The Arrington-Hoelscher Research Study:

Are other types of schooling incorporating Montessori principles?

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Maria Montessori believed that "a child has a special interior vitality which accounts for the miraculous manner in which he makes his natural conquests; but if during his sensitive stage a child is confronted with an obstacle to his toil, he suffers a disturbance or even warping of his being, a spiritual martyrdom that is still too little known, but whose scars are borne unconsciously by most adults" (Montessori, 1960, p.49). Children all possess certain innate desires to learn and master tasks. They are naturally equipped with sensitive periods during which they are "primed" to normalize different abilities. All children everywhere possess this inner drive and follow the similar patterns to normalization, typically mastering tasks in a similar order. It is something natural to the child. If environmental factors, specifically the adults in a child's life, are not favorable to the natural course of a child's development, their natural drive and happiness can be severely distorted. The Arrington-Hoelscher Research Study is designed to examine some different educational environments to see if the difference in environment affects the children's behavior.

Theoretical Foundation

Overview of Key Theorist and Theory

Maria Montessori lived and worked in Italy during a period of "rigid bureaucracy" and "lack of concern for education" (Kramer, 1976, p.21). She was born in 1870 not long after the unification of Italy, when hopes were high, but circumstances unfavorable. Having a strict mother, Montessori spent a great deal of her childhood working around the house or for her elderly neighbors (Kramer, 1976, p.25). As she continued in school, she became extremely studious and intended to enter the sciences (Kramer, 1976, p.34). Montessori grew into an impressive young woman with "self-discipline" (Kramer, 1976, p.44). She received a doctorate

in medicine from the University of Rome in 1896 (Kramer, 1976, p.48). But she turned her attention to education shortly after (Kramer, 1976, p.61). In 1907, she opened the first *Casa dei Bambini* (Kramer, 1976, p.123).

In her construction of the space at the *Casa dei Bambini*, Montessori prioritized the child. She wanted to build a space in which the child could make his own choices and form his own habits. Montessori believed in the importance of each child's autonomy and individuality (Kramer, 1976, p.163), free choice (Montessori, 1960, p.148), and silence and peace (Montessori, 1960, pp.151, 158), as well as allowing the children to furnish the space so that the children could feel more comfortable and interested in their educational environment (Montessori, 1960, p.170). Montessori let the children guide her and show her what they needed. She believed that the children were equipped with certain needs which they naturally sought to fulfill. This is explained in her theory of sensitive periods.

Comprehensive Summary of Theory

Montessori believed that children are naturally equipped to learn. As they develop, they become primed to master certain tasks. These periods of predisposition to learn and master different tasks were what she called sensitive periods. Because sensitive periods are innate, teachers would do better to facilitate the child's self-teaching than to try and direct it. When children misbehave, it is because their inner desire to master a task is being frustrated (Montessori, 1960, p.51). The environment must be specifically designed to allow and encourage children to satisfy their learning needs (Montessori, 1960, p.135). The classroom must be simple, child-centered, and peaceful (Montessori, 1960, pp.136, 142).

Sensitive periods, which are particularly relevant to students in the Early Childhood classrooms (ages 2.5-6 years), are "genetically programmed blocks of time during which the child is especially eager and able to master certain tasks [and] the child works with all her might at perfecting these abilities" (Crain, 2011, p.73). If a child does not have the chance to develop a specific skill during the sensitive period for that skill, "the special sensitivity which draws him to [these experiences of focusing to perfect the skill] will vanish, with a disturbing effect on development" (Crain, 2011, p.73). Sensitive periods include those for detail (1-2 years), order (1-3 years), use of hands (1.5-3 years), walking (1-2 years), the acquisition language (birth - 6 years), and order (typically ends around 3 years) (Crain, 2011, p.73). Included in these are sensitive periods for unconscious/conscious grasp of language (Crain, 2011, p.75) and for motor skills (Crain, 2011, p.74). Sensitive periods were the driving force behind much of Montessori's specific lesson plans, as Montessori aimed to encourage natural development in the children through her carefully created classroom environment tailored to achieve that purpose.

For early childhood education, Montessori determined that to have the most successful classroom environment, each classroom should allow for control of error, should be "a child-sized home" where the child can do activities on their own and exercise autonomy (Montessori, 1960, p.136), and should not provide the children with toys, but rather, should provide them with only educational materials and activities. As Montessori stated after extensive observation, "I then came to realize that everything about a child should not only be in order, but that it should be proportioned to the child's use, and that interest and concentration arise specifically from the elimination of what is confusing and superfluous" (Montessori, 1960, p.148). Thus, a Montessori classroom environment is carefully arranged in a way that is most conducive to children's learning and engagement, and all instructions given are clear, precise, and in no way

"superfluous". To allow for control of error, Montessori created materials in a way that if the task was not completed correctly, there would be a piece left over or something similar, which the child will be very intrigued by and "then figure out how to correct the matter on their own" (Crain, 2001, p.81). Creating the classroom to be a "child-sized home", as Montessori describes it, means that there are "objects proportioned to a child's body, bright and luminous rooms, low windows decked with flowers, and miniature pieces of furniture modeled after those in modern homes… [with] little cupboards that can be easily opened by the children containing various objects which they can use at will" (1960, p.136). If a classroom is organized in this way, then these "practical improvements" to the room will each "contribute to a child's development" and will allow for the children to gain more educational and developmental benefits than they would in a classroom containing furniture and activities not tailored to their physical level (Montessori, 1960, p.136).

Classroom routine was also very important to Montessori's theory. A major aspect of this is repetition (Montessori, 1960, p.145). Montessori observed that children would repeat tasks numerous times (at times with no regard for disturbances and distractions surrounding them), stopping only when they achieved a sense of satisfaction with the task, and they would then move onto another task (Montessori, 1960, p.145-6). As Montessori observed, "the more carefully an exercise was taught in all its details, the more it became an object of endless repetition" (Montessori, 1960, p.146). Montessori also stated that "repetition of … an exercise can lead a child to perform exterior acts with a perfection which it could never attain through mere instruction" (Montessori, 1960, p.152). Another major aspect of Montessori's classroom routine is free choice (Montessori, 1960, p.148), meaning that children can "choose their own occupations according to their own particular preferences" (Montessori, 1960, p.148), and they

choose to interact with "the material that [correspond] to their own inner needs" (Montessori, 1960, p.148). Montessori also very strongly believed in not giving rewards or punishments (Montessori, 1960, p.150). Her extensive observations confirmed what she refers to as "the futility of rewards and punishments" since the children "seemed equally indifferent to either treatment [of reward or punishment]", with the children often even refusing rewards offered to them (Montessori, 1960, p.150). Thus, Montessori believed that rewards and punishments were an ineffective way of reinforcing good behavior. Another very important tenet of Montessori's theory is silent exercise (Montessori, 1960, p. 151). Montessori held that quiet and peaceful environments encourage increased attention to the task at hand, as well as independent mastery and concentrations. Montessori also emphasized the importance of teaching writing before teaching reading. Montessori observed that "it was evident that the children were more interested in figuring out the letters of the alphabet than in reading the words" (Montessori, 1960, p.163), and the children were very interested in deciphering various fonts (Montessori, 1960, p.163). Montessori also stated, "if we had been in too great a hurry to explain the printed characters to the children, we would have quenched their interest and eager insight. A premature insistence upon their reading words from books would have had a negative effect… [and] would have diminished the energies of their dynamic minds" (Montessori, 1960, pp.163-4). The response of children to their environment was also very important to the classroom routine. Montessori hoped to promote intense concentration, normalization, and physical health. Montessori held that "the role of education is to interest the child profoundly in an external activity to which he will give all his potential" (Montessori, 1973, *From Childhood to Adolescence*, p.25). Thus, her aim in educating young children was to encourage such concentration and natural interest, with "each experience involving a meaningful relationship with his environment increases a child's capacity

for spontaneous concentration" (Orem, 1967, p.131). Normalization is when a child, "through intense work" (Crain, 2011, p.79), reaches "their true or normal state" (Crain, 2011, p.79). Essentially, "when given tasks that met inner needs at sensitive periods, the children worked on them over and over. And when they finished, they were rested and joyful; they seemed to possess an inner peace" (Crain, 2011, p.79). It results in happiness, restfulness, and mastery. Physical health is important to Montessori's theory too because if a child is physically unwell, then that child will not be able to thrive mentally and intellectually in a classroom (Montessori, 1960, p.165). Overall, Montessori aimed to promote healthy development in her students, both intellectually and physically, and to help the child do so in a peaceful environment that was optimally conducive to learning and exploration. (See also Appendix I).

Synthesis of Other Research Studies

Study 1

"Outcomes for students in a montessori program: A longitudinal study of the experience in the milwaukee public schools," a longitudinal research study conducted by Alan Gartner, Dorothy Kerzner Lipsky, and Kathryn Rindskopf Dohrmann, sought to assess how students who attended Montessori schools for most of their education compared academically in the long run to students who attended traditional-style schools for most of their education. The researchers conducted the study under the approval of AMI-USA, "the American branch office of the Association Montessori Internationale (AMI)" (Dohrmann, 2003, p. 2), who were interested in assessing what amount of Montessori programs and Montessori resources should be maintained or introduced into the school districts of MacDowell and Greenfield.

The researchers acknowledged that in previously existing research done on Montessori education and its long-term effects, it had been difficult to determine the impact of differences in

socioeconomic status, parental influence, and potential inconsistencies among standards of the Montessori educational institutions (Dohrmann, 2003, p. 2). A main aim of the researchers in this project was to provide current, careful, accurate, and comprehensive research results regarding how Montessori education affects students in the long-run (Dohrmann, 2003, p. 2). To amend as many of these potential inconsistencies and varying circumstances, the researchers recorded information such as the gender composition, race/ethnicity composition, and socio-economic composition of the participants; also, the researchers created very specific guidelines for study participants including carefully documenting how many years each participant spent in Montessori education (Dohrmann, 2003, p. 2).

The study "compares the academic outcomes of two groups of students who graduated from the high schools of Milwaukee Public Schools (MPS) during the years 1997-2001" (Dohrmann, 2003, p. 2), with the first group of students being those who "completed the 5th grade in Montessori programs at MacDowell and Greenfield schools during the years 1990-1994" (referred to in this study as "Montessori students") (Dohrmann, 2003, p. 2) and with the second group of students being students who did not attend Montessori programs in the same schools during the same years (referred to in this study as "Peer Control") (Dohrmann, 2003, p. 2). "To allow for statistical control of factors that might influence academic outcomes," the researchers made sure that "Montessori students and Peer Control students were carefully matched by gender, race/ethnicity, and socioeconomic status (using eligibility for free or reduced lunch as a surrogate)", and they were also matched by which high school they attended (Dohrmann, 2003, p. 2).

When beginning data analysis, the researchers compared data related to academic performance: namely, GPAs and standardized test scores from the ACT and the WKCE

(Dohrmann, 2003, p. 3). The researchers also compared gender-related and ethnicity-related information and found that the correlations showed that in terms of GPA, "females outperforming males" (Dohrmann, 2003, p. 3) and that "non-minority students significantly outperformed minority students with GPA, Math/Science, and English/Social Studies" standardized test results (Dohrmann, 2003, p. 3). In addition, the group of Montessori students scored higher overall than the Peer Control group did (Dohrmann, 2003, p. 3). Academic achievement was strong from both groups, but overall, Montessori students performed better in most of the comparative categories (Dohrmann, 2003, p. 3). Ultimately, "this study supports the hypothesis that Montessori education has a positive long-term impact" (Dohrmann, 2003, p. 4) which is an idea that the Arrington-Hoelscher study took as inspiration for part of the study's hypothesis.

Study 2

Montessori believed that letting children pursue their own interests would help them perform better and faster. Some, however, doubt that children will continue to work hard if there is no specific goal like fulfilling a requirement to graduate. Generally, no matter which side of the argument a person falls on, people agree there is a discrepancy between Montessori and non-Montessori achievement. Some believe Montessori students will do better because of the freedom they are given to choose the work which naturally interests them. Others believe traditional students will do better because there is a rigid plan which pushes the students to master specific concepts which our "pre-established principles" dictate children of a certain age should master. To determine whether there actually is a difference between the groups, Laski and her colleagues constructed a research project ("Longitudinal Comparison of Montessori Versus Non-Montessori Students' Place-Value and Arithmetic Knowledge") to compare the

arithmetic skills of children in Montessori and non-Montessori programs. The specific skills tested were base-10 and place-value understanding with a consideration of how often decomposition was used (a method which takes advantage of base-10 reasoning). Because these skills are sometimes difficult, especially for children, and because they are the foundation for other, more advanced mathematical concepts, the researchers wanted to know whether early mastery of these concepts correlated to mastery in later topics.

They performed a longitudinal study, testing two different samples from each type of program: one group was tested in kindergarten and second grade and the other group was tested in first and third grade. First, the researchers observed how the children formed different numbers with manipulatives representing different place-values. Then the children were also given typical arithmetic problems for that grade-level one-at-a-time while the researcher asked the children how they solved the problem. The same children were tested again in the same way two years later.

Laski and her colleagues found that, though children in Montessori programs showed early mastery of base-10 and place-value, their advantage did not continue. The students from both types of programs exhibited similar accuracy and even similar methods. Laski presents many explanations for why this might be, but the results show that not only did Montessori children not exceed their peers, but they also did not show as much improvement as their non-Montessori counterparts.

This longitudinal study focused on the academic achievement of school children in the different types of programs, but Montessori's goal was not academic achievement. She did think academics would improve using her methods, but not because of their rigor. She believed that the free choice of the children and the cultivation of their personality would make them overall

happier, better people. There is not exactly an evaluation mechanism for how happy or good a person is. But the fact that children in Montessori schools did not exceed their non-Montessori counterparts is not surprising, since that is not the purpose of Montessori-style education.

From this study, the researchers in the Arrington-Hoelscher Research Study drew the idea of comparing Montessori programs to non-Montessori programs. Time restraints prevented them from performing a longitudinal study like Laski and her colleagues. However, they did observe different levels of classrooms to get a sense of how the educational program affects children over time. They were not observing the same children over time, but it is reasonable to assume there is consistency in the program over the years and that the programs would have consistent results over the years. The researchers decided to focus on Montessori's principles of education, specifically the attitude of the children, which Montessori believed was affected the most by the type of educational environment.

The Arrington-Hoelscher Study

Connection Between Theory and Study

The researchers asked three questions based on Montessori's belief in child-centered education. First, since children are similar to each other in their desire to learn, does their education in a Montessori-style environment tend to look the same as that in a more teacher-centered (traditional) environment? The researchers believed that the education of children in the traditional environments would tend to look the same, at least at the early childhood levels (2.5 - 6 yrs old). This is because children are naturally drawn to the activities which will help satisfy their inner needs. As Montessori says, her "methods are oriented not to an pre-established principles but rather to the inherent characteristics of the different ages" (*From*

Childhood to Adolescence, p. 3). But as the children age and the "pre-established principles" of adults are imposed on the children, their educational environments will begin to look much different as the "scars" from the disturbing of their development deepen.

Secondly, the researchers asked what the differences and similarities are between Early Childhood Montessori classrooms and traditional Kindergarten classrooms and between Lower Elementary Montessori classrooms and traditional 2nd grade classrooms. They thought that interactive and hands-on activities would be present in both types of the younger classrooms, with the difference being that Montessori classrooms will be centered more on the individual children and the traditional classrooms will be centered more on the teacher, who leads group activities. Then, as the children get older, the differences between the classrooms will increase. This is because, as Maria Montessori outlined in her theory, the adults have been too restrictive on the child's natural development and it has started to become warped.

Third and last, the researchers asked whether a difference in program and structure of the classroom would lead to a difference in the levels of peace, positivity, and focus in the classroom. The researchers hypothesized that there would be higher levels of peace, positivity, and focus in the Montessori-style classrooms because the children's needs were being met. There would be more focus because the children would be more interested in their work, having been able to choose it themselves. There would be more peace because the children would be engaged, and therefore less likely to be disruptive. In the more traditional classrooms, there would be less peace, less positivity, and definitely less focus because the natural processes of development had been disturbed. Montessori believed that the result of unmet desires was misbehavior and discontent.

Setting and Participants

The researchers visited one private school that employed a traditional style of education and one private school that followed Montessori's style of education. The Montessori school was an accredited Montessori institution. Both schools were private and co-ed. During the study, the researchers observed one traditional Kindergarten class (of children ages 5 to 6), one traditional Second Grade class (ages 7 to 8), one Montessori Early Childhood class (ages 2.5 to 6), and one Montessori Lower Elementary class (ages 6 to 9). Each class contained between 17 and 22 students. The researchers sat quietly in each classroom setting and recorded observational data in the rubrics that the researchers had previously designed. At each school, the researchers followed the same procedure of observation and data recording using the same rubric for each class (see Appendix II). The researchers did not record information about the children's appearances, gender, or any other personally identifying data.

Study Method and Procedure

This was a strictly observational study. The two researchers visited two different classrooms in each of two schools where they observed. Each classroom visit lasted approximately one hour – for a total of four hours of observation by each researcher. The observational nature of the study aimed to mimic Montessori' emphasis on observational research and on recording and analyzing specific anecdotal data.

The two researchers visited two traditional-style classrooms at the same traditional private school on two different days (October 24, 2017 and October 25, 2017). During the first visit, the researchers sat in separate classroom to observe, with one researcher observing a

Kindergarten class for an hour while the other researcher observed a Second Grade classroom. On the second visit, the researchers switched classrooms, each observing the class which she had not observed during the first visit. When the observations were over, the researchers has two sets of observational data for each classroom, which provided the researchers with information about each of the classroom environments over two different time periods and which helped the researchers to more accurately evaluate the classrooms by having two perspectives.

The researchers then visited two Montessori-style classrooms at the same accredited Montessori private school for two separate hours on the same day (November 2, 2017).

The researchers had no direct interaction with the children other than a simple introduction to the students at the beginning of the observation session when the students' teacher felt it beneficial. In each classroom, the researchers sat in an area of the classroom designated by the instructors where they would be least likely to disrupt the class, and they recorded their observations in rich, detailed notes using the guidance of the rubric which they designed based on Montessori's theory of education and primary sources (see Appendix II). The researchers would analyze this information by comparing the recorded data to Montessori principles and concepts and seeing how closely aligned the observations were to such principles and theory, as well as comparing each classroom's data to the correlating age group in the other school.

The researchers encountered only minor problems and disturbances to their intended observation plan. On the second day of observation at the traditional-style school, the Kindergarten class was off-campus on a field trip. The researcher who was planning to observe that grade level was unable to, and she opted to observe the Second Grade class for a second day to collect more thorough notes and to observe a different Second Grade lesson than she had on

the previous day of observations. Thus, the researchers collected three rubrics filled with observational data for the traditional Second Grade classroom and only one rubric filled with observational data for the traditional Kindergarten classroom.

Another unforeseen circumstance surrounding the observational study was that on the first day of observation at the traditional-style school, the traditional Kindergarten class was at their scheduled computer class in the school's computer lab, and then the class proceeded to recess. Although the researchers were not given an opportunity to see the classroom and the classroom resources that the Kindergarten students have available to them for the majority of the day, observation of the computer class provided plenty of observational data that could be successfully compared to and analyzed with the other data collected in the research study.

Research Findings

In the Montessori Early Childhood class (ages 2.5-6), the researchers recorded 2 teachers and 20 total children in the classroom, with a student-teacher 10 children to 1 teacher. Comparatively, the traditional Kindergarten class (ages 5-6) had 1 teacher and 19 students, with a student-teacher ratio of 19 students to 1 teacher. The early childhood students were primarily independently engaged in tasks, a tendency that was similarly observed in the activities Kindergarten students. One difference noted by the researchers was that the Early Childhood students did not wear uniforms even though the older Montessori students were required to wear them, whereas the Kindergarteners did wear uniforms along with the older traditional students.

The classroom supplies in the Early Childhood room included plants, shapes and manipulatives, an alphabet strip on the wall, plenty of books, and sandbox letters. Each of these supplies were reminiscent of activities and furnishings that Montessori specifically created or

recommended. There was also a large kitchen area, photos of wildlife, artwork, flags, simple maps, easels, and plenty of color. The Early Childhood classroom definitely reflected Montessori's concept of a "child-sized home" that encourages the children's comfort, independence, learning, and development. Also, the arrangement and easy access of the hands-on activities in the Early Childhood classroom were particularly conducive to free choice, and each activity served as an excellent example of self-correction.

The Kindergarten computer classroom contained desktop computers for all of the students, headphones, and equal access to the educational website ABCYa.com. This site contained games and interactive activities involving mathematical concepts such as numbers and counting; language-related concepts including alphabetizing, spelling, word searches, letter tracing, and word flash cards; and artistic and creative concepts, including decorating games in which children could design their own virtual cookies, pizzas, Christmas trees, and other similarly well-known shapes. The website used in class reflected Montessori's principles of allowing for free choice, self-correction, and collaboration. The headphones also make the activities more interactive, and they allowed the children to drown out the classroom's noise to create a more silent environment.

In terms of classroom interactions, the children played quietly and happily with each other, helping and watching each other complete tasks and activities. The Early Childhood teacher gently reminded students to continue their work, and they spoke in whispers to quiet the children down rather than trying to speak over the chatting. The teachers communicated with sensory stimuli as well as auditory signals: for example, when one of the teachers turned the lights off and on, that signaled to the children that it was time to clean up and prepare to go to recess. As they passed through the door to recess, each child said "thank you" to the child

holding the door. Thus, polite, calm, and respectful speech was predominantly used by both students and teachers in the Early Childhood classroom.

In the Kindergarten classroom, the teacher loudly announced that the room's noise level was too loud and asked the students to either lower their voices or work independently rather than with a friend. When speaking individually to students or when offering one-on-one assistance, the teacher spoke quietly and calmly, and the students responded in a similar tone and manner. Children spoke quietly to each other, some offering assistance to classmates, some collaborating, some showing off their work, but the noise level in the room became much louder on more occasions than it did in the Montessori Early Childhood classroom. While some students did not, most of the Kindergarteners said "thank you" to the child holding their door on their way out the door to recess. Thus, the students primarily used respectful and calm speech in their interactions with other students as well as with their teacher.

The adherence to Montessori principles in the Early Childhood classroom was very clear. There was work to be done, but the children walked about and wandered freely. The children were allowed and encouraged to repeat tasks as often as they felt necessary. A young child was tracing letters in the sand, an activity specifically outlined by Montessori as an example of a stimulating activity. The children laid out mats for their games on top of which to sit, creating an independent work space amidst a largely collaborative environment, and the shelves were open with everything was placed neatly inside. Education continued outdoors during recess, and plants present in the classroom allowed students to interact with nature on a certain level even while still being indoors.

In the traditional Kindergarten classroom, Montessori principles were definitely observed and clearly present. The children each had equal access to the same website, which provided a

large number of activities with a more than one activity available for each concept and skill set. This clearly is in line with Montessori's emphasis on variety of available supplies and on free choice on the child's part. Most of the children (17 out of 19) played each game multiple times, showing their tendency toward Montessori's principle of repetition. Each student wore headphones, and most of the conversation was quiet and productive. Education was not simply contained to the indoor classroom, but also was extended into the outdoors during recess.

The researchers observed more discrepancies between the older classrooms than they did with the younger age groups. The student-teacher ratios were analogous to those of the younger classrooms. There were 10 students to 1 teacher in the Montessori Lower Elementary classroom and 22 students to 1 teacher in the traditional 2nd grade classroom. The students from both schools were in uniforms. However, their classroom arrangement was very different. The children in the Montessori school sat at tables together but worked separately while each of the students at the traditional school had his own desk yet were engaged in a group lesson. Especially in the Montessori classroom, the students worked independently, occasionally checking each other's work. In the traditional classroom, students talked to each other, but rarely about the lesson.

Their supplies bore some similarity. Both types of classrooms had manipulatives and posters. They both had snacks and classrooms rules or agreements posted on the walls. Both classrooms implemented some technology, the traditional teacher using a SMARTboard and projector and the Montessori teacher keeping a desktop computer per student. The major difference here was how they were stored. The traditional classroom stored supplies in cabinets which were chained and secured with a combination lock. This eliminated children's choice in stimuli. The supplies which could be seen and accessed was piled and cluttered. However, the

Montessori classroom left the shelves completely open with the supplies placed neatly on labeled shelves. This left the students free to choose which manipulative would help him best. The space was always neat and tidy.

Interactions in these classrooms were also very different. In the traditional classroom, the teacher was the center and mediator of all interactions. She addressed the class as a whole, often raising her voice to be heard. She spent a great amount of time hushing the students. Though the students seemed to get along fine, they also shared this large sphere of interaction. When an administrator came in, all the students would rise and say, "Good morning, Ms. _____!" The Montessori school, on the other hand, encouraged small sphere interactions. The students barely said a word. When they did, it was only after approaching their listener. The teacher said very little, sometimes reminding students of the rules or that it was time for work. However, it was all very controlled and quiet.

The Montessori school showed more adherence to Montessori principles. The interactions were dignified and peaceful. The cabinets were open to allow for the free choice of the students. The traditional classroom allowed for none of this. The cabinets were locked. The teacher told the students what to work on and where to sit. The only definite Montessori ideas seen in this class were the repetition the math problems, which the teacher presented to the class, working several examples before giving homework on the same topic, and PVC pipe letters, which were mentioned by the teacher after an observation session. She said she would use them to help children who struggle learning to read. This activity would be potentially self-correcting and very hands-on and creative. However, the researchers were never able to see it used.

Overall, the Montessori School was very consistent with Montessori theory and principles, yet while the traditional school showed some evidence of Montessori principles when

it was helpful, the traditional school generally did not incorporate the tenets of Montessori's theories. The most incorporated aspect of Montessori-style schooling was repetition and a structured to the environment, even though the traditional-style school did not have the carefully curated aspect found in Montessori classrooms. In both classrooms, students showed evidence of sensitive periods and capabilities associated with Montessori-style education.

In conclusion, the researchers' hypotheses were proven correct, and the study's conclusions were able to sufficiently answer the questions that drove this research study. Kindergarten was much more similar to the corresponding Montessori classroom than 2nd Grade was to its Montessori equivalent. Montessori classrooms were more child-centered and child-directed, whereas the more traditional classrooms were more teacher-directed, and there were fewer hands-on activities in the traditional classrooms than in the Montessori classrooms. Students in Montessori programs had higher levels of peace, positivity, and focus in the classroom as compared to students in a more traditional setting.

Evaluation

As previously mentioned, the researchers encountered problems during the research study including the Kindergarten class not being in their main classroom during the first day of observation at the traditional-style school and the absence of the Kindergarten class during the second day of observation at the traditional-style school. Another issue that arose was a challenge to the analysis of the researcher's recorded observational data. Due to the differing age ranges of the grade levels being compared, comparing the actions and activities of the traditional Kindergarten students (ages 5 to 6) to the Montessori Early Childhood students (ages 2.5 to 6), as well as comparing the actions and activities of the traditional Second Grade students (ages 7-8) to the Montessori Lower Elementary students (ages 6 to 9), would not allow the researchers to

easily compare and find correlations between each group of students since the comparisons could not be as one-to-one as the researchers had hoped.

The study successfully and sufficiently answered all of the questions that the researchers posed as the basis of the study, and the results of the study did substantiate the hypothesis. The strengths of the research study included the successful observation and data collection in various classroom environments and for different age groups, as well as successfully allowing the researchers to attain specific anecdotal evidence to support the research study's hypothesis and overall aim. One weakness of the study was that in creating the rubric, the researchers did not create a specific system of analyzing or assigning numerical values to the recorded data and observations written in the rubric. In creating such a system, the recorded data would be much easier to analyze and would be quantifiable and able to be represented in a graphical or visual way. Another weakness of the study that could have been improved is the scheduling of the observational visits. The researchers could have contacted the schools to ensure that the observation took place during times when the various classrooms and students observed would be following their usual schedule and lesson plans. This would have allowed the researchers to more accurately achieve their intended purpose and plan for this study.

Implications and Questions

The researchers found that the Montessori school was in accordance with Montessori principles, while the traditional, non-Montessori school was not. While this would make sense and is in accordance with the researchers' hypothesis, the researchers wanted to consider the implications of their findings. First, they asked how the use (or absence) of Montessori methods and principles in the classroom contributes to academic success and developmental progress. They want to be clear that Montessori's goal was not necessarily academics. In Montessori's

From Childhood to Adolescence, she said that her "vision of the future is no longer of people taking exams and proceeding on that certification from the secondary school to the university, but of individuals passing from one stage of independence to a higher, by means of their own activity, through their own effort of will, which constitutes the inner evolution of the individual" (1973, Preface). Her goal was the independence of the individual. However, the researchers see how independence and understanding are linked. The understanding can help provide independence while the independence can lead a person to deeper understanding. It is possible that the use of Montessori methods and the focus on independence of the individual may, indeed, produce the developmental and academic progress sought for by traditional schools.

The researchers also asked how long it would take for children to adjust to being their own teachers, if teachers in traditional schools were to incorporate more of Montessori's methods and principles. Montessori describes the traditional schooling method as "warping" to a child's being and leaving "scars" (Montessori, 1960, p.49). These types of almost spiritual injuries do not disappear automatically. It would definitely take teachers some time to learn about Montessori's theory and methods. However, the children, too, would need time to transition. They would need firm guidance and patience as they tried to heal from the scars of traditional schools. How much time would depend on the child and the skill of the guide.

If a transition like this takes time and effort, it is important that it be worth. Based on their observations, the researchers argue that it could be in teachers' interest to implement at least some of Maria Montessori's theories. Her style of teaching and learning has such simplicity to it. She sees an importance to letting the child's development take its natural course. In addition to heightened joy in learning and increased independence for the children, could teachers themselves benefit from the simplicity and flexibility of Montessori-style schooling? In the

traditional classrooms, the researchers saw the effort put into decorating the room and delivering the lesson. There were motivational posters, crafts, and personalized cubbies and desks. The teachers consistently pushed for finishing the work. They were also spending more time on correction and class management than on presenting the lesson.

In the Montessori school where the researchers observed, the teacher's role was notably different. She seemed calm and relaxed. She took time for each student and was available to all of them. She did correct them when necessary, but her role was much less intense than the teacher's at the traditional school. She acted more as a facilitator and less as a moderator. Even if a teacher is not at a Montessori-style school, she could potentially benefit from the simplicity of the method with at least the same results.

If teachers were to begin implementing Montessori methods, there is still one more issue: how could the standardized system of learning in the globalized world accommodate Montessori method of schooling? Many people are worried about Montessori-style Middle and High Schools because it seems too free. While that is the essential part of Montessori's theory, the freedom and independence of the child, the school system present in the Western world is not very kind to this approach. There are specific requirements and pre-determined timelines for completing them. But Montessori's theory prioritizes the child over "pre-established principles" (Montessori, 1973, p.3). What, if anything, can be done to help the standardized system accommodate a method as free and organic as Montessori's?

From this study, the researchers determined that Montessori-style classrooms really do foster the natural creativity and love of learning in children. They do facilitate free choice and encourage concentration, more so than traditional classrooms. Their goals were accomplished, but they are left with more questions than they can answer through this study. Having seen for

themselves the “inherent characteristics” of children and how Montessori’s methods foster those sensitivities, there is still the question of how to promote this valuable theory (Montessori, 1960, p.3). How can the world begin to resurrect the damaged soul of the child and restore its dignity? How can we return to the freedom and independence of our natural gifts?

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Appendix I: Glossary of Critical Terms

1. Sensitive Periods
    a. "genetically programmed blocks of time during which the child is especially eager and able to master certain tasks" (Crain, 73)
    b. "During these periods, the child works with all her might at perfecting these abilities" (Crain 73).
    c. If a child does not have the chance to develop a specific skill during the sensitive period for that skill, "the special sensitivity which draws him to [these experiences of focusing to perfect the skill] will vanish, with a disturbing effect on development" (Crain, 73).
    d. Sensitive periods include those for detail (1-2yrs), order (1-3yrs), use of hands (1.5-3yrs), walking (1-2yrs), and the acquisition language (birth - 6yrs).
2. Normalization
    a. When a child, "through intense work" (Crain, 79), reaches "their true or normal state" (Crain, 79).
    b. Essentially, "when given tasks that met inner needs at sensitive periods, the children worked on them over and over. And when they finished, they were rested and joyful; they seemed to possess an inner peace" (Crain, 79).
3. Control of Error
    a. Self-correction
    b. Montessori created materials in a way that if the task was not completed correctly, there would be a piece left over or something similar, which the child will be very intrigued by and "then figure out how to correct the matter on their own" (Crain, 81).
4. Gradual Preparation
    a. Because "children cannot learn many skills all at once" (Crain, 81) due to a lack of fine motor skills, "Montessori developed materials that would enable the children to learn skills in steps, at levels they could master" (Crain, 81), gradually working their way up until they have mastered the skill (Crain, 81).
5. Free Choice
    a. A focus of Montessori's educational philosophy
    b. Children-centered classroom environment
6. Repetition
    a. Montessori observed that children would repeat tasks numerous times (at times with no regard for disturbances and distractions surrounding them), stopping only when they achieved a sense of satisfaction with the task, and they would then move onto another task (*The Secret of Childhood*, p.145-6).
    b. "The more carefully an exercise was taught in all its details, the more it became an object of endless repetition" (*The Secret of Childhood*, p.146).
    c. "Repetition of … an exercise can lead a child to perform exterior acts wit a perfection which it could never attain through mere instruction" (*The Secret of Childhood*, p.152).

7. Peace and Quiet
    a. Quiet and peaceful environments encourage increased attention to the task at hand, as well as encouraging independent mastery and concentrations (*The Secret of Childhood*, p. 151).
8. Child-Oriented
    a. Montessori's system of education proposed "reversed roles of child and adult--the teacher without a desk, without authority, and almost without teaching, and the child, the center of activity, free to move about as he wills and to choose his own occupations" (*The Secret of Childhood*, p.135).
    b. "The teacher does not try to direct, instruct, drill, or otherwise take charge of the child; instead, the teacher tries to give the child opportunities for independent mastery. The assumption is that if the school environment contains the right materials--those that correspond to the children's inner needs at various sensitive periods--the children will enthusiastically work on them on their own, without adult supervision" (Crain, 77-8).
9. Writing before Reading
    a. Montessori observed that "it was evident that the children were more interested in figuring out the letters of the alphabet than in reading the words" (*The Secret of Childhood*, p.163), and the children were very interested in deciphering various fonts (*The Secret of Childhood*, p.163).
    b. "If we had been in too great a hurry to explain the printed characters to the children, we would have quenched their interest and eager insight. A premature insistence upon their reading words from books would have had a negative effect… [and] would have diminished the energies of their dynamic minds" (*The Secret of Childhood*, p.163-4).
10. Independent Mastery
    a. "The assumption is that if the school environment contains the right materials--those that correspond to the children's inner needs at various sensitive periods--the children will enthusiastically work on them on their own, without adult supervision" (Crain, 78).

Appendix II: Arrington - Hoelscher Montessori v. non - Montessori Classroom Rubric

Adapted from rubrics used by National Center for Montessori in the Public Sectors

1. Activities of Students

As recorded at the beginning of the observing session

Type of work	Independently engaged in task	Receiving help	Wandering	Disrupting friend	TOTAL
Students observed in activity					
Total students					

2. Classroom Supplies

Sensory	Mathematics	Language	Practical	Arts and Culture

3. Classroom Interactions

Includes teacher - parent, teacher - student, and student - student

	Teacher - parent	Teacher - student	Student - student
Quiet voices *Interactions are close, not far away*			
Calm and careful			
Respectful *Consider the tones of the voices*			
Polite *Consider word choice (please, thank you, etc.)*			

4. Adherence to Montessori Principles of Learning

As determined from primary source material

Montessori Principle	Number and description corresponding events
Free choice (The Secret of Childhood, 148)	
Repetition (The Secret of Childhood, 145)	
Peace and Silence, esp silence exercise (The Secret of Childhood, 158, 151)	
Writing and Reading (The Secret of Childhood, 163)	
Organization (To Educate the Human Potential, 4)	

5. Notes and Observations

Montessori included many anecdotes in her literature. Rich, specific observations will help with the oral presentation.