

The Cognitive Impact of Successive Montessori Programs: An Empirical Study

By Maria Angelica Paez-Barrameda, Ph.D.

AMI AGM 08.04.2019

Amsterdam, the Netherlands



My study is inspiring, at least for me and my fellow Montessori teachers at the Abba's Orchard School. We can confidently tell the parents that when they choose Montessori for their children, they will not just be independent, reasonable, caring and confident individuals but that they will be able to conquer the challenges in high school and will be able to pass the stringent qualifying examinations of top Philippine Universities.

The Cognitive Impact of Successive Montessori Programs. Why this study?

MY MONTESSORI JOURNEY



First, allow me to share my journey as a Montessori guide...

This research journey began in the early 90s in Manila when I sent my first two children to a bona fide Montessori school. I saw how my boys loved going to school, how they eagerly rose from bed to prepare for school, and how excited they were to spend a brand-new day of learning. As a mother, trained in psychology, that mattered to me. I didn't know the Montessori program; what was important to me was that my children enjoyed learning.

A few years later, my engineer husband got a very attractive job offer to spearhead setting up a tomato paste processing plant in the southernmost part of the Philippines. I left my job as a professional head-hunter. We uprooted the family from the concrete jungle of Manila to the mountain plateaus of cool and green Bukidnon.

Being the busy-bee that I am and accustomed to the frenzied life of a corporate front-liner, I knew I needed to do something productive. I needed to do something to help me keep my sanity in a very isolated place, a place where I can hear the crickets chirp and roosters crow when I did not talk.

I continued my post-graduate studies in School Management at the Jesuit-run Xavier University/Ateneo de Cagayan. Here, I saw a glimpse of what makes a good school : small adult-

student ratio, child-centered learning, higher-order proficiencies, critical thinking, visual aids, working with the hands, etc. These were concepts that stuck in my mind. Unfortunately, the school had no program that focused on these concepts. I could just imagine what a good school is like.

Bukidnon is paradise, but it did not have a good school for my boys that was to our liking. We settled for what was available : traditional schools. But after a couple of years, I shifted to home-schooling. Home-schooling is good but lacked the necessary social training that I wanted for my children. My first two boys, now in elementary, wanted classmates. So, we sent them back to attend a traditional school.

A few years later, our second batch of two other children were ready to go to school. We wanted to offer them something better than homeschool, and we were reminded of Montessori when an Irish friend shared about her learnings from an online Montessori course.



We longed for the times when my older children were enrolled in a Montessori school in Manila. This was when I and my husband thought about bringing the Montessori Program to Bukidnon.

First, I looked at the different Montessori Programs available. And then decided on the A-M-I. My husband and I thought it best for me to leave the country and study the Montessori Primary Program.

In 1997, I trained with Nimal Vaz in Phoenix, AZ. Nimal is a highly inspirational person. Her dedication to her craft was infectious. It made me desire to look deeper into Montessori.

While training, I found myself not just learning the Montessori Program. Armed with a caliper and a camera, I took dimensions of the materials that I knew I had to take back home. I became an architect, an engineer, a craftsman, and an artist in my desire to bring to Bukidnon all that I learned abroad.

Back in Bukidnon, my husband built a bungalow where I immediately started a small backyard school for my two pre-school-aged kids and ten other children. I also employed a local craftsman, Odon, who is still with the school now, to help me make the Montessori materials. I shared what I learned with Ms. Toni and Ms. Aleli. They helped me with the 12 children. Today, twenty years later, they are still helping me care for more than 1,300 children spread across 13 campuses in major cities in the Philippines.



The school, that once existed in my imagination, has become a reality. I am witness to how the theories of Montessori came alive in these school children. I saw how they inched their way towards normalization. I saw how they loved to learn. Parents were happy with their children's progress.



However, being the loving parents that desired only the best for their children, they cannot help but become anxious about how their little ones would later on fare when they transition to conventional education. It was not a few times when I was faced with the question, "How will my child do in university?" Will they make it to the good universities?

It was not also a few times when I had to assure these parents that their children will do well given their confidence and academic achievement. They read early. They initiated work. They could lead discussions. They were focused, good team players and team leaders, they made reasonable choices. And more importantly, they loved learning.

Yet, I find myself asking, "where is the empirical proof?" I found no answers to these gnawing questions as I shared the same anxiety for my own children. There was dearth of empirical studies in the Philippines about the effectiveness of the Montessori method. I felt conflicted by the expressions of parental anxiety and the joy that I witnessed in the children. I wanted to make sure that I was doing the right thing for these children. I wanted an assurance that I am not short-changing these learners. I wanted proof that this educational method is effective, not just anecdotally but scientifically. This was the reason why I chose this as the topic for my post-graduate thesis.



My understanding of Montessori has been largely influenced by these practitioners: Nimal Vaz, Phyllis Pottish Lewis, Judi Orion, Jenny Hoglund, and David Kahn. I would like to acknowledge and thank them.

THE RESEARCH

Two Main Questions:

- 1: How will a Montessori student perform at the end of a full spectrum Montessori education?
2. How will he perform cognitively after or outside Montessori?

Many of us have experienced losing children who transfer to traditional schools because their parents fear that Montessori will not be able to prepare them adequately for the bigger schools.

This study endeavors to answer two main questions:

1. How will a Montessori student cognitively perform at the end of a whole spectrum Montessori education?

2. How will he perform cognitively after or outside Montessori?

We all know that it is not only cognitive ability that defines the whole person. Montessori is holistically strong but my study is limited to measuring only cognition.

STUDIES ON COGNITION OF MONTESSORI STUDENTS

STUDIES ON COGNITION OF MONTESSORI STUDENTS

Comparative

- Clifford and Takacs (1991) Cleveland's Marotta Public School
- Miller Studies with Oyer (1979) 4 different preschool programs
- Lillard and Else-Quest (2006) Executive Function
- Diamond and Lee (2011) Better performance, enjoyed learning
- Csikszentmihalyi (2009) "Flow" or optimal experience
- Rathunde- (2001) Motivation

Latent Learning

- Dohrmann, et.al. Cleveland Public School
- Miller & Bussell 1983
- Bohldson (1990)
- Karnes

I reviewed studies that compared the performance of Montessori and non-Montessori children . The common thread that these studies exhibited is that Montessori children performed better than those who went to traditional schools. Here are some of them. ¹
2 3 4 5 6

Other studies focused on the Latent Learning attributes of the Montessori Method of education. This type of learning is not

¹ Clifford, A., & Takacs, C. (1991). Marotta Montessori schools of Cleveland follow-up study of urban center pupils. Unpublished paper, Cleveland State University. Retrieved August 2016 from <http://www.montessori-namta.org/Montessori-Research-Summary>.

² Miller, L., & Dyer, J. L. (1975). Four preschool programs: their dimensions and effects. *Monographs of the Society for Research in Child Development*, 40(162), 5-6.

³³ Lillard, A., & Else-Quest, N. (2006). Evaluating Montessori education. *Science*, 313(5795), 1893-1894. Retrieved May 14, 2017, from <http://www.montessori-science.org>

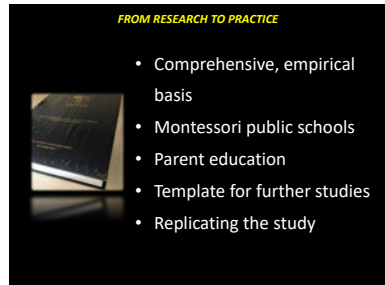
⁴⁴ Diamond, A., & Lee, K. (2011). Interventions shown to aid executive function development in children 4 to 12 years old. Retrieved August 27, 2017, from *Science AAAS* 333, from <http://www.sciencemag.org>. 961

⁵ Csikszentmihalyi, M. (1990). *Flow: the psychology of optimal experience* (1st ed.). New York: Harper Collins Publishers.

⁶ Rathunde, K. & Csikszentmihalyi, M. (2005). Middle school students' motivation and quality of experience: a comparison of montessori and traditional school environments. *American Journal of Education*, 111(3), 341-371. Retrieved on August 17, 2017 from <http://www.jstor.org>

apparent in the learner's behavior at the time of learning. But this learning manifests later when suitable motivation and circumstances appear. Here are some of them.^{7 89 10}

SIGNIFICANCE OF THE STUDY



This paper can find value to those involved in educating young hearts and minds, especially to the advocates of the Montessori Method of Education.

Comprehensive, empirical basis. Montessori movers can use the findings of this study to provide a comprehensive and empirical support to affirm the effectiveness of the Montessori Method in addressing the basic education needs of children, particularly in cognitive achievement.

Montessori public schools. The research can provide useful information to educational specialists of countries who are seriously looking at or have adopted the Method for their public education offerings.

Parent education. The research can help educate parents on the reliability of the Montessori Program in aiding children in their cognitive development. It will provide the necessary information on the benefits of starting the children early in the Montessori Program.

Template for further studies. The study can be used as a template in future studies on the effectiveness of the Montessori Method in aiding affective and physiological development.

Replicating the study. The study can be replicated to test for the universality of its findings in another environment that offers the whole spectrum of the Montessori Program.

⁷ Dohrmann, K. R., Nishida, T., Gartner, A., Lipsky, D. K., & Grimm, K. (2007). High school outcomes for students in a public montessori program. *Journal of Research in Childhood Education*, 22(2), 205-217.

⁸ Miller, L., & Bizell, R. (1983). Long-term effects of four preschool programs:sixth, seventh and eight grades. *Child Development*, 54.

⁹ Boehlein, M. M. (1988). Montessori research: analysis in retrospect. *The Namta Journal*, 13(3).

¹⁰ Karnes, M., Schwedel, A., & Williams, M. (1983). *A comparison of five approaches for educating young children from low-income homes*. In Consortium for Longitudinal Studies, As the twig is bent: Lasting effects of preschool programs (pp. 133-170). Hillsdale, NJ: Erlbaum.



Whole-spectrum Montessori attendance. School administrators can also cite the study to show that attending the whole Montessori spectrum program impacts significantly children’s cognitive development. Parents can be assured that sticking to Montessori is beneficial.

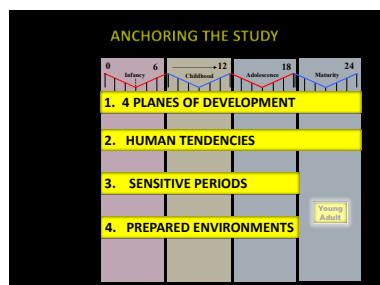
Stringent Program Implementation. The study demonstrates the need for the high-fidelity implementation of the Montessori program. As such, this can encourage Montessori Guides to implement the Montessori Method according to its design so that it can be effective in aiding the child towards optimum cognitive health.

Good scholastic performance. It is common knowledge that Montessori children exude confidence in articulating their thoughts and ideas. They are independent and capable workers. This study can give parents the needed security that the method equips children to hurdle traditional academic standards.

Peace of Mind. For parents, this study can dissipate their anxiety knowing that there is empirical data supporting their choice of a Montessori education for their children. For Montessori Guides, the study can also dissipate the Montessori practitioners’ anxiety knowing there is empirical proof that children will do well cognitively if they go through Montessori education.

Enhanced Confidence. The study can give Montessori Guides the necessary inspiration in their work, knowing that the sacrifices they do on a daily basis for the good of children under their care contribute to the children’s optimal development. Indeed, this can provide a boost to their morale and enhance confidence in their work.

ANCHORING THE STUDY



This study is anchored on four Montessori theories: The Planes of Development, Human Tendencies, Sensitive Periods, and the resulting Montessori Prepared Environments.

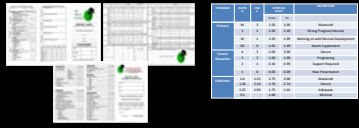
We know that Dr. Montessori designed her Prepared Environments according to the tendencies and propensities each human being developmentally goes through. We know that for the individual to optimally develop, our educational method should revolve around these characteristics and tendencies.

CONDUCTING THE STUDY

CONDUCTING THE STUDY

Research Design Descriptive, quantitative

Data Source Progress Report Cards
17 academic years (1999-2015)




Year	Grade	Score	Percentage
1999	1	85	85%
1999	2	78	78%
1999	3	72	72%
1999	4	65	65%
1999	5	58	58%
1999	6	52	52%
1999	7	45	45%
1999	8	38	38%
1999	9	32	32%
1999	10	25	25%
1999	11	18	18%
1999	12	12	12%
2000	1	88	88%
2000	2	80	80%
2000	3	75	75%
2000	4	68	68%
2000	5	60	60%
2000	6	55	55%
2000	7	48	48%
2000	8	40	40%
2000	9	35	35%
2000	10	28	28%
2000	11	20	20%
2000	12	15	15%

The research was conducted in the southernmost island of Mindanao, in the Philippines.

The study used a descriptive research design. The data was gathered from the 17 year academic records from 1999 to 2015. The ratings for the Casa and the Elementary levels were DESCRIPTIVE in nature so these had to be coded for statistical purposes. The number ratings in Erdkinder were already quantitative or numerical in nature.

105 AOS Erdkinder Graduates (2008-2015)



The respondents were the 105 graduates of the La Granja Campus of the Abba's Orchard School.

Research Setting: The Abba's Orchard School

13 campuses
4 farms
1337 students



The school runs Montessori Primary, Elementary, and Erdkinder Programs. The Assistants to Infancy Program was not existent yet at the time of the study so it was not included. Presently, the school operates in 13 campus locations in 11 major cities in the country. Four of these campuses include the Farm Environment for the adolescent program. The school provides Montessori education to 1337 students aged 14 months to 18 years old.

Quality Montessori

- Teacher education
- Parent education
- Montessori facility
- Program implementation



In order to ensure adherence to high quality Montessori delivery, The Abba's Orchard School strategically focuses on four major areas: teacher education, parent education, Montessori facility and program implementation. It is also guided by the specifications given during the AMI Teacher Training courses.

Statistical Design

Dr. Ester L. Raagas

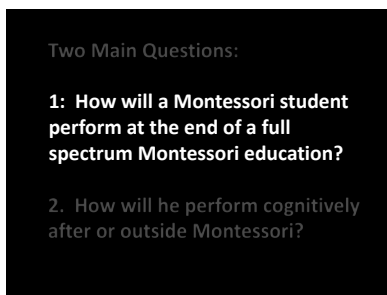
- Dean of Research
Xavier University



Since I am not a statistician, I have asked my doctoral adviser, Dr. Ester Raagas, to design the statistical treatment for the study. She is Dean of Research of Xavier University in Cagayan de Oro.

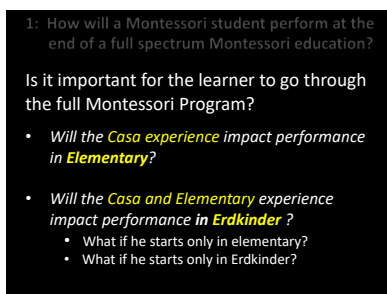


This research also went through the scrutiny of a panel of six Doctors in Education, three of whom are deans of departments and one vice president for Academic Affairs. This research has been approved and submitted to the Philippine Commission for Higher Education.



Now, let us look at the first question.

1: How will a Montessori student perform at the end of a full spectrum Montessori education?

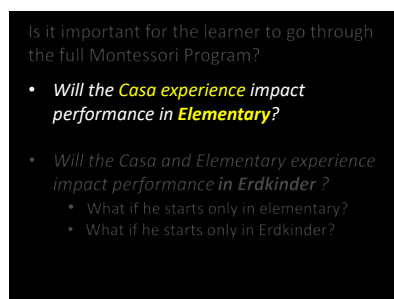


Is it important for the learner to go through the full Montessori Program?

Will the Casa experience impact performance in the Elementary?

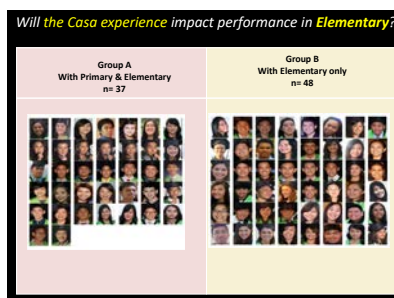
Will the CASA and Elementary experience impact performance in Erdkinder?

We also want to find answers to these: What if he starts only in elementary? What if he starts only in Erdkinder?



The first related question:

Will the Casa experience impact performance in Elementary?



To answer this, 85 students were grouped according to the number of Montessori Programs they attended. Group A had 37 students who had Casa and Elementary experiences. Group B had 48 students who went through elementary only.

Will the Casa experience impact performance in Elementary?

COMPARISON of LEARNERS' COGNITION IN Elementary (n=85)

Learning Area	Group A w/ Primary & Elem n=37			Group B w/ Elem only n=48			Mann-Whitney statistic U
	mean	sd	desc	mean	sd	desc	
Math	2.06	0.21	secure	2.00	0.09	secure	1108*
Geometry	2.05	0.20	secure	2.00	0.02	secure	953.5 ns
Geography	2.03	0.16	secure	2.00	0.00	secure	912 ns
Biology	2.03	0.16	secure	2.00	0.00	secure	912 ns
History	2.03	0.16	secure	2.00	0.00	secure	912 ns
Language	2.04	0.18	secure	2.00	0.01	secure	919.5 ns

ns-not significant (alpha= 0.05). * - significant (alpha ≤ 0.05) ** highly significant (alpha≤ 0.01)

The table shows the results of the tests for differences between Group A, those with Primary and Elementary, and Group B, those with Elementary only, on the different elementary learning areas: Math, Geometry, Geography, Biology. History and Language.

Will the Casa experience impact performance in Elementary?

FINDING 1 :
There is a significant difference in the performance of Group A and B in Math. Group A significantly performed better than Group B.

Math	2.06	0.21	secure	2.00	0.09	secure	1108*
------	------	------	--------	------	------	--------	-------

What does this tell us?

- Strong scaffold
- Materialized abstractions
- H O T S
- Flow

FINDING 1 :

There is a significant difference in the performance of Group A and B in Math. Group A performed better than Group B.

What does this tell us? These findings imply the effectiveness of the Primary Math Program.

- The program provides a strong scaffolding that helps students develop keener mathematical abilities.
- This is due to the strength of “materialized abstractions” that allow the learner to sensorially experience abstract mathematical concepts.
 - In using this teaching concept, students develop what Bloom defined as higher-order thinking skills (H.O.T.S) which go beyond the lower order thinking skills of knowledge, comprehension, and application. H.O.T.S are: evaluation, analysis, synthesis, and creation.¹¹
 - Also, learners identified mathematics as their preferred learning area because working on Montessori Math becomes a pleasurable experience. They even found working on complex mathematical problems as inspiring and non-threatening. They get into “flow.”

Will the Casa experience impact performance in Elementary?

FINDING 1 :
There is a significant difference in the performance of Group A and B in Math. Group A performed better than Group B.

Math	2.06	0.21	secure	2.00	0.09	secure	1108*
------	------	------	--------	------	------	--------	-------

Other corroborating studies

- Powell - Manchester preschool
- Donabella & Rule – On Math Materials
- Brown - African American children

This finding is also suggested in other studies. In the UK, a government-sponsored research in an inner-city primary school in Manchester showed that children who attended the Montessori Program achieved more than two levels of progress results in English and Mathematics. This finding surpassed the national average. This Manchester school is found in the top 10-percent of the most deprived areas in the country.¹²

¹¹ Bloom, B. (1956). *Taxonomy of educational objectives*. New York: David McKay Company.

¹² Powell, Carol. Gorton Mount Primary School Montessori Case Study. Retrieved July 15, 2010 from <http://www.montessori.org.uk/wp-content/uploads/2016/08/Gorton-Mount-Case-Study.pdf>

Donabella and Rule's 2008 research focused on multiple-digit multiplication. They described the effectiveness of using Montessori Mathematics materials in helping children in increasing their understanding of math concepts. They regarded the method and the materials as powerful tools in teaching Mathematics because of its "materialized abstractions" features.¹³

The Brown study yielded similar results.¹⁴

Will the Casa experience impact performance in **Elementary**?

FINDING 2:
There is NO significant difference in the performance of Group A and B in Geometry, Geography, Biology, History and Language.

What does this tell us?
Students will be able to absorb presented concepts in the above learning areas even if coming from a different learning background.

FINDING 2:

There is NO significant difference in the performance of Group A and B in Geometry, Geography, Biology, History and Language.

What does this tell us? Students will be able to absorb presented concepts in the above learning areas even when coming from a different learning background.

Other corroborating studies

- Dohrmann (2007) language and social studies
- Miller & Bizell (1983) – emergent effect
- Boenlein (1990), Karnes (1979) – Primary impact
- Hendron (2012) -key lessons

Similarly, Dohrmann's study found insignificant results in the language arts and social studies.¹⁵ Miller and Bizell found that the impact of Montessori Preschool experience is not observed at the end of the Primary Program; rather it emerges during the 2nd grade and persists up to the 6th grade.¹⁶ Boenlein¹⁷ and Karnes¹⁸ state that impact is observed even when the Casa experience is less than 3 years.

This researcher believes this Finding No. 2 is largely attributable to the way we use "Key Lessons" in these learning areas. Montessori created the "key lesson" principle to guide us. She emphasized the need to only present what is needed to fuel children's imagination so that they

¹³ Donabella, M., & Rule, A. (2008). Four seventh grade students who qualify for academic intervention services in mathematics learning multi-digit multiplication with the Montessori checkerboard. *Teaching Exceptional Children Plus*, 4(3).

¹⁴ Brown, K. E. (2006). Evaluating the effectiveness of Montessori reading and math instruction for third grade African-American students in urban elementary schools (Dissertation). University of North Carolina at Charlotte. Retrieved August 17, 2017 from <https://search.proquest.com>

¹⁵ Dohrmann, K. R., Nishida, T., Gartner, A., Lipsky, D. K., & Grimm, K. (2007). High school outcomes for students in a public montessori program. *Journal of Research in Childhood Education*, 22(2), 205-217.

¹⁶ Miller, L., & Bizell, R. (1983). Long-term effects of four preschool programs:sixth, seventh and eight grades. *Child Development*, 54.

¹⁷ Boehnlein, M. M. (1990). Research and evaluation summary of Montessori programs. In implementing Montessori education in the public sector. *The Namta Journal*. 476-483. Retrieved August 2016 from <http://www.montessori-namta.org>

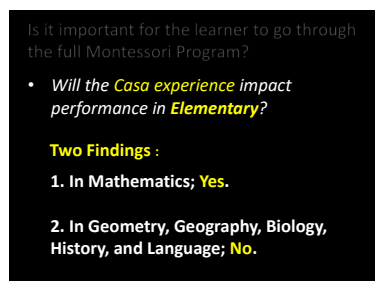
¹⁸ Karnes, M. E. (1979). Immediate, short-term and long-range effects of five preschool programs for disadvantaged children. *American Educational Research Association*. Toronto, Canada.

themselves will seek for more information related to the concept. By doing so, the doors for limitless exploration and discovery of new information become available. It must be noted that Dr. Montessori identified the emergence of the inquisitive and imaginative mind as a sensitivity of the Second Plane child in elementary.

According to Mario Montessori, “Key Lesson take up the details, item by item. Each gives some new information, presents new material, shows another exercise in a progression which allows the mind to build up knowledge and to continue searching on its own for what it does not know. Key Lessons are limited to essential presentations, to giving only information without which the mind of the child would find it difficult to understand a new concept. Other exercises may be interesting and offer variations, but if not absolutely essential to understanding, can be an obstacle to the mind's own investigation.”¹⁹



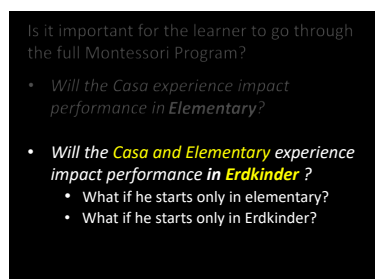
Hendron quoted Mario Montessori quoting his mother as saying, “they give what is sufficient and are limited to what is necessary.”²⁰



In summary, here is the answer to our first question..
Will the Casa experience impact performance in the Elementary?

Two Findings :

1. In Mathematics, Yes.
2. In Geometry, Geography, Biology, History, and Language, No.



Now, let us look at the next question.

Will the Casa and Elementary experience impact performance in Erdkinder ?

What if he starts only in elementary?

What if he starts only in Erdkinder?

¹⁹ Montessori, Mario. Key Lessons. Retrieved from <https://mariamontessori.b-cdn.net/wpcontent/uploads/2014/09/Key-Lessons-by-Mario-Montessori.pdf>

²⁰ Hendron, R. (2012). *Cosmic stories and key lessons in the elementary class*. Retrieved Sept 10, 2017, from: <http://montessoricommons.cc>

Will the *Casa* and *Elementary* experiences impact performance in *Erdkinder* ?

Area	Group A w/Primary, Elem, Erd n=27	Group B w/ Elem, Erd n=8	Group C w/ Erd only n=20	F value	p value
OSE	2.56	0.24	secure	2.58	0.000
CD	2.46	0.27	secure	2.27	0.000
GE	2.38	0.36	secure	2.23	0.001
PD	2.56	0.22	secure	2.60	0.001
Over all	2.29	0.19	secure	2.42	0.001

no not significant (alpha: 0.05)
* significant (alpha: 0.001)
** highly significant (alpha: 0.001)

We have the same students for Groups A & B. Group C is composed of 20 students with Erdkinder program only.

Will the *Casa* and *Elementary* experiences impact performance in *Erdkinder* ?

COMPARISON of LEARNERS' COGNITION IN ERDKINDER (n=105)

Area	Group A w/Primary, Elem, Erd n=27	Group B w/ Elem, Erd n=8	Group C w/ Erd only n=20	F value	p value
OSE	2.56	0.24	secure	2.58	0.000
CD	2.46	0.27	secure	2.27	0.000
GE	2.38	0.36	secure	2.23	0.001
PD	2.56	0.22	secure	2.60	0.001
Over all	2.29	0.19	secure	2.42	0.001

no not significant (alpha: 0.05)
* significant (alpha: 0.001)
** highly significant (alpha: 0.001)

The table shows the statistical analysis done to compare their performances. The selected learning areas are Opportunities for Self-Expression (O-S-E), Character Development (CD), General Education (GE), and Physical Development (PD).

Will the *Casa* and *Elementary* experiences impact performance in *Erdkinder* ?

Finding 1:
The results show that the three groups differ **highly significantly** in the **overall performance** in the learning areas (F=7.71**).

Area	Group A w/Primary, Elem, Erd n=27	Group B w/ Elem, Erd n=8	Group C w/ Erd only n=20	F value	p value
Over all	2.29	0.19	secure	2.42	0.001

no not significant (alpha: 0.05)
* significant (alpha: 0.001)
** highly significant (alpha: 0.001)

FINDING 1:

The results showed that the three groups differ significantly in their overall performance in the learning areas.

The probability value of 0.001 tells us that there is only one out of a thousand that the result is due to chance.

Will the *Casa* and *Elementary* experiences impact performance in *Erdkinder* ?

Finding 2:
The same **highly significant** difference was noted among the three groups in the following learning areas:
Character Development and **General Education** (p-value 0.001)

Area	Group A w/Primary, Elem, Erd n=27	Group B w/ Elem, Erd n=8	Group C w/ Erd only n=20	F value	p value
CD	2.46	0.27	secure	2.27	0.000
GE	2.38	0.36	secure	2.23	0.001

no not significant (alpha: 0.05)
* significant (alpha: 0.001)
** highly significant (alpha: 0.001)

Where are the **academic subjects** here?

FINDING 2: The same significant differences were noted among the three groups in the following learning areas: Character Development and General Education.

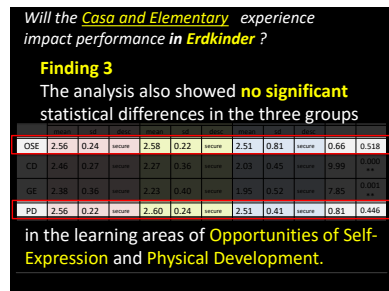
In fact, Group A adolescents exhibited the highest learning in CD and GE compared to Groups B and C. These learning areas present more direct indications of cognitive abilities and are used as measures of intelligence in schools in general. Where are the academic subjects here?

Dr. Montessori placed the academic subjects under two of the three components of the Montessori Adolescent Syllabus: Psychic or Character Development (or CD) and the Preparation for Adult Life or General Education (or GE).²¹

²¹ Montessori, Maria. (1994). *From childhood to adolescence*. Oxford, England: ABC-Clio Ltd

Montessori Adolescent Syllabus	
A. Opportunities for Self Expression	
Music, Language, Arts	
B. Psychic (Character) Development	
1. Moral Development	
2. Language	
3. Math	
C. Preparation for Adult Life (General Education)	
1. Study of the Earth & Living Things	
Geology, Geography, Biology, Cosmology, Botany, Zoology, Physiology, Astronomy, Anatomy	
2. Study of Human Progress & Building up of Civilization	
Physics, Chemistry, Engineering, Mechanics, Genetics	
3. Study of the History of Mankind	
D. Physical Development	

She emphasized Math and Language as necessary for Character Development. According to her, a keen mathematical ability is needed for the individual to take part in human progress as he collaborates and cooperates with others through language. The Preparation for Adult Life or General Education covers the sciences and human history.



The analysis also showed no significant statistical differences in the three groups in the learning areas of Opportunities of Self-Expression (or OSE) and Physical Development (or PD).

Is it important for the learner to go through the full Montessori Program?

Will the Casa experience impact performance in the Elementary? **YES, SIGNIFICANTLY**

Will he perform well at the end of the Erdkinder Program? **YES, SIGNIFICANTLY**

- What if he starts only in elementary?
- What if he starts already in Erdkinder?

YES, BUT NOT AS MUCH AS WHEN THE CHILD STARTS IN CASA

With the above findings, we can now answer these questions:

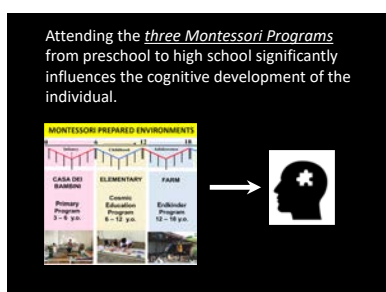
Will the Casa experience impact performance in the Elementary? **YES, SIGNIFICANTLY.**

Will he perform at the end of the Erdkinder Program? **YES, SIGNIFICANTLY.**

What if he starts only in elementary?

What if he starts already in Erdkinder? **YES, BUT NOT AS MUCH AS WHEN THE CHILD STARTS IN CASA**

Now we know that our children will do well at the end of the program.



In summary, we can confidently say that attending the three Montessori Programs from preschool to high school significantly impacts the cognitive development of the individual.

"The adult is the result of the child. Every adult is the achievement of a grown-up child; the causes of good or evil in the adult must all be sought in the very short period of the child's growth."

Dr. Maria Montessori
From Childhood to Adolescence


Montessori, emphasized the significant role of the child in constructing the adult when she said, "The adult is the result of the child. Every adult is the achievement of a grown-up child; the causes of good or evil in the adult must all be sought in the very short period of the child's growth."²²

²² Montessori, Maria. (1994). *From childhood to adolescence*. Oxford, England: ABC-Clio Ltd

Now, we ask,

Will the learner be able to hurdle stringent qualifying examinations given by **top universities**?

Will it matter if he starts in **Casa**? Or in **Elementary**? Or in **Erdkinder**?



The next concern that faces us is “How will the children do after Montessori?” We are all aware that our students thrive very well in whatever environment they are placed in. So we ask:

Will the learner be able to hurdle stringent qualifying examinations given by top universities?

Will it matter if he starts in Casa? Or in Elementary? Or in Erdkinder?

Top 3 Philippine Universities



University of the Philippines
1908



Ateneo De Manila University
1859



De La Salle University
1911

In the Philippines, the top-tiered universities are

1. The University of the Philippines - a state university founded in 1908
2. The Ateneo de Manila - run by the Jesuits, founded 1859
3. The De La Salle University - run by Christian Brothers, founded 1911

These 3 universities produce MAJORITY of the leaders in all sectors of the Philippine society : in government, in business, in the professional field and in civic and religious movements. Admission is very competitive and is viewed to open doors. In 2019, the U.P. alone received over 90,000 applications and took in only 11,821 freshmen qualifiers.²³

Table 3. Results of Statistical Analysis Between Adolescents' Performance in **University Entrance Tests (UET) and the Identified **Independent Variables (IV)** (n=105)**

1. Number of Montessori Programs Attended (**MPA**)
2. Erdkinder Academic Rating (**EAR**)

Using the pass/fail ratings in the graduates university entrance tests, two variables were considered: The number of Montessori Programs Attended by the students or MPA; and their Erdkinder Academic Rating or EAR. We can view the EAR as like the student's Grade Point Average or GPA in high school.

1. Number of Montessori Programs Attended (MPA)
2. Erdkinder Academic Ratings (EAR)

Independent Variables	B	S.E.	Wald	df	Sig.	Exp (B)
X1: MPA	1.24	0.37	11.220	1	0.001	3.464
X2: EAR	3.34	1.146	8.501	1	0.004	28.23
Constant	-11.141	2.801	15.106	1	0.000	.000

Omnibus Tests of Model Coefficients:
"Model chi-Square" statistic =32.52 where df=2 and prob< 0.01
** highly significant (p< 0.01)

Main Model:
logit(pv)= -10.141 +1.24x₁ +3.34x₂ equation 1
$$p = \exp \frac{-10.141 + 1.24x_1 + 3.34x_2}{1 + \exp \frac{-10.141 + 1.24x_1 + 3.34x_2}} \text{ equation 2}$$

FINDINGS: The statistics tell us that the number of Montessori Programs Attended and the Erdkinder Academic Rating contributed highly significantly to the likelihood of passing at least one of the university entrance test of the top three universities.

²³ University of the Philippines College Admission Test. Retrieved from en.m.wikipedia.org.

1. Number of Montessori Programs Attended (MPA)
2. Erdkinder Academic Ratings (EAR)

Independent Variables	B	S.E.	Wald	df	Sig.	Exp (B)
X1: MPA	1.24	0.37	11.220	1	0.001	3.464
X2: EAR	3.34	1.146	8.501	1	0.004	28.23
Constant	-11.141	2.801	13.106	1	0.000	.000

Omnibus Tests of Model Coefficients:
"Model chi-square" statistic =32.52 where df=2 and prob< 0.01
** highly significant (p< 0.01)

Main Model:
logit(p) = -10.141 + 1.24x₁ + 3.34x₂ equation 1
p = exp (-10.141 + 1.24x₁ + 3.34x₂) equation 2
1-exp (-10.141 + 1.24x₁ + 3.34x₂) equation 3

There are two findings that we can see here:

FINDING 1: The results indicated that attending an additional Montessori program increases the chance of passing any one of the three University Entrance Tests when the Erdkinder Academic Rating is constant. The statistics reveal a learner is three and a half times as likely to pass any one of the University Entrance Tests with an increase in the number of Montessori Programs they attend.

Allow me to illustrate this with an example. Steve and I went to the Abba's Orchard Erdkinder at the same time and had the same GPA. Steve had more Montessori Programs attended; he started attending the school in Casa; while I started attending only in elementary. Steve and I took the same university entrance test, say that of the UP. Based on the above statistical data, Steve will have three and a half times better chance to pass the UP entrance exams.

1. Number of Montessori Programs Attended (MPA)
2. Erdkinder Academic Ratings (EAR)

Independent Variables	B	S.E.	Wald	df	Sig.	Exp (B)
X1: MPA	1.24	0.37	11.220	1	0.001	3.464
X2: EAR	3.34	1.146	8.501	1	0.004	28.23
Constant	-11.141	2.801	13.106	1	0.000	.000

Omnibus Tests of Model Coefficients:
"Model chi-square" statistic =32.52 where df=2 and prob< 0.01
** highly significant (p< 0.01)

Main Model:
logit(p) = -10.141 + 1.24x₁ + 3.34x₂ equation 1
p = exp (-10.141 + 1.24x₁ + 3.34x₂) equation 2
1-exp (-10.141 + 1.24x₁ + 3.34x₂) equation 3

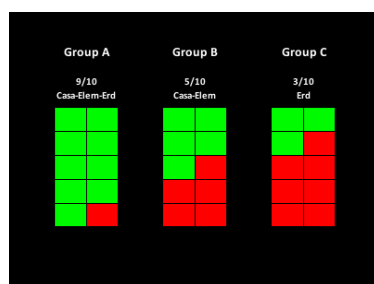
FINDING 2 : Considering now the MPA as constant; and the EAR as variable, the statistics signify that with every unit increase in Erdkinder Academic Rating, the odds that a learner can be predicted to pass any one of the University Entrance Tests increases by a factor of around 28 times.

To illustrate this with an example: Ela and I went to the Abba's Orchard Erdkinder at the same time. We also both attended Casa and Elementary. Ela is more studious [and/or is simply academically gifted] so she got one unit higher GPA or EAR (1.5 out of a perfect 1.0) than I did (2.5). Ela and I took the same university entrance test, say, that of Ateneo de Manila. Based on the above statistical results, Ela will have 28 times better chances to qualify and be accepted at the Ateneo de Manila University.

University Entrance Test (UET) Performance Table				
University	DLSU CET	ACET	UPCAT	Passed at least one UET
Total # graduates	105	105	105	
Passed	55	32	35	
Failed	35	61	61	
Did not take	15	12	9	
%passed	61%	34%	36%	
%failed	39%	66%	64%	
Programs Attended (n)				# %age
Casa/Elem/Erdkinder (37)	93%	63%	56%	33 89%
Elem/Erdkinder (48)	52%	13%	24%	25 52%
Erdkinder (20)	28%	31%	21%	7 35%

Here is a Summary Table of the PASS/FAIL results in the competitive University Entrance Test.

The table shows that 89% of those who went through the whole Montessori spectrum passed any one of the University Entrance Tests compared to 52% of those who attended only Elementary and Erdkinder and 35% of those who attended only the Erdkinder.



If we use tiles to visualize the pass/fail results, this is what it will look like:

For Group C or those with Erdkinder experience only, 3 out of 10 will pass any one of the university examinations. This, in itself, is a good batting average for any school considering the difficulty of making it into these universities.

For Group B, or those with Elementary and Erdkinder experiences, about half will make it into any one of the three universities.

For Group A, or those who went through the whole Montessori spectrum from Primary to Elementary and to Erdkinder, 9 out of 10 will be able to pass any one of the university entrance examinations of the top three universities in the Philippines.

THE END OF MY RESEARCH JOURNEY

THE END OF MY RESEARCH JOURNEY

In this study, Cognitive Performance is **attributable** to two factors :

- 1. Successive and Self-Regulated Learning Environments**
- 1. Holistically Prepared Learning Environments**


This study led to several conclusions and implications.

In this study, Cognitive Performance is attributable to two factors :

1. Successive and Self-Regulated Learning Environments and
2. Holistically Prepared Learning Environments

*"If 'the formation of man' becomes the basis of education, then the **coordination of all schools from infancy to maturity**, from nursery to university, arises as a **first necessity**: for man is a unity, an individuality that passes through interdependent phases of development.*

*Each preceding phase prepares the one that follows, forms its base, nurtures the energies that **urge towards** the succeeding period of life".*



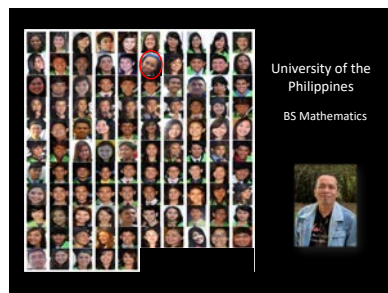
Dr. Maria Montessori
From Childhood to Adolescence

We see the value of attending the WHOLE Montessori spectrum from the Casa to the Elementary and the Erdkinder. In fact, Montessori emphasized that for education to be an effective tool in aiding the optimal development of the individual, the learning levels must not be treated independently from one another. Rather, it should be viewed as an integrated whole where one level is scaffolded on the previous one.

She says, *"If 'the formation of man' becomes the basis of education, then the coordination of all schools from infancy to maturity, from nursery to university, arises as a first necessity : for man is a unity, an individuality that passes through interdependent phases of development. Each preceding phase prepares the one that follows, forms its base, nurtures the energies that urge towards the succeeding period of life."*²⁴

²⁴ Montessori, Maria. (1994). *From childhood to adolescence*. Oxford, England: ABC-Clio Ltd. p.84.

This study saw two scholars graduate.



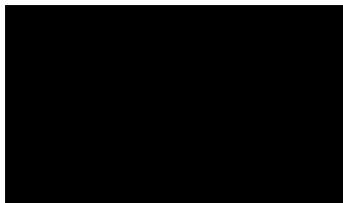
Remember the craftsman, who for the past 20 years has helped me make materials for the classrooms? Odon's daughter, Shanice, was an Abba's Orchard scholar. She is one whose family will not be able to afford education in a private school, much less, a bona fide Montessori school. Shanice passed the University Entrance Test of the University of the Philippines; her course: BS Mathematics. Odon has three more children at the Abba's Orchard.



Concon comes from a non-tuition family. Her father worked in the tomato paste plant where my husband worked. She started in Casa as one of the first 10 students in Bukidnon. She went through the whole Montessori program; made it to the U.P. where she also played varsity soccer. Concon graduated Cum Laude [her parents only found out on graduation day. She never mentioned it to her parents because it really didn't matter to Concon that she was receiving an award for excellent performance]. After university, she worked for a public relations company where she became a manager. The job paid well but she did not find fulfillment in the work, so she quit the job and joined the pool of Abba's Orchard guides. She chose to fulfill her cosmic task---to influence young hearts and minds.

Today, the Abba's Orchard has about 50 scholars in pre-school, elementary and high school. Many of these children come from LOW SES families and would not have access to good Montessori education. Even now, we are excited for them, for who they can become in the world that is being opened to them - one where they will assume their cosmic tasks of being change agents, of becoming children of peace.

What has become of these children?



Here is a 3 minute video of what some of these children have to say about how Montessori impacted their lives.

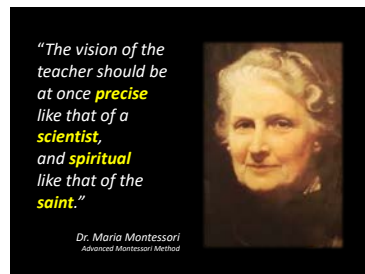
What has become of these children?

- RESPONSIBILITY
- EMPATHY
- LOVE FOR LEARNING
- ADAPTABILITY
- EXCELLENCE

It is worth noting the key words mentioned by the students :

- Responsibility
- Empathy
- Love for learning
- Adaptability
- Excellence

These traits, this study did not measure. How do we really measure them to begin with? How does one get to ace empathy or adaptability? The only metrics available is their life. All three children started in casa. All hurdled the top universities. Three finished with honors. One is going to med-school. One ranked high in the very competitive certified public accountant licensure test and thus was invited to work for a premier accounting firm, where she is presently. One set up his own I.T. Company. One quit a lucrative PR / marketing job and came back to school as a Montessori guide.



Let me end with a quote from Dr. Montessori, *“The vision of the teacher should be at once precise like that of a scientist, and spiritual like that of the saint.”*²⁵

All of you, all of us, with the dedication we give our work as Montessori guides, are spiritual as that of saints. I pray that sharing this study with you contributed to your being precise observers as that of a scientist.

Thank you for
listening !

Thank you for listening!

²⁵ Montessori, Maria. (2007). *The Advanced Montessori Method-I*. Clio Press LTD.