COMPARISON OF ACADEMIC PERFORMANCE AND ATTENTION SPAN OF CHILDREN BETWEEN MONTESSORI AND TRADITIONAL PEDAGOGICAL APPROACHES OF PRESCHOOLS

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Abstract

This study compares test scores of preschoolers ages 5-6, when exposed to the Montessori prepared environment and teaching pedagogy with those of preschoolers experiencing the traditional lecture classroom approach. A case study done in Davao City Philippines on six preschools and an experiment were conducted by providing preschool children who were schooled in the traditional lecture method approach with activities that were modelled from a Montessori teaching pedagogy. Comparisons between the two pedagogies were done through experimental observation and by conducting pretests and posttests to find out if there was a difference in the academic performance and attention span of children exposed to the Montessori prepared environment while learning compared to children exposed to the traditional classroom lecture method only. The results of the t-tests showed that children exposed to the Montessori prepared environments with active outdoor learning approaches achieved higher mean gain results in their test scores in both math and science compared to those children inside the traditional classroom. Children learned more when exposed to active learning with an appropriate environment with different learning activities. The research also documented the attention span of children while being given writing and manipulative classroom activities. The preschoolers exhibited longer attention spans when given activities in a Montessori prepared environment than inside the traditional classroom one.

Introduction

In Philippine culture, education is perceived by most parents as the greatest legacy they can leave to their children, and good education means sending children to the best schools. Moreover, in the Philippine setting good schools are either expensive or affordable but difficult to get into because of the limited accommodation in terms of number of students due to limited facilities. Currently, the tuition fee in Metro Manila is running at the rate of P84,000.00 annually in preschools and primary years not yet including the registration fees and books. At the rate of continuous annual increase of tuition fees at 12 percent per annum, the school business has become very lucrative. In fact as of 2010 a total of 1,989 preschools had emerged. (Philippine Statistics Authority, 2010). The pioneer in the operations of preschools was O.B Montessori, which was established in 1966 conducting classes in an apartment of a middle class subdivision at Malate Manila (www.obmontessori.edu.ph). Following the establishment of O.B Montessori, various preschools followed through with the Montessori vision and mission (Montessori, 1997).. Through the years Montessori schools have created a

reputation for good quality education and eventually became among the expensive schools in the Philippines. Moreover, different pedagogical approaches have surfaced ever since the first preschool was established. These pedagogies offer different learning environments with unique architectural features that affect the learning attitude of children. In a Montessori pedagogy the students are assigned their own personal workstations designed with educational items that correspond to the daily lesson plans and activities. Students are responsible for setting up the work area, choosing the learning activity, applying the physical materials, and returning the materials back to the shelves (Pickering, 2004).

Montessori teachers introduce materials with a brief lesson and demonstration and then passively guide the audience through a period of student-centered inquiry(Edwards, 2002). On the other hand, in a typical classroom lecture method, according to Perrott (1982) for all lessons or learning sequences, the teacher has to present information and ideas. He/she has to introduce topics, summarize the main points of the learning activity and stimulate further learning. All these activities require the use of lecture-explanation techniques. The lecture-explanation approach when used properly can inspire enthusiasm and capture the student imagination.

In Davao City, early childhood education has also emerged in residential communities ranging from a small neighborhood daycare centers to preschool institutions. The Department of Education (2015) has identified 206 registered and with-permit-to-operate private preschools. Montessori and traditional or traditional-developmental are currently the pedagogical approaches used by private preschools with student activities both co-curricular and extra-curricular being set by the different types of preschools. Most of these preschools mostly offer the traditional lecture or conventional method of teaching. The learning and the outdoor spaces are also among the differing features of preschools depending on their teaching pedagogy. Montessori schools refer to their classroom as the prepared environment, while traditional schools refer to it as a classroom.

For this study, three Montessori schools, namely the Abbas Orchard School, Angels at Work Montessori, and Montessori de Manila-Davao, and also three traditional private preschools in Davao City have been visited (Jose Maria College, Philippine Nikkei Jin Kai School of Davao, and Bright Angels of Tomorrow). Based on empirical observations a typical classroom for a Montessori school in Davao had specific areas for every subject.that were arranged in a logical order. Children of ages 2 to 6 interact with each other in a prepared environment. A typical subject area consists of the different learning materials that were chosen and are of unique characteristics. The area for mathematics showed a series of pencils arranged according to colour in the prepared environment. Children are trained to get the materials and return them on their own. A kitchen is also found in the prepared environment of a Montessori school, and this space is intended for their practical life lessons, which involved exercises such as spooning, pouring, washing, slicing, and other practical activities commonly done in the kitchen and dining area of a house. All materials used in the practical learning activities are real and

breakable. Children are held responsible in every work that they do, so they become cautious even at a very young age according to the administrator. Children in the Montessori school are also trained to take care of themselves, where they are taught how to comb their hair, put clothes on, and other activities that pertains to taking care of one's self. There are also the daily line time activities, where children dance, sing, and recite/read poems and stories. Children from different levels interact with each other for 30 minutes with the guidance of the teachers. A reading area is also provided for children, and they are allowed to use the space anytime. Books are readily available for children to read. Tables, chairs and other materials in a Montessori school are child-size, and children as young as two years old can play soccer. Where children do physical education, which involves sports like soccer and badminton, they learn the basics of the sport three times a week.

On the other hand, in the traditional classroom lecture methodology everything is very much pre-determined by the zones or territories, which are strictly imposed upon children. Although they are usually described as *homebase* areas, many are similar in character to school classrooms. Each homebase area may be further designated into functional zones such as the cloakroom, the wet zone (with sinks for art and craft activities) and the quiet zone. This is a range of activities that is so tightly prescribed that the architecture tends to reduce and limit the scope for learning rather than extending and opening it up. The free spirit of young children is somehow narrowed down to a set of activities deemed to have educational value (Dudek, 2008). Most of the learning activities of traditional pedagogical pre-schools like reading, writing, watching, and creating artworks were done inside the classroom. Private preschools also conducted fieldtrips for children to learn about different things and experience different environments. Physical education was also noteworthy and done in school courtyards outside of the classroom, but generally all other classes were conducted inside the typical classroom with blackboard and were mostly done in a teacher-centered arrangement.

Objectives of the Study

The general objectives of the study were to explore the different exposure of preschool students in the Montessori and traditional school teaching approaches and learning spaces in order to improve learning performance of preschool students. Specifically, it aimed at the following:

1. To assess level of performance of preschool children by comparing pretest and posttest scores of preschool children exposed to Montessori teaching approaches and its prepared environment and those of students experiencing the traditional lecture method in a private school classrooms .
2. To measure the attention span of preschool children exposed to the Montessori teaching method and its prepared environment with those in the traditional lecture classroom environment of private preschools.
3. To document the different student activities and learning spaces of the Montessori and traditional private preschools in Davao City.

Research Design

This study used different research tactics such as key informant interviews, direct observations, photo documentation, and experimentation to achieve its goals. The experimental method was used in this study using the quasi-experimental pretest/posttest non-equivalent control group design.

Four sections of preschool students in Hizon elementary school and Southpoint school have been subjected to traditional classroom lecture method and the Montessori approach. Two classes of Kinder 2 students with ages 5 to 6 years in each school have participated in the experiment. Children subjected to the experiments were assessed before and after the learning activities. They were given pretests and posttests to measure the level of their performance. The design of the test was patterned to the exams given to Kinder 2 students and was checked by the preschool teachers of the classes subjected to the experiment.

The lessons were planned according to their homeroom teacher's specifications and were prepared prior to the day of experimentation. Children in Hizon Elementary School were taught counting numbers from 14-19 in math and classification of different vegetables in science. As specified by the homeroom teacher, lessons were based on the pace of the classes that were subjects of the experimentation. Children in Southpoint were taught counting numbers from 0-10 in math and parts of the plant, which involved basic gardening, in science.

The learning objectives targeted by both the Montessori and the conventional method were the same. The applied student teacher ratio in the conventional classroom lecture method only one teacher handled the whole class as patterned to the commonly used student-teacher ratio in private preschools. In the Montessori method, one teacher handled a maximum number of 10 students as specified by the consultant.

The design used for the experiment was as follows:

01	x	02	Experimental
03		04	Control

01 - is the pretest average test-score of the experimental group
02 - is the pretest average test-score of the experimental group
03 - is the posttest average test-score of the control group
04 - is the posttest average test-score of the control group
X - is the effect of the treatment

The following statistical treatments were used:

1. Solving for the mean

$$X = \frac{\sum x}{N}$$

Where:
X = Arithmetic Mean
x = Sum of Scores
N = Number of Cases

2. T-test formula used

$$t = \frac{(X_1 - X_2)}{\sqrt{\left[\frac{SS_1 - SS_2}{n_1 + n_2 - 2}\right]\left[\frac{1}{n_1} - \frac{1}{n_2}\right]}}$$

Where:
X = Arithmetic Mean
SS = Sum of Squares
n = Number of Cases
n + n – 2 = df (degrees of freedom)

Assumption and the Hypothesis

The assumed null hypotheses for this research would be that there is no significant difference between the pretest and posttest mean scores of students exposed to the Montessori prepared environment and its teaching approach (experimental group).

There is no significant difference in the mean gain scores of the students exposed in traditional classroom and lecture method (control group).

There is no significance difference in the mean gain scores of the students exposed to the Montessori prepared environment (experimental group) and those exposed to the traditional classroom and lecture approach (control group).

Experimental and Control Groups

This section discusses results of the experiment conducted to assess children's performance levels through pretest and posttest grades of both the experimental group subjected to the Montessori pedagogy method and the control group subjected to the traditional classroom lecture method. Included also are results on measuring the the preschool students' attention span.

In the case study, four sections of preschool students in Hizon Elementary School (n=120 students) and at Southpoint private school (also n=120) were subjected to traditional lecture and Montessori pedagogy. Two classes of Kinder 2 students from ages 5 to 6 years in each school participated. Children were assessed before and after learning activities, with lessons planned according to teachers' specifications from Montessori schools and traditional private preschools. Lessons and tests were prepared weeks prior to the day of experimentation. Hizon Elementary School children were taught counting numbers from 14-19 in math and classification of different vegetables in science. As specified by the homeroom teacher, lessons were based on the pace of the classes of the subjects of the experiment. Children from Southpoint were taught counting numbers from 0-10 in math and parts of the plant that involved basic gardening in science. Lessons were also based on the pace of the classes of the subjects of the experiment. In science, the children were also taught actively about the parts of the plant and how to plant in the Montessori approach. The same lectures were also taught to the children in the traditional lecture method. The exact environmental conditions in both the Montessori prepared environment and traditional classroom were applied. For the traditional classroom lecture method, the homeroom teacher assigned to the class was also the one who handled and gave the lecture to the Montessori preschool class. In the Montessori pedagogical approach, the researcher plus an assistant were the ones who handled and taught the class. A trained consultant of Montessori school provided necessary guidelines in teaching in the Montessori way The learning scope and objectives aimed at by both the Montessori and the traditional method were the same.

The preschool students were given pretests and posttests to measure their performance level in both math and science. The test designs were patterned to the exams given to Kinder 2 students and were checked by the preschool teachers of the classes in the experiment. The applied student-teacher ratio in the traditional lecture method was one teacher handling an average class of 40

students, consistent with the commonly used student-teacher ratio in private preschools in Davao City. In the Montessori approach only 10 students were handled by one teacher as specified by the consultant.

The Conducted Pretest and Posttest

Pretests and posttests were conducted in math and science subjects. At Hizon Elementary school two sections from the Kinder 2 preschool students were subjects for the experimental and control group. The experimental group were taught and exposed in the prepared environment using the Montessori method, while the control group was taught using the traditional lecture method.

Table 1

Pre-test and Post-test Results in Math of Hizon Elementary School

	Experimental Group Subjected to Montessori Method at the Prepared Environment		Control Group Subjected to Traditional Lecture Method Inside the Classroom	
STUDENT	PRETEST	POSTTEST	PRETEST	POSTTEST
1	4	4	16	16
2	5	2	16	14
3	16	16	10	14
4	4	4	5	3
5	4	7	3	1
6	1	3	8	5
7	11	12	7	10
8	5	11	4	4
9	3	5	4	2
10	4	5	12	11
11	7	4	9	9
12	11	10	2	3
13	5	11	7	13
14	13	12	12	13
15	2	7	3	3
16	3	6	3	0
17	5	5	6	6
18	2	9	6	3
19	4	5	2	2
20	3	5	4	5
21	4	2	5	9
22	4	4	3	7
23	5	4		
24	0	1		
25	6	11		
26	1	2		
27	6	6		
28	2	2		
29	3	4		
MEAN SCORE	4.93	6.17	6.68	6.95

As shown in Table 1, all scores of the 51 students who took the test in math were tabulated. These results are from the students of Hizon Elementary School. Due to absences, the expected number of 60 students was not achieved. Scores were tallied in all pretests and posttests. The mean scores of students taught in the Montessori method resulted in 4.93 in their pretest and 6.17 in their posttest scores. The mean scores of students taught in the traditional lecture method were 6.68 in their pretest and 6.95 in their posttest.

Table 2

Pretest and Posttest Results in Science of Hizon Elementary School

	Experimental Group Subjected to Montessori Method at the Prepared Environment		Control Group Subjected to Traditional Lecture Method Inside the Classroom	
STUDENT	PRETEST	POSTTEST	PRETEST	POSTTEST
1	3	1	8	8
2	1	3	4	4
3	0	3	4	7
4	6	3	3	3
5	0	3	0	2
6	1	3	0	0
7	3	2	3	2
8	3	1	5	0
9	0	0	4	3
10	0	0	4	2
11	0	4	7	7
12	0	0	3	3
13	0	3	1	0
14	3	0	6	4
15	1	0	6	8
16	0	6	6	7
17	0	8	6	6
18	3	8	5	0
19	3	0	4	6
20	3	8	4	8
21	0	3	2	3
22	0	0	0	4
23	0	6		
24	0	0		
25	0	0		
26	3	0		
27	0	3		
28	3	0		
29	0	0		
MEAN SCORE	1.29	2.43	4.05	4.13

As shown in Table 2, the mean scores of students taught science using the Montessori method were 1.29 in their pretest and 2.43 in their posttest with a mean gain difference of 1.14 . The mean scores of students taught science in the traditional lecture method were 4.05 in their pretest and 4.13 in their posttest with a mean gain difference of only .08.

Results for Southpoint in math are presented in Table 3. The mean scores of students taught using the Montessori method were 23.26 in their pretest and 24.42 in their posttest with a mean gain difference of 1.16. The mean scores of students taught in the traditional lecture method were 22.65 for their pretest and 23.31 for their posttest with a mean gain difference of only .66.

Table 3

Pretest and Posttest Result in Math of Southpoint School

	Experimental Group Subjected to Montessori Method at the Prepared Environment		Control Group Subjected to Traditional Lecture Method Inside the Classroom	
STUDENT	PRETEST	POSTTEST	PRETEST	POSTTEST
1	15	19	22	23
2	25	26	20	22
3	25	25	23	23
4	25	24	24	25
5	25	22	15	17
6	24	26	25	25
7	20	22	22	23
8	26	26	24	26
9	18	26	22	22
10	25	26	26	26
11	25	25	20	21
12	24	25	25	25
13	21	26	23	24
14	26	25	25	26
15	24	26	22	23
16	24	24	23	23
17	25	23	24	24
18	23	24		
19	22	24		
MEAN SCORE	23.26	24.42	22.65	23.41

As shown in Table 4, all scores were tabulated for the 36 students who took the tests in science at Southpoint School.The mean gain difference for the experimental group was .89 and for the control group was .82

Table 4

Pretest and Posttest Result in Science of Southpoint School

	Experimental Group Subjected to Montessori Method at the Prepared Environment		Control Group Subjected to Traditional Lecture Method Inside the Classroom	
STUDENT	PRETEST	POSTTEST	PRETEST	POSTTEST
1	4	4	2	4
2	4	4	4	4
3	0	2	4	4
4	1	1	4	4
5	4	4	4	4
6	4	4	2	2
7	2	4	2	4
8	4	4	2	2
9	4	4	1	2
10	0	2	0	2
11	2	4	4	4
12	4	4	1	4
13	4	4	1	2
14	2	4	2	2
15	4	4	1	4
16	1	4	2	2
17	4	4	2	2
18	2	4		
19	2	4		
MEAN SCORE	2.74	3.63	2.24	3.06

Summing up the results, it can be seen that that the difference of the mean gains of preschool students who were subjected to the Montessori pedagogical approach were higher than those of students subjected to the traditional classroom lecture method, which indicates that the Montessori approach was significantly better. See Table 5.

Table 5

Summary Mean Gain Results and Computed t-value of Hizon Elementary Preschool Students

Experimental Group Subjected to Montessori Method at Hizon Elementary School					
Subject	Pretest Mean	Posttest	Mean Gain	Computed t value	Critical t
MATH	4.93	6.17	1.24	7.18	2.07
SCIENCE	1.29	2.43	1.14	11.89	2.07
Control Group Subjected to the Traditional Method at Hizon Elementary School					
Subject	Pretest Mean	Posttest	Mean Gain	Computed t value	Critical t
MATH	6.68	6.95	0.27	3.04	2.05
SCIENCE	4.05	4.13	0.08	2.12	2.05

Moreover, the computed t-value of the those students subjected to the Montessori approach at 7.18 against 3.04 in math and 11.89 against 2.12 in science were also significantly higher, which indicate again that it is the better pedagogy. However, the results of the computed t value of the traditional lecture method at 3.04 in math and 2.12 in science were also higher than the critical t which indicated also that it is also a good method of teaching.

Table 6

Summary Mean Gain Results and Computed t-value of Southpoint Preschool Students

Subject	Pretest Mean	Posttest	Mean Gain	Computed t value	Critical t
MATH	23.26	24.42	1.16	2.88	2.09
SCIENCE	2.74	3.63	0.89	6.91	2.09
Subject	Pretest Mean	Posttest	Mean Gain	Computed t value	Critical t
MATH	22.65	23.41	0.76	2.11	2.01
SCIENCE	2.24	3.06	0.82	6.48	2.01

Additionally, the mean gain results of Southpoint preschool students also showed the same conclusions. Referring to Table 6, the mean gain result of the students subjected to the Montessori method is 1.16 in math and .89 in science compared to the .76 in math and .82 in science of those students of the classroom lecture method, which showed that the Montessori pedagogical approach resullts are higher. The computed t value was also slightly higher in math at 2.88 against 2.11 and at 6.91 and 6.48 in science, which indicated that Montessori approach results were again higher and thus better. Moreover, the computed t value of 6.48 in science, which is higher than the critical t value of 2.01, meant that the lecture method also improved the performance of the control group evaluated based on the subjects covered. The computed t value for math is 2.118, which is still higher than the critical t value of 2.01. This means that students of the control group still learned the covered topics in the two subjects using the traditional lecture method. Thus, it is indeed a classic and effective method in teaching.

Attention Span Result

An experiment was also conducted with the preschool students given the same set up of using the Montessori approach compared to the lecture method in both math and science subjects. The preschool students were subjected to writing and manipulative activities while their attention spans were recorded. The results concluded that children of ages 5 to 6 had an average of 10 to 20 minutes attention span. Moreover, the experimental group also showed a longer attention span than the control group. The average attention span of children in the experimental group was 7 minutes during science period and 12 minutes during the math period. Preschool students from the control group had an average attention span of 5 minutes during science period, and the average attention span was 6 minutes in math.

Learning Spaces and Learning Competencies

Based on empirical and ocular observation from preschools in Davao City different learning competencies were provided with different learning spaces. These spaces are necessary in order for children to be more productive and effective. As observed and documented in the conducted school visits, there were different learning spaces found in a Montessori school. The spaces were provided according to the learning competencies covered by the school. They have a kitchen complete with utensils, table, and sink where children do their practical learning activities. There are specific spaces provided for math and sensorial subjects. Children were also provided with a reading area. They are also provided with an open space where they can gather as a class and do activities such as dancing, singing, reciting poems and stories. Montessori schools abroad provide organic gardens for the children to indulge into activities like planting. Such space is not provided in Montessori schools found here in Davao City due to spatial constraints. Most Montessori schools visited used to be houses and were then renovated into a school. An open field is provided for children to play. It is where they learn the art of different sports. A fish pond can also be found in a Montessori school. It is where they get the opportunity to learn about fishes and feed them, which is also a part of their learning experience. Hence, children in the Montessori school experience different spaces while learning. A typical traditional preschool, on the other hand, has classrooms for every level. Most of the learning activities are done inside the classroom. Children go on field trips as one of their learning activities. Only then do children experience other spaces for learning other than the classroom.

Conclusions

The results of pretest and posttest results for both math and science in both pedagogical approaches indicated a higher computed t value compared to its critical t value evident in the results of both schools, which means that both types of teaching pedagogy are significant and deliver good and positive academic performance in preschool students.

The mean gain results for the postest and pretest of the Montessori pedagogy, however, resulted in a great difference compared to those for the traditional lecture method, which showed that it offers more points as a better learning method given its practical learning spaces.

Moreover in the attention span experiment, results showed that the children subjected to the Montessori activities and learning spaces had an attention span higher than the children subjected to the lecture method inside the classroom, leading to the conclusion that children have more interest in learning when they are involved in different activities and in different learning environments rather than just one.

To conclude and summarize, the exposure of children in different kinds of environments present in the Montessori prepared environment while learning as conducted in the experiment resulted in an attention span higher than the children exposed to the same classroom environment. Also children have better levels of performance as reflected on the conducted pretests and

posttests for the experimental group exposed to the Montessori prepared environment than for those inside the classroom. Hence, children learn more if exposed to active learning with the appropriate environment for the different learning activities.

The traditional preschool provided a classroom where most of the learning activities took place. The Montessori school offered a prepared environment where areas for specific subjects were provided. There were different student activities that each type of pedagogy included in their curriculum. Children showed to be more attentive and have a higher level of performance when exposed to the Montessori way compared to that of the traditional classroom approach.

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