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The Effects of Hands-on Versus Demonstration Teaching Methods on Immediate, Short-term, and Long-term Recognition in Adults

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May 2008
Abstract

Objective. This study compared hands-on versus demonstration teaching methods in an adult population. It was hypothesized that there would be a difference in recognition memory between the hands-on learning group and the demonstration learning group.

Methods. Forty adults were randomly assigned to either the hands-on learning condition or the demonstration learning condition. Participants in the hands-on group participated in making a facial mask along with the investigator, while participants in the demonstration group observed the facial mask being prepared by the investigator. Immediately following the twelfth and final step of the facial mask preparation, the participant was given a paper and pencil test. In order to test recognition, the test had 24 possible choices with only twelve of them being correct. The test was repeated, with the possible steps in a different order, 15 minutes after and 24 hours following the instructions of the facial mask making occupation.

Results. No statistically significant differences were found between the hands-on and demonstration groups in terms of immediate, short-term and long-term recognition.

Conclusion. The results of this study did not support the hypothesis that there would be a difference between the hands-on group and the demonstration group with regards to immediate, short or long-term recognition. Further research is needed in order to determine which method of teaching, hands-on or demonstration, is more effective at teaching an individual a novel occupation.
The Effects of Hands-on Versus Demonstration Teaching Methods on Immediate, Short-term, and Long-term Recognition in Adults

Eighty years ago the organization that became the American Occupational Therapy Association (AOTA) included among its founding principles the “ability to instruct” as an “essential qualification for the occupational therapist.” (National Society for the Promotion of Occupational Therapy, 1917). The current guidelines for practicing occupational therapists include that therapists, “Demonstrate the ability to educate and train client/family/significant others to facilitate skills in performance areas as well as prevention, health maintenance, and safety” (American Occupational Therapy Association, 2003). Because teaching is, and has always been, at the core of the profession, occupational therapists have an obligation to understand which methods are most effective. In this paper, two teaching methods were examined: hands-on and verbal demonstration in the adult population. To begin, three different aspects of memory will be discussed followed by an historical review of the research on these methods. The present study examining the teaching methods and their effects on memory will be followed.

Cavanaugh and Blanchard Fields (2006) categorize memory into short-term memory which includes working memory, and long-term memory. Short-term memory is viewed as the limiting capacity for remembering bits of information. Short-term memory is limited in scope and time unless placed in a different storage area. Long-term memory is the ability to remember extensive amounts of information for any period of time. Long term memory is what people most commonly think of as “memory.” This storage area is the aim for a person who desires to learn because it can be drawn from
when necessary. Working memory, a sub-category of short-term memory, is the active process and structures involved in holding information and, simultaneously, using that information to solve a problem, make a decision, or learn new information. Working memory is like a mental scratchpad. It is the middle ground between short-term memory and the dynamic process of applying knowledge to ever changing scenarios.

In order to know if teaching has been effective, memory must be evaluated. An evaluation of the memory is done through examinations of recall and recognition. Cavanaugh and Blanchard Fields (2006) effectively define these terms. Recall involves remembering information without hints or clues. Recall can be thought of as information that one “just knows” or that can be said without prompts. This is information such as one’s own phone number, a friend’s name, or revealing the plotline of a recently read book. Recognition involves picking previously studied information from among many items. The most common example of this is a multiple choice test. Another example is identifying a friend in a crowd of strangers. Recall and recognition are the principle methods that will be used to examine our teaching methods.

*Teaching Methods*

Hands-on teaching is learning by active performance. It is learning how to drive by getting in a car and physically sitting down and being in control of the steering wheel, brakes, turning signals, etc. It is learning how to make lasagna by physically putting together and baking the meat, noodles, and cheese. This method of learning intuitively seems the most reasonable way to learn. Occupational therapists frequently use this method of teaching with clients when they teach occupations of daily living. This includes teaching a person how to dress independently after suffering a stroke or teaching
a child with mental retardation how to tie his or her shoes. In order for these clients to master these new skills and reach their goals, they must physically prove their capability.

Demonstration-only consists of a person (a teacher) engaging in the occupation to be learned, while the observer (a student) is expected to vicariously learn through visual and/or auditory stimulus. This method is frequently used in typical classroom settings where there is a large teacher/student ratio. Occupational therapists may use this method if they are educating several members of a client’s family on safety precautions.

Summary of the current research

Research has shown that memory for an action phase improves if the actions are performed rather than just solely heard audibly (Englekamp, Seiler, & Zimmher, 2005). Some occupational therapists, such as Gilner (1985), argue that motor learning is inseparable from the premise of occupational therapy. But evidence demonstrating the effectiveness of hands-on learning has been mixed.

Warner (1989) was the first to compare these teaching methods in occupational therapy. The researcher compared the effects of a hands-on versus a demonstration occupation in terms of the level of memory retention in 29 elderly females with cognitive deficits. The hypothesis was that those who participated in the hands-on group would receive a significantly higher score on a memory quiz than those in the demonstration group. The randomly assigned females received approximately one hour of hands-on or demonstration of an ice cream making occupation. Immediately following the occupation, the level of memory retention was measured using a task-related quiz developed by the researcher. The author reported an increase in memory retention among the females participating in the hands-on condition. The results of this study were the
first to indicate the superiority of hands-on teaching in comparison to the demonstration method in terms of immediate recall. Since then several different studies have expounded on the hands-on versus demonstration question with differing independent variables, populations, and methods of scoring.

Buddelmeyer (1995) compared hands-on versus verbal teaching methods in terms of free recall in children with learning disabilities. The occupation involved was making play-doh. The hypothesis was that the children engaging in the hands-on play-doh making occupation would remember significantly more steps than those who received verbal instructions. After the instructions were read, both groups said the step aloud. Children were asked to verbally recall the steps of the occupation, in the proper order, and in the exact words that they were presented. A tape recorder was used to document the results. Using pre-determined criteria for scoring, points were awarded for the syntactical units recalled correctly, and then points were added for remembering the steps in the proper order. Results confirmed that immediate recall in children who performed the hands-on condition was superior to the verbal condition. The results of the study validate the principle of learning through active doing used in occupational therapy.

Hartman, Kopp Miller and Nelson (2000) examined 73 healthy third-graders taught to make a volcano in terms of hands-on and demonstration teaching methods. Volcano-making was chosen because it was meaningful to the participants. The first hypothesis was that participants who engaged in a hands-on teaching method embedded in a meaningful and purposeful occupation would have a greater recall score than participants who engaged in a demonstration teaching method. The second hypothesis was that participants who engaged in a hands-on teaching method would recall more task
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steps in their proper order than participants who engaged in a demonstration teaching method. Unlike the previous studies, the number of instructions recalled and the correctness of the order of recall were separate dependent variables. The children were awarded two separate scores, one for recalling the correct syntactical units and another for the correct order of the steps. The participants in the hands-on condition had a mean recall score significantly greater than those in the demonstration condition. There was no significant difference between the two conditions in terms of mean order score. This study contributes to the establishment of a valid base of research supporting the principle of hands-on learning on immediate recall.

Eakman and Nelson (2001) compared hands-on versus demonstration learning in 30 males with closed head injuries. The occupation involved was making meatballs. It was hypothesized that participants in the hands-on occupation would recall more of the instructions for making meatballs than the participants receiving verbal demonstration only. Participants in both conditions were asked to recall the steps involved in making meatballs accurately and in their proper order. Points were awarded for each. The scores were combined into one. A Mann-Whitney U test confirmed that the participants in the hands-on group had significantly more immediate memory recall than the verbal demonstration group. This research emphasizes the importance of hands-on learning in everyday tasks as used in occupational therapy practice.

Messina (1999) examined hands-on versus demonstration teaching methods on immediate and final recall in 48 adults with mental disorders. The occupation taught was making no-bake cookies. The hypothesis was that individuals in the hands-on condition would have higher recall scores for both immediate and final recall compared to those
assigned to the demonstration condition. This was the first study to examine both variables of immediate and final recall. Immediate recall was defined as anything that could be remembered within the first ten minutes of exposure to a stimulus. Final recall was examined 15 minutes following immediate recall. During the intermittent time, a card game was played to ensure the participants did not reverse the steps in their head. The score was determined by adding points for each participant’s number of syntactical units remembered, number of steps remembered without considering order, and number of steps remembered in the correct order for both immediate and final recall were calculated. An unpaired t-test revealed that there was not a significant difference in terms of immediate recall between the two conditions. However, there was a significant difference between individuals in terms of final recall, with individuals in the hands-on condition remembering more of the cookie recipe than the participants in the demonstration condition. Even though immediate recall scores did not differ between teaching methods, the long-term effects of using a multi-sensory teaching method enhanced a person’s ability to remember information.

Hearns (2000) examined the effects of hands-on demonstration versus verbal demonstration on memory in 60 college students. She included the memory variables that had been used thus far, immediate and short-term, and added long-term memory. Long-term memory was analyzed 24, but no more than 48 hours following the occupation. The task examined was making no-bake cookies. It was hypothesized that the students in the hands-on condition would have greater immediate recall, short-term recall, and long-term recall than the students in the demonstration condition. Participants were asked to repeat the exact wording of the steps, in the correct order immediately,
after fifteen minutes, and twenty four to 48 hours following the cookie making. Points were awarded as one score for the syntactical units for each step of the recipe and one score for the correct order of the steps. The authors reported that one hypothesis was supported. The students in the hands-on condition had greater long-term recall than the students in the demonstration condition. The results of this study were not consistent with previous research by Warner (1989), Eakman and Nelson (2001), Buddelmeyer (1995), or Hartman, Kopp Miller and Nelson (2000). The results did correspond with Messina (1999), in terms of the significance of long term recall. This is important because clients need to recall and implement what they are taught long after their session with the occupational therapist.

Kluczynski (2002) examined hands-on versus verbal demonstration teaching methods in 50 older adults. She continued to use the three memory variables in an ice cream making occupation. Immediately, 15 minutes, and 24 to 48 hours following the occupation, participants were asked to verbally recall, in order, the exact wording of the ten recipe steps. Three separate recall scores were added for the three time frames, one for the accuracy of the syntactical units, one examining the steps regardless of order, and one to analyze the order of the steps. There were no statistically significant differences found between the hands-on group and the verbal demonstration group in terms of immediate recall, short-term recall, or long-term recall. This study was the first not to show any statistical significance between the two teaching methods.

Because Kluczynski’s results were inconsistent with previous research, Bird (2004) replicated Kluczynski’s research on 40 older adults. The participants learned each step of a strawberry ice cream occupation. The hypothesis was that there would be a
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difference between the hands-on teaching method and demonstration teaching method in terms of immediate recall, short-term recall, long-term recall, and the order of the steps remembered. The scoring was replicated from the Kluczynski study. The results of the MANCOVA indicated that there were no statistically significant differences between the two teaching methods in terms of immediate, short term, or long term recall, and the order of the steps remembered. The results of these studies indicate that teaching methods may not be an important variable while teaching older adults.

However, Bird (2004) and Kluczynski (2002) both called for further research on this topic, but with modifications. Several important limitations were noted in their studies. The first was the small sample size of each of these studies. Expanding the population could result in significant findings. Another limitation was the scoring of the responses appeared to be very restrictive. The participants were only given points when they remembered all the syntactical units for each step. For example, the first step of Bird’s (2004) instructions was, “prepare the strawberries by washing them.” Many participants remembered the first step as, “wash the strawberries.” Therefore, they did not remember all syntactical units of that step, and were penalized. Since they did not remember the first step, the participants were not given credit for subsequent steps. Kluczynski (2002) and Bird (2004) suggested changing the way in which the participants were scored by using a paper and pencil test. Their suggestions included either a multiple choice test or picking correct answers from a list. These changes could improve participants recall and recognition. This also eliminates the use of the tape recorder, an artificial occupational form, which made some participants anxious and uncomfortable. Participants also questioned the reasoning behind the memorization of a recipe, when
typically recipes are looked up. Finally, individual differences among the participants were not well controlled. Some participants required additional assistance with the materials from the researcher because of upper extremity weakness. Other individuals had difficulty reading the steps on the index card. These individuals lost critical visual input to aid their memorization. The meaningfulness of the occupation could also be an important variable to consider. If an occupation is meaningful to the participant learning could be enhanced because the participants become more fully engaged in the occupation. Ice-cream making may not have been meaningful enough to the older adults to fully engage in. These reasons could explain the lack of significant results in the Bird and Kluczynski studies. It is also possible that the differences between the hands-on and demonstration conditions are not of importance when teaching older adults. But because teaching is critical to the field of occupational therapy it is important to understand which teaching methods are most effective when working with any population.

Current Study

The previous research placed the majority of evidence in favor of the hands-on teaching method compared to demonstration in regards to memory recall. Increased immediate recall was demonstrated by Warner (1989), Buddelmeyer (1995), and Hartman, Kopp Miller and Nelson (2000). Messina (1999) demonstrated the effectiveness of short-term recall. Hearns (2000) demonstrated the effectiveness of short-term recall. The only studies not providing evidence for hands-on teaching have been measuring all three variables in an older adult population. The current study intended to implement many of the changes Bird (2004) and Kluczynski (2002) suggested. The present study examined hands-on teaching method versus demonstration teaching method
using adults aged 18 to 55. This approach intended to explore the advantages of teaching methods in the general adult population before examining special sub-populations. A memory covariate in the form of the Contextual Memory Test (Toglia, 1993) was included. The test examining the memory variable was changed to a paper and pencil test. This change introduced recognition as a testing variable. Previous studies only examined recall, but by reading the steps, participants may be able to “recognize” the wording of the steps. The teaching occupation consisted of a self-care facial mask.

The current study compared hands-on versus demonstration teaching methods and their effect on immediate, short-term, and long-term recognition in the adult population. It was hypothesized that there would be a difference between the hands-on teaching method and the demonstration teaching method in terms of immediate, short-term, and long-term recognition. Although most of the studies demonstrated the advantage of hands-on learning, because Kluczynski (2002) and Bird (2004) did not have significant results, a non-directional hypothesis was proposed.

Methods

Participants

Forty adult men and women, between the ages of 18 and 55, living in the Midwest were recruited for the study. The participants were recruited through flyers, e-mails, and word of mouth. An e-mail was sent to those interested in participating in the research study. In order to be eligible for the study the participants were required to be between the ages of 18 and 55 and have no allergies to banana, egg, honey, wheat germ oil, lemon juice, or rose and vanilla perfume oils. It also required that they be able to read and see the steps for making the facial mask. This was measured by having them read a nonsense
sentence off of an index card similar to the ones being used in the study. If the participant was unable to meet any of these requirements, he or she was thanked and then excused from the research.

**Material and Instruments**

The Contextual Memory Test (Toglia, 1993) is a memory test that examines different aspects of individuals’ knowledge of their memory limitations. It uses pictures of related objects, such as items commonly found in a restaurant. After ninety seconds of viewing the pictures the participant was asked to recall from memory as many items as possible. Fifteen minutes later they again recalled as many items as they could. The use of common and meaningful items to remember is thought to correlate more highly than traditional memory tests. This test was used as a covariate.

The materials being used for the occupation included a ripe banana, honey, egg yolk, wheat germ oil, finely powdered oats, lemon juice, rose and vanilla perfume oils, a fork, towel, and a mixing bowl. Also included were index cards with the steps written on them for the participant to read aloud during the step.

After the occupation, the participant was given a paper and pencil test. The paper and pencil test included 24 randomly placed steps. There were 12 correct steps actually used in the occupation. Those steps not actually involved in the facial mask recipe were similar to the actual steps involved in the recipe. All 24 steps were placed into a bag and randomly pulled out to determine the order for the immediate test. This method was used two more times in order to have different order for the short-term and long-term tests. The test had two separate columns for answers. In the left column, participants wrote either ‘yes’ or ‘no’ based upon if they thought the step was performed or not. In the right
column participants write the chosen steps in order they thought the occupation was performed. See Appendix A for an example. One score was determined by the number of steps chosen correctly. A second score was based on the order in which they put the steps. The final score was a combination of the first two scores. This was the total memory recognition score.

Procedure

All participants were asked to sign an informed consent form prior to their participation in the study. They were randomly assigned to the hands-on or the demonstration group. The co-investigator administered both conditions of the independent variable. All participants were tested individually. For both conditions, the researcher sat across the table from the participant while over-viewing the informed consent, the reading of the nonsense sentence, and giving the Contextual Memory Test. The investigator sat across from the participants when going over the steps for the facial mask and while administering the recognition test.

After the informed consent was signed and questions were answered, the administrator asked the participants to read a nonsense sentence off of an index card. Next, they were read a list of the ingredients used in the facial mask, and asked if they had any known allergies to the ingredients. If they were unable to read from the card or were allergic to any of the ingredients, they were thanked for their participation and told that that was all the information that was needed.

Before beginning the facial mask making occupation, the Contextual Memory Test (Toglia, 1993) was administered as described in the previous section. During the intermission between the immediate recall and delayed recall, the participant performed
his or her choice of activities, reading a current magazine, talking with the co-
investigator, or playing a card game.

The investigator then began the facial mask occupation. In both conditions, the
investigator read aloud each step of the occupation, and then asked the participants to
repeat it in order to ensure that the step was understood. Participants in the
demonstration group watched the researcher perform the steps of the facial mask
occupation. Participants in the hands-on group performed the steps along with the
researcher.

At the beginning, participants in the hands-on group were read the following script:

“Today, I am going to read to you the steps required to make a facial
mask. After I read a step of the process, I want you to repeat it back to me in
order to make sure you understood what I said. Remember each step exactly as it
is written on the index card. Then I will demonstrate each step for you and ask
you to perform the step as well. After we have read and performed all of the
steps, I am going to have you answer questions on a piece of paper. Once the
testing has begun I will be unable to answer any of your questions. Do you have
any questions?”

Participants in the demonstration group were read the following script:

“Today, I am going to read to you the steps required to make a
facial mask. After I read a step of the process, I want you to repeat it back
to me in order to make sure that you understood what I said. Remember
each step exactly as it is written on the index card. Then I will
demonstrate each step for you. After I have gone through and performed
all of the steps, I am going to have you answer some questions on a piece
of paper. Once the testing has begun I will be unable to answer any of
your questions. Do you have any questions?”
If the participants had any questions, the researcher answered by repeating the steps of the occupation until the participants had a clear understanding of the instructions. The occupation began after questions had been answered. The steps for both groups were as follows:

1. Peel the banana.
2. Add banana to bowl.
3. Mash the banana with a fork.
4. Add 1 tablespoon of honey.
5. Separate the egg yolk from the egg white.
6. Add the egg yolk.
7. Stir in with the fork.
8. Add 1 teaspoon of wheat germ oil.
9. Add 1 tablespoon of the powdered oats.
10. Add 1 teaspoon of lemon juice.
11. Add 2 drops of each rose and vanilla perfume oils.
12. Mix well.

As in the steps above, the participants in the demonstration group were read the step and then asked to repeat it. Afterward, they watched the investigator perform the step. Participants in the hands-on group did the same, but they performed the steps as well.

Following completion of the facial mask all materials and index cards were moved out of view. The participants in both groups were then given the immediate paper and pencil test form. Both groups were read the following script:
“Please pick the steps which you feel were performed out of this list of 24. In the first blank please write ‘yes’ if you feel it is a step that was performed and ‘no’ if you feel it is not a step that was performed. In the second blank please place the steps that you have written ‘yes’ for in the order in which they were presented to you. Remember you are supposed to pick out the exact wording of the steps that were used to make the facial mask. Please let me know when you are finished. Good Luck!”

When finished, the participants were invited to apply the facial mask for 10 minutes and to read a magazine or play a card game. After 10 minutes, the participants were asked to wash off the facial mask and dry their face. Ten to 15 minutes past the occupation, the participants were handed the same test, only with the 24 “steps” in a different order. The same script as mentioned was read again. When finished, the participant was thanked for their participation and reminded to return the following day for the last portion of the test. When the participants arrived the next day, the same script that was read before the previous tests was repeated and they were given the long-term test. After the test they were thanked for their participation.

Scoring

The participants were scored on three different levels. First, they were scored on whether or not they chose the correct 12 steps involved in the facial mask occupation. The participants were given a point for each correct step chosen. Second, they were scored on order. If the participants put the correct number in front of the step, they were given a point. Otherwise, no point was given. For example, if they chose the correct 12 steps, but put two of them in the wrong order, they were given 10 out of 12. Finally their
scores were added together. This gave the participant a final memory recognition score. A perfect score was 24.

**Results**

Data analysis was based on the results of 40 adults for immediate, short-term, and long-term recognition. The mean age of the sample was 26.67 (SD = 7.89). Statistics from both groups showed that the Contextual Memory Test or CMT score was 30.35 out of a possible 40 (SD = 5.32). The demonstration group had five males and 15 females. The hands-on group had two males and 18 females.

*Interrater Reliability*

Interrater reliability was tested and an Interclass Correlation Coefficient (ICC) for the immediate, short-term, and long-term test variables was calculated. The ICC for the immediate test was 0.76, for the short-term test was 0.98, and for the long-term test 0.99. The scoring completed by the primary investigator was compared to an unbiased research assistant who was not connected to the research study otherwise. The research assistant was trained to score the tests by the written instructions provided in this paper and instruction given by the co-investigator.

*Hypothesis Testing*

The hypothesis for this study stated that there would be a difference between the hands-on teaching method and the demonstration teaching method in terms of immediate, short-term, and long-term recognition in terms of the total memory score. The maximum possible score for all three tests was a 24 and the minimum possible score for the three tests was a zero. A score of 24 indicate that all twelve of the correct steps were chosen and were placed in the correct number order. A score of zero meant that none of the
correct steps were chosen or placed in the correct order. An alpha level of 0.05 was used for all statistical tests.

For the immediate test, participants in the hands-on group had a mean immediate memory score of 20.85 ($SD = 2.94$) while participants in the demonstration group had a mean immediate memory score of 20.65 ($SD = 2.27$). For the short-term test, participants in the hands-on group had a mean short-term memory score of 20.65 ($SD = 3.13$), while participants in the demonstration group had a short-term mean score of 20.60 ($SD = 2.23$). And, finally, for the long-term test, participants in the hands-on group had a mean long-term memory score of 20.35 ($SD = 3.54$) while the participants in the demonstration group had a long-term mean score of 20.40 ($SD = 2.03$). A MANCOVA was performed to compare the hands-on and demonstration groups to the three test conditions. The results are not significant. ($F = 0.25; p > 0.05$)

Discussion

The purpose of this study was to compare hands-on versus demonstration teaching methods and their effect on immediate, short-term, and long-term recognition in the adult population. Results of this study show that there was not a difference between the hands-on and demonstration conditions in terms of these three variables. This would imply that between the teaching methods used, active participation of the occupation (as in the hands-on condition) or passive participation of the occupation (as in the demonstration condition) did not make a difference in the recollection of the order or steps on a paper and pencil test with the forty participants. This study was a modification of the studies completed by Kluczynki (2002) and Bird (2004), both of which used a population of older adults. The current study used a middle-aged population (18 to 55
years old). These are studies in which significant differences were not found between the hands-on and demonstration conditions.

The results of this study run counter to the results of several previous occupational therapy studies on hands-on and demonstration teaching methods, including Warner (1989), Buddelmeyer (1995), Hartman et al. (2000), Hearns (2000) and Eakman and Nelson (2001). The results of these previous studies supported the results of the hands-on teaching method. Using a task-related quiz, Warner (1989) found significant results in elderly females with cognitive deficits during an ice cream making occupation. Buddelmeyer (1995) found that children with learning disabilities participating in a play-doh making occupation remembered more steps than children in a demonstration group. In 2000, Hartman, Kopp Miller, and Nelson examined children learning how to make a volcano, placing them in either the hands-on or demonstration conditions. Again, children placed in the hands-on condition recalled more steps than children in the demonstration condition. Hearns (2000) examined immediate, long, and short-term memory in terms of hand-on versus demonstration in college students. Significant results in favor of hands-on learning were reported. Eakman and Nelson (2001) also reported significant results in favor of hands-on research in 30 males with closed head injuries. A similarity between the studies which reported significant results is that the populations of the studies had a narrow age-range (third graders) or focused on a specific special needs population.

This study is not the first to report non-significant results between the hands-on and demonstration groups. Messina (1999) and Hearns (2000) also reported mixed results in their research. In 1999, in a population of adults with mental disorders,
Messina reported significant results in final recall, but not immediate recall. Similarly, Hearns (2000) found a significant difference between the hands-on and the verbal demonstration group in long-term recall, but did not find significant results between the condition in immediate and short-term recall. Kluczynski (2002) and Bird (2004) examined hands-on versus demonstration teaching methods in older adults and did not find a significant difference in terms or immediate, short-term or long-term recall. A similarity between the two studies which reported non-significant results is that both focused on a population defined by age-range, not a specific group. Perhaps focusing exclusively on a broad age group is not enough information about a population to understand which teaching method is the most effective.

The current study follows two studies that similarly did not find significant results among adults. The average scores for the immediate, short-term, and long-term tests for the current study were relatively high, each about 20/24 correct or 83%. For the immediate test results, the hands-on group had slightly higher immediate memory scores than did those in the demonstration group, but these results were not significant. For the short-term condition, again, participants in the hands-on group had a slightly higher recognition of the steps involved in the occupation, but it was not shown to be of significance. For the long-term condition, participants in the demonstration group recognized more steps in the correct order, but again, the results were not significant. Scores tended to decrease in both the amount of steps recognized and the numerical order of steps from immediate to short-term, to long-term recall.

This occupation was intended to be meaningful and purposeful to the participants. Making a cosmetic facial mask was hypothesized to be meaningful due to the social
importance of clean, healthy-looking skin. Perhaps due to the relatively high scores achieved by most of the participants, the occupation was meaningful. Regardless of which group a participant was assigned, the occupation may have been motivating enough to learn. An occupation that has more meaning or relevance to participant’s lives could affect how well that occupation is learned.

An occupational therapist may incorporate a combination of teaching methods when instructing a patient on new skills. These teaching methods could be in the forms of hand-outs, verbal instructions, demonstration, and hands-on learning. Occupational therapists frequently teach clients new skills through the use of the hands-on teaching method. For example, clients who have undergone surgery for the replacement of a hip often need to be shown how to safely put on a sock using a sock aid, while adhering to their range of motion precautions. An occupational therapist will usually demonstrate this equipment, with explanation, and then have the client repeat this as independently as they are able. This method of showing the client a skill, then having them physically repeat it could improve this line of research. With that said, evidence-based research determining effective teaching methods should be pursued for occupational therapists to better understand which teaching methods are effective. As of now, no one method has been demonstrated to be universally effective for teaching participants in the 18 to 55 year old age range, a novel occupation.

Implications for occupational therapy

Although the hypothesis was not supported, there are several important implications for the field of occupational therapy. One implication is that teaching methods may not be as important when presenting new information to a healthy adult
Hands-on teaching methods may be more effectively seen in children, as seen in the studies by Buddelmeyer (1995) and Hartman, Kopp Miller, and Nelson (1999) or special populations, as seen in Eakman and Nelson (2001) and Messina (1999). Children and special populations have identifiable learning characteristics which a researcher studying teaching methods can tailor to meet that populations needs. For example, children tend to like visually stimulating occupations, as seen in the volcano-making occupation of Hartman, Kopp Miller, and Nelson (1999). Special populations, like people with brain injuries, have learning requirements that are specific only to them.

For each step of the occupation both the hands-on and the demonstration groups heard the instructions from the co-investigator, and then read the instructions aloud from a card. Participants from both groups at minimum were provided with auditory input from the investigator, the visual instructions on the card, the auditory input from themselves, and finally demonstration of the instruction from the co-investigator. Both groups had scores that were close (about 20 for the immediate, short-term and long-term tests), and relatively high (20/24). An implication for occupational therapists because of this is that the auditory and visual components of the study may have provided the necessary input for the participants to learn the facial mask making occupation.

For the current study, 34 of the 40 participants were below the age of 30. The results of this study primarily reflect those of younger adults. There are unique implications for occupational therapists treating young adults. Young adults have more recently gone through school than older adults, either high school or college. They are more likely to be accustomed to being tested in a quiz-like format and may be more motivated by it. Test-taking may be inherently motivating for younger adults, that scores
are improved regardless of the teaching method. Since the mean participant’s score was relatively high (approximately 20), test-taking may have been inherently meaningful enough to improve test-scores. For occupational therapists treating adults, an effective method for ensuring that a home exercise program or treatment program is understood may be administering a quiz which tests the clients on essential information.

Limitations

There are several possible limiting factors that could have been involved with this study. First, there is a possibility that a Type II error occurred. A Type II error occurs when significant results actually occur, but go undetected. This can be caused by a small sample size and/or a large variance within the group. The sample size for this study was small, with 40 participants. Another limiting factor could be the small geographical area represented in the study. All participants were recruited from northwestern Ohio or southeastern Michigan. This geographical area limits the study from being representative of all adults. Another limiting factor is that the co-investigator administered both conditions of the independent variable. Although the co-investigator intended to remain unbiased during the administration of the occupation, there could have been times when additional help was unknowingly offered to some participants. And finally, a limitation could have been from the paper-pencil test. A paper and pencil test does not directly examine whether memory is improved during an actual occupation. Physically repeating an occupation independently is ultimately one of the goals of occupational therapy treatment. Scores for the paper and pencil tests were high, indicating the possibility that the test was too easy. Perhaps the scores were high because participants actually learned how to make the facial mask, or perhaps they ‘remembered’ reading the steps. To verify
that a memory is improved through hands-on learning, a hands-on test would be the most accurate way to test the results. Therefore, it is suggested the test be changed from a paper-pencil test to a hands-on demonstration of the learned occupation.

Future Studies

There are several avenues to approach further research in hands-on versus demonstration teaching research. One option is to explore teaching methods in a more focused group of healthy adults. Previous research has demonstrated the superiority of hands-on learning has included more focused populations, including children in Buddelmeyer (1995), and Hartman, Kopp Miller, and Nelson (1999) or special populations, as seen in Eakman and Nelson (2001), and Messina (1999). A more specific population with similarly identifiable characteristics, other than age-range, could be taught more meaningful occupations. Perhaps teaching occupational therapy students how to construct adaptive equipment, retail workers safe body mechanics for a lifting task, or interested individuals to learn how to knit for the first time would be an effective and relevant teaching method for use in hands-on versus demonstration research.

Future research should also include more demographic information from the population and increase the number of participants. These variables would give additional information that would be useful to examine to determine which teaching methods are the most effective. These variables could include income level, highest education level attained, race, family educational level, occupation, and learning style preference. For example, perhaps students or those who are college graduates learn better through demonstration because that is how many college courses are organized. Having additional variables to examine will give the research more information that
could be important to learning. By increasing the number of participants a Type II error could be avoided and these demographics could be more accurately analyzed.

A final recommendation for future research is to change the test to visually examine hands-on learning. Since hands-on ‘doing’ is the most accurate method for assessing whether an occupation has been remembered, watching how a participant performs a novel occupation would be the best way to examine whether learning has taken place. With this study, it would be beneficial to examine whether the participants would perform as well actually making the cosmetic facial mask as they did with the paper-pencil test. To carry out this hands-on method of assessing learning, the co-investigator would have to be visually astute in recognizing which steps were being performed by the participants, in which order, and how the ingredients were being measured.

Conclusion

The current study did not show a significant difference between hands-on and demonstration teaching methods in an adult population in terms of immediate, short-term, or long-term recognition. A better understanding of teaching methods is important for the profession of occupational therapy in order to effectively educate the populations that we serve. Further research, implementing the suggested changes, should be pursued in order to solidify occupational therapy’s understanding of effective teaching methods.
References


APPENDIX A
PAPER AND PENCIL TEST
Immediate Recognition Test

Subject # ______
CMT Score _______
Group ______
Age ______
Gender ______

Write ‘yes’ in the first column if you feel that the step was performed and ‘no’ if you feel it was not performed during the facial mask occupation. Remember, you want the exact wording of the step. When finished with this, please list the steps you chose in the correct order.

<table>
<thead>
<tr>
<th>Step</th>
<th>YES or NO</th>
<th>Step #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add 1 teaspoon of wheat germ oil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 1 tablespoon of oatmeal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stir in with the fork</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 1 tablespoon of wheat germ oil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 1 tablespoon of the lemon juice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add the banana to the bowl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gently fork the banana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add one tablespoon of honey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mix well</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separate the egg yolk from the egg white</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add one drop of the rose and vanilla oils</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add ½ teaspoon of lemon juice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 1 tablespoon of the powdered oats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 2 drops of the rose and vanilla oils</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add a spoonful of honey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 1 teaspoon of olive oil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mash the banana with a fork</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add ½ tablespoon of the powdered oats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add the egg yolk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peel the banana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 1 teaspoon of the powdered oats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 1 teaspoon of the lemon juice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add the whole egg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whip all together</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>