Hands-On Purposeful Activity and Short-Term Memory Retention in Elderly Patients with Cognitive Deficits

Desiree Arah Varner
HANDS-ON PURPOSEFUL ACTIVITY AND SHORT-TERM MEMORY RETENTION IN ELDERLY PATIENTS WITH COGNITIVE DEFICITS

by
Desiree Arah Warner

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the requirements for the
Degree of Master of Science
Department of Occupational Therapy

Western Michigan University
Kalamazoo, Michigan
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This study compared the effects of hands-on purposeful doing with demonstration (HO) versus a demonstration-only (DO) activity in terms of the level of memory retention in elderly females. Twenty-nine females with a mean age of 81.8 years (SD = 11.6) and with moderate cognitive deficits as determined by a score of 3-8 on the Mental Status Questionnaire (Kahn, Goldfarb, & Pollack, 1960) were selected from an extended care nursing facility. Fifteen randomly assigned subjects (in three sub-groups of five) had approximately one hour of demonstration and hands-on involvement with ice cream making. Fourteen randomly assigned subjects in sub-groups of four or five received demonstration only of ice cream making. The level of memory retention was measured using a task-related quiz developed by the researcher. This quiz was administered by an assistant unaware of group assignment. A t-test indicated a significant difference in favor of the HO group.
ACKNOWLEDGEMENTS

I would like to dedicate this thesis to my mother, Edith, whose financial, emotional, and spiritual support made this achievement possible.

To my thesis advisor, Dr. David Nelson, thanks go for his guidance, constructive feedback, and patience.

Also, I thank my second and third readers, Doris Smith and Clare Callan for their invaluable input and assistance.

I would also like to express deep appreciation to Orchard Grove Extended Care, Benton Harbor, MI and Lee, who allowed me the use of their facility for subject selection and their assistance while I was there.

Desiree Arah Warner
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Hands-on purposeful activity and short-term memory retention in elderly patients with cognitive deficits

Warner, Désirée Arah, M.S.
Western Michigan University, 1989

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1. Summary of Subjects' Ages, MSQ, and Memory Retention Quiz Scores ................. 11
The term "purposeful activity" has been called one of the unifying concepts of occupational therapy (Mosey, 1981, p. 99). Although the concept of purposeful activity is a philosophical assumption of occupational therapy, (Pedretti, 1985, p. 6), there now appears to be a diversity in the definitions of the term. According to Lyons (1983), this "definitional dilemma" appeared as the profession began to expand into various treatment areas. King (1978), and English, Kasch, Silverman, and Walker (1982) considered purposeful activity to include crafts, games, or activities of daily living. In contrast, Swift (1981), Gleave (1980), and Hagele (1980) defined purposeful activity by identifying what it excluded—exercise—rather than what it included. In 1983, in an attempt to narrow the philosophical base of purposeful activity, the American Occupational Therapy Association issued a description of purposeful activity as:

Tasks or experiences in which the person actively participates. Engaging in purposeful activity requires and elicits coordination between one's physical, emotional, and cognitive systems. An individual who is involved in purposeful activity directs attention to the task itself, rather than to the internal process required for achievement of the task....Purposeful activities, influenced by the individual's life roles, have unique meaning to each person. (p. 805)
REVIEW OF LITERATURE

Mosey (1981) defined purposeful activities as "doing processes directed toward a planned or hypothesized end result" (p. 99). In contrast to Mosey's concept of purposeful activity as active participation, passive activity may be defined as an activity in which the individual has little effect on the environment. Thus, learning through personal involvement can be characterized as active, whereas learning through demonstration only is characterized as passive. Zgola (1987) hypothesized that each person has an "inherent need" to do things in order to define oneself as an individual and to exert control over his/her environment.

Fidler and Fidler (1987) saw purposeful doing as the "process of investigating, trying out, and gaining evidence of one's capacities for experiencing, responding, managing, creating, and controlling". Purposeful doing leads to mastery and competency in one's environment, while a reduction in doing generates pathology (p. 307).

The ideas discussed above illustrate the occupational therapy idea that learning is enhanced and
facilitated through purposeful doing and interaction with the environment. This present study was concerned with the comparison of a demonstrated passive activity and a comparable hands-on purposeful activity in elderly patients with cognitive deficits. There is a lack of research in this area despite its theoretical significance. There have been no occupational therapy studies that have compared passive learning through demonstration versus learning through hands-on doing.

According to Zgola (1987), persons with cognitive deficits as seen in dementia appear to suffer most from loss of immediate recall and recent memory, in contrast to remote memory loss. Loss of immediate recall involves an inability to remember events occurring just seconds in the past. In recent memory loss, events occurring within a matter of minutes are lost; in remote memory loss, events from the past (days, weeks, months, and years) are lost. Zgola further stated that subjects who were exposed to information through three sensory systems—visual (demonstration), auditory (verbal instructions), and tactile (hands-on)—show a higher rate in the acquisition of new skills and memory retention than subjects exposed to the same information through the visual and auditory systems only. Tasks which are presented verbally and reinforced by actions and visual
cues are more apt to be learned and retained for longer periods.

An activity that is purposeful activates an individual to make an impact on the environment, that is, to exert control. As a result, as competence develops, the desire for learning is enhanced. For a task to be purposeful to an individual, it must have relevance, be voluntary, and offer a reasonable level of success. A task which involves purposeful doing motivates the individual not only to be receptive to the task, but also to retain skill in the components of the task for longer periods of time.

Tarlat et al. (1985), described clinical practice using functional (purposeful) activities as well as reality orientation and repetition in patients with cognitive dysfunctions. These authors believed that reality orientation and task repetition had limited success, while functional (purposeful) activities had a higher rate of success. The authors suggested that functional (purposeful) activities could be beneficial for therapeutic and rehabilitative programs.

The present study compared the effects of a hands-on purposeful doing with demonstration (HO) versus a demonstration-only activity (DO) in terms of the level of memory retention in subjects with cognitive dysfunctions.
deficits. The activity--making ice cream--involved a familiar food, but it was an activity with which the subjects had little prior experience. The HO group received demonstration and hands-on instruction, while the DO group had demonstration only. After the activity, the memory retention of each subject was assessed through a short interview consisting of task-related questions (see Appendix B). It was hypothesized that those engaged in the HO group would receive a significantly higher score on the task-related quiz than those engaged in the DO group.
METHOD

Subjects

Twenty-nine elderly females ranging in ages from 55 to 101 with a mean age of 81.8 years, SD=11.6, served as voluntary participants. All participants were extended care facility patients with moderate mental impairment, as determined by the Mental Status Questionnaire (MSQ) (Kahn, Goldfarb, & Pollack, 1960).

The Mental Status Questionnaire (MSQ), developed by Kahn, Goldfarb, and Pollack in 1960, was used in this study as a measurement of mental impairment in elderly patients with cognitive deficits. The MSQ was administered verbally, and a concrete response was required to each of the 10 questions (see Appendix A) which were valued at one point each. Each subject was tested independently and verbally prior to the experimental procedure by the investigator. The subject's responses were also given verbally, and they were allowed as much time as needed to respond. A score of 0-2 showed no mental impairment, 3-8 demonstrated moderate impairment, while a score of 9-10 demonstrated severe impairment. Those subjects demonstrating moderate impairment by obtaining a score in a range of
3-8 on the MSQ were eligible for the study. The mean MSQ score of the sample was 4.1 points, with SD=1.1

Instrumentation

A short task-related, memory retention quiz developed by the researcher served as the dependent variable. There were seven questions with a total range of scores from 0 to 14. The questions were based on information that could be learned through the activity in either condition, rather than common knowledge. Subjects in a pilot study similar to those in this study understood the questions. Each word used in the questions was exactly the same in both conditions of the independent variable. Questions, correct answers, and possible points are reproduced in Appendix B.

An interviewer blind to each subject’s assignment administered the task-related quiz to each subject at the conclusion of the activity. Each subject was taken to a pre-designated enclosed area and the quiz was administered. Each subject’s answers were recorded on separate photocopies of the task-related questionnaire.

Procedure

Prior to administering the MSQ, each potential
subject was asked: (a) "Have you ever made ice cream?" (b) If so, "How often?" (c) If so, "With this type of ice cream maker?" If an individual had made ice cream with this type of ice cream maker, the plan was to exclude her. However, since none of the subjects had experience with an electric ice cream maker, they were all included in the study.

After the MSQ was administered and the subject met the criteria, each subject was randomly assigned to either an experimental group that was involved in the HO activity or to a control group that observed the demonstrated activity. The HO group was comprised of 15 members, divided into three groups of five; while the DO group had 14 members and was divided into two groups of five and one group of four. Each subject was randomly assigned to a role order for measuring, mixing, or stirring. Materials were set up in an assembly-line manner, and the task was performed at the tabletop level.

Each sub-group participated in the study for approximately one hour. The HO group performed the hands-on activity (making ice cream) along with demonstration from the group leader, whereas the DO group observed as the group leader demonstrated the
activity. The principal investigator of this study acted as the leader for both the experimental and the control groups.

The goals and subjects' roles were described and defined in short concise sentences at the initiation of each condition. At this time the subjects were encouraged to ask questions of the investigator. Since none of the subjects asked any questions it was assumed that they understood the instructions. The subjects were seated at a table in a semi-circle facing the investigator. It took approximately ten minutes to explain the goals of the activity.

In each HO sub-group, subjects were told that the researcher was interested in teaching women over 55 years of age to make ice cream. The stated purpose was to teach them a new task and to make ice cream for themselves and their friends. They were told that, after the task was completed, they would be asked a few questions about the activity. They were given the following instructions: "Today we're going to make ice cream. Listen to all the instructions first. I will show you the ingredients and equipment needed to make ice cream and give you a chance to measure, mix, and stir the ingredients. I will be here at all times to help you." The subjects were then given verbal
instructions, a demonstration, and an opportunity to participate in the activity. Each subject had an opportunity to participate in the measuring, mixing, and stirring of the ingredients and the setup of the ice cream maker. The only part of the activity not done by all was the measuring of the salt because only one-quarter teaspoon was required by the recipe. Appendix C gives the protocol's details.

The DO sub-group subjects were given verbal instructions along with demonstration by the group leader. Subjects in the DO group were told that the researcher was interested in teaching women over the age of 55 to make ice cream. The stated purpose was to teach them a new task and to make ice cream for them and a few of their friends. They were told that, after the task was completed, they would be asked a few questions about the activity. The instructions were: "Today I am going to make ice cream. I will demonstrate while you watch. I will show you all of the ingredients, then I will mix, measure, mix, and stir them. You should watch me at all times so as not to miss any part of the activity." Protocol for the DO group is in Appendix C. The experimenter in the DO group did the same hands-on task as the subjects in the HO group.
RESULTS

There was no evidence of skewed or abnormally distributed data. A t test was used to compare the groups' scores. Table 1 provides a summary of the ages, MSQ scores, and quiz scores for both conditions of the

Table 1

Summary of Subjects' Ages, MSQ scores, and Memory Retention Quiz scores

<table>
<thead>
<tr>
<th></th>
<th>Hands-on (HO) group n=15</th>
<th>Demonstration (DO) group n=14</th>
<th>t</th>
<th>p</th>
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<tbody>
<tr>
<td>AGE</td>
<td>Mean 79.3</td>
<td>84.6</td>
<td>-1.24</td>
<td>.22</td>
</tr>
<tr>
<td></td>
<td>SD 13.6</td>
<td>8.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSQ</td>
<td>Mean 4.1</td>
<td>4.1</td>
<td>-.02</td>
<td>.98</td>
</tr>
<tr>
<td></td>
<td>SD 1.2</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QUIZ</td>
<td>Mean 6.7</td>
<td>3.1</td>
<td>4.41</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>SD 2.2</td>
<td>2.1</td>
<td></td>
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Results supported the hypothesis that subjects who engaged in the hands-on purposeful activity (HO) had a higher level of memory retention than subjects who engaged in the demonstration-only (DO) activity. More than twice as many questions were answered correctly by the HO group than the DO group. There was no evidence that any particular subject's performance depended on sub-group membership. This was confirmed by an analysis of variance on the sub-groups within each group.
DISCUSSION

Occupational therapy was founded on the premise that activity is vital and necessary for the maintenance and restoration of health. "By engaging in relevant, meaningful, and purposeful activity an individual is able to effect changes in behavior and performance from dysfunctional toward more functional patterns" (Pedretti, 1985 p. 113). In other words, an individual who is mentally and physically involved with a task is actually altering his/her dysfunctional state.

Although it is an occupational therapy theoretical assumption that purposeful involvement facilitates learning and mastery of one's environment, there are no previous occupational therapy research studies which have compared hands-on purposeful doing and demonstration versus demonstration only. This study's results support Mosey's (1981) belief that when abstract situations do "not lead to some type of action, critical opportunities for learning are lost" (p.105).

Mosey further stated that the information, abilities, and attitudes that are obtained through "purposeful interaction" with one's surroundings are at the center of the practice of occupational therapy.
This basic assumption is a base for occupational therapy intervention and treatment for individuals of all ages and levels of dysfunction.

The findings of this study have important implications for the occupational therapy profession. It demonstrated that through use of hands-on purposeful tasks, skills can be learned more effectively than when the individual has no active involvement in the activity. It should be noted that this study was done with only one task, one level of memory retention, and one sample of the population. However, clinicians should consider the importance of hands-on involvement to increase memory across a wide range of skills in the elderly. Ayres (1985) stated that without physically interacting with one's environment, learning is very difficult. Ayres further stated that doing an activity rather than discussing or thinking about the activity is the optimal way in which to improve motor and sensory functioning. For example, the HO group probably had a higher score due to the fact that they received not only visual and auditory input from observing the task and listening to the experimenter, but also tactile input from the utensils and ingredients as well as proprioceptive input from the movement involved in the doing. On the other hand, the DO group only received
audio and visual input. In fact, they may have been
daydreaming or otherwise not alert.

Future studies may include a larger sample,
smaller-sized groups in each condition (2 or 3
subjects), or less variance in terms of age. First, a
larger sample could be selected from a variety of
settings such as a retirement community, a long term
unit in a hospital, or other skilled care facilities.
In selecting smaller sized sub-groups, each subject in
the HO group would have more time involvement for
measuring, mixing, and stirring. Finally, by selecting
subjects with similar age ranges, one could hypothesize
whether the age of a subject influenced his/her
performance.

A possible limitation to this study is the
instrumentation used to test the dependent variable.
The task-related quiz administered after the activity
was a non-standardized test instrument developed by the
researcher for this study. However, the quiz was
developed specifically for this task, and answers were
based on subjects' direct exposure during the activity.
CONCLUSION

This is the first occupational therapy study to compare the effects of subject performance with a hands-on and demonstrated activity versus a demonstrated-only activity. This study supports the occupational therapy belief of the importance of activity, and the advantage of active doing in comparison to passive instruction.
Appendix A

Mental Status Questionnaire
MENTAL STATUS QUESTIONNAIRE (MSQ)
(Kahn, Goldfarb, & Pollack, 1960)

To be completed by group leader*

*Subject’s I.D. # __________ Date ________

Race: 1. White
2. Black
3. Other

*Years of education: ________ 1. Grade School
2. High School
3. Past High School

1. Where are we now? (Name of place) __________
2. Where is this place (Correct city) __________
3. What is today’s date? (Day) __________
4. What month is it? __________
5. How old are you? __________
6. What year is it? __________
7. What is your birthday? (Month) __________
8. What year were you born? __________
9. Who is the president of the United States? __________
10. Who was the president before him? __________

Scores: 0-2 errors CBS absent
3-8 errors CBS moderate
9-10 errors CBS severe

*These demographic questions asked by the researcher were added to the MSQ and were not scored.
Appendix B

Task-Related Quiz
TASK-RELATED INTERVIEW QUESTIONS

1. What are the ingredients in the recipe? Sugar (1), flour (1), salt (1), half & half (1—an answer of milk and/or cream would be acceptable), eggs (1), vanilla extract. (1)

2. When do you know the ice cream custard is ready to be taken off of the stove? When the custard coats the spoon. (1)

3. Should the ice cream custard be cooked over low, medium, or high flame? (1)

4. For safety what should you always use when stirring the custard on the stove? A long-handled spoon (1) and a pot holder/mitt. (1)

5. What two things must go in the outer rim of the ice cream maker before you turn the maker on? Crushed ice (1), and salt. (1)

6. When do you know that the ice cream is made and ready to be taken out? When the ice cream maker motor makes a low-sounding hum/noise. (1)

7. For safety what is the first thing to do when the ice cream is ready? Unplug the ice cream maker. (1)
Appendix C

Protocols for HO & DO groups
"Today I’m going to teach you to make ice cream. Listen to all of the instructions first. I will show the ingredients needed to make ice cream and give you a chance to measure, mix, and stir the ingredients. I will be here at all times to help you."

"Here is the sugar, flour, salt, half & half, egg, and vanilla extract." (Leader points to each object).

"Pick up the yellow measuring cup and fill it with sugar. Now put it into this pot." (Demonstrate)

"Pick up the measuring spoon." (Demonstrate) "Fill it with flour, use this handle and even the top." (Demonstrate) "Fill it again."

"Pick up the small measuring spoon. Fill it with salt like this." (Demonstrate) "Now you do it."

"Pour two cups of half & half into the white measuring cup."

"Turn on the stove to medium, put the pot on the stove. Now pour in the half & half. Stir it with a spoon." (Demonstrate) "Now you do it."

"So far all the ingredients are salt, flour, sugar, and half & half."

"Keep stirring it until it thickens, or coats the spoon. Remember to always use a pot holder/mitt when holding a hot pot or spoon."

(When it thickens, have subject set a timer to two minutes).

"Set the timer to two minutes and stir until the timer rings. Hold the pot handles with the pot holder and pour a little of the custard into this bowl." (Demonstrate)

"Crack this egg into the bowl." (Demonstrate) "Stir. Finished? Now pour it back into the pot. Put the pot back on the fire and mix it all in."

"Now turn the stove off. O.K. now add the rest of the half & half. Add the vanilla extract." (Demonstrate)
"Remember the ingredients are flour, sugar, salt, eggs, vanilla, and half & half. I'll pour the custard in this bowl and cover it. Always use a pot holder for safety. Now put it in the freezer. Set the timer to ten minutes."

"Let's set up the ice cream maker. First we put ice on the bottom, then salt, then ice, then more salt." (Demonstrate)

(While waiting for the timer to go off, repeat these general rules).

"Remember these rules:

1. The ingredients are flour, sugar, salt, eggs, vanilla, and half & half.

2. Cook the custard over a medium flame." (pause)

3. "Always use a pot holder and a long handle spoon to prevent burns." (pause)

4. "The custard is ready when it thickens or coats the spoon." (pause)

5. "And you always put a layer of crushed ice on the bottom of the ice cream maker and then a layer of salt on top of the ice. You keep doing that until you reach the top.

6. You know the ice cream is ready when the motor (this) makes a lower-sounding hum.

7. Always unplug the ice cream maker first as soon as the ice cream is ready." (Timer should have gone off by now)

"Take the custard out of the freezer and pour it into the ice cream can, close it like this." (Demonstrate)
"Now dry your hands. Finished? Now plug the cord into the socket like this."

"When the machine is turned on it will make a loud noise/hum like this. But when the ice cream is ready the noise/hum will get softer like this."
"After we turn the machine on I will ask you a few questions about what you just saw and heard. Now turn the ice cream maker on like this."

(Each interviewer will then take a subject to a predesignated area and administer the task-related quiz)
"Today I'm going to teach you to make ice cream. I will demonstrate while you watch. I will show you all of the ingredients, then I will measure, mix, and stir them. You should watch me at all times so as not to miss any part of the activity."

"Then"

"Here is the sugar, flour, salt, half & half, egg, and vanilla extract." (Leader points to each object).

"Pick up the yellow measuring cup and fill it with sugar. Now put it into this pot." (Demonstrate) "Pick up the measuring spoon." (Demonstrate) "Fill it with flour, use this handle and even the top." (Demonstrate) "Fill it again."

"Pick up the small measuring spoon. Fill it with salt like this." (Demonstrate) "Now you do it."

"Pour two cups of half & half into the white measuring cup."

"Turn on the stove to medium, put the pot on the stove. Now pour in the half & half. Stir it with a spoon." (Demonstrate) "Now you do it."

"So far all the ingredients are salt, flour, sugar, and half & half."

"Keep stirring it until it thickens, or coats the spoon. Remember to always use a pot holder/mitt when holding a hot pot or spoon."

(When it thickens, have subject set a timer to two minutes).

"Set the timer to two minutes and stir until the timer rings. Hold the pot handles with the pot holder and pour a little of the custard into this bowl." (Demonstrate)

"Crack this egg into the bowl." (Demonstrate) "Stir. Finished? Now pour in back into the pot. Put the pot back on the fire and mix it all in."

"Now turn the stove off. O.K. now add the rest of the half & half. Add the vanilla extract." (Demonstrate)
"Remember the ingredients are flour, sugar, salt, eggs, vanilla, and half & half. I'll pour the custard in this bowl and cover it. Always use a pot holder for safety. Now put it in the freezer. Set the timer to ten minutes."

"Let's set up the ice cream maker. First we put ice on the bottom, then salt, then ice, then more salt." (Demonstrate)

(While waiting for the timer to go off, repeat these general rules).

"Remember these rules:

1. The ingredients are flour, sugar, salt, eggs, vanilla, and half & half.

2. Cook the custard over a medium flame." (pause)

3. "Always use a pot holder and a long handle spoon to prevent burns." (pause)

4. "The custard is ready when it thickens or coats the spoon." (pause)

5. "And you always put a layer of crushed ice on the bottom of the ice cream maker and then a layer of salt on top of the ice. You keep doing that until you reach the top.

6. You know the ice cream is ready when the motor (this) makes a lower sounding-hum.

7. Always unplug the ice cream maker first as soon as the ice cream is ready." (Timer should have gone off by now)

"Take the custard out of the freezer and pour it into the ice cream can, close it like this." (Demonstrate) "Now dry your hands. Finished? Now plug the cord into the socket like this."

"When the machine is turned on it will make a loud noise/hum like this. But when the ice cream is ready the noise/hum will get softer like this."
"After we turn the machine on I will ask you a few questions about what you just saw and heard. Now turn the ice cream maker on like this."

(Each interviewer will then take a subject to a predesignated area and administer the task-related quiz)
Appendix D

Subject Consent Form
Dear Subject:

I am a graduate student in occupational therapy at Western Michigan University. I will be doing a study at several nursing homes in order to better understand how different tasks affect the memory of the elderly. Subjects in this study will be divided into two groups. All subjects will be making ice cream, which should take no longer than one hour to do. After, I will ask you a few questions about ice cream making. I will be present at all times.

Your name will not be used for any reason. There are no special risks and you may stop at any time.

If you have any questions please call me at 1-473-2650 or my research advisor, Dr. David Nelson, at 387-3850.

Thank you,

Sincerely,

Desiree A. Warner, OTR

A. I consent to be a subject in this study.

_________________________   __________________________
Signature                  Date

B. I consent for ______________________ to be a subject in this study.

_________________________   __________________________
Signature                  Date

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Appendix E

Human Subjects Institutional Review Board

Research Protocol
TO: Desiree A. Warner
FROM: Ellen Page-Robin, Chair
RE: Research Protocol
DATE: February 16, 1989

This letter will serve as confirmation that your research protocol, "Hands-On Purposeful Activity and Short-Term Memory Retention in Patients With Dementia" is now complete and has been signed off by the HSIRB.

If you have any further questions, please contact me at 387-2647.
BIBLIOGRAPHY


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