information that is related to performance in relation to the goal of the task” (p. 61). KR can be manipulated into different frequency groups, such as after every trial the participant will receive (100%) feedback or after every other trial the participant will only receive (50%) feedback. As a general consensus, participants performed better after receiving 100% KR, but they did not retain the skill as well as the participants who received 50% KR (Jarus, 1995; Lai & Shea, 1998a; Lance & Burke, 1974; Lee, White, & Carnahan, 1990; R. A. Schmidt, Young, Swinnen, & Shapiro, 1989; Winstein & Schmidt, 1990; Wulf & Schmidt, 1989; Young and Schmidt, 1992; Rice, 2003).

According to Salmoni, Schmidt, and Walter (1984) and Shea and Wulf (2005), participants who received frequent feedback performed better than those who did not receive frequent feedback. The rationality behind this phenomenon is the participants who received frequent KR relied on a lot of feedback for completing the task and not on their own memory during the trials with no feedback. Salmoni, Schmidt and Walter (1984) and Shea, and Wulf
(2005) believed that conditions that depend on greater cognitive processing help the encoding process of the required skills needed to perform the occupation, which results in enhanced recall of that skill.

The purpose of this study is to investigate the effectiveness of a motor learning strategy using knowledge of results (a specific type of feedback) to teach text-messaging in a middle aged population. It is hypothesized that the use of KR will enhance the ability to recall text message inscription in middle aged adults. It is hypothesized that participants who receive KR will demonstrate an enhanced ability to accurately identify the meaning associated with text messaging. It is also hypothesized that there will be a difference in the ability to identify the meaning of text messages between the 100% KR, the 50% KR, and the control group.

Method

Participants

There were eight males and thirty-two females who participated in this study with a total of forty participants. The average age was 50.98 years old. Thirty-seven participants were Caucasian, two participants were Hispanic and one participant was Chinese. Participants were recruited through from local churches and community centers via advertising brochures. The inclusion criteria for the participants were: the age range was from 40-65 years old; the participants had to be either parents or grandparents, and through verbal report, not have experience with using text messaging. They also had to be free from any neurological or physical impairment that would adversely affect their ability to participate in this research. The sample size was based on the sample size of a study involving a similar independent variable that reached statistical significance with 77 persons (Kilduski & Rice, 2003). Originally an n of 80
was planned for this study; however, only 40 participants participated because of scheduling conflicts.

**Apparatus**

A Pentium 4 laptop computer with a custom developed inscription program was used to deliver the independent variable (text message). The custom software was developed on Microsoft Visual Basic Version 6.0. The individual was given a choice of using either the computer touch pad or a mouse.

**Procedure**

The participants signed an informed consent form prior to participating in the study. The data were collected from September 2007- March 2008. The study took two days to complete per participant and took 30 minutes to complete the first day and 30 minutes to complete the second day. The participants were randomly assigned to one of three groups from custom developed software using permutated randomized blocks. There were fourteen people in the first group who received feedback 100% after every trial. There were sixteen people in the second group who only received feedback 50% of the time after every other trial. There were ten people (control group) who did not receive any feedback after each trial. The participants were seated at the laptop computer and went over 12 different “G-rated” sayings six times for each 72 trials. The 12 words used in this study were: address, apple pie, homework, cool, alive and smiling, later, excellent, alright, bye bye, good luck, hug and kiss, and sorry (Dominounplugged, 2007; Lingo2word, 2007; Netlingo, 2007; Webopedia, 2007; Webwasp.co.uk, 2007). For an example, the phrase “My Hat Is Off To You” was at the top of the computer monitor and the participants were able to choose the correct abbreviation for that phrase. They were able to choose from A. MHOTY, B. MHAIOF2U, C. MHITYO. (A. is the correct answer.) Depending on which group
the participant was in depended on when they received correct feedback. If they choose the
correct answer, then they would hear, “You chose ____, that is the correct answer”. If they
chose the wrong answer they would hear, “Sorry, you chose _____, that is incorrect. The correct
answer is ____”. On the second day of the experiment, participants were tested on the exact
same phrases without feedback (retention phase). The participants were only exposed to each
word/phrase one time for a total of 12 trials. A transfer phase was also assessed the second day.
Following the retention phase a 10 minute break occurred between the retention and the transfer
phases. The transfer phase involved identifying the correct sequence of text abbreviations that
represented a sentence. A total of six sentences were provided with each sentence being
provided one time. Each sentence included a word that was included in the acquisition and
retention phases. All of the words in each of the sentences provided each of the options, were
identical except for the word that was included in the acquisition and retention phases. Here,
there was one correct spelling of the text word among the three options. The purpose of the
transfer phase was to determine whether the participants could generalize what they had learned
earlier to the new phrases.

Statistical Analysis Data Reduction

For the acquisition phase, the number of correct responses was summed for each word.
The response time to choose an answer was averaged across all six trials for each word. During
the retention and transfer phases analyses of variance (ANOVA) on accuracy with repeated
measures were used for the acquisition phase. Specifically, for hypothesis one a separate 3x12
(Group x Trial) ANOVA was used. Trials that were 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
an ANOVA was completed on the factor of groups for each of the dependent variables. A follow
up Tukey’s pairwise comparison was used to determine whether any differences existed between the three groups (100% KR, 50% KR, and the control group).

Results

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 choose the correct word (Table 1 and Figure 1), but there was a significant difference with the participant choosing the correct word (Table 2 and Figure 2). There was also no interaction between which words the participant had in each group. There was an interaction between the factors of correctness and word on during the acquisition phase (Table 1). Figure 2 illustrates that 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 demonstrate an enhanced ability to accurately identify the meaning associated with text messaging. Tukey’s pairwise comparison was used to compare the three groups on word correctness during the acquisition phase. There was a significant difference between the control group and the 50% KR group. There was also a significant difference between the control group and 100% KR group. However, there was not a significant difference between the 50% KR group and the 100% KR group. See Table 2.

For all three groups during the retention phase (100% KR, 50% KR, and the control group) there was a significant difference in word correctness but not with average time. See Table 3. During the retention phase the average time to respond was average across all 12 trials for all groups. Tukey’s pairwise comparison was used to compare the three groups on word correctness during the retention phase. There was a significant difference between the control
group and 50% KR group. There was also a significant difference between the control group and 100% KR group. However, there was not a significant difference between the 50% KR group and the 100% KR group. See Table 4. There is a trend that reduced KR yields better results than 100% KR. Participants who received KR performed better than those who did not receive KR. See Table 5.

For all three groups during the transfer phase (100% KR, 50%KR, and the control group) there was a significant difference between groups and word correctness, but there was not a significant difference with how long it took the participant to choose the word. See Table 6. Tukey’s pairwise comparison was used to compare the three groups on word correctness during the Transfer phase. There was a significant difference between the control group and the 100% KR group. There was a significant difference between the control group and the 50% KR group. There was not a significant difference between the 50% KR group and 100% KR group. See Table 7. During the transfer phase, there is a trend that reduced KR yields better results than 100% KR. Participants who received KR performed better than those who did not receive KR. See Table 8. Overall, there was not a significant difference with how long it took the participant to choose the correct word. See Figure 1.

Based on these results, this study demonstrates that KR facilitates learning, regardless if it is reduced or if it is constant. See Figure 2. Receiving KR does matter in order to enhance the ability to recall text message inscription in middle aged adults. The participants who received KR were able to generalize effectively to a sentence. See Table 7.
Discussion

The purpose of this study was to determine whether KR was an effective method for teaching middle aged adults text message inscription. As previously mentioned, KR has been shown to be effective in facilitating simple motor skills in children, young adults, and the elderly. Few studies have solely focused on if KR can be an effective method for learning cognitive skills.

The first hypothesis was supported in that the use of KR enhanced the ability to recall text message inscription in middle aged adults. Both the 50% KR and 100% KR groups performed better than the control group. Therefore, these results demonstrate that KR can facilitate the recall of text message inscription. And although, not statistically significant, during the retention and transfer phases, the 50% KR and 100% KR groups took less time to choose the correct word/phrase than the control group. Overall the 50% KR group performed better than the other two groups. This trend is in line with what has been shown in the literature, specifically sporadic knowledge of results have been found to be more successful in promoting learning than continuous (e.g. 100% KR) knowledge of results (Baird & Hughes, 1972; Ho & Shea, 1978; Winstein & Schmidt, 1990).

The second hypothesis was supported in that participants who receive KR demonstrated an enhanced ability to accurately identify the meaning associated with text messaging. During the retention and transfer phases, the trend was that the 50% group performed better than the 100% group for selecting the correct word in a shorter amount of time. As previously mentioned participants in the 50% KR group retained the skill more than participants in the 100% KR group because participants in the 50% KR group relied more on their own memory during the different trials without feedback than the 100% KR group (Jarus, 1995; Lai & Shea, 1998a; Lance &

The third hypothesis was that there would be a difference in the ability to identify the meaning of text messages between the 100% KR, the 50% KR, and the control group. During the retention and transfer phases, the 50% KR group and 100% KR group performed better than the control group. One reason to explain this phenomenon is that the participants who received KR might have found more meaning with this occupation because they were receiving feedback whether they chose the right or wrong answer. The control group did not receive feedback; therefore, an inference is being made that the control group might not have found this occupation very meaningful because they did not know if their answers were right or wrong.

There are multiple studies that have found participants who received reduced feedback performed better than those who received constant feedback, such, as Wulf, Schmidt, and Deubel (1993) in which they had thirty-eight participants who moved the right forearm in a device similar to a skate board, but with only one axis allowing rotational movement of the forearm stemming from shoulder internal and external rotation. The goal of the task was to perform these movements with spatial accuracy as well as within specific time frames. The results were that the group with the reduced KR frequency demonstrated significantly better performance during the retention and transfer trials. Participants who are in the 50% KR group seemed to perform better and retain the skills that they learned.

Another study that produced similar results is Rice and Hernandez (2006) which investigated the effect of 100% KR versus 50% KR in a group of individuals with developmental delay and a group of age-matched average individuals. The task involved matching a yellow bar
to a blue target bar on a computer screen by moving the access device. Participants received KR in the form of a green bar that indicated the level of success in matching the blue bar to the position of the yellow bar on the computer screen. Knowledge of results was provided after every trial. Results indicated that the participants with developmental delay who were assigned to 100% KR group performed better during the acquisition phase than the participants assigned to the 50% KR group. Similar to the results in the study Gillespie (2003), the 50% KR group performed better than the 100% KR group in the retention phase. Participants who were in the 50% KR group were able to retain the information better than the participants who were in the 100% KR group.

A final study that found similar results was Applegate, Rice, Stein, and Maitra (2008) in which cognitive skills were being focused on instead of motor skills with KR. The purpose of this study was to determine if there is an effect on learning to tell the time when KR was applied in a person with intellectual disability. The study used an A1-B1-A2-B2 single-case experimental design. The “A” phases contained no KR and the “B” phases provided KR. Each day a total of 12 times were presented on an analogue clock-face on a computer screen. Each time was presented six times with 72 trials on each day. The participant was instructed to do the study on any five days within a seven-day week. The results for this study indicated that incorporating KR into a learning strategy in an individual with intellectual disabilities facilitated the ability to tell the time more accurately. Knowledge of Results can enhance learning both motor and cognitive skills.

Application to Occupational Therapy

Occupational therapy enables people to achieve health, well-being, and life satisfaction through participation in occupation. Occupational therapists are experts with knowledge of
occupation and how engaging in meaningful occupations can be used to enhance human performance and the effects of disease and disability. Occupations are generally viewed as activities having meaning and purpose in a person’s life. Occupations are vital to a person’s identity and competence. Occupational therapists use their knowledge to address performance issues in any or all areas that are affecting the person’s ability to engage in occupations.

Occupational therapists are knowledgeable about the seven different areas of occupation which are: occupations of daily living, instrumental occupations of daily living, education, work, play, leisure, and social participation. For example the therapist is familiar with the subcategories within the seven areas of occupation such as: caring for others, communication device use, health management and maintenance, and exploring interests, to name a few. Since the occupational therapist is knowledgeable in all of the areas of occupation, that makes him/her qualified to educate a middle aged adult on any area of occupation that he/she might be struggling with or wanting to learn, such as text messaging (American Occupational Therapy Association, 2002).

Some goals of occupational therapy are: to enhance the well-being of clients through occupation, to encourage interaction through occupation, and to improve function in occupations (Bruce & Borg, 2002).

Occupational therapists encourage interaction through occupation. It is important that older people learn ways to communicate with the younger generation so they can continue to be in successful relationships with them. One way that occupational therapists can help fill the communication gap between the middle aged population and the younger population is teaching the middle aged population how to text message and to understand the meanings behind the text messages. Occupational therapists realize the importance of communicating with each other in order to maintain a relationship. As previously mentioned, each generation has some lexical and
stylistic features that differ from each other. The English language is continuously changing, and it is important for the older generation to keep up with the younger generation in order to foster intergenerational communication. The occupational therapist can help the older population become more comfortable with technology, such as using a cell phone. The occupational therapist can help the older person understand how text messaging works, as well as teaching them different words so that they will be able to communicate effectively with their younger loved ones. It is important that the older generation finds text messaging meaningful and purposeful for them. Finding meaning in an occupation is a motivating factor in learning something. Text messaging is similar to learning a new language, and the occupational therapist can help the individual with this process.

Limitations

There were a few limitations with this study. The first limitation is that the participants might not have found this occupation meaningful. The participants might not be interested in learning how to text message. They may not have problems communicating with their children or grandchildren, so this occupation may not have been meaningful for them. If the occupation was not meaningful for the participant then he/she may not have put forth an effort in trying to remember the words from day the first day or testing to the second day, which might have made the results less significant. The second limitation is that the results of the present study do not represent all ethnic populations. There were thirty-seven participants who were Caucasian and there were three participants who represented different ethnic populations. This study should not be generalized for all ethnic populations. The third limitation was the sample size. The results of this study are based on a relative small $n$ with forty participants being distributed across three separate groups. It is probable that a Type II error occurred between the 50% KR and 100% KR
group. Therefore, if there were more participants; perhaps the results between the two groups would be significant.

*Future Directions*

More research is needed in order to establish efficacy of the use of knowledge of results when teaching the middle aged population text message inscription. In future studies there should be more participants and a wider range of ethnic groups tested. It is important to determine the most effective level of KR of frequency when teaching text messaging. In addition, it would be beneficial to extend this research towards a more elderly population.

*Conclusion*

In conclusion, this study found that using knowledge of results enhanced the ability to recall and generalize text message inscription in middle aged adults. Although not statistically significant, the participants who received less feedback performed better than those who received constant feedback presumably because they were relying on their own memory during trials with no feedback instead of relying on feedback for guidance through the task. Knowledge of results can help the middle aged population learn text message inscription and therefore may subsequently benefit those who use text messaging for communication. Specifically, this may result in an increased ability of the middle aged population to communicate effectively with the younger generation.
References


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### Table 1: Results of Acquisition Phase

<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
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</thead>
<tbody>
<tr>
<td>Word</td>
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<td>11</td>
<td>33.078</td>
<td>3.111</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Smct1</td>
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<td>9.591</td>
<td>4.725</td>
<td>.000</td>
</tr>
<tr>
<td>Gp1</td>
<td>Avetm1</td>
<td>4.528</td>
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<td>2.264</td>
<td>.213</td>
<td>.808</td>
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<tr>
<td></td>
<td>Smct1</td>
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<td>2</td>
<td>287.604</td>
<td>141.699</td>
<td>.000</td>
</tr>
<tr>
<td>GP 1x</td>
<td>Avetm1</td>
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<td>.969</td>
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<td>5.696</td>
<td>2.806</td>
<td>.000</td>
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<td>10.633</td>
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<tr>
<td></td>
<td>Smct1</td>
<td>12296.000</td>
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</table>

*note: Avetm1 = average time, Smct1 = sum correct.*
Table 2

*Tukey’s Pairwise Comparison for the Acquisition Phase*

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>group</th>
<th>group</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smct1</td>
<td>Control</td>
<td>50% KR</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>100 % KR</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>50% KR</td>
<td>100% KR</td>
<td>.963</td>
</tr>
</tbody>
</table>

*note:* Smct1 = sum correct
Table 3

*Results of Retention Phase*

<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>Type of III</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retention Phase</td>
<td>Avetm2</td>
<td>17.307</td>
<td>2</td>
<td>8.654</td>
<td>.419</td>
<td>.661</td>
</tr>
<tr>
<td></td>
<td>Smct2</td>
<td>268.643</td>
<td>2</td>
<td>134.321</td>
<td>25.298</td>
<td>.000</td>
</tr>
<tr>
<td>Error</td>
<td>Avetm2</td>
<td>763.926</td>
<td>37</td>
<td>20.647</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Smct2</td>
<td>196.457</td>
<td>37</td>
<td>5.310</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Avetm2</td>
<td>2184.362</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Smct2</td>
<td>3458.000</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note:* Avetm2 = average time, Smct2 = sum correct.
Table 4

*Tukey’s Pairwise Comparison for the Retention Phase*

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>group</th>
<th>group</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smct2</td>
<td>Control</td>
<td>50% KR</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>100% KR</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>50% KR</td>
<td>Control</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>50% KR</td>
<td>100% KR</td>
<td>.624</td>
</tr>
</tbody>
</table>

*note:* Smct2 = sum correct.
# Table 5

**Descriptive Statistics for the Retention Phase**

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avetm2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>6.90</td>
<td>4.67</td>
<td>10</td>
</tr>
<tr>
<td>50% KR</td>
<td>5.23</td>
<td>4.38</td>
<td>16</td>
</tr>
<tr>
<td>100% KR</td>
<td>6.02</td>
<td>4.64</td>
<td>14</td>
</tr>
<tr>
<td>Smct2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>4.20</td>
<td>2.62</td>
<td>10</td>
</tr>
<tr>
<td>50% KR</td>
<td>10.50</td>
<td>1.67</td>
<td>16</td>
</tr>
<tr>
<td>100% KR</td>
<td>9.71</td>
<td>2.67</td>
<td>14</td>
</tr>
</tbody>
</table>

*note:* Avetm2 = average time, Smct2 = sum correct.
Table 6

Results of Transfer Phase

<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>Type of III Sum of Squares</th>
<th>df</th>
<th>Mean</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer Phase</td>
<td>Avetm3</td>
<td>240.031</td>
<td>2</td>
<td>120.015</td>
<td>.707</td>
<td>.500</td>
</tr>
<tr>
<td></td>
<td>Smct3</td>
<td>57.643</td>
<td>2</td>
<td>28.821</td>
<td>10.112</td>
<td>.000</td>
</tr>
<tr>
<td>Error</td>
<td>Avetm3</td>
<td>6279.879</td>
<td>37</td>
<td>169.726</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Smct3</td>
<td>105.457</td>
<td>37</td>
<td>2.850</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Avetm3</td>
<td>11566.934</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Smct3</td>
<td>920.000</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*note: Avetm3 = average time, Smct3 = sum correct.*
Table 7

*Tukey’s Pairwise Comparison for the Transfer Phase*

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>group</th>
<th>group</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smct3</td>
<td>Control</td>
<td>50% KR</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>100% KR</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td>50% KR</td>
<td>100% KR</td>
<td>.735</td>
</tr>
</tbody>
</table>

*note:* Smct3 = sum correct.
Table 8

Descriptive Statistics for Transfer Phase

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avetm3 Control</td>
<td>14.99</td>
<td>22.32</td>
<td>10</td>
</tr>
<tr>
<td>50% KR</td>
<td>8.75</td>
<td>7.25</td>
<td>16</td>
</tr>
<tr>
<td>100% KR</td>
<td>11.39</td>
<td>8.80</td>
<td>14</td>
</tr>
<tr>
<td>Smct3 Control</td>
<td>2.30</td>
<td>1.77</td>
<td>10</td>
</tr>
<tr>
<td>50% KR</td>
<td>5.25</td>
<td>1.53</td>
<td>16</td>
</tr>
<tr>
<td>100% KR</td>
<td>4.79</td>
<td>1.81</td>
<td>14</td>
</tr>
</tbody>
</table>

Note: Avetm3 = average time, Smct3 = sum correct.
Figure 1: Average Time for Responses
Figure 2: Average Sum of Correct Responses