

A 3-Year Study of Self-Regulation in Montessori and Non-Montessori Classrooms

By Barbara Ervin, Pamela D. Wash, and Marilyn E. Mecca

INTRODUCTION

Research in Self-Regulation

Take a glimpse into the minds of 5- and 6-year-old Montessori children:

Interviewer:

"When something is hard for you to do, what do you do to make it easier?"

Sample responses from children:

"Keep trying."

"Look at the thing and it shows me what to do."

"Sometimes you call someone to help you."

"I figure it out."

"I just keep doing it."

"To work on it a little bit more."

These responses, taken from interviews of South Carolina public school Montessori kindergarten students in the spring of 2005, indicate persistence, self-motivation, goal setting, and metacognition. These traits and others, such as the ability to control impulses and delay gratification, are collectively known as self-regulation.

Albert Bandura, the leading pioneer in the study of self-regulation, has defined the term as the child's ability to self-educate, self-direct, regulate motivation, and learn to think about what she is learning (1994). Lev Vygotsky's theory that children can be taught to think independently about how to solve problems expands upon Bandura's work (1978). And Blair (2003) states that self-regulation is the child's ability to take steps to meet a goal, control emotions, plan strategies, monitor progress, persist at a task, and self-correct errors. The importance of self-regulation in the classroom is apparent when we consider that "high levels of motivation and self-regulation are clearly associated with academic achievement independent of measured intelligence" (Blair, 2002, p. 111). Further, Bandura (1994) has stated that the self-efficacy beliefs of classroom teachers can contribute to the child's developing ability to learn and use self-regulation.

Though Montessori did not use the term *self-regulation*, the descriptions of inner discipline, or *normalization*, in her writings are clearly related to this concept. Inner discipline, according to Montessori, is the child's ability to concentrate, work with constant effort, bring order to the mind, respect others as well as the environment, achieve contentment, and live in peace (Montessori, 1995). Because Montessori classrooms emphasize developing behaviors associated with self-regulation, Lander University's Montessori Teacher Education Program chose to focus on this as a topic of research in a 3-year study funded by a 2004 congressionally directed grant (#P116Z04-0218).

The differences in classroom culture between Montessori and

non-Montessori public school environments may account for differences in how children learn independent work habits and healthy social skills associated with self-regulation. Montessori classrooms, as opposed to non-Montessori settings, use more individual or small group instruction and have greater reliance on the direct, independent use of concrete materials by children. Montessori classrooms employ multiage grouping, so teachers work with the same children over several years. Children in Montessori classrooms are also afforded more choice in work activities and the way they structure their time in the academic day.

Research Questions and Interpretations

The following questions guided Lander's study:

1. *Is there a difference in levels of self-regulation in children between Montessori and non-Montessori classrooms?*
2. *Is there an association between children's level of self-regulation and academic achievement in Montessori and non-Montessori classrooms?*
3. *Is there an association between levels of teacher beliefs of self-efficacy and self-regulation and academic achievement in children in Montessori and non-Montessori classrooms?*
4. *Is there an association between parental views of child discipline and levels of self-regulation in Montessori and non-Montessori classrooms?*

In order to assist the reader, the researchers offer the following details related to the study design and findings. In this study, the researchers provide data and summations of the data, but only point out associations in the data while making no claims or naming causation(s) for the outcomes. Associations made in research are identification of data that are deemed statistically significant; therefore, when data results were significant, associations are provided allowing the reader to consider potential causations (Dorak, 2009). Additionally, classrooms and participants in this study were in schools offering public school choice for all students in their respective districts (available to all households); however, one Montessori private school was also included in order to work with approximately the same number of both Montessori (127) and non-Montessori (129) students. As you will see in the research methods to follow, reliability and validity measures were taken to control as many variables as possible and to eliminate or at least minimize any potential bias.

Setting and Participants

The data collection for the study took place over a 3-year period from spring 2005 to 2007. Subjects for the study were a cohort group of 256 kindergarten, first-grade, and second-grade students from three public school districts in South Carolina. Two districts were rural and one was urban. One independent Montessori school, located near a small city in South Carolina, also participated in the study. The study comprised a total of 127 children in Montessori classrooms

and 129 in non-Montessori classrooms. The schools used in this study were located in four different geographical regions in the state of South Carolina. Only two of the five schools used were within forty minutes of Lander University; the remaining three schools were a one-hour drive or farther from Lander. Rural School One had an enrollment of 397 students in grades PK–5 with a 61% free/reduced lunch population; Rural School Two consisted of 463 students in grades PK–5 with 73% free/reduced lunch; Rural School Three had an enrollment of 428 students in grades PK–5 with 77% free/reduced lunch; Urban School 4 consisted of 293 students in grades PK–5 with 45.2% free/reduced lunch; and Independent School Five had an enrollment of 138 students from infants to grade 8 and is located in a public school district with an overall 36% free/reduced lunch population.

Montessori and non-Montessori classrooms coexist in the three rural school buildings; therefore, the children in these classrooms came from the same population. Parents, however, were able to select either Montessori or non-Montessori classrooms for their children. The one urban school is entirely a Montessori school whose enrollment comes from its neighborhood attendance zone and the larger district. The children in the study were of mixed racial backgrounds. Written parental permission was received each year in order for the children to be part of the study.

Thirty-three teachers in the schools were also subjects in the study; each year they completed a survey measuring their self-efficacy based on surveys developed by Bandura (n.d.). Eleven non-Montessori teachers and twenty-two Montessori teachers participated. The multiage classroom configuration explains the larger numbers of Montessori teachers needed in order to have equivalent numbers of children from the same level each year. All public school teachers held the required state certifications. Seventeen of the Montessori teachers held Montessori certification for the age level they taught, while the remaining teachers held Montessori certification, but not for that level, or were in training for a certificate. Montessori education and credentials came from a variety of different programs. Both groups of teachers had about the same classroom experience, an average of 8 years for Montessori teachers and 7 for non-Montessori teachers.

Parents participated in the study by completing a survey and answering an open-ended question at the end of the survey about how they teach their children discipline. A total of 226 parent surveys were completed over the 3-year period.

METHODS

Measures Used in the Study

Both quantitative and qualitative data were collected each year during the course of the study; all but one of the measures were developed by the researchers. A description of each is provided on the next page. Quantitative data was

obtained from the Early Childhood Teachers' Attitude Scale, the Rating Scale of Work Habits and Social Relationships for Young Children, the Parent Survey, and the MAP (Measures of Academic Progress) tests. The Child Interview and comments that parents made about their methods of discipline on the survey provided the qualitative data.

Rating Scale of Work Habits and Social Relationships for Young Children

This rating scale, developed by the research team, was based largely upon the developmental milestones of self-regulation detailed by Bronson (2000). The measure contained 17 Likert-scale response items; 8 related to social relationships and 9 to work habits. At the end of the scale, the teacher was asked to rate each child's academic performance.

Prior to the study, the internal consistency of the measure was established using 10 groups of teachers and their student teachers in early childhood classrooms. The teachers and their student teachers each rated 5 of the same children and the results showed a Cronbach's alpha reliability coefficient of .9037.

Child Interview

Each year, beginning in kindergarten and ending in second grade, a sampling of children was interviewed using a standardized interview instrument developed by the lead researcher. All the questions were open-ended and the interviewer wrote as the children responded to each question. The measure had been used previously in a pilot study of 17 second-grade children in a rural South Carolina school in 2000 and later revised.

Early Childhood Teachers' Attitude Scale

The purpose of the attitude scale was to measure teachers' beliefs about efficacy. This scale was based upon the work of Bandura (n.d.). In fall 2004, the survey was given to a similar group of 18 teachers in a graduate course, which resulted in a Cronbach's alpha internal reliability of .8722. They were also asked to make any suggestions for rewording of items to make the survey more effective, and none were given.

Parent Survey

All parents were asked to respond to a 13-item Likert-scale survey. The statements on the survey correlated closely with the Rating Scale of Work Habits and Social Relationships for Young Children completed by teachers. Parents were asked to rate items related to their child's curiosity, pride in accomplishment, and helpful actions toward others. At the conclusion of the survey, parents were asked: "Can you describe how you teach your child discipline or what you do so that your child understands appropriate behaviors?" These responses were collated and analyzed.

Measures of Academic Progress (MAP) Tests

These tests are computer-generated and administered three times each year, beginning in second grade. All three public school districts participating in the study routinely administer this test. The scores reported in the study are from spring 2007. MAP tests were designed and disseminated through the nonprofit Northwest Evaluation Association. The website describes the tests as "state-aligned computerized adaptive assessments . . . that measure academic growth over time." The ongoing research of the Northwest Evaluation Association indicates that the tests correlate well with the Iowa Tests of Basic Skills and that the tests are reliable and valid (www.nwea.org).

Collecting the Data

During March of each of the 3 years of the study, a member of the research team met with teachers, reviewed the study, and explained the measures. The teachers were told about the anonymous nature of the study regarding children, teachers, and specific schools. At the yearly meeting, teachers completed a data sheet and were given the self-efficacy survey described above and copies of the Early Childhood Teachers' Attitude Scale. They also received parental consent forms to be sent home and were told that only children with signed parental approval would participate. Teachers distributed the Parent Survey to those parents who had given their consent and asked that it be completed and returned promptly. During April of each year, all data was collected by the researchers when they were in the school to conduct child interviews. At the end of the third year, school principals provided MAP tests data for participating children.

Each March, the researchers trained undergraduates from Lander's teacher education program in the techniques of interviewing young children and recording their responses. The undergraduates learned how to begin the interview by developing a level of comfort with the child, how to ask the questions, what to do when a child would not or could not answer a question, and how to ask clarifying questions when the child's response was not understood. This occurred just before the actual interviews were scheduled so that the effect of the training would remain current. A member of the research team was present in the school while the interviews were conducted. Interviews took place in the classroom or in an available auxiliary room in the school, and each one lasted about 10 minutes. The children were told that their words would be written down and most appeared to enjoy the experience.

FINDINGS

Table 1 (next page) describes the variation in numbers of respondents to the different measures used. Results from measures are provided in separate tables.

Results of the Rating Scale of Work Habits and Social Relationships for Young Children

The Rating Scale contained 18 items in two categories: work habits and social relationships. The directions to the teachers were to use one of the following ratings—Always, Almost Always, Almost Never, or Never—to rate each child based on age-appropriate expectations. Analysis of the rating scale shows that on nine of the items—mostly those dealing with work habits—the ratings for Montessori children were statistically significant at the .001, .02, and .05 levels (99.9% accurate, 98% accurate, and 95% accurate, respectively) meaning it is unlikely these results occurred by chance, statistically speaking. These items were:

1. To what extent does the child need less supervision to solve conflict;
2. To what extent does the child exhibit feelings of happiness and contentment;
3. To what extent does the child indicate a desire to work toward academic goals, such as learning to read, write, or do math;
4. To what extent is the child proactive in using problem-solving strategies when engaged in cognitive tasks;
5. To what extent can the child monitor his/her own learning for correctness;
6. To what extent can the child inquire, ask questions, and seek out information when he/she does not fully understand the task;
7. To what extent is the child developing internal standards of performance;
8. To what extent does the child recognize academic areas in which he/she does well and react positively to them; and
9. To what extent does the child recognize the good work of peers and use the knowledge for self-judgment of his/her own performance?

Even for those items that did not prove to be statistically significant, the ratings for Montessori children increased as they progressed from kindergarten to second grade. No claim can be made that the effect of the Montessori method resulted in all of the increased scores, but the trend for Montessori children is positive. In contrast, the non-Montessori children either decreased in the teacher ratings of self-regulation regarding social and work habits or made no change on eight out of eighteen items, neither of which was statistically significant.

Analysis of the Child Interview

Replies children gave to the interview questions over the 3-year period were categorized according to the frequency of like responses. These repeated or like responses were then analyzed and themes emerged (see Table 2, page 26).

Table 1.
Total Data Collected for Montessori and Non-Montessori
(number of respondents)

Instrument:	Montessori	Non-Montessori
Rating Scale	127	129
Child Interview	94	73
Teachers' Attitude Scale	22	11
Parent Survey	117	109
MAP Tests	25	47

Results of the Early Childhood Teachers' Attitude Scale

The Early Childhood Teachers' Attitude Scale is a Likert-scale measure containing 18 items, divided into the two subgroups of Instruction and Parental Relationships. The teachers were asked to rate themselves on each statement by circling one of the following indicators: Nothing, Very Little, Quite a Bit, or A Great Deal. The 3-year collection of data revealed that only one item showed a statistically significant difference. Montessori teachers were more confident that they *could get parents to become more involved in school activities*. The remaining scores, with means tested over the period of the study, differed only slightly. Items rated with the highest means by both groups were:

1. To teach children to work together (3.72 Montessori (M); 3.72 Non-Montessori (NM));
2. To seek and find better ways to teach (3.6 M; 3.8 NM);
3. To help children enjoy school (3.8 M; 4.0 NM); and
4. To get children to believe they can succeed (3.8 M; 4.0 NM).

Items rated lowest by both groups included:

1. The ability to keep children on task (3.3 M; 3.3 NM);
2. To motivate unmotivated children (3.0 M; 3.3 NM);
3. To overcome the achievement gap among children (3.3 M; 3.3 NM);
4. To overcome the effects of a neglectful home environment (M 3.1; NM 3.0); and
5. To work positively with uncooperative parents (2.9 M; 3.2 NM).

Results of the Parent Survey

There were 13 Likert-scale items on the Parent Survey to which parents were asked to respond about their children using one of the following indicators: Never, Almost Never, Almost Always, and Always. Two of 13 items, *Can solve everyday problems without always depending on others* and *Talks about the feelings of others* were statistically significant for Montessori classrooms. Although the other items on the survey were not statistically significant, it is important to

Table 2.
Results and Themes for Each Interview Question

Question	Montessori N=94	Non-Montessori N=73
What kind of work do you like best?	Over the three year period, 80% of the children responded with academic examples, such as "addition wheels," "learning about reptiles," "dynamic addition," and "work with the bead chains." While math work seemed to be their favorite overall, reading was added by second graders. Theme: Academic work is fulfilling.	In the kindergarten year, 70% of the children said that "playing with Legos," "cutting paper," and "drawing, coloring, and playing in sand" were their favorite kinds of work. In first and second grade, 73% of the children selected math as their favorite work. Theme: Informal learning activities and math are fulfilling.
Why is this your favorite work?	In kindergarten, 65% of the children said that the work they selected as their favorite "lets me learn," "makes me smarter," or "makes me do hard things." In first grade, 70% of the children selected the work because "it is fun," "I can use my hands," or "I am good at it." By second grade, the most frequent responses were that they "enjoy the work," "are good at the work," or "it is challenging and teaches [them] what [they] don't know." Theme: Learning can be enjoyable, but it can also be expected to be challenging.	In kindergarten, 58% of the children responded by saying that their favorite work was "fun to do," "it made [them] happy," and "I liked doing it." By first grade, 83% of the children were specific in their reply, saying that math teaches you "to plus and minus," "do fast facts," and "helps you understand pennies, nickels, and dimes." By second grade, a majority of the children liked math because it "helps us get smart" or because doing the functions, such as adding and subtracting, or solving problems, "is interesting." Theme: There is pleasure in doing work, especially math functions.
What kind of work do you do very well?	For all 3 years, the most frequent response was almost evenly divided between reading and math. Theme: Children have knowledge of their academic strengths in reading and math.	57% of kindergartners listed several areas, such as "ABC's, writing, and drawing." In first grade, most of the children selected math or handwriting. Second graders favored math and reading in almost equal proportions. Theme: Children have knowledge of their academic strengths in several subjects.
Can you tell me something you have done to be helpful to others?	Over the 3-year period, 60% of Montessori children responded by saying they help put work away, help others with their work, make friends, or try to be helpful. About 30% help others when they fall or are hurt. Theme: The environment of the Montessori classroom allows children to assist others in a variety of ways.	The children (40%) help others with schoolwork, but most of the children help others who are hurt or do not feel well. Theme: While some helpful actions are practiced by children in the classroom, they primarily consider helpfulness as aiding those who are injured or ill.
What do you do when someone is unkind to you, calls you a name, pushes or hurts you?	19% of kindergartners would, as their first approach, "tell the teacher," but more than 75% of them would first use others measures, such as "walk away," "talk it out," or "use my words." A large majority of first graders would try to solve the disagreement themselves by using the peace table or by using words to explain to the person why they are offended. Second graders would first tell the teacher in 30% of the cases. But, again, the vast majority of these children solve the problem themselves by "going to the peace table," "talking with the other person," or "writing about it in the book." Theme: Most of these children are learning how to solve their own conflicts without adult assistance.	Almost 100% of the kindergarten children tell the teacher. By first grade, the number had dropped to 70% with the remainder of the children using strategies such as "just walk away" or "go play with someone else." By second grade, 64% would tell the teacher as their first approach; 24% would use coping strategies, such as "I ignore them," "I walk away," or "I tell them to stop." Another response from 12% of the children is that they would retaliate by "hitting them back," "being mean to them," or "getting mad at them." Theme: Most of the children are adult-centered when conflicts arise.

Table 2. *Continued*

Question	Montessori N=94	Non-Montessori N=73
Can you remember what grownups at home ask you about what you do in school?	100% of kindergartners reported that they were asked about school by their parents or grandparents. The questions were evenly divided between what they were learning and if their day was a good one. By first grade, 75% of the Montessori children were asked by their parents about the kinds of work they did that day or how well they did on their work that day. 25% of the children could not recall anyone asking about their school day. At second grade, 100% of the parents asked about their child's day in school in the following ways: 72% asked about the kinds of lessons they did or what they learned, while the remaining parents asked about behavior or about how their day went. Theme: Parents value what children learn and if their children are content in school.	In kindergarten, only two children reported not being asked about their school day. 35% were asked about their behavior, while another 45% were asked about what they learned, what they did that day, about the food they ate, or if they had a good day. At first grade, almost 50% of the parents or grandparents asked the children about what kind of work they did in reading or math, and the other half asked about behavior. Every child except one reported being asked about their school day. 95% of second-grade parents ask children, if not every day then quite often, about their day in school. 35% ask about their behavior or if they did well on tests, 20% asked what they learned, and the remainder asked a general question, such as <i>What did you do in school today?</i> Theme: Parents value how children behave in school and what they learn.
On days when you are not in school, what do you miss about not being in school?	27% of kindergartners would miss their friends, 22% would miss the teachers, 22% would miss the work, and the remaining children would miss the other subjects or recess. 5 children would not miss school at all. By first grade, 50% would miss their work, 30% would miss their friends, 14% would miss playing, and 12% would miss nothing.* At second grade, 40% would miss friends, 31% would miss the lessons and work, and 16% would miss the teacher. A few children mentioned recess or said they would miss nothing. Theme: When not in school, children miss the socialization they have with their peers, the lessons that help them learn, and being with the teachers.	28% of kindergartners said that they would miss nothing about school. 25% said they would miss play with their friends. The remaining children would miss various things. In the remaining years, there was a 50% split in missing work and missing play or their friends. Theme: As children moved from kindergarten to first and second grade, they liked school more and missed both their work and their play with friends.

* Numbers in Table 2 will occasionally add up to more than 100% as responses were often detailed and in more than one category.

report that the yearly means for the Montessori classrooms showed an upward pattern on most of the items while the means for the non-Montessori classrooms declined slightly on several items.

Another important aspect of the parent survey was the qualitative data categorized and summarized from the written responses given to the question, *Can you describe how you teach your child discipline or what you do so that your child understands appropriate behaviors?* Ninety-three Montessori parents responded to this part of the survey, while eighty-one non-Montessori parents responded. The explanations of the parents who responded were sometimes brief, a sentence or two, while others wrote a paragraph of explanation.

Often, parents used more than one strategy when disciplining. When all responses were analyzed, the following categories emerged (percentages for each group are also noted:

1. The Parent Who Models, Explains, or Discusses (M=55%; NM=48%),
2. The Parent Who Tells (M=39%; NM=39%),
3. The Parent Who Rewards (M=13%; NM=12%) and
4. The Parent Who Punishes (M=60%; NM=83%).

For further clarification, complete descriptions for each of the categories are contained in Table 3 (page 28).

Results of MAP Tests

Table 4 (page 29) shows the results of the MAP tests in reading and math from spring 2007 for all public school second graders in the study. Children in the independent school were not tested with this measure. The chart shows the number of children from each group taking the test and their percentages at each numerical level on different sections of the test. The average scores for each section are also given.

Table 3.
Parent Survey—Open-Ended Question

Category	Descriptive Comments
The Parent Who Models or Explains	<i>I try and model appropriate behavior; I talk to my child about his/her behavior; I teach my child that there are consequences for her behavior; I explain the right way to do something; We discuss rules and why we have to have rules; We use examples and learn from mistakes; We talk a lot about putting ourselves in someone else's shoes; I talk to my child and try and develop a warm relationship with her.</i>
The Parent Who Tells	<i>I let her know when she does something inappropriate; I give her a choice of doing what I ask her to do or she can take the consequences; She is given a verbal warning; I set guidelines and rules; She has responsibilities.</i>
The Parent Who Rewards	<i>I use positive feedback; I reward good behavior.</i>
The Parent Who Punishes	<i>When she doesn't behave properly, she loses privileges and gets time-out; I use the time-out chair; Light spanking, if necessary; Use the corner and take away happy things.</i>

As indicated, the Montessori children had an overall higher average score on each section of the test than the non-Montessori children. When looking at the higher ranges of test scores (191–211) for math and reading, a larger percentage of Montessori children scored within that range. The math percentages for Montessori are 48% compared to 38% for non-Montessori; reading percentages are 65.4% for Montessori compared to 31.8% for non-Montessori.

Summary of the Research Questions

After an analysis of the data collected, our answers to the original study questions were:

Question #1: *Is there a difference in levels of self-regulation in children between Montessori and non-Montessori classrooms?*

Of the 18 items on the Rating Scale, nine were statistically significant for Montessori classrooms. Montessori children:

1. need less supervision to solve conflict ($p < 0.05$);
2. are more likely to exhibit feelings of happiness and contentment ($p < 0.05$);
3. are more likely to be proactive in using problem solving strategies when engaged in cognitive tasks ($p < 0.01$);
4. can monitor their own learning for correctness ($p < 0.001$);
5. can inquire, ask questions, and seek out information when the task is not fully understood ($p < 0.001$);
6. are developing internal standards of performance ($p < 0.05$);
7. recognize academic areas in which they perform well and react positively to them ($p < 0.05$);
8. recognize the good work of peers and use the knowl-

edge for self-judgment of their own performance ($p = 0.05$); and

9. are enthusiastic and curious learners ($p < 0.05$).

The data also shows that on eight of the eighteen items the non-Montessori children regressed or made no change at all over the 3-year period.

The Parent Survey results support the findings from the Rating Scale. Although only 2 of the 13 items were statistically significant for Montessori, 10 of the items showed higher means in second grade for Montessori children than they had achieved in kindergarten. In contrast, the mean for non-Montessori children on 10 of the items regressed, showing a higher mean in kindergarten on each item than at the end of the study in second grade. The item *Can solve everyday problems without always depending upon others* was found to be statistically significant for Montessori on both the Parent Survey and the Rating Scale. The other item that was statistically significant for Montessori, *Talks about the feelings of others*, had a higher mean at second grade, having increased from 3.2 in kindergarten to a 3.4 on the Rating Scale with an overall mean difference “increase” of -0.1650 when compared to the mean for the non-Montessori children. The non-Montessori children had regressed on this item from a 3.1538 in kindergarten to a 3.0263 in first grade and finally to a 3.1250 in second grade with a mean difference of 0.0288.

In the Child Interview, when both groups were asked *How do you know you are good at this work?* the Montessori children's responses revealed a higher level of self-responsibility for measuring their level of performance. The non-Montessori children gave some evidence of this but seemed conflicted

Table 4.
Spring 2007 MAP Scores for Montessori and Non-Montessori Children

Montessori N=25	Scores	Percentages	Non-Montessori N=47	Scores	Percentages
Mathematics	<161	0.0%	Mathematics	<161	0.0%
	<171	8.0%		<171	10.6%
	<181	16.0%		<181	12.8%
	<191	28.0%		<191	38.3%
	191–200	24.0%		191–200	36.2%
	201–210	16.0%		201–210	2.1%
	211+	8.0%		211+	0.0%
Average Score	191		Average Score	185	
Reading	<161	7.75%	Reading	<161	10.6%
	<171	3.8%		<171	10.6%
	<181	11.5%		<181	19.1%
	<191	11.5%		<191	27.7%
	191–200	38.5%		191–200	21.2%
	201–210	15.4%		201–210	10.6%
	211+	11.5%		211+	0.0%
Average Score	185		Average Score	180	

with the external rewards of grades, report cards, and test performance. Responses of Montessori children indicated a better understanding of the effort it takes to learn, and more often reported experiences that showed they were more self-directed than their peers in non-Montessori settings.

It is concluded that there is a difference in self-regulation skills between these two groups of children. The data supports the findings that Montessori children have a higher level of self-regulation and a more consistent growth in self-regulation skills over the 3-year period of the study than non-Montessori children.

Question #2: *Is there an association between children's levels of self-regulation and academic achievement in Montessori and non-Montessori classrooms?*

The findings of the previous question found Montessori children at higher levels of self-regulation. Their scores on the MAP tests indicated higher means in both reading and math, resulting in the finding that there is a direct relationship between levels of self-regulation—particularly on work habits where the ratings for Montessori children were shown to be statistically significant—and academic achievement, according to this one test.

Related to this question, the interview data shows that Montessori children, by the end of second grade, understand that work is hard but that practice and working with materials are the essentials for understanding. Learning habits of practice and work, so much a part of the culture

of Montessori classrooms, may be another reason why Montessori children achieve academically.

The conclusion is that there is an association between how well children internalize levels of self-regulation and their academic success.

Question #3: *Is there an association between levels of teacher beliefs of self-efficacy on the one hand and self-regulation and academic achievement in children in Montessori and non-Montessori classrooms?*

The data related to this question (which comes primarily from the Teachers' Attitude Scale) shows no association between teacher self-efficacy, ratings of self-regulation, and academic performance of children. On nine of the items non-Montessori teachers rated themselves higher than Montessori teachers. On only six of the items did the final mean for Montessori teachers exceed that of non-Montessori teachers. Non-Montessori teachers rated themselves higher on items that related directly to academic achievement, such as *Influencing achievement when all factors are considered*; *Positively influencing the most difficult children*; *Motivating children*; and *Helping children to believe that they can do well in school*. Yet the mean scores on the MAP tests of non-Montessori children were lower than those of the Montessori children. Likewise, non-Montessori teachers rated themselves higher on items that related directly to work habits and social relationships, such as *Motivating children to work harder* and *Making children enjoy school*. Yet

data from the Rating Scale does not support these ratings.

The conclusion of this study is that there is no association between levels of teacher self-efficacy rating and student self-regulation and academic performance in Montessori and non-Montessori settings.



Jude Keith Rose Photography

Promoting coordination and concentration

Question #4. *Is there an association between parental views of child discipline and levels of self-regulation in Montessori and non-Montessori classrooms?*

Parental responses to the open-ended question on the Parent Survey are the main data source for this question. The research found that Montessori parents (55%) were more likely to model and explain when teaching discipline than non-Montessori parents (48%). Both groups used “telling” in the same proportion and this was also true of the “reward system.” The largest gap was in the category of punishment. Non-Montessori parents reported more frequent use of punishment as a method of discipline (83%) than Montessori parents (60%). Related to this question is data from the Teachers’ Attitude Scale indicating that Montessori teachers had a slightly higher mean on three of the survey items about parental relationships than non-Montessori teachers did. Only one item, *How much can you*

do to get parents to become involved in school activities? was statistically significant. This may indicate that in this population, Montessori teachers have been slightly more effective in helping parents employ positive approaches to discipline than non-Montessori teachers.

We conclude that the homes from which non-Montessori children come practice less modeling, explaining, and telling.

SUMMARY

As is often the case in research, the findings pose new questions and suggest intriguing avenues for further study. Will the results be replicated in different school populations? Will the trends for both groups of these children continue to diverge as the children progress through subsequent grade levels? Are there steps Montessori teacher education programs can take to strengthen teacher candidates’ feelings of self-efficacy? To what extent are parental discipline practices influenced by their children’s school settings and the classroom management techniques they observe in use?

The positive results for Montessori children in ratings of self-regulation and academic performance affirm the effectiveness of Montessori classroom practice in fostering positive work habits and internal motivation. We hope that these results will lead more public school administrators, particularly those in small rural settings where programs of school choice are rare, to consider Montessori a viable option.

References

- Bandura, A. (n.d.). Bandura’s instrument teacher self-efficacy scale. Retrieved September 6, 2004, from www.coe.ohiostate.edu/ahoy/Bandura%20Instr.pdf.
- Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior* (Vol. 4, pp. 71–81). New York: Academic Press. (Reprinted in H. Friedman [Ed.], *Encyclopedia of mental health*. San Diego: Academic Press, 1998). Retrieved September 2, 2004, from www.emory.edu/EDUCATION/mfp/BanEncy.html.
- Blair, C. (2002). School readiness: Integrating cognition and emotion in a neurobiological conceptualization of child functioning at school entry. *American Psychologist*, 57(2), 111–127.
- Blair, C. (2003). Self-regulation and school readiness. *ERIC Digest*, ED477640. Retrieved August 13, 2004, from ERIC Clearinghouse on Elementary and Early Childhood Education, Champlain, IL (www.ericdigests.org/2004-1/self.htm).
- Bronson, M. (2000). *Self-regulation in early childhood*. New York: Guilford Press.
- Dorak, M. (2009). *Common concepts in statistics*. Retrieved on January 22, 2010, from dorakmt.tripod.com/mtd/glosstat.html.
- Montessori, M. (1995). *The absorbent mind*. New York: Henry Holt and Company.
- Northwest Evaluation Association. Retrieved September 2, 2004, from www.nwea.org.
- South Carolina Department of Education (2006). 2006 State of South Carolina education accountability act report cards. Retrieved on March 10, 2008, from ed.sc.gov/topics/researchandstats/schoolreportcard/2006.

Vygotsky, L. (1978). *Mind in society: The development of higher mental processes*. Cambridge, MA: Harvard University Press.

Zimmerman, B. (1990). Self-regulating academic learning and achievement: The emergence of social cognitive perspective. *Educational Psychology Review*, 2, 173–201.

BARBARA ERVIN is associate professor of education and director of the AMS-affiliated Montessori teacher program at Lander University in Greenwood, South Carolina. She is Montessori-credentialed (Early Childhood and Elementary I).

PAMELA D. WASH is an assistant professor of middle-level and secondary education at the University of South Carolina Upstate. She also serves as the National Council for Accreditation of Teacher Education (NCATE) assessment coordinator and technology coordinator for the School of Education.

MARILYN E. MECCA served as lead researcher for the study. She is professor emeritus at Lander University and completed the courses and internship for Primary Montessori with MEPI (Montessori Educational Programs International) in 1998.

Did You Know?

The most important part of life is not the university, but the first period—the period that extends from 0 to 6 years, because it is during this first period that intelligence, the great instrument of man, is formed; and not only intelligence, but the whole of the psychic faculties are constructed during this period.

—Maria Montessori, *The Absorbent Mind*, p. 31



Montessori-inspired language materials
Integrated early reader series
Books • Word Cards • Objects • Activities



Zodiworks for reading, Zodiworks for writing,
Zodiworks for thinking, Zodi works for you.



THE SHELTON WAY

A World Model for Educating Students Who Learn Differently



Montessori Applied to Children at Risk MACAR Beginning and Advanced Level Courses

July 6 – 10 and 12 – 15, 2010
Shelton School, Dallas, TX
(972) 774-1772 www.shelton.org

Materials available.

*Attendees of the 12-hr AMS Spring 2010 Preconference / Conference MACAR
Training may register for Advanced MACAR Training.*

Copyright of Montessori Life is the property of American Montessori Society and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.