

Effects of Practical Life Exercises on Fine Motor Development in a Montessori  
Children's House Classroom

By

Elizabeth Elcombe

A Master's Paper

Submitted in Partial Fulfillment of  
The Requirements for the Degree of  
Master of Science in Education - Montessori

---

Major Advisor's Signature

---

Date

University of Wisconsin – River Falls

2017

### **Abstract**

#### **Effects of Practical Life Exercises on Fine Motor Development in a Montessori Children's House Classroom**

This action research project examined the effect of Montessori Practical Life exercises on kindergarteners' and pre-kindergarteners' fine motor development. Fine motor skills have been linked to academic and social/emotional achievement. This project's primary research question was: Do interventions in the Practical Life area support fine motor development? The secondary question for this study was: Are there differences in fine motor growth between students in pre-kindergarten and kindergarten who receive interventions in the Practical Life area? This study was conducted in a Montessori Children's House classroom containing pre-kindergarten and kindergarten students between the ages of four and six years old in an urban public school. Students were pretested and post-tested using the Penny Posting Test to determine fine motor pincer grip ability. Over a five-week period, Children's House students received interventions in the area of Practical Life specifically focusing on developing pincer grip ability. Results show growth in fine motor ability, which indicates that Practical Life materials do support the development of fine motor ability. Based on this study, continued advocacy for the inclusion of Practical Life materials in the public school Montessori curriculum is necessary.

*Key words:* fine motor development, pincer grip, Montessori, Practical Life, academic achievement, Children's House

### **Introduction**

The link between fine motor development and academic achievement should be examined, if our goal is to support children's knowledge of the world and their ability to function socially and emotionally within it. Children with fine motor delays have demonstrated delays in academic skills in math and reading (Son & Meisels, 2006) as well as socially and emotionally (Schoemaker & Kalverboer, 1994). It follows that children who experience these difficulties may struggle in school and beyond.

Maria Montessori observed a connection between movement of the hands and cognitive development. She designed and adapted materials to support young children's fine-motor ability thus supporting their cognitive and social development. Montessori Practical Life exercises have been linked to fine motor development (Rule & Stewart, 2002). While research has investigated the connection between work in the Practical Life area and fine-motor development, it seems not to have examined the fine motor outcomes of Practical Life interventions for pre-kindergarten compared to kindergarten students in a Montessori setting.

This study examined the potential difference of the influence of interventions in the Practical Life area on fine motor development between pre-kindergarten and kindergarten students in a Montessori Children's House classroom. The primary research question of this study is: Do interventions in the Practical Life area support fine motor development? The secondary question for this study is: Are there differences in fine motor growth between students in pre-kindergarten and kindergarten who receive interventions in the Practical Life area?

## **Review of Literature**

### **Definition of Fine Motor Skills**

Motor skills are the “underlying internal processes responsible for moving the body or parts of the body in space” (Cameron, Cottone, Murrah, & Grissmer, 2016, p. 93). This is how we move our bodies and coordinate our movements. Gross motor skills refer to the ability to control and maneuver the large muscles of the body used for walking, running, jumping, etc. Fine motor skills refer to the manipulation and coordination of the small muscles used for writing, drawing, playing an instrument, and speaking (Cameron et al., 2016).

Research shows there are various types of fine motor skills. Dinehart and Manfra (2013) investigated fine motor object manipulation, or the ability to manipulate small objects such as blocks or beads; and fine motor writing, which is the ability to copy designs or symbols on paper using a writing instrument such as a pencil. Rule and Stewart (2002) and Grissmer, Aiyer, Murrah, Grimm, and Steele (2010) examined the fine motor skill required to hold a pencil, or the pincer grip. The pincer grip is the use of the thumb and the fingers to hold an object such as a pencil, sewing needle, tweezers, and tongs (Rule & Stewart, 2002). This study specifically examines the pincer grip due to its importance in academic work and achievement.

### **Impact of Fine Motor Development on Academic Achievement**

Children’s fine motor ability appears to impact their academic achievement. Math and reading skills have been linked to children’s fine motor skills (Dinehart & Manfra, 2013; Cameron, Murrah, Grissmer, Brock, Bell, Worzalla, & Morrison, 2012). Dinehart and Manfra (2013) found that the ability to hold a pencil in preschool is a

predictor of later academic achievement in math and reading. They suggest this might be due to the children creating “internal models for the symbol system” (p. 155) through the active process of writing. Son and Meisels (2006) found connections between 1) fine motor skill in kindergarten and academic achievement in first grade, 2) fine motor skill and reading and math skills, and 3) the age of the child and the importance of fine motor skills to academic achievement. As children progressed through their first grade year, their fine motor skills became more important to their academic achievement.

In a secondary analysis of three longitudinal data sets, Cameron, Murrah, Grissmer, Brock, Bell, Worzalla, and Morrison (2012) found fine motor skills to be strong predictors of later math and reading skills. While the data sets provided slightly differing results regarding the importance of early math versus early reading skills, they were consistent in that “measures of fine motor skills showed highly significant results for both math and reading in all three data sets” (p. 1010) supporting the claim that fine motor development impacts later academic achievement. Additionally, Cameron et al. (2012) found evidence that the ability to attend to a task was just as important as fine motor ability as a predictor for later academic achievement.

Fine motor skills are strong predictors of later academic achievement. The ability to copy designs with a pencil may assist children with internalizing number and letter symbols. Additionally, children’s fine motor skills at the entry of their kindergarten year are also predictive of their academic achievement in the spring of their first grade year.

### **Impact of Fine Motor Development on Social and Emotional Development**

In addition to academic achievement, fine motor ability is connected to social and emotional development in children. The ability to attend, or maintain focus and

concentration, is an important social and emotional skill needed for learning. Stewart, Rule, and Giordano (2007) found a link between fine motor skills and a child's ability to attend. The authors provided fine motor activities to kindergarten classrooms and found that "female but not male attention, was increased through the use of the materials" (p. 108). The link between fine motor skill and a child's ability to attend seems to have been established for girls but not boys in this study. The difference between the genders demands further investigation.

Several studies have found a connection between motor development and social and emotional development. Schoemaker and Kalverboer (1994) found that children who experienced motor delays tended to be more introverted than their typically developing peers, experienced lower self-concept, and "show[ed] significantly more signs of anxiety both in general terms and when they [were] faced with the prospect of performing movement tasks" (p. 135). The authors explored previous research that pointed to clumsiness as a "precursor" to social and affective problems in children (p. 130), but they questioned whether clumsiness is the cause or the effect.

Piek, Baynam, and Barrett (2006) found that "poor fine motor ability was associated with lower perceived scholastic ability" (p. 73). Children who demonstrated fine motor delays felt less confident in their academic abilities than their peers. The authors also found that adolescents experienced this in greater depth than the younger children.

The connections between fine motor development and children's academic achievement as well as social and emotional development demonstrate a need to address this issue in early childhood education. The Montessori method offers an avenue through

which to do this.

### **Fine Motor Development and the Montessori Method**

Montessori's method addresses the role of the teacher, the prepared environment, and the development of the child. For the purposes of this study, the prepared environment and the development of the child will be addressed. According to Lillard (1972), the prepared environment consists of "six basic concepts" (p. 51). These concepts are "freedom, structure and order, reality and nature, beauty and atmosphere, the Montessori materials, and the development of community" (p. 50). The Montessori materials themselves adhere to six main principles: interest to the child, isolation of difficulty-focus is on one concept or skill such as size or shape, progression from simple to complex, indirect preparation for future works, progression from concrete to abstract, and control of error-whereby the child can determine and correct his or her own errors without adult intervention (Lillard, 1972).

In addition to determining characteristics of the most effective materials, Maria Montessori observed several "sensitive periods" in which children are at an optimum stage for specific areas of development (Montessori, 1966). She identified sensitive periods for language, movement, math, and "discovery of order in the environment," among others (Lillard, 1996, p. 25). It is essential to work within a sensitive period since once this time has passed the opportunity for maximizing the child's development in this area has been missed. While this does not mean the child will never develop in a particular domain once the sensitive period has passed, the child would not develop with the ease he or she may have experienced while working within the sensitive period. The sensitive period for movement begins at birth and continues to the age of six (Lillard,

1996). Children in the Children's House, (three to six years old) are at an optimum age for addressing fine motor development.

A Montessori Children's House classroom includes the areas of Practical Life, Sensorial, Math, Language (reading and writing), and Culture (including the Physical Sciences, Zoology, Botany, and Geography). Since indirect preparation for future works is a characteristic of Montessori materials, each area includes materials designed to support fine motor development as indirect preparation for holding a pencil. For example, the Sensorial area includes the knobbed cylinders. Following is a quote in which Maria Montessori describes the knobbed cylinders:

Solid Insets: This material consists of three solid blocks of wood each 55 centimeters long, 6 centimeters high and 8 centimeters wide. Each block contains ten wooden pieces, set into corresponding holes. These pieces are cylindrical in shape and are to be handled by means of a little wooden or brass button which is fixed in the centre of the top...The child takes the cylinders out of the moulds, mixes them upon the table, and then puts each back into its corresponding opening (Montessori, 1964, p. 193).

The action of removing and replacing the cylinders requires the child to use a pincer grip. Work with these materials support the fine motor skills necessary to hold a pencil.

Another example of indirect preparation for writing comes from the cultural studies area. This area includes puzzle maps of the continents of the world, countries of each continent, and states within each country. A small knob is attached to the top of each puzzle piece. The child uses a pincer grip to grasp the knob by the puzzle piece and



transfers the piece to a control chart, which consists of the outline of the puzzle and its pieces. There are many ways in which the Montessori Children's House classroom supports a child's development of fine motor skills. This study examines, specifically, the area of Practical Life.

### **Exercises in Practical Life**

Montessori believed that when "considering the method as a whole, we must begin our work by preparing the child for the forms of social life, and we must attract his attention to these forms" (Montessori, 1964, p. 121). The materials in the Practical Life area must be beautiful, natural whenever possible, and attractive to children while adhering to the previously discussed six main principles: interest to the child, isolation of difficulty, progression from simple to complex, indirect preparation for future works, progression from concrete to abstract, and control of error.

Additionally, the materials and exercises must reflect the culture in which the child lives. His or her home life and experiences must be reflected in the Practical Life area. Young children wish to do what the adults do in their lives. When a child observes an adult pouring a glass of water from a pitcher, he or she wishes to do the same.

Because these exercises should have their roots in the child's immediate environment and culture, there can be no prescribed list of materials involved.

The individual teacher must arrange her own exercises, using materials based on Montessori principles of beauty and simplicity, isolation of difficulty, proceeding from simple to complex, and indirect preparation (Lillard, 1972, p. 71).

In the Montessori method, the Practical Life exercises are broken down into three categories: care of self, care of environment, and grace and courtesy. Exercises for the

care of oneself include hand washing; using dressing frames-with which children may practice zipping, buttoning, lacing, tying, and buckling; pouring; transferring dry items with tweezers and tongs, and preparing food. The exercises of caring for the environment include sweeping, dusting, polishing, table washing, and plant watering. The lessons in grace and courtesy include how to respect another's work, how to greet someone new, how to push in a chair, how to wait for a turn, how to get someone's attention, among others.

The purpose of the Practical Life exercises in a Montessori classroom "is not a practical one.... Their aim is to assist development" (Standing, 1995, p. 213). Work in the area of Practical Life helps children develop the social and emotional skills needed to complete more complex work in the academic areas. Practical life exercises help children develop "solid work habits and a strong inner sense" (Woods, 2000, p. 38). Lillard (1972) states that while children are learning skills in this area, "the purpose is not to master these tasks for their own sake. It is rather to aid the inner construction of discipline, organization independence, and self-esteem through concentration on a precise and completed cycle of activity" (p. 71). Children learn to complete a work cycle, which includes selecting and completing an activity independently. Standing (1998), also describes the importance of these exercises, "No other occupations which could be undertaken by the children *at this stage* (3-5) [emphasis added by Standing] could be more important for their whole development—physical, mental, and moral—than these 'exercises of Practical Life'" (p. 213). The purpose of exercises in Practical Life is to assist children in developing the social and emotional skills necessary to apply themselves to more challenging academic work. It may be looked at as a way of teaching

children how to learn: how to make mistakes and to correct those mistakes; how to plan ahead; how to concentrate and focus; and how to follow through with an activity when faced with problems or challenges.

The Practical Life exercises support children's fine motor and social/emotional development. While these activities must adhere to a set of criteria, the teacher must create them to reflect their students' cultures and home life in order to appeal to the child. These exercises provide preparation to the child for future academic work.

***The impact of Practical Life exercises on fine motor development.***

Montessori (1995) viewed the "work" of the child as the child's "experience with the environment" (Montessori, 1995, p. 88). Work in the area of Practical Life encourages movement and interaction with the environment. The child must use his or her motor skills to complete the tasks in this area. Montessori observed this relationship between movement and "work." She wrote of coordinating muscle movements as opposed to strengthening them in order to support the development of the child's personality.

When children have developed strong fine motor skills, they are better able to be successful with the academic works presented later. Montessori observed that movement is an important support to cognitive development. She described the "hands" as the "instruments of man's intelligence" (Montessori, 1995, p. 27). Children can interact with their environment effectively, thus bolstering their acquisition of knowledge and self-confidence.

While the research investigating the impact of Practical Life exercises on fine motor skills is limited, interventions using Practical Life materials have demonstrated a

positive impact on fine motor development in kindergarteners. Rule and Stewart (2002) found a significant growth of fine motor skill in kindergarten students who received Practical Life materials as opposed to kindergarten students who did not receive the materials.

Bhatia, Davis, and Shamas-Brandt (2015) found that "...Montessori Practical Life activities had a significant effect on improving the fine motor skills of kindergarteners" (p. 604). According to Bhatia et al., the Practical Life materials were more effective at developing fine motor control than the method (Handwriting Without Tears) used in the traditional kindergarten program.

In a thorough look at the available literature, there does not appear to be a study that specifically compares the difference in growth between four- and six-year-olds. Research in this area has been limited to kindergarten students. These studies do not address the differences in fine motor growth between the pre-kindergarten students and kindergarten students in a Montessori Children's House classroom. According to Lillard (1996), the sensitive period for the refinement of movement (fine motor skill development) ends before the age of six. Since students in the Children's House classroom are in or about to depart the sensitive period for fine motor development, it would be helpful for the purposes of early intervention to investigate whether Practical Life exercises would provide greater benefits to one age over another.

This action research examines the impact of interventions using Practical Life materials on the development of fine motor skills in pre-kindergarteners and kindergarteners in a Montessori Children's House classroom. While research has shown a connection between fine motor development and academic achievement as well as

social/emotional development, it has not examined the differences in growth, if any, between four- and six-year-olds. If we work within the sensitive period for movement (motor development), we can optimize the effectiveness of our interventions. Montessori materials, specifically Practical Life materials, provide “built in” opportunities for fine motor development. This study investigates the usefulness of Practical Life materials in developing fine motor skills and whether four-year-olds benefit more than six-year-olds from these materials.

## **Methodology**

### **Participants and Setting**

This quantitative action research study took place in an urban public Montessori elementary magnet school, which enrolls approximately 346 students. The student population at this school consists of 55% Asian American, 12% African American, 5% Hispanic American, 5% Caucasian American, and 1% American Indian-identifying students. English Language Learning services are provided to 47% of the student population and 65% of the student population is eligible for Free and Reduced Lunch.

This study took place in a Children’s House classroom consisting of children in pre-kindergarten and kindergarten between the ages of four and six years old. The sample consisted of 20 students, 11 of whom were male and nine of whom female. Additionally, 11 participants were in their pre-kindergarten year and 9 participants were in their kindergarten year.

### **Data Collection Procedure: The Penny-Posting Test**

Rule and Stewart’s (2002) Penny-Posting Test was used, with modifications, to measure each child’s fine motor ability. This test consists of using a pincer grip to place

pennies into a one-inch long slot in the top of a container during a set period of time.

Rule and Stewart (2002) placed 50 pennies on a towel, asked each participant to place the pennies in the slot, and measured how many pennies the participant was able to place in the slot in the span of 30 seconds.

For the purposes of this study, 100 pennies were laid out on a rug and the participants were asked to place the pennies in a one-inch slot at the top of a container for the span of one minute. The number of pennies dropped by each participant was also recorded as “errors.”

Due to the motor difficulties faced by several of the participants, the time of the assessment was lengthened from 30 seconds to one minute and the number of pennies increased from 50 to 100, in order to give the participants time to experience success. The intention was to make the task enjoyable rather than stressful for these students.

### **Interventions and Materials**

The Practical Life materials chosen for this study required the children to use and practice their fine motor skills, specifically their pincer grip. The materials consisted of Orange Peeling, Pins and Sugar Shaker, and Silver Polishing.

**Orange peeling.** The Orange Peeling materials required the children to use their pincer grip to peel clementine oranges. Clementine oranges were chosen due to the ease of peeling as well as their small portion size.



*Orange peeling.  
See Appendix A for lesson write-up.*

**Pins and sugar shaker.** These materials required the children to use their pincer grip to place straight pins through the holes at the top of a sugar shaker.



*Pins and Sugar Shaker  
See Appendix B for lesson write-up.*

**Silver polishing.** Silver polishing required the children to hold a Q-tip or a cotton ball using their pincer grip to apply silver polish to a silver object.



*Silver Polishing*  
*See Appendix C for lesson write-up*

### **Data Collection and Intervention Procedure**

Children's fine motor skills, specifically their pincer grip, were assessed using a modified version of the Penny-Posting test, as described in the Data Collection Procedure section above, (Rule & Stewart, 2002). This assessment provided a baseline for measuring the children's progress. The Penny-Posting test was administered after the third week of intervention and at the conclusion of the study.

Each intervention was presented to every child participating in the study. The materials were presented in two-week intervals. Once a material was presented, it remained available to the children for the duration of the data collection period. Orange Peeling was presented first, so it was available for five weeks. Pins and Sugar Shaker materials were available for four weeks, and Silver Polishing was available for two weeks.



### **Data Analysis Procedures**

A two-tailed, paired *t* test was used to detect the statistical significance between the pretest number of pennies placed and posttest number of pennies placed by the entire test population. The average number of pennies placed was calculated for the pretest and posttest data of the entire test population, for kindergarten, pre-kindergarten, male, and female test groups. The averages were used to calculate the percent growth between pretest and posttest scores for each test group. Additionally, averages and percent growth were calculated for each group between pretest and posttest number of errors, or number of pennies dropped by each participant during the assessment.

### **Results**

Overall, fine motor skills increased during the course of the study. On average, kindergarten participants scored higher than the pre-kindergarten participants in both the pretest and posttest, while the pre-kindergarteners showed more growth. Similarly, the male participants scored higher on both the pretest and posttest, while the female participants demonstrated more growth. Each group demonstrated growth in ability to place the pennies in the container and a decrease in the number of errors.

### **Entire Test Population Analysis**

The entire test population's average pretest and posttest scores were calculated and compared for growth. Table 1 shows the average pretest and posttest scores for the entire test population. The test population average of pennies placed grew by 12.5% while the errors decreased by 60%. The test population as a whole grew in their "Pennies Placed" score from the pretest to the posttest and decreased in their errors. Data for the entire test population for Pennies Placed was found to be statistically significant ( $p =$

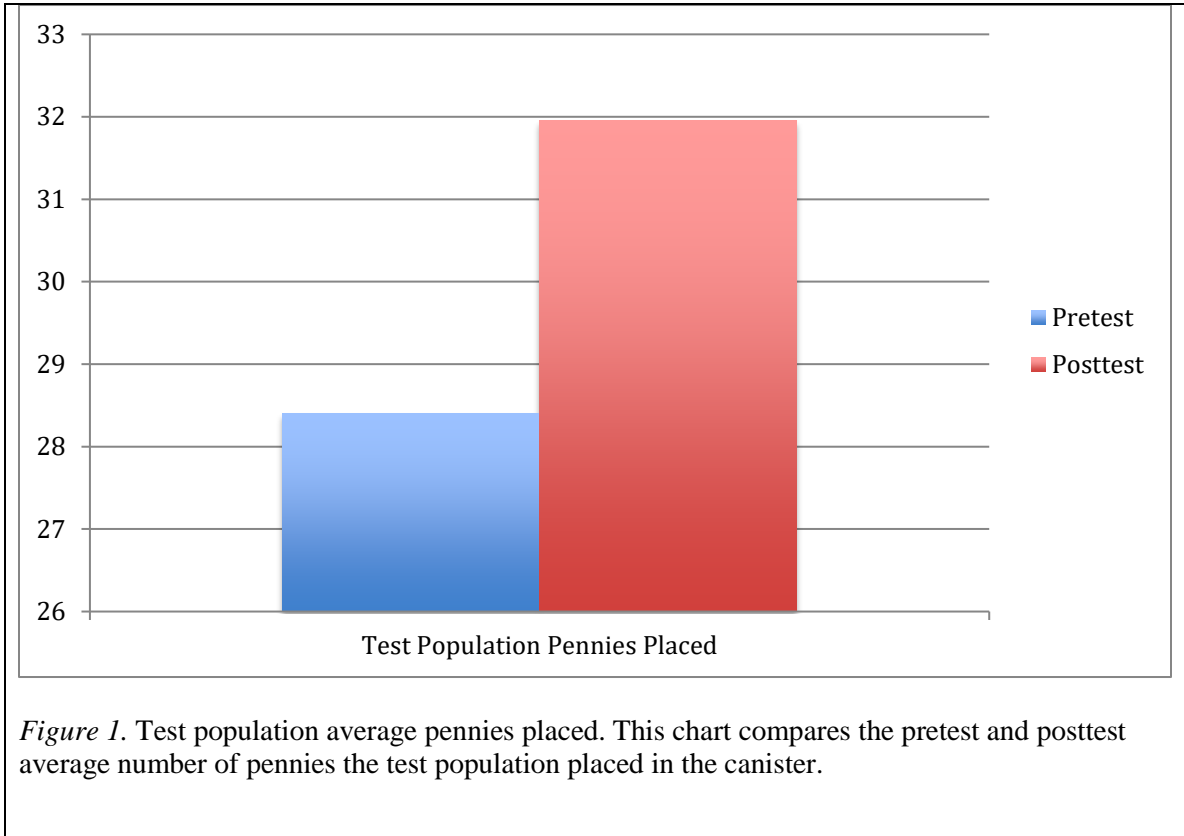
0.017). Figure 1 shows the increase of the average from the pretest to the posttest.

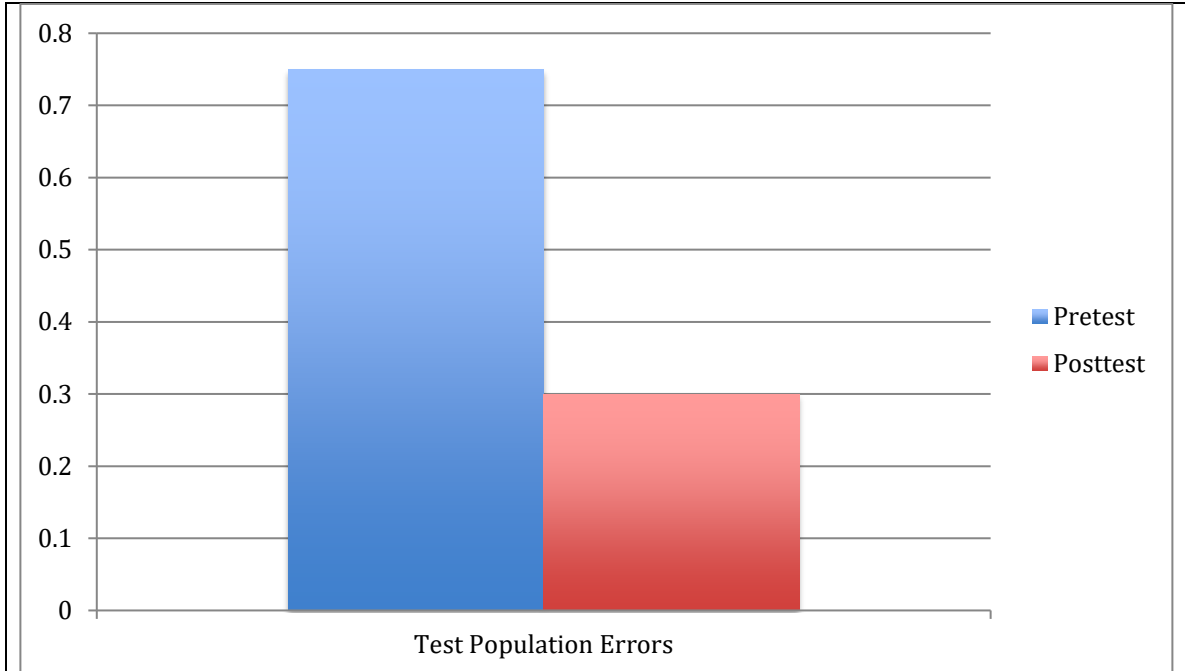
Figure 2 shows the decrease in errors from the pretest to the posttest.

Table 1			
Test Population Average of Pennies Placed and Pennies Dropped (Errors)			
	Test Population Pretest Average	Test Population Posttest Average	Percent Growth
Number of Pennies Placed	28.4*	31.95*	+12.5%
Number of Pennies Dropped (Errors)**	0.75	0.3	-60%

*Note.* The data is significant at the \* $p < 0.05$  level.

\*\*An “error” is a penny dropped during the pretest or posttest assessment.





*Figure 2.* Test population average errors. This chart compares the pretest and posttest average number of errors made by the test population. An error is a dropped penny during the pretest or posttest assessment.

## Age

Average pretest and posttest scores of the pre-kindergarten and kindergarten test groups were calculated and compared to determine growth. Table 2 displays the average numbers of pennies placed and average number of errors (pennies dropped) by pre-kindergarten and kindergarteners.

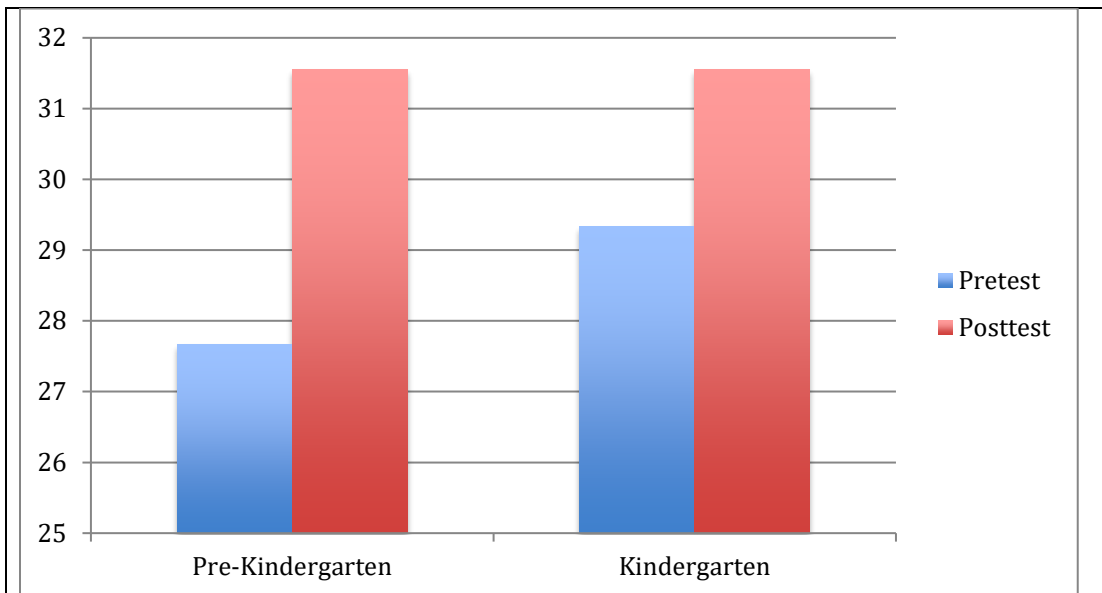
	Pretest	Posttest	Growth
Pre-Kindergarten	27.64	31.55	+14.14%
Kindergarten	29.33*	32.44*	+10.61%
Pre-Kindergarten Errors	1.18	0.55	-53.85%
Kindergarten Errors	0.1	0	-100%

*Note.* The data is significant at the \* $p < 0.05$  level.

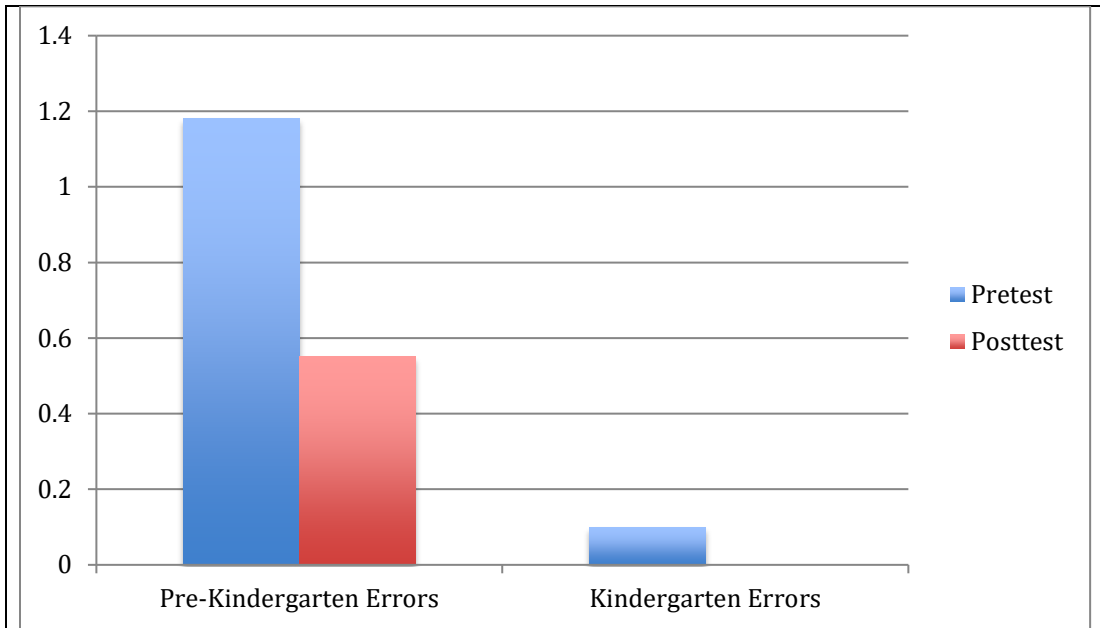
Both kindergarten and pre-kindergarten students showed growth in their scores. Kindergarten students scored higher overall than pre-kindergarten students and their scores were shown to be statistically significant ( $p = 0.02$ ). Pre-kindergarten students showed more growth in the average number of pennies placed than kindergarten students, but their scores were not significant ( $p = 0.13$ ). Pre-kindergarten students' scores grew by 14.14% and kindergarten participants' scores grew by 10.61%. Figure 3 demonstrates the growth of the average score of pennies placed by pre-kindergarten and kindergarten students between the pretest and posttest.

Additionally, while both pre-kindergarten and kindergarten participants decreased the number of errors between the pretest and posttest, the pre-kindergarten participants demonstrated more errors than the kindergarten participants in both the pretest and posttest. While the kindergarten students decreased their errors by 100%, their average errors decreased by 0.1 errors. Pre-kindergarten decreased their average errors by 0.63 errors. Pre-kindergarten students showed a smaller percent decrease in their average errors, but a greater decrease in number of average errors as they demonstrated more

errors than kindergarten students in the pretest and, therefore, had more room to decrease their number of errors than the kindergarten students. Figure 4 demonstrates the decrease in errors made by pre-kindergarten and kindergarten participants between the pretest and posttest.



*Figure 3.* Average number of pennies placed by pre-kindergarten and kindergarten. This chart compares the average pretest and posttest scores of pre-kindergarten and kindergarten students for pennies placed in the container.



*Figure 4.* Pre-kindergarten and kindergarten average number of errors. This chart compares the pretest and posttest average number of “pennies dropped” or errors made by pre-kindergarten and kindergarten participants.

## Gender

Average pretest and posttest scores for male and female participants were compared for growth. Male participants scored higher overall for pennies placed. While both males and females demonstrated growth in their scores, female participants showed much greater growth than the male students. Female participants’ scores were statistically significant ( $p = 0.01$ ). Male participant scores did not demonstrate a significant difference ( $p = 0.34$ ). Figure 5 shows the growth between male and female pretest and posttest scores.

Males made more errors than females in both the pretest and posttest, but both groups decreased their number of errors in the posttest. Table 3 shows the average pretest and posttest number of pennies placed and errors (pennies dropped) by male and

female participants. Figure 6 shows the decrease in pretest and posttest errors made by male and female participants.

	Pretest	Posttest	Growth
Male	30.66	32.77	+6.88%
Female	*26.55	*32.27	+17.81%
Male Errors	0.78	0.33	-57.14%
Female Errors	0.73	0.27	-62.5%

*Note.* The data is significant at the \* $p < 0.05$  level.

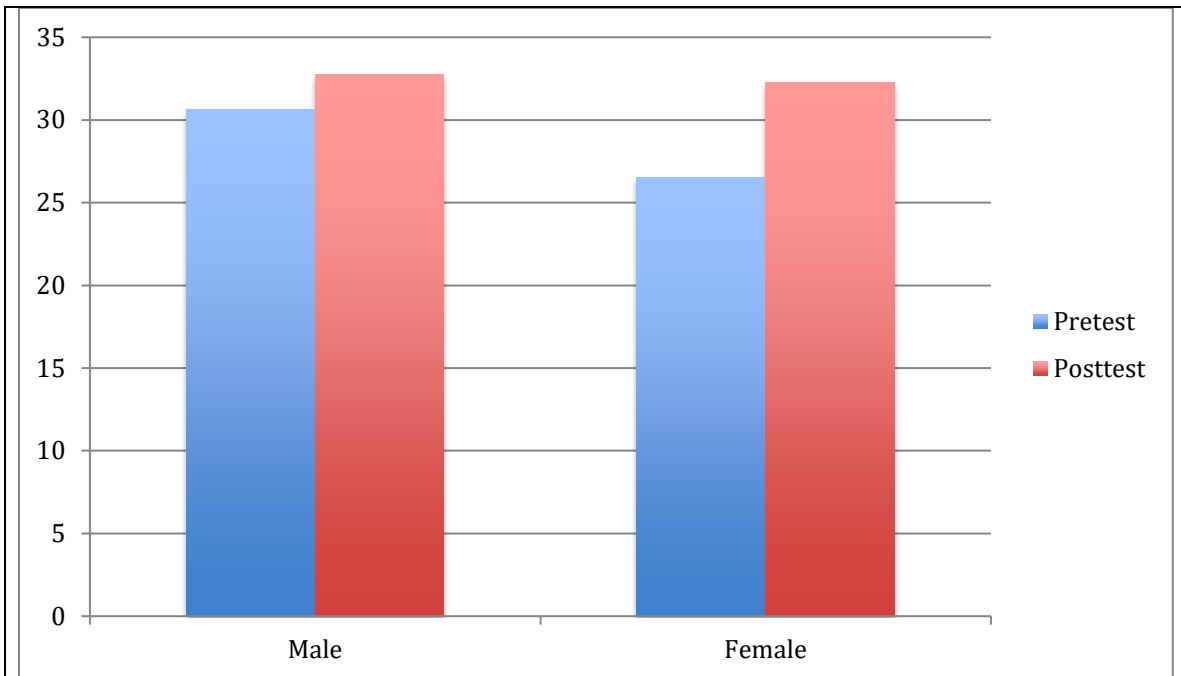
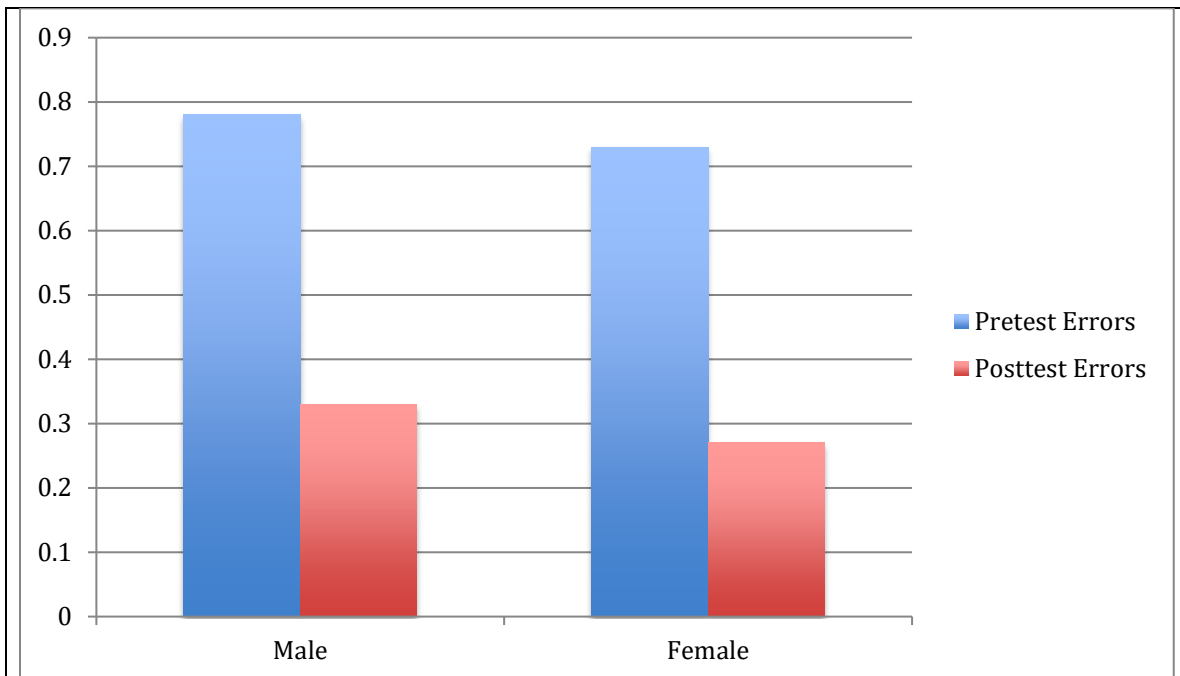


Figure 5. Average number of male and female pennies placed. This chart demonstrates the average pretest and posttest scores of male and female participants for pennies placed.



*Figure 6.* Average number of male and female errors. This chart compares the average pretest and posttest scores for errors made by male and female participants.

The participants showed growth in fine motors skills. While each group demonstrated growth in their fine motor ability, pre-kindergarten and female participants showed the most growth in their ability to use their pincer grip to place pennies in a one-inch slot.

### **Discussion**

The primary research question was: Do interventions in the Practical Life area support fine motor development? The results show that interventions in the Practical Life area do appear to support fine motor development. The entire test population showed 12.5% growth in the number of pennies placed in the container between the pretest and posttest and decreased their number of errors by 60%. This supports Rule and Stewart's (2002) conclusion that Montessori Practical Life materials support kindergarten fine



motor development. These results were expected, as practice in an area of development will increase skill in that area.

### **Differences between Pre-Kindergarten and Kindergarten**

The secondary research question was: Are there differences in fine motor growth between students in pre-kindergarten and kindergarten who receive interventions in the Practical Life area? The results show that there are differences in fine motor growth between pre-kindergarten and kindergarten students who receive interventions in the area of Practical Life. Kindergarten students demonstrated more advanced fine motor ability than pre-kindergarten students. Interestingly, the pre-kindergarten students demonstrated more growth than their kindergarten counterparts.

The growth seen in the pre-kindergarten students might be explained in several ways. First, the younger students are in the midst of the sensitive period for fine motor development. The sensitive period for movement ends around the time a child reaches the age of six (Lillard, 1996). Since this study was done during the second half of the school year, the kindergarten students were closer to exiting or had already exited the sensitive period for fine motor development.

Second, the greater growth in the pre-kindergarten group might be due to the place of the materials in the pre-kindergarten students' Zone of Proximal Development. Lev Vygotski identified the Zone of Proximal Development (ZPD) as the space between a learner's stage of development and what they are learning with help and support from a teacher (Levine and Munsch, 2014). The materials chosen for this study may have been better placed in the pre-kindergarten students' Zone of Proximal Development than in the kindergarteners'.

A third explanation for why the pre-kindergarten students demonstrated more growth is they may have chosen the work more frequently than the kindergarteners. One limitation of this study is that the frequency of the works chosen and the duration of time students spent working with the materials were not measured. This would be important to investigate in future research.

### **Considerations Regarding Gender**

The results show that while male students scored better overall, female students demonstrated more growth. It is possible that the works provided were too easy for the male students and therefore did not assist in the progression of their fine motor ability. As with the kindergarten students, the work may not have been in the males' ZPD.

Another explanation is that the work may have been more appealing to the female population of the sample. While the materials chosen for this study were designed to be gender neutral as much as possible, it is unknown whether female students chose the materials more often or found the work more appealing than the male students.

Additionally, males made more errors than females in both the pretest and posttest assessments. This could be indicative of more risk-taking behavior demonstrated by the males. An avenue for future research could be male versus female risk taking in Practical Life or academic works.

### **Conclusion**

This study demonstrates how Practical Life materials support the fine motor development of students in a Montessori Children's House classroom. Each test group demonstrated growth in fine motor ability after using the materials. That being said, future research is needed to investigate the frequency and duration of materials chosen as

well as the attractiveness of the materials to each test group. This study did not record the frequency or duration of the materials chosen. It also did not record whether every child used the materials after the initial presentation of them or what each child's feelings were toward the materials themselves. Additionally, it may be necessary for the purposes of early intervention to determine whether there are gender differences within the age groups. The sample size of this study was not large enough to investigate this query.

### **Action Plan**

Based on the findings of this study, it is essential to maintain a rich Practical Life area in the classroom. The materials should be appealing to students with varying interests and skill levels. Maintaining a rich Practical Life area will support students' fine motor development, which is particularly important for those students who struggle with fine motor ability. Due to the connection between fine motor ability and academic and social/emotional achievement, it may be argued that Practical Life exercises support children's development in these areas as well.

My own classroom research in this area will be ongoing. I will continue to collect data on student fine motor skills. Additionally, I will collect data on student interest in the materials. The Practical Life exercises chosen for my classroom will be based on student interest and skill level.

In addition to implementing and maintaining a Practical Life area in the classroom, it is clear that advocacy for this area is important in the public school setting. This research may be used to advocate for Practical Life materials in the curriculum of public Montessori schools specifically in my current school setting. In this era of

standardized testing and academic standards, the area of Practical Life can easily be set to the side or completely ignored (Woods, 2000).

The value of Practical Life exercises can be found in the development of social/emotional skills necessary for academic achievement. Practical Life exercises support children's social and emotional skills by developing children's ability to concentrate and building their sense of independence. Additionally, Practical Life exercises support children's academic achievement by developing the fine motor skills necessary for academic work. While this project focused on fine motor skill development through the use of Practical Life materials, future research would do well to explore how Practical Life exercises can be used to directly support academic achievement.

### References

- Bhatia, P., Davis, A., & Shamas-Brandt, E. (2015). Educational gymnastics: The effectiveness of Montessori practical life activities in developing fine motor skills in kindergartners. *Early Education and Development, 26*(4), 594-607.
- Cameron, C., Cottone, E., Murrah, W., & Grissmer, D. (2016). How are motor skills linked to children's school performance and academic achievement? *Child Development Perspectives, 10*(2), 93-98.
- Cameron, C., Brock, L., Murrah, W., Bell, L., Worzalla, S., Grissmer, D., & Morrison, F. (2012). Fine motor skills and executive function both contribute to kindergarten achievement. *Child Development, 83*(4), 1229-1244.
- Dinehart, L., & Manfra, L. (2013). Associations between low-income children's fine motor skills in preschool and academic performance in second grade. *Early Education and Development, 24*(2), 138-161.
- Grissmer, D., Grimm, K., Aiyer, S., Murrah, W., & Steele, J. (2010). Fine motor skills and early comprehension of the world: Two new school readiness indicators. *Developmental Psychology, 46*(5), 1008-1017.
- Levine, L. & Munsch, J. (2014). *Child Development: An active learning approach*. Thousand Oaks, CA: SAGE Publications.
- Lillard, P. P. (1972). *Montessori, a modern approach*. New York: Schocken Books.
- Lillard, P. (1996). *Montessori today*. New York, NY: Schocken Books.
- Montessori, M. (1964). *The Montessori method*. New York: Schocken Books.
- Montessori, M. (1966). *The secret of childhood*. New York, NY: Ballantine Books.
- Montessori, M. (1995). *The absorbent mind*. New York, NY: Henry Holt and Company.

- Piek, J., Baynam, G., & Barrett, N. (2006). The relationship between fine and gross motor ability, self-perceptions and self-worth in children and adolescents. *Human Movement Science, 25*(1), 65-75.
- Rule, A., & Stewart, C. (2002). Effects of practical life materials on kindergartners' fine motor skills. *Early Childhood Education Journal, 30*(1), 9-13.
- Schoemaker, M., & Kalverboer, A. (1994). Social and affective problems of children who are clumsy - how early do they begin. *Adapted Physical Activity Quarterly, 11*(2), 130-140.
- Son, S., & Meisels, S. (2006). The relationship of young children's motor skills to later reading and math achievement. *Merrill-Palmer Quarterly (1982-), 52*(4), 755-778.
- Standing, E. (1995). *Maria Montessori: Her life and work*. New York, NY: The Penguin Group.
- Stewart, R., Rule, A., & Giordano, D. (2007). The effect of fine motor skill activities on kindergarten student attention. *Early Childhood Education Journal, 35*(2), 103-109.
- Woods, C. (2000). "Back to basics" for the Montessorian: The practical life foundation. *Montessori Life, 12*(1), 38-41.

## APPENDIX A

**Area:** Practical Life

**Activity:** Orange Peeling

**Direct Aims:** To teach the child how to peel a clementine orange.

**Indirect Aims:** Fine motor development (coordination), sequencing of steps (order), self-esteem, independence, and development of concentration.

**Materials:**

- Tray for dishes
- Bowl for orange peels
- Plate for orange wedges
- Bowl for unpeeled oranges
- Dishwashing station consisting of two tubs (one with soapy water and one with clean rinse water)
- Sponges (one for soapy water, one for rinse water, one for wiping the tablemat)
- Dishtowel

**Presentation Steps:**

1. Invite the child to learn the Orange Peeling work.
2. Put on an apron and invite the child to do so as well.
3. Wash hands.
4. Prepare the workspace with a tablemat reserved for food preparation.
5. Show the child where the work is kept in the classroom.
6. Place an orange on the plate on the tray.

7. Using both hands bring the tray to a table or chowkie and place at the top of the table.
8. Place the bowl and the plate with the orange on the work mat.
9. Return the tray to the shelf.
10. Using your thumb on your dominant hand, puncture the peel of the orange.
11. Remove the peel with your fingers and place it in the bowl.
12. Once the peel is removed, separate the wedges of the orange and place them on the plate.
13. Eat the orange or offer pieces to others.
14. Return the plate to the workspace.
15. Empty the orange peel from the bowl into the trash or compost bucket.
16. Bring the bowl to the dishwashing station.
17. Using a sponge or cloth, show the child how to wipe the inside and outside of the bowl in the soapy water.
18. Place the bowl in the rinse water.
19. Remove the bowl from the rinse water and place on a drying rack or dry with a dishtowel.
20. Repeat steps 15-19 with the plate.
21. Return the bowl and the plate to the tray and return the tray to the shelf.
22. Clean the tablemat with a cloth or sponge.
23. Roll and return the tablemat to the appropriate place in the classroom.
24. Return the apron to the appropriate place in the classroom.
25. Thank the child for their work.



**Points of Interest:** oranges, eating or sharing the oranges, washing the dishes

**Variations:** Use other fruit that requires peeling such as bananas.

**Extensions:** Include slicing fruits, make fruit salads.

**Language:** orange, clementine orange, peel, wedge, wash, rinse

**Source:** Elizabeth Elcombe



## APPENDIX B

**Area:** Practical Life

**Activity:** Pins and Sugar Shaker

**Direct Aims:** To accurately place pins in the top of a sugar shaker.

**Indirect Aims:** Fine motor development (coordination), sequencing of steps (order), independence, and development of concentration.

**Materials:**

- Tray for materials
- Sugar shaker
- Straight pins in a container with a lid
- Table work mat.

**Presentation Steps:**

1. Invite the child to learn the Pins and Sugar Shaker work.
2. Prepare the workspace with a tablemat.
3. Show the child where the work is located.
4. Carrying the tray with two hands, bring the materials to the workspace and place at the top of the table.
5. With the dominant hand, place the sugar shaker on the mat.
6. With the dominant hand, place the container of pins on the mat.
7. Return the tray to the shelf.
8. Hold the container of pins with your non-dominant hand. Using your dominant hand, demonstrate to the child how to remove the lid from the container of pins.
9. Place the lid and the container of pins on the left side of the sugar shaker.

10. Using a pincer grip with the dominant hand, grasp one pin by the bulb on the end and place it in a hole at the top of the sugar shaker.
11. Once several pins are placed, remove them one at a time using a pincer grip with your dominant hand and replace them in the container.
12. Replace the lid on the pin container.
13. Retrieve the tray from the shelf, replace the items on the tray and return the work to the shelf.
14. Return the tablemat to its place in the classroom.
15. Thank the child.

**Points of Interest:** sugar shaker, straight pins, colorful bulbs at the end of the pins

**Variations:** Place pins in a saltshaker.

**Extensions:** Create patterns with pins.

**Language:** Straight pin, sugar shaker.

**Source:** Elizabeth Elcombe, Mary Schmidt



## APPENDIX C

**Area:** Practical Life

**Activity:** Silver Polishing

**Direct Aims:** To teach the child to polish an object made of silver.

**Indirect Aims:** Fine motor development (coordination), sequencing of steps (order), self-esteem, independence, and development of concentration.

**Materials:**

- Tray for materials
- Vinyl mat on which to work
- Polish jar
- Apron
- Piece of silver
- Cotton ball
- Q-tips
- Squeeze bottle with non-toxic polish
- Soft polishing cloth
- Sponge

**Presentation Steps:**

1. Invite a child to polish silver. Put on an apron. Show the child where the materials are kept on the shelf.
2. Using both hands, carry the tray to the table and place it at the top. Carry a mat to the table and place it below the basket. Sit on the child's dominant side.

3. Lay out each item on the mat in sequence from left to right – polish jar, cotton ball, polishing cloth, sponge. Place the silver object to be polished in front and center of the mat.
4. Holding the jar of polish with the non-dominant hand demonstrate how to open the jar with your dominant hand.
5. Place the polish on the mat above the silver object.
6. Using a Q-tip, apply a small portion of polish to the silver object.
7. Use a cotton ball to rub the polish in a circular motion over the silver object.
8. Repeat until the tarnish is removed and the object shines.
9. Use the polishing cloth to shine the object. Admire the polished surface.
10. Replace the lid to the polish jar.
11. Put the used Q-tips and cotton balls in the wastebasket.
12. Place the used polishing cloth in the laundry basket.
13. Return the items to the tray.
14. Place a clean polishing cloth, cotton balls, and Q-tips in their containers on the tray.
15. Return the work to the shelf.
16. Return the apron to its place in the classroom.

**Points of Interest:** silver object, polish, and circular motion of polishing the item.

**Variations:** Polish other metals, polish wood, polish furniture, polish cabinets, polish the color tablets.

**Extensions:** Polish pieces of silver that have intricate designs using a small soft brush.

**Language:** silver, polish, shine, tarnish.

**Source:** Elizabeth Elcombe, Brenda Petta

