

An Examination of Implementation Practices in
Montessori Early Childhood Education

by

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ABSTRACT

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This study examined to what extent Montessori early childhood education programs in one geographical region of the United States could be classified into homogeneous clusters based on teachers' reported practices associated with Montessori education. Once identified, the characteristics defining each subgroup were described, and factors supporting or hindering the implementation of recommended practices were examined. Of particular interest was whether the teachers were intentionally or inadvertently making changes to the model, and if modifications were being made, whether these were due to situational factors or to viewpoints that differed from Montessori's perspectives. Teachers' beliefs about managing and motivating children were also assessed in relation to their interpretation of the Montessori method in order to examine what role, if any these beliefs played in shaping classroom practices.

Sixty-six early childhood Montessori teachers completed a semistructured telephone interview that investigated their implementation of five dimensions of Montessori practice, and factors influencing their enactments of the approach. Using

cluster analysis, four subgroups of Montessori educators were identified: a *traditional* subgroup that adhered to authentic Montessori practices; a *contemporary* cluster that enacted elements of authentic Montessori education, though not to the same extent as the *traditional* teachers; and two clusters, a *blended* group and an *explorative* group, that combined elements of the Montessori method with practices typically associated with other models of early childhood education. Post-typological analyses revealed significant differences between three of the four largest clusters on work period length and percentage of whole group presentations, and a difference approaching significance on the use of mixed-age grouping. Although no cluster differences were found on extent of modification, situational constraints, and motivation orientation, two of the three clusters differed from one another on their agreement with Montessori practices. The lack of group differences on modification suggests that some teachers were unaware that they were implementing practices that were inconsistent with the philosophical tenets of the approach.

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CHAPTER I INTRODUCTION

Background of the Study

In recent years, growing recognition of the importance of early childhood education has generated interest in identifying the most effective programs for educating young children. In order to determine which instructional models are most beneficial to children during the preschool years, researchers have reexamined what is already known about contrasting instructional approaches (Epstein, Schweinhart, & McAdoo, 1996; Goffin & Wilson, 2001; Golbeck, 2001), and have compared different models of early education (Burts, Hart, Charlesworth, Fleege, Mosley, & Thomasson, 1992; Marcon, 1992, 1999; Stipek, Feiler, Daniels, & Millburn, 1995). At the heart of this debate is whether young children are more effectively educated in child-centered environments where self-regulated learning activities are encouraged, or in classrooms emphasizing direct teacher instruction and basic skill acquisition.

Empirical support for both types of instructional models has prompted some early childhood professionals to advocate integrating child-regulated and teacher-guided approaches in a coherent way (Golbeck, 2001; Huffman & Speer, 2000). One curricular model being reexamined as such a synthesis is the Montessori method of early childhood education (Golbeck, 2001). While generally viewed as a child-centered approach, the Montessori method also incorporates teacher-guided instruction and a curriculum with academic components. The approach enables children to regulate their own activity in a structured environment, but also provides for individualized instruction geared toward each child's interests and developmental level. With standards-based

reform and a new focus on academic achievement permeating American education, the Montessori model offers a means for developing early literacy skills and numerical abilities through individually paced activities in a noncompetitive environment.

Findings from a number of studies indicating long-term benefits of Montessori early childhood education for low-income children (Gross, Green, & Clapp, 1970; Karnes, Shwedel, & Williams, 1983; Miller & Dyer, 1975; Miller & Bizzell, 1983, 1984) suggest that the Montessori model could serve as a viable alternative to both teacher-directed and child-centered approaches to early education. However, in some instances when the model has been compared to other early education approaches, results have been conflicting (Banta, 1969; Berger, 1969; Karnes, Teska & Hodgins, 1970; Stodolsky & Karlson, 1972). A review of these comparative studies (Daoust, 1994) indicates that programs which adhered more closely to traditional Montessori practices, such as mixed-age groupings and extended periods of free choice in the classroom, exhibited more significant gains than those programs classified as Montessori which did not meet authentic Montessori criteria.

These findings highlight an enduring problem with Montessori education: what is consistently described as the Montessori method in writings about the approach is often inconsistently found in actual Montessori classrooms. Interpretations of the Montessori model differ considerably particularly in the United States where there are numerous training organizations and no legal specifications for what constitutes Montessori education. While the two largest organizations, the Association Montessori Internationale (AMI) and the American Montessori Society (AMS), have issued standards consistent with Montessori principles, only a small percentage of programs

undergo the accreditation process. With such variability in how the approach has been implemented, assessing the outcomes of Montessori early childhood education becomes problematic.

For example, DeVries and Goncu (1987) compared 4-year-old children from constructivist and Montessori preschool programs on their interpersonal relations and found the children from the constructivist program were more advanced in social-cognitive competence than children from the Montessori program. Descriptions of the two Montessori classrooms used in the study, however, suggest that Montessori practices had not been fully implemented. Rather than consisting of children from 3 to 5 or 6 years of age, both Montessori classrooms only contained 4- and 5-year-old children. Materials unrelated to the Montessori method were provided in each of the classrooms (e.g., dolls, toy cribs, cars, trains), and most importantly, only one of the teachers was fully certified to teach early childhood Montessori. Dilution of the method in the Montessori environments used in this study may have compromised the results. The classroom inconsistencies also make it impossible to generalize these findings to other Montessori programs.

Yen and Ispa (2000) ran into similar difficulties when assessing whether curriculum type (Montessori or constructivist) moderates the impact of temperament on the classroom behavior of 3- to 5-year-olds. With no standard guidelines available to assess the degree of Montessori implementation in the 10 classrooms evaluated, the authors adapted three items from an instrument designed to measure program implementation of constructivist principles. The range of responses obtained on these items made it impossible for the investigators to identify a single Montessori model.

This occurred even though all the teachers were Montessori certified and all the schools were AMS affiliated. Different interpretations of the Montessori method obscured the findings, and consequently made it more difficult to detect interactions between temperament and type of curriculum. These unintended findings highlight not only the difficulty in conducting research with Montessori programs, but also underscore how pervasive the variation is within Montessori early childhood education.

Modification of the Montessori approach in the United States has generally been toward greater teacher-directed instruction, such as whole group lessons and more limited opportunities for choice, and away from the child-centered practices typically associated with the method. Research examining why practitioners tend to be more child-centered or teacher-directed in their instructional strategies suggests that an educator's beliefs or implicit theories about the nature of teaching and learning play a major role in shaping classroom decision making (Brousseau, Book, & Byers, 1988; Fang, 1996; Isenberg, 1990; Kagan, 1992). These beliefs, related to teacher personality traits as well as prior schooling experiences, affect the interpretation of ideas presented during an educator's professional development, and shape a practitioner's perceptions, judgments, and behaviors (Calderhead, & Robson, 1991; Kagan, 1992). Professional knowledge and pedagogical skills that are incongruent with a teacher's beliefs are not used in the classroom, while the practices that are implemented tend to be consistent with a practitioner's implicit theories (Cassidy, Buell, Pugh-Hoese, & Russell, 1995; Charlesworth, Hart, Burts, & Hernandez, 1991; Stipek & Byler, 1997; Stipek, Daniels, Galluzzo, & Milburn, 1992; Vartuli, 1999). Beliefs have been found to be relatively stable over time and resistant to change despite efforts by teacher educators and school

reformers to modify the often inaccurate assumptions of both pre-service and experienced practitioners (Griffin, 1989; Prawat, 1992; Weinstein, 1990).

Beliefs about managing and motivating students are likely to influence whether a practitioner is more comfortable with a teacher-directed or child-centered approach to early childhood education. In order to minimize disruptive behavior and maintain classroom order, some practitioners employ controlling motivational techniques that emphasize teacher directives and limited decision-making opportunities for children (Flink, Boggiano, & Barrett, 1990; Reeves, Bolt, & Cai, 1999). Educators maintaining this perspective tend to perceive children as irresponsible, undisciplined, and needing to be managed through the use of rewards and punitive measures (Woolfolk, Rosoff, & Hoy, 1990). With its focus on teacher-controlled decision-making, this motivational orientation is more consistent with teacher-directed educational approaches that emphasize structured learning and pupil compliance than with child-centered educational models.

Other teachers prefer to manage and motivate children by supporting their autonomy in the classroom. Educators who are autonomy granting typically emphasize an accepting, trusting view of children and foster their student's independence and self-regulation by providing them with many opportunities for choice. To assist children in becoming self-disciplined and responsible, these teachers present children with the information they need to solve their own problems and pursue their own interests, and help children to internalize the school's values and agenda (Reeves, Bolt, & Cai, 1999). By de-emphasizing the controlling features of their actions, these practitioners allow children to develop intrinsic motivation and self-control (Deci & Ryan, 1987). This

orientation is compatible with child-centered educational practices that stress child-initiated learning and noncoercive approaches to minimizing misbehavior and maintaining student engagement.

Children have been shown to benefit both developmentally and academically when teachers support their autonomy. Relative to students with control-oriented teachers, children in classrooms with practitioners who encourage their autonomy are more likely to demonstrate higher self-esteem (Deci, Schwartz, Sheinman, & Ryan, 1981), greater academic achievement and performance (Boggiano, Flink, Shields, Seelbach, & Barrett, 1993; Flink, Boggiano, & Barrett, 1990), and enhanced motivation (Deci & Ryan, 1987; Grolnick & Ryan, 1987; Deci, Schwartz, Sheinman, & Ryan, 1981; Ryan & Stiller, 1991). Children with autonomy-supporting teachers have a greater desire for challenge (Boggiano, Main, & Katz, 1988; Boggiano & Ruble, 1986) and display greater creativity (Amabile, 1983; Amabile & Hennessey, 1992; Koestner, Ryan, Bernieri, & Holt, 1984) than students who experience controlling practitioners. According to self-determination theory (Deci, 1980; Deci & Ryan, 1985), children show these benefits because their autonomy-granting teachers enable them to make decisions about how to act which encourages them to seek and master challenges that are optimal given their capabilities (Pintrich & Schunk, 1996).

Traditional Montessori education emphasizes an autonomy-supporting approach to classroom management. As facilitators of children's self-regulation, teachers in nonmodified Montessori programs provide children with the information and skills necessary for functioning independently and successfully coexisting. Children in authentic programs are encouraged to solve their own problems and choose their own

activities during a lengthy, uninterrupted work period. The method's academic components, highly structured environment, and exact use of materials, however, may attract prospective teachers who are more control oriented than autonomy supporting in their approach to classroom management. The prevalence of modified Montessori programs that limit children's opportunities for choice, emphasize whole group instruction, and/or employ punitive approaches to discipline suggest that some practitioners may hold motivational beliefs that are inconsistent with traditional Montessori education. The use of controlling teaching strategies by some practitioners undermines the purpose of Montessori education and could be detrimental to children's motivation and healthy development. The identification of factors that support the implementation of inappropriate practices in some modified environments would be an important first step toward changing these practices and implementing procedures that are more consistent with authentic Montessori principles.

Statement of the Problem

The extent of program differences in Montessori education is unknown. How Montessori early childhood classrooms differ from one another has not been systematically examined, and no data have been collected on the prevalence of fully implemented programs, or on what types of modifications are most common in less than fully enacted programs. Research that does highlight implementation differences, either directly or indirectly, is often dated (Miller & Dryer, 1975; Murphy & Goldner, 1976; Neubert, 1980; Reuter & Yunik, 1973; Wheeler, 1975), and limited in scope (Berger, 1969; Chaney, 1991; DeVries & Goncu, 1987; Karnes, Teska, & Hodgins, 1970). While some research suggests that programs could be classified into subgroups based on their

degree of adherence to Montessori principles (Wheeler, 1975; Yen & Ispa, 2000), this type of investigation has not been undertaken.

Whereas research documenting program differences is almost nonexistent, the findings of a few investigations (Chaney, 1991; Zener, 1994) provide insights into why authentic practices may or may not be implemented in Montessori classrooms. Chaney (1991) used questionnaires, semistructured interviews, and observations to assess the degree of philosophy-enactment disparity exhibited by practitioners in two models of early childhood education, Montessori and High Scope, and to determine why this disparity occurred. A discontinuity between teachers' understanding and application of their model was found to exist when the educators were inadequately informed about the philosophical directives of the model or had not sufficiently integrated their own beliefs with the model's philosophy. The teachers enacted their own interpretations of the models and dismissed philosophical elements that they did not understand and therefore were unable to promote. Although only eight teachers participated in this study, the results give some indication of the factors that may influence whether practitioners implement a model of early childhood education in a manner that is consistent with the model's philosophical foundations.

In a related investigation, Zener (1994) examined the extent of agreement between practicing AMI Montessori teachers' knowledge and attitudes and Montessori's recommendations for guiding the process of normalization¹. Practitioners' reasons for differences from those recommendations were also explored. The 156 teachers surveyed

¹ Montessori used the term *normalization* to describe the most important outcome of her educational method. Zener (1994) defines normalization as representing normal characteristics of children's development: love of work, concentration, self-discipline, and sociability.

at various workshops and conferences were found to have a high degree of agreement between their knowledge and attitudes and Montessori's recommendations. Interviews with 17 of the teachers revealed that when differences of agreement did occur, they were the result of misunderstanding or disagreeing with Montessori's ideas, using other aspects of Montessori theory to justify their differences, experiencing difficulty in carrying out the theory in practice, or misinterpreting the scale items. Only AMI-trained Montessori teachers were included in this investigation and actual classroom practices were not assessed. These results, however, are consistent with Chaney's (1991) findings and suggest that a practitioners' inadequate understanding of Montessori theory, lack of practical knowledge for implementing the approach, and personal beliefs that are different from the basic tenants of Montessori education serve as possible reasons why some Montessori educators maintain perspectives and implement practices that are different from those proposed by Montessori.

While providing some rationale for why practices incongruent with Montessori education are implemented in Montessori classrooms, both empirical studies were limited in size and scope. Only four Montessori teachers participated in Chaney's study, and the practitioners assessed in Zener's (1994) investigation were AMI certified and therefore had received similar training that emphasized authentic practices and a traditional approach to Montessori education. It is unclear whether a larger group of teachers with more diverse training than those assessed by Chaney and Zener would result in comparable reasons for inconsistencies between teacher's perspectives or practices and Montessori's recommendations.

It is also unclear from these investigations to what extent practitioners are consciously making changes to Montessori practices in their classrooms and to what extent they are inadvertently modifying the method. Whereas some cultural adaptation is expected, and even desirable (Neubert, 1992; Turner, 1992), with too much accommodation, individual interpretations of the method may no longer be compatible with the philosophical tenets of the approach. Research is needed to examine on a larger scale not only why programs identified as Montessori fail to implement key practices associated with the approach, but also to what extent practitioners are consciously or unconsciously modifying the method, and if changes are being made, whether these are intentional or circumstantial. Examining the impact of contextual factors (such as school policies and procedures) on teachers' classroom practices could also be beneficial for untangling the many factors influencing program implementation.

Research highlighting the important role that educators' beliefs play in shaping their classroom practices and decision making (Brousseau, Book, & Byers, 1988; Fang, 1996; Isenberg, 1990; Kagan, 1992) suggests that some Montessori teachers may be interpreting the approach in a way that is more consistent with their own pedagogical beliefs than with those of Montessori. Chaney's (1991) investigation of the philosophy-enactment disparity in Montessori and High Scope early childhood programs supports this idea. Her findings indicated that some teachers unknowingly misinterpreted and misapplied the philosophical insights of the models they espoused in a direction more congruent with their own goals and perspectives than with the philosophy of the model they had adopted. In this investigation (Chaney, 1991), teachers' beliefs were particularly evident in how they managed their environments and motivated children to

comply with classroom procedures. Further exploration of the relationship between teachers' management and motivational orientations and their classroom practices could provide additional insights into why Montessori practitioners have or have not implemented key practices associated with the approach.

Purpose of the Study

This study will examine whether Montessori early childhood education programs in one geographical region of the United States can be classified into homogeneous clusters or groups based on teachers' reported implementation of practices associated with Montessori education. If subgroups can be found, the number and frequency of each group will be assessed and the characteristics that define the subgroup will be identified. Statistical analysis will be used to determine whether the type of teacher training, or other variables such as the teachers' age or experience, influence group membership.

In addition, this study will investigate why teachers in each subgroup implement the practices they do in their classrooms. Factors supporting or hindering the implementation of recommended practices will be examined. Of particular interest is whether teachers are inadvertently or deliberately making changes to the model, and if modifications are being made, whether these are due to disagreement with Montessori's ideas or to situational constraints. Teachers' beliefs about managing and motivating children will also be assessed in relation to their interpretation of the Montessori method in order to examine what role these beliefs play in shaping classroom practices.

The following research questions will be addressed:

- 1) To what extent can Montessori early childhood education programs be classified into meaningful subgroups based on teachers' reported implementation of practices associated with Montessori education?
- 2) If clusters can be identified, what characteristics define each subgroup?
- 3) To what extent are Montessori teachers intentionally or unintentionally modifying the method, and if changes are being made, to what extent are these due to situational factors or to perspectives that differ from Montessori principles?
- 4) What role do teachers' beliefs about motivation and classroom management play in shaping classroom practices?

Relevance of the Study

Assessing differences in Montessori early childhood education programs, as well as some of the factors that have contributed to these differences, would provide a more comprehensive view of the Montessori method as it currently exists in this country. The classification of similar programs into subgroups based on the extent of Montessori teachers' implementation of practices associated with Montessori education would make it possible to determine whether there are consistencies in interpretations of the approach. Identified subtypes of the Montessori approach could then be used as a context for examining traditional practices and for determining whether a particular type of Montessori education is most beneficial to children. The recognition of Montessori model subgroups would also facilitate comparative research between Montessori and other programs of early childhood education. Rather than assuming that schools with trained teachers or the same affiliation will have similar programs, subgroup

identification would enable investigators to establish guidelines for classifying the Montessori programs used in research.

The identification of factors supporting or hindering the implementation of recommended practices could be used to develop strategies for improving Montessori teacher training. Teacher education centers could use information about supports and obstacles to authentic implementation to evaluate the effectiveness of their programs and to modify their training accordingly. Furthermore, if teachers' beliefs about motivation and classroom management are found to distinguish between those who implement practices consistent with Montessori educational principles and those who do not, teacher training programs could provide preservice teachers with the classroom management experiences needed to help them modify incongruent assumptions in a direction more consistent with Montessori perspectives.

Practices that teachers have questioned or disagree with that are identified in this study could be subjected to research in order to determine whether some modification of Montessori's original recommendations would be appropriate. Most importantly, the investigation of Montessori implementation would be a step toward defining ideal criteria for Montessori education as well as determining what can be considered a valid Montessori early childhood program. The affiliation criteria of Montessori accrediting organizations could then be reevaluated and strengthened as needed to better align with a universally accepted definition of Montessori education.

Definitions

- (1) Maria Montessori: Dr. Maria Montessori was an Italian physician, social reformer, and educator who developed the Montessori system of education over a period of 40 years beginning in the early 1900s.
- (2) Montessori Method: Based on the holistic development of the child, the Montessori approach consists of a methodology and philosophy of education that caters to children's individual needs and their natural desire to learn. A specific educational environment is prepared to accommodate the child at each stage of development, and manipulative materials enable students to explore and discover concepts and ideas through their own activity.
- (3) Montessori Teacher Training: Training to become a Montessori teacher focuses on the psychological and developmental characteristics of the child and prepares the educator for applying principles and practices consistent with Montessori philosophy.
- (4) Montessori Materials: Specialized manipulative materials, each isolating a single idea, used in Montessori education to facilitate the learning of skills and concepts. The Montessori materials are multisensory and self-correcting; they enable children to learn through self-initiated activity.
- (5) Uninterrupted Work Period: An extended period of classroom time in which children can engage in self-selected activities without interruption. Sessions are provided every day and generally last for up to three hours.
- (6) Mixed-Age Groupings: A multiaged, heterogeneous grouping of children. In Montessori early childhood classrooms children are grouped across a 3-year age span beginning at 2 1/2 or 3 years of age.

- (7) Material Presentation: Montessori materials are introduced on an individual basis according to the each child's interest and readiness. During a presentation (or demonstration), the teacher models the use of a material; the child may then decide whether to repeat an activity or not.
- (8) American Montessori Society (AMS): Founded in 1960 to adapt the Montessori method to American culture, the AMS supervises teacher education programs, offers regional and national conferences, and maintains affiliate schools. The AMS provides resource materials and publishes a national journal.
- (9) Association Montessori Internationale (AMI): Established in 1929 by Dr. Maria Montessori, the AMI is recognized as the oldest authority on Montessori education worldwide. The association oversees teacher-training institutes and works to further the growth and development of Montessori standards and principles.
- (10) Early Childhood Education: Education provided to children from birth to 8 years of age. In Montessori education, the term generally refers to a combined preschool/kindergarten class serving children between 2 1/2 or 3 and 5 or 6 years of age.
- (11) Montessori Program: An educational organization that uses the developmental theories and philosophy of the Montessori method as its curriculum model.
- (12) An Authentic Montessori Program: A term used to describe educational settings that closely adhere to traditional Montessori principles and practices.

CHAPTER II REVIEW OF RELATED LITERATURE AND RESEARCH

This chapter investigates the growth of the Montessori movement in the United States from a *diffusion of innovation* perspective, and reviews selected literature and research relevant to the five dimensions of Montessori practice found to be inconsistently implemented in Montessori early childhood classrooms. These examinations highlight factors contributing to implementation differences, help to explain why programs may assume the characteristics they do, and illuminate possible reasons why there may or may not be agreement with Montessori's ideas within the American Montessori community. By doing so, the information provided here serves as a basis for interpreting the empirical findings of this study as they relate to each research question addressed in this investigation.

Growth of the American Montessori Movement

Theory on the diffusion of innovation provides a useful context for examining how the American Montessori movement has influenced the different ways practitioners currently interpret and implement the Montessori educational approach. As described by Nancy McCormick Rambusch (1977a), who is credited with reintroducing Montessori education in the United States during the 1950s, diffusion of innovation theory helps to account for the evolution of the Montessori method into American Montessori education.

In this section, different models of innovation diffusion are examined, the characteristics of innovations that affect a new idea's rate of diffusion are discussed, and

the role of a change agent in accelerating the diffusion process is described. These aspects of diffusion theory are then applied to the early growth of the American Montessori movement that began in the late 1950s. The section concludes by showing how early diffusion efforts and events have impacted the way the Montessori approach is currently interpreted and implemented in the United States.

Diffusion of Innovation Theory

Viewed as a special form of communication, diffusion of innovation theory focuses on the process by which new ideas are spread to the members of a social system. In this context, diffusion refers to the dissemination of new ideas through human interaction, while an innovation is an idea, practice, or object perceived as new by an individual (Rogers & Shoemaker, 1971). Why some new ideas are adopted and others are not can be illuminated by examining how innovations spread from their source to potential adopters and investigating the factors that effect the adoption of a new idea or practice.

A center-periphery model of innovation diffusion has been proposed to account for the spread of new ideas at a very basic level of conceptualization. Resembling a wheel with spokes emanating from the center, the center-periphery model is based on three assumptions: (1) the innovation to be diffused must be fully realized prior to dissemination, (2) diffusion involves movement of the new idea outward from the center to its ultimate users, and (3) directed diffusion is a centrally managed process of dissemination, training, and provision of resources and incentives (Schon, 1971).

Successful diffusion in a center-periphery system depends on the level of resources and energy at the center of the diffusion effort as well as the number of innovation

adopters represented by points on the periphery. The distance between the center and periphery points, the amount of energy involved in gaining new adoptions, and the system's ability to generate and manage feedback also determines the effectiveness of the system. Failure of the center-periphery system occurs when demand from the periphery exceeds the resources or the energy at the center, or when feedback from new adopters is mishandled. System failure results in ineffective dissemination, distortion of the message, or disintegration of the entire system (Schon, 1971).

A variant to the center-periphery model is the magnet model. In this rendition, the "magnet" attracts potential adherents to itself. Universities act as magnets when they attract students from around the world who then return to their native countries in order to teach and practice what they've learned. While the magnet model allows greater control over what is disseminated, there is less control over what occurs afterward, and the doctrine presented may not be well suited to the individualized needs of new adherents.

In a second variant, what Schon terms "the Johnny Appleseed model", the primary center travels to the "territories" and is able to adapt the message presented to the special conditions of each location (Schon, 1971). The roaming scholars and artisans of the Middle Ages are an example of this diffusion approach. Despite the advantages of a traveling bard model, the Johnny Appleseed variant lacks a strong organized center necessary for attracting and maintaining new adherents.

In both variants of the center-periphery model new centers may be generated as a consequence of dissemination. However, the new centers which emerge function independently from the primary center and are free to interpret the adopted message as

each sees fit. The primary center assumes no responsibility for managing or monitoring the newly created centers or for the ongoing process of dissemination initiated by the independent operations.

In an elaboration of the center-periphery model, new centers are deliberately established and maintained by the primary center (Schon, 1971). In the proliferation of centers model, the secondary centers specialize in diffusing the innovation, while the primary center serves as the guardian of preestablished doctrine and methodology and as a trainer of trainers. The effectiveness of the system depends on the primary center's ability to support and monitor the activities of the secondary centers. Differentiating the secondary centers results in an exponential increase in the scope and efficiency of the entire diffusion system provided the primary center maintains the energy and resources necessary for sustaining the secondary centers (Schon, 1971). Whether the central message lends itself to modification based on regional differences and whether limits to acceptable deviation are clearly defined also determines the effectiveness of the proliferation of centers model. Prototypes of this model include the Christian missionaries, industrial expansion, and the Communist movement.

When the proliferation of centers model fails, the secondary centers get out of control and the diffusion system fragments (Schon, 1971). What looks like appropriate modification of the new idea to regional differences by the secondary center, may appear as insubordination from the center's point of view. Once separated from the primary center, the decentralized operation may decline or fail altogether, or may assume the role of a new primary center. If a secondary center does gain independence, the innovation

will no longer exist as an established message and regional adoptions will vary and only marginally resemble one another.

The number of new adoptions, or the innovations rate of diffusion, determines the effectiveness of the diffusion model. Rogers and Shoemaker (1971) have identified five attributes of innovations that affect the rate at which an innovation is diffused and adopted. These characteristics include: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability. A potential adopter's perception of these attributes determines whether a new idea will be adopted.

The relative advantage of an innovation is the extent to which it is perceived as being better than the idea it supersedes (Rogers, 1962). Relative advantage is often expressed as economic profitability, but can also be measured in terms of social prestige and approval, convenience, and satisfaction. Whether to adopt or reject a new idea depends on the intensity of the reward associated with the innovation, as well as a consideration of negative consequences that may occur. The greater the perceived relative advantage of an innovation, the more likely the new idea will be embraced and the more rapid its rate of adoption.

Adoption rates are also influenced by an individual's perception of the compatibility between an innovation and his or her cultural norms. New ideas that are consistent with the sociocultural values and beliefs of a potential adopter are perceived as less risky and are more meaningful to the individual (Rogers & Shoemaker, 1971). Compatibility with previously introduced ideas may likewise provide reassurance as long as the preceding idea was received favorably. In the same manner, innovations that clearly meet a felt need of the client are more likely to be adopted.

Both the perceived complexity of an innovation and a new idea's trialability act to impede or facilitate the innovation's rate of diffusion and adoption. Potential adopters will be more attracted to a new idea viewed as simple to understand and to implement, than they will be to an innovation perceived as complicated and difficult to use. Innovations that can be experimented with on a trial basis are less risky for the client and tend to be adopted more rapidly than innovations that must be implemented in their entirety. Whether the results of a new idea are visible to others (the observability of the innovation) also influences the new idea's diffusion and rate of adoption. Material innovations with a high degree of observability and results that are easily communicated to others are more readily accepted than nonmaterial ideas or innovations that are difficult to describe to others.

A change agent, who serves as a link between the diffusing agency and the client, may be used to promote a new idea. While a change agent may be able to accelerate the diffusion process, there is no guarantee that the message delivered by the agent will be perceived in the way it was intended by the client. The messages a client receives about an innovation and how this information is interpreted will depend on the potential adopters personality and cultural norms (Rogers & Shoemaker, 1971). Successful adoption involves the integration of the innovation into the practices and way of life of the receiver (Rogers, 1995). This integration is less likely when the innovation is inconsonant with the receiver's beliefs, felt needs, and past experiences. Inadequate implementation, misuse, or discontinuation of an innovation may be avoided by providing the client with the motivation, resources, and knowledge necessary for using the innovation properly. A change agent can assist in this process by working to promote

compliance with the new idea and by providing reinforcing messages to new adopters. Unanticipated or unintentional consequences to an innovation can also be minimized through the change agent's efforts.

Nancy Rambusch used diffusion of innovation theory in her doctoral dissertation to examine the expansion of American Montessori education (Rambusch, 1977a). As one of the leaders of the American Montessori movement, Rambusch was in a unique position to analyze the movement's growth and her own role in shaping how Montessori education was promoted and received in this country. At the same time, Rambusch's active involvement in the movement influenced her perspective of the events, and this point of view is reflected in her analysis. Furthermore, Rambusch's study focuses on her own role as a change agent in the American Montessori movement and does not address other aspects of innovation diffusion such as factors impacting a new idea's rate of dissemination and adoption, or what conditions are necessary for successful implementation to occur. The investigation reported here uses diffusion of innovation theory as a framework for exploring the growth of Montessori education in the United States from a more generalized perspective.

Diffusion Theory Applied To Montessori Education

During her lifetime, Maria Montessori employed a strategy for disseminating her educational approach that met all the requirements of the center-periphery model of innovation diffusion (Rambusch, 1977b). Montessori met the model's first criterion—fully realizing the innovation in its essentials prior to diffusion—by publishing books on her pedagogy and philosophy, and by establishing courses in teacher training. Diffusing the innovation outward from the center to its ultimate users,

the model's second requirement was accomplished by Montessori's tight control of the training process. Not only did Montessori personally train and certify all new teachers, but she also insisted that the newly certified teachers were not qualified to train others (Kramer, 1988). Furthermore, Montessori controlled the sale of the didactic materials necessary for implementing the method, and closely supervised Montessori societies established primarily to safeguard the integrity of the approach and to ensure that the method was adopted in its entirety. By personally controlling every aspect of the movement (Hainstock, 1978; Kramer, 1988), Montessori fulfilled the center-periphery model's third requirement: that directed diffusion should be a centrally managed process of dissemination, training, and provision of resources and incentives.

Rambusch maintains that Montessori avoided many of the pitfalls associated with the center-periphery model of diffusion by combining aspects of both the "magnet" and "Johnny Appleseed" variants of the model (Rambusch, 1977b). Montessori's role as a magnet began when visitors from around the world came to see her work in Rome, and that role was maintained by the international training courses she offered, primarily in Europe, throughout her lifetime. Montessori's lectures in Europe, South America, Asia, and the United States (Standing, 1957) solidified her role as a kind of traveling bard associated with the Johnny Appleseed variant of innovation diffusion.

In many instances, Montessori's visits to a location would renew interest in the approach and result in the formation of new schools and new Montessori societies. Maintaining these establishments, however, proved difficult due to Montessori's insistence on personally monitoring the activities of the organizations affiliated with her movement (Rambusch, 1990). Fearing the misinterpretation or misapplication of her

approach, or worse, the exploitation of her name for profit, Montessori ceased to recognize any organization bearing her name that she didn't feel she could trust. As a consequence, both authorized and unauthorized Montessori organizations proliferated in many regions of the world.

In 1929, 23 years after the opening of the first Montessori school, the Association Montessori Internationale (AMI) was established to help oversee the activities of recognized schools and societies. Whereas Montessori and the AMI monitored the affiliated associations closely, helping to ensure proper interpretation and implementation of her method, organizations not managed by Montessori often developed their own versions of the approach (Kramer, 1988; Rambusch, 1977b, 1992). This proliferation of unauthorized programs is consistent with the center-periphery model's notion that new centers functioning independently are likely to emerge as a result of innovation dissemination.

It wasn't until after her death in 1952 that the movement started by Montessori began to develop into a proliferation-of-centers model of innovation diffusion. The AMI, now led by Montessori's son Mario Montessori, assumed control of the "authorized" movement, and a system of secondary centers was established to facilitate diffusion of the approach. In the United States, the process of establishing a secondary center began with the activities of Nancy Rambusch who became interested in the method while studying in Europe. After training with the AMI in London, Rambusch founded a Montessori school in Connecticut in 1958 and traveled throughout the country lecturing about the approach. Through her intensive promotional efforts, which inspired numerous newspaper and magazine articles as well as television and radio interviews about the

method, Rambusch generated widespread interest in Montessori's educational ideas. She was appointed the official representative of the AMI in the United States, and given permission by the organization to open Montessori schools, start an affiliated society, and establish an institute for teacher training (Applebaum, 1971; Hainstock, 1978). By serving as a link between the AMI and potential adopters of Montessori education, Rambusch became a self-appointed change agent.

During the 1950s and 1960s, widespread dissatisfaction with the American educational system helped to revive interest in the Montessori approach to early childhood education (Applebaum, 1971; Hainstock, 1978; Meyer, 1975). Alarmed by the school system's inability to prepare students for functioning in an increasingly complex society, parents and educators alike were becoming more receptive to new ideas and approaches to education. At the same time, a growing body of research on human development and behavior was overturning many of the psychological theories that had formed the basis for traditional educational practices (Hunt, 1964; Lillard, 1972). Intelligence was no longer viewed as a fixed genetic capacity as previously thought, and early childhood was now recognized as a qualitatively different and critically important period of life. Research had revealed the crucial role of sensory stimulation for mental development (Hunt, 1964) and for the first time in this century, the possibility of intrinsic motivation for behavior was acknowledged. The psychological theories that had prevented acceptance of Montessori's ideas in the United States during the early 1900s (see Applebaum, 1971; Hunt, 1964) were being replaced by new theories of cognitive growth that, like Montessori's ideas, emphasized the importance of environmental influences on mental development. These new theories

substantiated Montessori's theory and practice and increased the method's credibility as a possible alternative to traditional early childhood approaches.

Within this context, potential adopters, which included parents, educators, and school entrepreneurs, were becoming aware of the relative advantages associated with the Montessori approach. Parents interested in developing their children's intellectual abilities at a young age were drawn to the method's perceived emphasis on reading and writing (Lillard, 1972). Aware of the method's earlier success with impoverished children in Rome, educators viewed the method as a potentially effective means for educating economically disadvantaged children. Both educators and parents were attracted to Montessori's systematic and holistic approach to early childhood education.

The method's emphasis on individualized education and learning by doing was compatible with changing beliefs about child development and learning. For many of the middle and upper middle-class Catholic parents who first adopted Montessori education in this country, the method provided a humanistic alternative to some of the outdated practices used in Catholic parochial education (Rambusch, 1977b). These parents and educators were attracted to the Montessori method's cognitive approach to early education as well as its ability to foster independence, intrinsic motivation, and a love for learning in the young child. The Montessori method was beginning to be perceived as an advantageous approach to early childhood education that was compatible with the changing beliefs of many potential adopters.

Despite the possible advantages of Montessori education and its consistency with new perspectives on child development and learning, aspects of the traditional AMI model would have posed considerable challenges to the method's widespread diffusion

in the United States. The authentic version developed by Montessori was presented as a comprehensive system of education that was to be adopted in its entirety.

Implementation of the approach required purchasing a full complement of Montessori materials, extensive teacher training by AMI authorized trainers, and a considerable period of practice necessary for developing the understanding and skill essential for successfully running a Montessori classroom. Authorized training and materials, however, could only be obtained in Europe and initially there were few functioning classrooms available for student teaching and for general observation of the method in the United States. When first reintroduced in this country, these requirements and circumstances would have severely restricted the model's accessibility for most interested adopters. As traditionally presented and offered, the method may have been perceived as overly complex, not conducive to experimentation on a trial basis, and not readily available for observation of the results.

Aware of these constraints, as well as the method's short-lived popularity when initially introduced in the United States prior to World War I, Rambusch advocated for an "Americanized" version of Montessori education when she reintroduced the approach in this country. Together with the American Montessori Society (AMS), which she established, Rambusch emphasized the necessity of making Montessori education culturally relevant and recommended an integration of Montessori principles with American educational practices (Applebaum, 1971; Rambusch, 1977b). In order to accomplish this objective, students training to be Montessori teachers would be held to the same professional standards as traditionally trained teachers. Teacher education would not be limited to Montessori-oriented material, but would also include courses in

child development and the historical and philosophical foundations of American education (Rambusch, 1977b). Rather than simply establishing Montessori schools in the United States as the AMI had intended, the AMS additionally assumed the goal of inserting Montessori insights into American culture. The minutes of the AMS Executive Committee meeting of August 1962 reflect this intention:

Aware of the pertinence of the Montessori insights, the AMS feels its responsibility to institutionally splice them into acceptance by American educational leaders—not as something static, but as a footing on which American education can re-direct itself to maximize the educational potential latent within each autonomously individual child. (Applebaum, 1971, p. 174)

By modifying Montessori's approach to teacher training, Rambusch and the AMS were attempting to create a program more consistent with the needs of potential adopters than the traditionally recognized model of Montessori education (Meyer, 1975). From a proliferation-of-centers model perspective, they were modifying the innovation based on regional differences in order to maximize the effectiveness of the diffusion effort. In addition, they were shaping potential adopter's perceptions of the innovation's relative advantage, compatibility, complexity, trialability, and observability.

Presenting the Montessori method as "American Montessori" facilitated the adoption process by fostering more favorable perceptions of the approach in potential clients. Whereas potential adopters could view both the AMI and AMS Montessori versions as offering prestige and a superior education compared to traditional nursery school approaches, the reframed American interpretation offered advantages over the AMI model. A modified approach to Montessori education could be perceived as providing children with the best of both worlds—Montessori and traditional—and offered parents and educators alike much greater flexibility than the traditional

Montessori model. To potential school owners, this greater flexibility could translate into considerable financial savings and convenience. Rather than being required to have trained and certified Montessori teachers in every classroom of a school, as mandated by AMI for accreditation, the AMS only required that one teacher per school be certified for affiliation with the organization (Applebaum, 1971). In addition, the AMI called for each classroom to be fully equipped with Montessori materials and related activities and extensions. The AMS, on the other hand, recommended that a “range of sequentially structured developmental aids” be provided (American Montessori Society, 1976) and did not require a full set of Montessori materials or the exclusion of supplementary materials. The difficulty and high costs associated with obtaining Montessori materials and adequately trained teachers may have made the less stringent AMS affiliation criteria more attractive to those interested in starting a school. For a range of potential adopters, greater advantages could be associated with the adoption of an Americanized model of Montessori education.

The AMS version of Montessori education may also have been more compatible with American cultural norms than the traditional model. Even though Montessori’s insights in the early 1960s were more consistent with that era’s notions about the nature of intelligence and how children learn than when they were first introduced to the American public 40 years earlier, some aspects of the authentic Montessori model were still incongruent with deeply embedded ideas about the purposes of early childhood education and the type of activities young children should experience. For those less familiar with Montessori theory and the underlying rationale for particular classroom practices, the independent nature of many of the Montessori activities could have been

viewed as hindering children in their social development. The model's lack of stress on the imagination and play-oriented activities in favor of exercises fostering independence, sensory discrimination, and intellectual growth may have seemed foreign, unnecessary, or even inappropriate by some potential adopters. Prospective clients may also have been uncomfortable with the traditional model's lack of teacher-directed whole group exercises that were typical of most early childhood education programs at the time. Offering an eclectic version of Montessori education, which could accommodate some traditional nursery school practices may have appealed to those reluctant to adopt aspects of the Montessori method that were incompatible with their own values and beliefs.

The perceived complexity of the traditional model may have been a constraining factor for some potential clients. The system of education that Montessori developed is comprehensive and requires intensive teacher training (Kahn, 1993). Her philosophy incorporates scientific concepts and terminology, provides a rationale for the classroom practices she recommends, and provides a framework for coordinating the different elements of the approach (Kahn, Dubble, & Pendleton, 1999). Unless the philosophy is well understood, the practices associated with the method, particularly those diverging significantly from traditional preschool procedures, may seem complicated and difficult to execute. Rather than implementing, or having their children attend an entirely new system for early schooling, educators and parents alike may have been attracted to the mix of novelty and familiarity inherent in the modified version of Montessori education. Where the traditional model offered complexity and appeared hard to apply effectively, the Americanized version offered consistency with familiar practices and perspectives.

By integrating Montessori's ideas with American educational practices, potential adopters may have viewed the approach as less foreign and easier to implement.

Perceptions of the trialability of the Montessori approach may have similarly been enhanced when it was reconceptualized as American Montessori education.

Implementing the traditional Montessori model on a trial basis would not have been practical due to the high cost and difficulty in obtaining materials and trained teachers, as well as the AMI recommendation that the method should be applied in its entirety for best results. As a hybrid of Montessori and American educational practices, the modified AMS version of the method could more easily be tried on an experimental basis. For example, a traditional preschool classroom could be gradually converted into a Montessori environment with the addition of certain materials and practices. Marketing Montessori as a blended approach with flexible guidelines may have provided potential clients with the perception that the approach could be applied on a trial basis.

The observability of Montessori education in the United States was greatly enhanced by the promotional activities of Nancy Rambusch and the AMS. The Montessori method was virtually unknown in this country prior to Rambusch's school opening and diffusion efforts, and early school-foundings would not have been possible without continued support from the AMS in terms of providing information, teacher training, and assistance in obtaining materials. To help prevent the failure of Montessori education in the United States, the AMS established study groups, composed primarily of parents, to promote and examine Montessori philosophy in preparation for opening a school. With 50% of the study groups failing to become AMS school affiliates, this mechanism helped to prevent premature or unsuccessful school-foundings (Meyer,

1975). Groups that did open affiliated schools helped to make the modified version of the method more visible to the American public. The steady rise in school-foundings during the 1960s as well as on-going national media attention heralding the impressive outcomes of the Montessori approach greatly increased the visibility of the method in the United States. In the eyes of potential adopters, the high degree of observability and easily communicated results may have made the Montessori system more appealing as an educational alternative.

While emphasizing an Americanized version of Montessori education, Rambusch and the AMS at the same time were concerned with preserving the integrity of Montessori's original insights (Neubert, 1990). In 1962, Rambusch described the changes the AMS envisioned as of the nonessential type primarily dealing with making the materials culturally relevant, and aligning teacher training with American professional standards (Applebaum, 1971). From the AMI's perspective, the method could already accommodate cultural variation. As the director of the AMI, Mario Montessori stressed the importance of maintaining the purity of the Montessori method in the United States, and cautioned against "neo-Montessorians who too hastily try to put into practice seemingly logical and marvelous additions" (Applebaum, 1971, p.186). The continued insistence by the AMS to modify and improve the Montessori method and teacher education strained the relationship between the two organizations and eventually resulted in a split between the AMI and the AMS. The diffusion of Montessori education now occurred along two paths in the United States: one aligned with the AMI and dominated by a "purist" perspective of the method, the other, associated with the AMS, offering a more integrated approach to Montessori education.

In 1970, the AMI/USA was established as a secondary center to conduct the AMI's business in the United States, while the AMS evolved from a secondary center into a center of centers (Rambusch, 1977b) and continued to promote an alternative form of Montessori education.

The evolution of the AMS from a secondary center to the center of its own diffusion efforts is consistent with the notion of system fragmentation from a proliferation of centers perspective. In order to sustain its dissemination activities, the AMS needed qualified teacher trainers and some flexibility to modify the innovation and teacher education according to regional differences. Still regrouping after the death of Maria Montessori in 1952, there were only a few recognized teacher trainers available from the AMI, and the organization was unwilling to accept any significant modification of the approach or the teacher-training model established by Montessori. By not providing the resources and flexibility required by the AMS, the AMI inadequately supported and monitored the needs of the decentralized organization. When the associations separated from one another, the AMI accused the Americans of insubordination and distorting the Montessori message while the AMS viewed the international Montessorians as rigid and unwilling to meet the needs of potential adopters. This pattern of mutual blame and misunderstanding is consistent with the center/branch conflicts that occur when the model of the proliferation of centers fails.

Once functioning as its own center, the AMS almost succumbed to failure due to its own limited resources and the strong demand for information and resources from both potential adopters and already functioning member schools. When the organization was unable to fulfill the needs of its Montessori clients, such as providing appropriately

trained teachers, many of the clients developed workable solutions and became their own centers in an evolving proliferation of centers diffusion model (Rambusch, 1977b). These centers, which were regional in nature, developed their own teacher-training programs with AMS approval, and in doing so perpetuated the diffusion of an Americanized model of Montessori education. The AMS evolved into a center-of-centers out of necessity and continued to serve in this capacity by supporting and monitoring a growing number of secondary centers specializing in Montessori teacher training.

Now that it was no longer connected with the international Montessori movement, the AMS intended to maintain the method's essential elements but at the same time advocated for a culturally relevant model of the approach. From a proliferation of centers model perspective, with the AMS now as the center, the organization was allowing some modification of the innovation based on regional differences in order to maximize the effectiveness of the diffusion effort. Although individual interpretations of the method would differ, important aspects of Montessori's original doctrine would be maintained and the goal of inserting Montessori's insights into the American culture could be achieved. The effectiveness of this system, however, was hindered by the organization's unwillingness to establish and enforce clearly defined limits to acceptable deviation. The organization's reluctance to restrict interpretations of the approach is apparent in the policies and procedures established by the AMS.

Because successfully functioning AMS schools were viewed as essential to the diffusion of American Montessori education in the United States, the Society established requirements and recommendations for both affiliated schools (in 1965) and teacher

training programs (in 1963). The standards enacted for member schools, however, were broad in scope and did not include specific guidelines for developing an Americanized model of the approach or for integrating the Montessori method with American educational practices. Furthermore, the consultation visits conducted by AMS representatives that were required for all newly affiliated schools were not intended to “evaluate in a verdict-type manner, the quality or professional worth of a particular school in relation to the AMS organization”, but were meant instead to “assist each school in its unique growth” (American Montessori Society, 1974, p. 6). By approving any school meeting the minimum requirements of the AMS and not assuming the authority to take away affiliation, the organization encouraged a variety of interpretations of the method and may have recognized programs that implemented practices that were inconsistent with basic principles of the Montessori approach.

A different pattern of meeting acceptable limits occurred with the development of AMS teacher education criteria. Although the AMS enacted very general teacher-training program requirements in 1963, more comprehensive and stringent standards weren't established until 1969-70. By the time these policies were implemented, seven teacher-training programs were already in existence and nearly 1,000 newly trained teachers had been graduated (Neubert, 1990). In addition, it wasn't until the 1980s that the AMS made an institute for teacher trainers available to affiliates. The time lag that occurred between the organization's separation from the AMI in 1963 and the development of more stringent teacher-training policies and procedures may have inadvertently fostered more variation in interpretations of the approach than initially intended. As the center of its own system, the AMS attempted to maintain the integrity

of the Montessori method in United States, but may have been hindered in this effort by failing to clearly define the message that was diffused and to promptly establish limits to acceptable deviation.

A consequence of the diffusion efforts of Rambusch and the AMS was the emergence of non-AMS affiliated Montessori schools and teacher education programs. By 1970 there were approximately 800 self-described Montessori schools operating in various locations throughout the United States (Applebaum, 1971). Of these programs, only 300 were associated with the AMI or the AMS; the remaining 500 schools claiming to use the Montessori approach were not affiliated with either organization. While some of these programs may not have wanted to pay the affiliation fees required by both organizations, others may not have met accreditation criteria or were affiliated with other Montessori associations that also began to appear during the 1960s (e.g., the Montessori Institute of America). The emergence of independently functioning, unsupervised programs with various interpretations of the adopted message would be expected to occur in a diffusion model where designated centers are responsible for disseminating a new idea.

In addition, numerous articles in both educational and lay journals generated excitement about the Montessori approach, but at the same time helped to perpetuate misunderstandings about the method. Many of the people writing these articles didn't fully understand Montessori philosophy and often excerpted concepts out of context in order to provide an overview of the approach (Hainstock, 1978). How individuals interpreted what they read about the method varied; some, for example, viewed the method as overly structured and rigid, while others interpreted the approach as being

overly permissive. The multiple interpretations generated by the media and the public's diverse perceptions of the Montessori system of education is congruent with the diffusion theory idea that there is no guarantee that the disseminated message will be perceived in the way it was intended by the adopter. The range of criticisms of the Montessori approach that occurred as a consequence of diffusion is consistent with the notion that individuals filter the messages they receive about an innovation through their own cultural norms, past experiences, and beliefs.

Because the Montessori name was in the public domain (it could not be copyrighted or patented), any school, regardless of its practices, could call itself a Montessori program. Schools affiliated with the AMS were encouraged to Americanize Montessori education, but were not guided in this process with clear standards and limits to acceptable variation. Teacher training programs developed during the 1960s were not closely monitored by the AMS, and may have developed hybrids of the method that were inconsistent with basic principles of the approach. Some of these programs may have failed to provide education with enough depth or scope to adequately prepare teachers to implement the method. Although the AMS introduced more rigorous accreditation standards for schools in the early 1990s, only 70 of the organization's nearly 1000 affiliated schools in the United States (Public School Montessorian, 2004) have undergone the accreditation process. At the same time, the number of American Montessori schools recognized by the AMI has continued to decline with only 190 schools currently affiliated with the organization (Association Montessori Internationale/USA, 2003d). With the establishment of other Montessori teacher training and accrediting organizations over the years, each with its own perspective on

Montessori education, it is not surprising that practitioners' implementations of the method would differ.

This investigation of the American Montessori movement from a diffusion of innovation perspective has shown how early dissemination efforts contributed to a range of interpretations of the Montessori method. Whereas the movement's founders succeeded in generating widespread interest in the approach, a lack of available resources to respond to the subsequent demand created by their efforts may have inadvertently contributed to a more integrated approach than intended. The establishment of numerous unregulated or nonaffiliated programs also contributed to variation in implementation. As a consequence, what has become known as Montessori education in reality may represent a variety of interpretations reflecting a synthesis of beliefs, experiences, and perspectives on Montessori principles and practices.

Whether various enactments of the Montessori method could be classified into distinct subgroups with similar characteristics is unclear from these findings. Although some movement toward a synthesis of Montessori education with traditional early childhood practices would be expected based on this historical overview, the extent of this integration is unknown. These findings also bring into question whether practitioners would recognize that their Americanized models of the Montessori method differed from more traditional adaptations. This investigation addresses these uncertainties.

Dimension Literature Review

An examination of the American Montessori movement suggests that implementation differences in Montessori education could be widespread and

manifested in a variety of ways. This literature review will examine five areas where implementation differences have been found to occur. Each of these areas, or dimensions, will then be examined from four perspectives including: (1) Montessori's writings, (2) the AMI and the AMS, (3) the National Association for the Education of Young Children (NAEYC), and (4) empirical research.

Research Documenting Implementation Differences

Whereas some investigators have found variation in the Montessori method in the course of investigating something else (DeVries & Goncu, 1987; Yen & Ispa, 2000), others have consciously set out to examine implementation differences in Montessori education. Research suggests five areas where practices recommended by Montessori appear to have been inconsistently implemented in American Montessori education. These areas include: (1) supplementing or replacing traditional Montessori materials, (2) providing opportunities for children's choice, (3) providing a long, uninterrupted work period, (4) implementing mixed-age groupings spanning 3 years or more, and (5) presenting materials to children individually rather than collectively.

Two studies have assessed whether Montessori educators have introduced play and other non-Montessori materials into their classrooms. Torrence (1992) used a questionnaire to investigate 128 Montessori teachers' attitudes toward their children's pretend play activities, and whether standard play materials, such as blocks and puppets, were available to children in their environments. Because Montessori believed that young children prefer real-world experiences over make-believe play activities, standard play materials are not traditionally found in Montessori early childhood classrooms. Contrary to this practice, many survey respondents in Torrence's study, who taught in

AMS affiliated schools, indicated that they provided their children with non-reality based materials during designated work periods. Dress-up materials were included by 30% of the respondents, 24% provided housekeeping areas, and 70% indicated that blocks and/or legos were available during the work period. Many respondents' classrooms also contained water tables, sand tables, puppets, and dolls.

Neubert (1980) obtained results consistent with these findings in an assessment of implementation practices in 10 AMS early childhood classrooms. Extensive observations revealed that 69% of teacher and child-initiated activities in the programs examined involved the use of non-Montessori supplementary materials. While these data do not specify what portion of activities were specifically play related, and were both conducted in AMS affiliated classrooms, they do indicate that children in some Montessori environments spend the majority of classroom time engaging in activities not traditionally associated with the approach.

Whereas Montessori emphasized the importance of preparing a classroom environment that would foster individual liberty (Montessori, 1964; Standing, 1957), teachers have been found to differ in the extent that freedom of choice is extended to the children in their care. One area where teachers diverge in their practices is whether children are permitted to engage in fantasy play during the work period. In a survey examining Montessori teachers' likelihood of intervening to stop children's make-believe play in their classrooms, Torrence (1992) found that the 123 participants were divided in their responses depending on the situation. For example, whereas 54% of respondents indicated that they were very likely or somewhat likely to redirect children's block-building with the sensorial materials, only 7% indicated that they were

somewhat or very likely to intervene when children engaged in fantasy play with playdough models. On average, 23% of the teachers indicated they were very likely to intervene in 10 fantasy play situations, 23% indicated that they were somewhat likely, 42% reported that they were not very likely to intervene, and 17% indicated that they would never redirect children in the situations presented.

Chattin-McNichols (1992) also surveyed Montessori educators ($n = 394$) with a broad range of teacher training backgrounds on their fantasy play interventions and obtained a continuum of responses on 13 survey items ranging from never intervene to always intervene. While most teachers indicated that they were likely to stop any warlike fantasy, the majority also reported that they were unlikely to intervene in nondisruptive imaginary play. Findings from both fantasy intervention studies suggest that Montessori practitioners use a variety of approaches to deal with the spontaneous fantasy behaviors that occur in their classrooms, and that both extremes of practice, that is, total acceptance of a child's choice to engage in fantasy play, as well as complete intolerance, can be found in Montessori early childhood environments.

Montessori teachers have also been found to differ in whether they permit children to freely interact with one another in the classroom and in the amount of time they provide for free choice of activity. Although Montessori emphasized encouraging children to work together during class time (Montessori, 1967a), Yen and Ispa (2000) found that children in 5 of the 10 AMS Montessori classrooms they assessed were not encouraged to interact with each other. In an examination of implementation practices in 18 Montessori early childhood classrooms, Wheeler (1975) found that group activities, rather than uninterrupted periods of free choice, were emphasized by the majority of

Montessori teachers in the investigation. Children in most of the classrooms were expected to participate in two extended circles during the morning activity period, and all but 3 of the 18 classrooms had snack as a group, rather than on an individual basis, as is often customary in Montessori education.

In contrast to these findings, Neubert (1980) found that teachers devoted an average of 63% of class time to an independent work period where children made their own activity choices, and only devoted 23% of class time to group activities. During the independent work period, children in the 10 AMS classrooms assessed were encouraged to work together and spent an average of 59% of their independent time engaging with others. While the discrepant results obtained by these studies (Neubert, 1980; Wheeler, 1975; Yen and Ispa, 2000) most likely reflect differences in the samples used and in how each investigation was conducted, they nonetheless highlight dissimilarities in the amount and type of choice provided to children in Montessori early childhood classrooms.

Research demonstrating differences in opportunities for student choice suggests a third area where Montessori classrooms differ—the amount of time provided for an uninterrupted work period. Whereas the children in most of the classrooms studied by Wheeler (1975) participated primarily in structured group activities, the children in the Montessori programs assessed by Neubert (1980) spent the majority of their classroom time choosing their own activities during an independent work period. Montessori viewed the extended work period, which is often 2 1/2 to 3 hours in length, as essential for developing the young child's ability to concentrate and to complete a cycle of activity (Montessori, 1974). If shortened, children not only have less time to work with

the Montessori materials, but also will not develop the intensity of involvement that Montessori believed was essential for optimal growth. Research reporting work periods that were less than 2 hours in length (Chaney, 1991; DeVries & Goncu, 1987) suggests that this element of Montessori education is often compromised in practice.

A fourth area where Montessori early childhood classrooms have been found to differ is in whether children have been grouped across a 3-year age span. In traditional programs, children between the ages of 2 1/2 or 3 and 5 or 6 years of age coexist in a single classroom. This type of grouping enables the older children to assist the younger ones, and provides the younger children with motivation for accomplishing the same activities as their older peers. Whereas mixed-age groupings of 3 or more years have been observed in research assessing AMI-accredited classrooms (Flynn, 1990; Murphy & Goldner, 1976; Reuter & Yunik, 1973; Seefeldt, 1981), research conducted in AMS or nonaffiliated Montessori programs indicated that multiage groupings were not consistently implemented in these schools (DeVries & Goncu, 1987; Miller & Dryer, 1975; Wheeler, 1975). Both nonaffiliated classrooms assessed by DeVries and Goncu (1987) only contained children of 4 and 5 years of age, while the two independent classrooms investigated by Berger (1969) consisted of only 3- and 4-year-old children. Of the 18 classrooms with different Montessori affiliations visited by Wheeler (1975), most did contain children from 3 to 5 years of age. However, 3- and 4-year-olds greatly outnumbered the 5-year-olds in eight of the classrooms observed. These findings suggest that mixed-age groupings are not always the norm in Montessori classrooms, and that achieving a balanced distribution of ages spanning a 3-year period has not always been possible.

A final area of difference in the implementation of Montessori education is whether presentations to introduce the didactic materials are given to children individually or in a large group setting. Despite Montessori's insistence that lessons be given to individuals based on the child's interests, abilities, and level of development (Montessori, 1964; 1973; 1990; Standing, 1957), some research (Chaney, 1991; Vaughn, 1999) suggests that a number of teachers give initial material presentations to large groups of children during circle time. Within these classrooms, once a material's use has been demonstrated collectively, any interested child may select the activity during the independent work period. While this approach may be convenient for the teacher, it does not take into account the range of developmental levels within any given classroom, or the need of each child to closely observe how a particular material can be used. Children already familiar with a material presented to the group may be bored with the demonstration; at the same time, those not developmentally ready for a presented activity may be uninterested or frustrated. In addition, obtaining feedback about the appropriateness of an activity through the child's reactions is not possible during large group presentations. Even if a child is motivated to repeat the activity, this may not be possible due to others who are also interested in the work selecting the material or to continuation of the circle. Despite limited research on the prevalence of group versus individual presentations, further investigation of this dimension is warranted due to the negative implications associated with this practice.

Taken together, these studies indicate that many American Montessori environments have been significantly modified and may not be providing children with the types of experiences typically associated with the approach. Whereas Montessori

insisted that children be allotted an extended, uninterrupted activity period (Montessori, 1965b), be grouped across a 3-year age span (Montessori, 1964, 1967a), and be presented materials on an individual, rather than a large group basis (Montessori, 1964; 1967b), these traditional practices have not been consistently found in investigated classrooms (DeVries & Goncu, 1987; Neubert, 1980; Wheeler, 1975). The extent of children's free choice, as recommended by Montessori, has also been restricted in certain environments by an emphasis on group activities (Wheeler, 1975), and in some classrooms, by limiting children's social interactions (Yen and Ispa, 2000) and spontaneous play activities (Chattin-McNichols, 1992; Torrence, 1992). Furthermore, traditional materials have been replaced or supplemented in a number of Montessori classrooms (Neubert, 1980; Torrence, 1992; DeVries & Goncu, 1987). This practice runs counter to the notion that the didactic materials are of critical importance in the Montessori system of education. These findings suggest that core principles of Montessori education have been compromised within many programs identifying themselves as Montessori.

Literature on Five Dimensions of Practice

This examination has identified five dimensions of Montessori practice that have been inconsistently implemented in American Montessori education. These dimensions include: (1) supplementing or replacing traditional Montessori materials, (2) opportunities for children's choice, (3) providing a long, uninterrupted work period, (4) implementing mixed-age groupings spanning 3 years or more, and (5) presenting materials to children individually rather than collectively.

In this section of the literature review, each of these dimensions will be investigated from four perspectives. First, Montessori's writings will be examined to determine her recommendations and rationale for each dimension. This analysis is based on Montessori's major published books, her authorized biography written by E. M. Standing (1957), and a book compiled from lectures by her grandson to clarify Montessori's point of view (Mario Montessori, 1976). The recommendations derived from these sources will be used as a foundation for developing the interview protocol used in this research.

A second perspective on each dimension will be obtained by examining the websites and standards for school recognition and accreditation of the AMI and the AMS, the two largest Montessori organizations in the United States. Both associations have outlined their positions on appropriate Montessori practice on their websites, either within their school standards and/or within informational documents included as links. The consistency of each organization's recommendations with those of Montessori will be assessed for each of the five dimensions.

The National Association for the Education of Young Children (NAEYC) accreditation criteria (NAEYC, 1998) and recommendations for developmentally appropriate practice in early childhood programs (Bredenkamp & Coople, 1997) will be investigated for a third perspective on the selected dimensions of Montessori practice. As the nation's largest professional organization of early childhood educators, the NAEYC established its accreditation criteria and recommendations to improve the quality of care and education provided to young children in group programs in the United States (NAEYC, 1998). Based on the most up-to-date research and theory in the

field of early childhood education, the NAEYC guidelines represent the profession's current best understanding of how children learn and which educational practices are the most beneficial to children's healthy development. In this literature review, a comparison of the NAEYC's position with Montessori's recommendations will be made for each dimension of interest.

Finally, a fourth perspective on the dimensions will be provided by examining whether there was empirical research support for the practices recommended by Montessori. Although few investigations have directly examined the five dimensions described in this review, particularly with preschool children, research that is indirectly related to these dimensions and assessments with older children do provide a foundation for evaluating whether the practices proposed by Montessori may be beneficial to young children.

Materials

One way Montessori education differs from more traditional nursery school approaches is through the use of specially designed manipulative materials rather than toys and play-oriented activities in the classroom. Although Montessori regarded play activity as essential in the development of infants and toddlers, she found that the children in her original Casa dei Bambini consistently preferred her curricular materials to the toys they were offered (Montessori, 1966). The manipulative material and real life activities offered to children in the first Montessori schools, such as table washing and sweeping, fascinated the children and lead to repeated activity and deep concentration. From these observations, Montessori concluded that her didactic materials and real world activities fulfilled a developmental need for young children whereas play was

undertaken for a lack of something else to do (Montessori, 1966). In *The Secret of*

Childhood Montessori writes:

He regards play as we would regard a game of chess or bridge. These are pleasant occupations for hours of leisure, but they would become painful if we were obliged to pursue them at great length. When we have some important business to do, bridge is forgotten. And since a child always has some important thing at hand, he is not particularly interested in playing. Because a child is constantly passing from a lower to a higher state, his every passing minute is precious. Since a young child is constantly growing, he is fascinated by everything that contributes to his development and becomes indifferent to idle occupations (Montessori, 1966, p. 122).

Montessori therefore did not incorporate play or make-believe activities into her morning activity period², but instead included an array of specialized materials and reality-based exercises that were highly interesting to young children and enabled them to learn through self-initiated activity. Only freely chosen materials and activities that fostered repeated use and concentrated activity were retained by Montessori in her system of education. Each material was designed with a built-in control of error enabling the children to correct themselves and to further clarify and develop their thinking. The reality-based materials available in the environment were child-sized and included fragile items, such as glass dishes, to help the children learn to use authentic materials. Through these hands-on, real world experiences Montessori believed that children constructed themselves and their understanding of the world.

Consistent with Montessori, both the AMI and the AMS call for their member schools to provide each classroom with a full set of Montessori materials (one of each activity) appropriate for the age range of children served by the program. The AMS

² Children were provided with an hour of *free games* and another hour of *manual work*, i.e. clay modeling, design, etc., in the afternoon in Montessori's original *Children's House* schedule.

requires its affiliate schools, not just those seeking accreditation, to have “a full complement of Montessori materials”, and states in a website position paper that each classroom should have a diverse set of Montessori materials, activities, and experiences (American Montessori Society [AMS], n.d.b). Likewise, the AMI requires in its standards (Association Montessori Internationale/USA [AMI/USA], 2003b) that “There shall be a complete set of materials from an AMI authorized manufacturer, according to AMI training, in each classroom.” This requirement is reiterated in an AMI website essay explaining school recognition. What is less clear from the standards and literature of both organizations is whether it is appropriate to supplement these materials, and if so, in what way and under what circumstances. While an AMS standards call for curriculum support materials to be available in each classroom environment, the document doesn’t explain what is meant by this term. The AMI does not directly address supplementation in its standards, but emphasizes consistency with what is presented in the organization’s teacher training courses.

Although the addition of make-believe play and other supplementary activities in contemporary programs may be inconsistent with an emphasis on reality-based education and didactic learning materials, Montessori encouraged on-going classroom experimentation and cultural adaptation of her method. How this should be accomplished, however, is unclear from both her writings as well as from the guidelines of the AMI and the AMS.

In contrast to the Montessori approach, which does not specifically incorporate traditional play-oriented activities in the classroom, the NAEYC recognizes child-initiated play as an essential component of developmentally appropriate practice. In its

discussion of principles that inform these practices (Bredekamp & Copple, 1996), the NAEYC emphasizes that play is a highly supportive context for development and learning, and cites research supporting sociodramatic play as a means for learning curriculum content with children from 3 to 6 years of age. The NAEYC's guidelines for developmentally appropriate practice, however, do not specifically define play but encourage teachers to "incorporate a wide variety of experiences, materials and equipment, and teaching strategies in constructing curriculum to accommodate a broad range of children's individual differences" (Bredekamp & Copple, 1996, p. 18). The association recognizes children as active learners who construct their own understanding of the world, and advocates for children's direct participation in such pursuits as conducting scientific experiments, solving mathematical problems, and writing (Bredekamp & Copple, 1996). In addition, teacher-selected activities and materials should encourage children to think, reason, question, and experiment (NAEYC, 1998). According to the NAEYC, success for all children depends on providing a challenging and interesting developmentally appropriate curriculum.

The above requirements suggest that the NAEYC supports a range of classroom activities beyond those typically associated with play, and similar to many of the hands-on, real-world experiences recommended by Montessori. Both Montessori and the NAEYC advocate providing materials and experiences that enable children to construct themselves and their understanding of the world, and both emphasize that these activities must be challenging, interesting, and build on what the learners already know and are able to do. The NAEYC may not recommend specific curriculum materials like those available in the Montessori system, but by encouraging the implementation of a broad

range of content that takes into account the age and experience of the children, the association advocates a number of criteria for developing curriculum that are consistent with Montessori's perspective.

Research on the use of both Montessori and non-Montessori manipulative learning materials suggests that children can benefit from instruction with concrete materials. Kuan-Lau (2002) found that children in a low-income public school kindergarten class provided with Montessori language arts instruction and materials significantly outperformed two comparable control groups taught with skill-based language arts materials on a standards-based assessment of reading. Hiebert and Wearne (1992) compared the place-value understanding of 103 public school first graders taught with Montessori-type base-10 blocks and 48 first graders provided with textbook instruction, and noted significant differences favoring the alternatively-taught students on written assessments and conceptual understanding tasks. Fuson and Briars (1990) obtained similar results in their investigation of first and second graders place value and multidigit number understanding using Montessori-type base-10 blocks. These findings suggest that instruction with Montessori manipulative materials may benefit the reading and math performance of children educated in this manner.

Research has similarly indicated that instruction with non-Montessori concrete materials can have a positive effect on student achievement. Reviews have consistently shown that the use of manipulative materials in mathematics instruction enhances student learning (Parham, 1983; Suydam, 1986; Suydam & Higgins, 1976; Tyner, 1990). Instruction with concrete materials has benefited student's learning of place value, addition, and subtraction (Hiebert & Wearne, 1992; Fuson & Briars, 1990; Swart, 1988;

Thompson, 1991), fractions (Cramer, Post, & del Mas, 2002; Peck & Connell, 1991), and decimal fractions (Hiebert, Wearne, & Taber, 1991; Wearne & Hiebert, 1988). Significant learning gains achieved through manipulative material use have also been reported in science and geography (Blahut & Nicely, 1984; Gardner, Simmons, & Simpson, 1992; Howes & Durr, 1982). Although some investigations have not reported significant differences resulting from the use of concrete materials (Labinowicz, 1985; Resnick & Omanson, 1987), possibly as a consequence of ineffective instruction (Thompson, 1994), the positive outcomes evident in the majority of studies suggest that manipulative material use in instruction can positively effect student learning. These findings are consistent with Montessori's belief that concrete learning materials help children to develop their thinking and understanding of the world.

Choice

In her theory of human development, Montessori proposed that inner urges guide children to activities in the environment that will be the most beneficial for their self-construction during different periods of growth. Because children's internal needs determine their activity preferences, they must be allowed freedom within a structured classroom environment. In her educational writings, Montessori insists that children must be free to move about the classroom (Montessori, 1965b, 1966), make their own activity choices (Montessori, 1965b, 1967a, 1967b), choose where they will work in the classroom (Montessori, 1967b), and interact with others to collaborate and assist one another as needed (Montessori, 1965a, 1966, 1967a). Once engaged in an activity, children must be permitted to work with their selections for as long as they wish, undisturbed by interruptions (Montessori, 1965b). Montessori believed that self-directed

activity in an appropriately prepared environment fostered children's self-construction and self-regulated behavior.

Montessori underscored the importance of observing children's activity preferences in order to determine the most appropriate material to introduce to each child based on his or her needs, interests, and ability. Although she acknowledged that lessons impinged on the liberty of the children (Montessori, 1965b), she maintained that children could decide to have a lesson or not (Montessori, 1967b, Standing, 1957), and that short presentations were necessary for preparing children to engage in self-initiated activities. Montessori wrote that children chose from the exercises that were already presented to them (Montessori, 1965b, 1967b), but she also recognized that a child could learn to do an exercise by observing the activity of others. In *Spontaneous Activity in Education* she states:

The children are free to choose the exercises they prefer; but of course, as the teacher initiates them in each exercise, they only choose the objects they know how to use. The teacher, observing them, sees when the child is sufficiently matured for more advanced exercises, and introduces them to him, or perhaps the child begins them for himself, after watching other children more advanced. (Montessori, 1967b, p. 102).

Once selected, exercises could be modified according to the children's inner needs, provided these changes didn't impinge on the rights of others. Montessori emphasized that the collective interests of the classroom always limit the freedom of individual children (Montessori, 1964), and that children need guidance in developing their ability to make choices.

Despite the critical importance of choice in the Montessori system of education, neither the AMS nor the AMI standards for accreditation and recognition specifically address how this dimension should be actualized in Montessori early childhood

classrooms. In its accreditation guidelines, the AMS outlines both principles and standards that only relate indirectly to the classroom provision of choice. In a section identifying early childhood education criteria, the AMS (AMS, 2002) stipulates, “The organization of each room environment is congruent with Montessori principles of individualization and developmental appropriateness.” Another accreditation principle states, “There is obvious evidence that the adults demonstrate behaviors that facilitate children’s optimal development of social skills and intellectual growth.” While these principles imply an expectation that practices consistent with Montessori’s perspective will be implemented, they are general in nature, and not specific to issues of choice in the Montessori environment. Moreover, the document’s standards supporting those principles that are related to opportunities for choice are equally general and more geared to student outcomes than to actual organizational expectations concerning educational choice. For example, the most recent AMS guidelines (AMS, 2002) state that a classroom’s schedule should encourage “the child’s spontaneous activity” and that children should “demonstrate decision-making, problem solving and responsibility for their learning.” While occasions for choice may contribute to these positive outcomes, by not incorporating specific guidelines consistent with Montessori’s recommendations on choice in its accreditation standards, the AMS may inadvertently be allowing for more variation on this dimension than intended or desired.

The AMI is equally nonspecific about the role of educational choice in its standards for school recognition. In its guidelines for recognition in the United States (AMI/USA, 2003b), the AMI only indirectly addresses the issue of choice by stating, “The philosophical approach of the school should be consistent with what is presented in

AMI training courses.” For those unfamiliar with the content of these courses, the standards do little to clarify the organization’s expectations on this dimension.

Both the AMS and the AMI websites, however, include documents outlining educational practices that are compatible with Montessori’s suggestions for implementing choice in early childhood environments. In a position paper comparing Montessori with traditional education, the AMS describes the Montessori classroom as a place where children choose their own activities according to their interests and abilities, work where they are comfortable, and discuss their activities freely with others (AMS, n.d.a). The document describes the environment as one where students can “move and talk at will”, provided that they don’t disturb others, and where “group work is voluntary and negotiable.” Children “work where they are comfortable” and are portrayed as “problem-solvers who can make choices and manage their time well.” Furthermore, the document explains that children are permitted to establish their own learning pace, working as long as they want on chosen projects. Another website position paper on key concepts and practices (AMS, n.d.b) describes the Montessori environment as “a classroom atmosphere that encourages social interaction for cooperative learning, peer teaching and emotional development.” Taken together, these statements illustrate the AMS’s consistency with Montessori’s recommendations on aspects of educational choice in the classroom.

There is also some reference to the role of choice in Montessori education in documents posted on the AMI’s website. A website essay on how to select a school (AMI/USA, 2003c) states that children “choose their own activities”, and acknowledges “The highly social atmosphere of the environment stems from a unique combination of

freedom and structure...”. Another document describing the prepared environment (AMI, 1999) refers to the “sophisticated balance between liberty and discipline” that occurs in Montessori classrooms, and reports “children who have acquired the fine art of working freely in a structured environment joyfully assume responsibility for upholding this structure, contributing to the cohesion of the social unit.” These references to classroom choice highlight the importance of freedom in a Montessori environment. Nonetheless, by focusing primarily on outcomes rather than on the range of choices that children should be provided within the classroom, the AMI website documents fail to clarify the organization’s expectations on this dimension.

Like Montessori education, the NAEYC recommends that teachers provide children with opportunities to make “meaningful choices” in early childhood classroom environments. In its guidelines for decisions about developmentally appropriate practice (Bredekamp & Copple, 1996), the NAEYC maintains that children develop their initiative by choosing and planning their own learning activities, and that children benefit from deciding what they will do and learn. The document urges teachers to provide opportunities for skill practice as a self-chosen activity, as well as to offer children the choice to participate in small group or solitary activities. In addition, the NAEYC encourages teachers to foster children’s peer collaboration, and to assist and guide those who are “not yet able to use and enjoy child-choice activity periods” (Bredekamp & Copple, 1996, p. 18). The organization’s accreditation criteria further state that the children’s right to choose not to participate in activities must be respected by teachers (NAEYC, 1998).

These NAEYC statements echo Montessori's emphasis on self-directed activity in early childhood education. They are consistent with Montessori's recommendation that children make their own activity choices and that teachers encourage children to interact and collaborate in the classroom. Furthermore, both Montessori and the NAEYC recognize that children need guidance to develop their choice-making abilities. While the NAEYC guidelines regarding educational choice are not as specific as Montessori's recommendations on this dimension, they are consonant with her belief that children benefit most from self-chosen activity in an environment prepared with interesting and appropriate activities.

Research with students from kindergarten through 12th grade and with undergraduates has shown that educational choice enhances students' intrinsic motivation (Cordova & Lepper, 1996; Flowerday & Schraw, 2000; Swann & Pittman, 1977; Turner, 1995; Zuckerman, Porac, Lathin, Smith, & Deci, 1978), increases student learning (Cordova & Lepper, 1996; Matheny & Edwards, 1974; Perlmutter & Monty, 1977), and reduces disruptive behavior (Flowerday & Schraw, 2000; Munk & Repp, 1994). In a study designed to increase the motivational appeal of computerized learning activities with fourth- and fifth-graders, Cordova and Lepper (1996) found that student choice strengthened both intrinsic motivation and learning, even when limited to a few instructionally irrelevant aspects of an activity. Zuckerman, et al., (1978) were similarly able to increase the motivation of college students by permitting some subjects to select three of the six puzzles they worked with. According to achievement motivation theorists, people innately strive for competence and take pleasure in their achievements (Deci & Flaste, 1995; Ryan & Deci, 2000). By allowing children to make meaningful

choices children are encouraged to more fully engage in what they are doing, and as a consequence develop their sense of self-control and self-determination. This perspective, like Montessori's, acknowledges that choice situations are intrinsically motivating because they promote feelings of both competence and autonomy. Once children are motivated, learning is more likely to occur.

Some research suggests that how choice experiences are organized determines whether they help children to learn. Linn (1980) found that learning was most likely to occur in a free-choice situation when sixth grade students were provided with direct instruction prior to experiencing opportunities for choice while engaging in scientific reasoning tasks. Compared with students who received free-choice first and then instruction, and another group who received instruction interspersed with free-choice, students who received a 15 minute lecture-demonstration followed by opportunities for free-choice were more task-oriented during learning and significantly out-performed their peers in reasoning ability. These findings are consistent with results of an earlier study in which children gained more from an instruction-free-choice program than a program with free-choice but no instruction (Linn, Chen & Thier, 1976). In both investigations, teacher guidance beforehand helped students to select free-choice experiences most beneficial to their learning. These findings are in agreement with Montessori's notion that children are most successful when given short material presentations prior to engaging in self-initiated activities.

A few studies suggest students aren't always comfortable making classroom choices. Cultural factors may play a role in whether children prefer to make their own choices, or whether they favor having decisions made for them. Iyengar and Lepper

(1999) found that Asian American children from 7 to 9 years of age were more intrinsically motivated on an experimental task when choices were made for them by trusted authority figures or peers than Anglo American children who were more motivated when they made their own activity choices. Flowerday and Schraw (2000) reported in their qualitative study of teacher's beliefs about instructional choice that several K-12 educators recounted instances where students reacted negatively to classroom choice. In some cases the teachers reported that their students didn't know what they were going to do or preferred a "normal assignment" when offered an opportunity for choice. In others, the teachers stated that their students responded skeptically to instructional choice and felt that there must be a catch. Although most of the K-12 teachers interviewed in the study stated that older children needed more choices than younger students, a minority maintained that it was never too early to start teaching decision-making and self-regulation skills that spontaneously emerge from choice -making (Flowerday & Schraw, 2000). The findings from these studies reflect Montessori's view that children need help to make appropriate choices and that even very young children benefit from choice -making opportunities.

Although limited in number and scope, and primarily conducted with older students, research examining educational choice supports Montessori's perspective that children's learning and self-regulated behavior is fostered through self-directed activity in the classroom. Study results suggest that children benefit from instruction before being given choice and that students may be uncomfortable with decision-making. These findings are consistent with Montessori's emphasis on lessons prior to activity use, and developing children's choice-making ability. Research with younger children to

substantiate these results at the early childhood level is needed, as well as investigations examining other aspects of classroom liberty such as possible benefits associated with permitting children to work together or allowing children to use materials for different purposes than they were intended.

Work Period

Montessori observed that children left free in the Montessori prepared environment developed such deep interest in their activities that they chose to work for long periods of time without fatigue (Montessori, 1964). By recording the work cycles of children in her experimental schools (Montessori, 1965a, 1965b), Montessori found that most children engaged in two successive phases of work. During the initial phase, which lasted approximately an hour, the children selected easy and familiar tasks. This phase was followed by a longer period of more intense and challenging work. For a short time between the two phases, the children showed signs of agitation and appeared to be becoming disorderly. If at this point the children were allowed to settle and choose new occupations, they quickly became absorbed in more difficult activities. However, if interrupted by an inexperienced teacher and not permitted to continue selecting their activities, the children remained restless and unfocused. Only when provided with an extended, uninterrupted work period did the children develop sustained concentration and engage in new and more challenging activities. At the end of the second phase, the children would contemplate their finished work and appear “rested, satisfied, and uplifted” (Montessori, 1965b, p.97). Montessori believed completion of this entire cycle was necessary for the child to become self-disciplined and for work, as well as orderly conduct, to become “a habitual attitude” (Montessori, 1965b).

Despite these findings, Montessori never directly specified the ideal length of a work period in her major publications. While her discussion of the conditions most favorable to work includes an activity cycle chart suggesting a 3-hour work period (Montessori, 1965b, p. 98), a *Proposed Winter Schedule of Hours in The “Children’s Houses”* included in Montessori’s first book indicates a much shorter period for free choice (Montessori, 1964). After an hour of teacher-directed activities, the schedule only includes a 1-hour period for exercises with the materials before the group is reconvened for gymnastics. The book explains that this schedule was outlined when the first “Children’s House” was established and that they never followed it entirely, but does not describe how the schedule was modified in practice. Whereas Montessori emphasized the importance of a long, uninterrupted work period repeatedly in her writings, the inclusion of contradictory information in her publications and her failure to specifically state how long this period should be may have lead to differing interpretations by practitioners.

Both the AMS and the AMI recognize the importance of a long, uninterrupted work period in their standards for school accreditation and recognition, as well as on their websites. In its website discussion of *Key Concepts and Practices*, and in its standards for accreditation, the AMS states that classroom schedules should provide for large blocks of uninterrupted work time. This is in contrast to the organization’s earlier set of standards (Rambusch & Stoops, 1992), which only required that at least one-half of the school day provide opportunities for individual activity³. The AMI has similarly moved toward greater specificity in its standards by changing its requirement that

³ In the many schools with half-day programs this would not be a long period of time.

“substantial uninterrupted work periods (are) provided each day”, to directly stating in its guidelines that the school must provide an uninterrupted 3-hour work cycle each morning (AMI/USA, 2003). Although the AMI criteria are more stringent than the AMS guidelines, both organizations have recently modified their standards to be more closely aligned with Montessori’s implication in her later writings that a 3-hour work period was desirable.

The NAEYC has taken a similar position on work period length as the AMS and the AMI by stating that children should be allotted extended blocks of time in the classroom to engage in play, projects, and/or study (Bredekamp & Copple, 1996). Also consistent with the AMS and the AMI, the NAEYC favors minimizing the number of transitions or regroupings that children experience during the school day (NAEYC, 1998). Like the AMS, however, the NAEYC does not specify how long this extended period of activity should be. More importantly, the association does not directly indicate that these intervals of time are to be uninterrupted periods of free choice. By recognizing the importance of providing children with extended blocks of time for their activities, the NAEYC position is consistent with Montessori’s perspective. Even so, by not indicating what is meant by an extended interval of time the association’s position is more general and open-ended than Montessori’s suggestions on this dimension.

Two investigations have considered the effects of activity period duration on preschool children’s play behavior. In both cases, longer activity duration, that is, 30 or 45 minutes of free choice rather than 15 minutes, resulted in more complex and productive play activities (Christie, Johnsen & Peckover, 1988; Tegano & Burdette, 1991). When provided with a longer activity period, children were able to move beyond

an initial phase of exploration and manipulation of objects and into situations that provided opportunities for problem-finding and problem-solving (Tegano & Burdette, 1991). While these findings begin to support Montessori's notion that children need extended time to engage in self-selected activities, it is unclear from these results whether a substantially longer activity period, such as the 3 hours implied by Montessori, would provide additional benefits to children.

Research on focused attention has shown that young children tend to engage in a particular activity until information processing is completed (McCune & Zanes, 2001). Shifting attention to a new task may be very difficult if the child is already fully engaged in an activity. Furthermore, the child's next bout of attention, if it can be attained, will not be as long or as concentrated as the first (Lansink & Richards, 1997; Richards & Casey, 1992). These findings underscore the importance of not interrupting the focused activity of young children. As Montessori recognized, children need sufficient time for the completion of their activities; by providing them with an extended, undisturbed free choice period it is less likely that they will be interrupted in their natural cycle of activity. Research is still needed to examine whether children provided with a lengthy work period do engage in two distinct phases of activity (i.e., an initial phase where familiar activities are selected, followed by a longer period of more intense and challenging work) and if so, whether this type of scheduling benefits children more or differently than schedules including teacher-directed and/or mandatory activities.

Mixed-age Groupings

Montessori discovered the benefits of the multiage grouping of children while applying her educational theories with a mixed class of 3- to 7-year-olds in the original

Casa dei Bambini. She observed that all of the children benefited from this arrangement.

The 3-year-olds were inspired by the work of the older children and asked for explanations. The older children's responses both enthused the younger children and also helped the more advanced children to better understand what they already knew (Montessori, 1967a). Moreover, the older children served as protectors of their younger classmates. Montessori describes the advantages of mixed-age grouping in *The*

Absorbent Mind:

Our schools show that children of different ages help one another. The younger ones see what the older ones are doing and ask for explanations. These are readily given, and the instruction is really valuable, for the mind of a five year old is so much nearer than ours to the mind of a child of three, that the little one learns easily what we should find it hard to impart. There is a communication and a harmony between the two that one seldom finds between the adult and the small child ... There is between them a natural mental "osmosis". (Montessori, 1967a, p. 226)

Even though the first *Casa dei Bambini* was meant to serve children from 3 to 7 years of age, in her writings Montessori discusses an age span of 2 1/2 or 3 years to 5 years of age (Montessori, 1964, 1967a). In his book, *Education for Human Development*, Mario Montessori Jr. describes a classroom catering to children from 3 to 6 years of age, and refers to children first coming to school when 2 1/2 or 3-years old (Mario Montessori, 1976). Together these descriptions suggest a 3-year age span for the Montessori early childhood classroom beginning at 2 1/2 or 3 years of age and continuing until 5 or 6 years of age.

The AMS and the AMI each outline a perspective on mixed-age grouping in their standards for accreditation and on their websites that is congruent with Montessori's recommendations. Two of the AMS standards, one describing school policies and the other program planning and implementation, call for a 3-year age span of children.

Accredited schools, according to the guidelines, are expected to practice “vertical grouping” and to assign to each class a balance of ages. The AMS reiterates its stance on multiage grouping in a number of website position papers including one essay, entitled *Mixed Age Grouping* (AMS, n.d.c), which describes the many advantages of this form of classroom organization.

The AMI is equally specific in its standards about multiage grouping, requiring that classes include a well-balanced division of ages and are made up of children representing a 3-year age range. One essay on the organization’s website refers to “children of mixed-age levels” (AMI/USA, 2003a), while another explains that “usually children enter around the age of 3 and remain in a class for 3 years” (AMI/USA, 2003c). Like the AMS, the AMI clearly communicates its position on this dimension and reflects Montessori’s perspective that children benefit most from a multigraded classroom with a 3-year age span.

The NAEYC does not directly recommend the use of mixed-age grouping in its guidelines for developmentally appropriate practice in early childhood programs. Instead, the association acknowledges that multiage grouping is one strategy that can be used to increase children’s opportunities to experience “continuity of relationships with teachers and other children” (Bredekamp & Copple, 1996, p. 25). The association’s accreditation criteria, however, do state that groups of children may be age-determined or multiage, and that multiage grouping is both permissible and desirable (NAEYC, 1998). In both documents, the organization recognizes the important role more competent peers can play in the classroom by providing less advanced classmates with supportive scaffolding that enables them to succeed on tasks just beyond their immediate

reach. While this perspective is consistent with Montessori's emphasis on children assisting one another in mixed-age classrooms, the NAEYC does not explicitly recommend a multigraded classroom with a 3-year age range as advocated by Montessori.

Whereas reviews of research on mixed-age grouping at the elementary level have consistently found no differences between mixed-age and single-age classes (Miller, 1990; Pratt, 1986; Veenman, 1995), possibly as a result of instructional similarities in both types of grouping (Veenman, 1995), studies at the early childhood level suggest that young children can benefit from participating in mixed-age classes. Consistent with Montessori, who emphasized both the social and cognitive advantages associated with mixed-age grouping, young children in multiage classrooms have been found to engage in more positive interactions than children in same-age classrooms (Goldman, 1981; McCellan, 1991; Winsler, 1993), and to have obtained higher cognitive growth rates than their counterparts in nonmultilevel settings (Bailey, Burchinal & McWilliams, 1993). Furthermore, McCellan (1991) found that mixed-age classrooms were predictive of lower rates of aggression and competitiveness, and were also less likely to contain children who had been rejected or neglected by their peers than same-age classrooms. These findings support Montessori's notion that harmonious relationships between children are more likely to develop in multi-aged classrooms.

There is also some research support for Montessori's idea that older children assume leadership and instructive roles in multilevel classrooms. Younger children in mixed-age settings have been found to view their older peers as leaders and a resource for help and instruction (Blume, 1987; French, 1984; French, Waas, Straight, & Baker,

1986). Research has also shown that children with disabilities and social behavior problems benefit more from interactions with cross-age peers than from interactions with peers of the same age (Blasco, Bailey, & Burchinal, 1993; Furman, Rahe, and Hartup, 1979; Kim, 1990). In addition, children have been found to perform significantly better when taught by peers who were very discrepant in age as compared to children who were tutored by peers who were less discrepant in age (Linton, 1973; Thomas, 1972). These findings are congruent with Montessori's belief that children of different age levels benefit from an environment where cooperative learning and peer teaching are encouraged. They suggest that an age-span of 3 or more years may be more beneficial to children than a mixed-age group that spans only 2 years.

Presentation Format

Most lessons given in a Montessori early childhood classroom acquaint the children with the use of the various materials available in the environment. Because these materials correspond with children's developmental needs, Montessori emphasized that they must be presented individually according to each child's interests and abilities. Presentations of materials should be geared to the individual child's level of functioning, and given with precision to attract the child's attention and to show him or her exactly how to proceed with the activity (Montessori, 1967a). By than observing the child's spontaneous use of the material, the teacher can assess the child's interest in the activity and understanding of the lesson, as well as determine which activities to present next. Montessori insisted that children should not be held back by giving them material beneath their individual capabilities which will be boring to them (Montessori, 1967b), or by giving them something that exceeds their capabilities (Standings, 1957) and

potentially frustrating them. Consequently, she held that collective or large group lessons were inappropriate unless the activity could interest the entire group. In *The Montessori Method* she states:

... the teacher *cannot give* collective lessons. Such lessons, indeed, will always be *very rare*, since the children being free are not obliged to remain in their places and ready to listen to the teacher, or to watch what she is doing. The collective lessons, in fact, are of very secondary importance, and have been almost abolished by us. (Montessori, 1964, p. 107-108)

Mario Montessori Jr. also insisted that material presentations must be given individually to accommodate each child's developmental needs (Mario Montessori, 1976). In addition, he recognized that many activities, such as singing, dancing, the silence lesson, exercises on the line, making decorations, etc., are often engaged in collectively in Montessori classrooms. Neither Mario nor Maria Montessori addressed the role of small group presentations in their primary publications on Montessori early childhood education despite the prevalence of lessons given to two or three children in many of these settings.

Whereas Montessori clearly emphasized one-to-one presentations over group lessons in her recommendations for Montessori early childhood education, neither the AMS nor the AMI stress individualized instruction in their standards for accreditation or on their websites. In its most recent set of standards, the AMS requires teachers to demonstrate the ability to give meaningful individual and small group lessons, as well as the ability to plan and implement group activities (AMS, 2002). Acknowledging the importance of all three formats is an improvement over the organization's earlier standards, which only required teachers to "demonstrate a broad repertoire of teaching strategies" (Rambusch & Stoops, 1992). However, by not emphasizing individualized

instruction, the document doesn't fully align with Montessori's recommendations on this dimension. An AMS website document similarly states that "individual and group instruction adapts to each student's learning style" (AMS, n.d.a). This statement is equally vague, and is the only reference made to presentation format on the association's website. With no written statement in its standards or elsewhere on its website, the AMS position on individualized instruction remains unclear.

The AMI also fails to address the issue of individualized instruction directly in its standards or on its website. Instead, in its school recognition guidelines the organization requires that AMI programs adopt a philosophical approach that is consistent with what is presented in AMI training courses (AMI/USA, 2003b). While AMI teacher education does emphasize individualized instruction, stating this directly in the organization's standards or on its website would help to more effectively convey the AMI's expectations on this dimension.

The NAEYC, in contrast to the AMS and AMI, does emphasize individualized interactions between adults and children in its guidelines for developmentally appropriate practice. Like Montessori, the NAEYC recommends that adults' interactions with children be as individualized as possible (Bredekamp & Copple, 1996). The association encourages teachers to observe the spontaneous activity of individual children and to use information about their interests, abilities, and developmental progress to plan experiences that enhance the children's learning and development (Bredekamp & Copple, 1996). The importance of building on what children already know and can do as well as challenging children with activities tailored to their emerging competencies is emphasized. Furthermore, in its accreditation criteria the

NAEYC recommends limiting the amount of time spent in teacher-initiated, large-group activities (NAEYC, 1998). While the organization does advocate providing children with a variety of grouping options that are available most of the day, its recognition of the importance of individualized interactions for children's learning and development is congruent with Montessori's preference for one-on-one instruction.

There have been no studies assessing whether individual demonstrations of materials are more beneficial to young children than whole group presentations. Research on the effects of tutoring with elementary aged children, however, has shown that tutorial one-on-one instruction consistently leads to significant learning gains (Cohen, Kulik, & Kulik, 1982; Shanahan, 1998; Wasik & Slavin, 1993). Tutored children outperformed their peers on exams, and they benefited both socially and emotionally from their participation in tutoring programs (Cohen, Kulik & Kulik, 1982). Positive results for children were particularly evident when well-trained tutors were used (Pinnell, Lyons, DeFord, Bryck, & Selzer, 1994; Leach & Siddall, 1990; Wasik & Slavin, 1993), and when tutors engaged in scaffolded interactions that involved providing children with just enough information to problem solve on their own (Juel, 1996).

When used in place of traditional instruction, tutorial programs were shown to be superior to group instruction (Bloom, 1984; Cohen, Kulik & Kulik, 1982; Pinnell et al., 1994). Bloom (1984) describes a series of studies where children with similar backgrounds were randomly assigned to three instructional conditions: conventional, mastery learning, and tutoring. The average tutored student tested above 98% of the students in the conventional class, and developed attitudes and interests that were

significantly more positive than students in the other two conditions. Collectively, these findings suggest that one-on-one instruction is superior to conventional instruction and benefits children academically as well as socially and emotionally.

Research on the young child's development of focused attention provides additional support for the use of individualized instruction in the 3- to 6-year-old classroom. Studies have shown that until the age of 8 or 9, children are severely limited in their ability to control attentional processes (Pick, Frankel, & Hess, 1975; Shepp, Barrett, & Kolbet, 1987; Vurpillot, E., & Ball, W. A., 1979). Attending to complex and unfamiliar activities is particularly challenging for young children, while activities that are too familiar simply fail to engage their attention (McCune & Zune, 2001). Furthermore, children have been found to focus longer when they attend to a stimulus voluntarily (Suzuki & Cavanagh, 1997). These findings augment the results of tutorial research and support Montessori's view that instruction should be given on an individual basis rather than in a whole group format. Group presentations that are too familiar or beyond the child's reach will not engage the child's attention, and as a result little or no learning will occur. Individual lessons, on the other hand, can be geared to each child's developmental level, and are ultimately a more productive use of classroom time.

Summary and Conclusion

This literature review has examined five dimensions of Montessori practice from the perspective of Montessori's writings, the AMI and the AMS, the NAEYC, and empirical research. Consistency was found between Montessori's recommendation that her didactic materials be made available in early childhood classrooms, and with both the AMS and AMI requirements that member schools provide a full complement of

Montessori materials. The NAEYC, while not directly recommending Montessori manipulatives, does encourage the use of a wide variety of developmentally appropriate and challenging materials and equipment. Furthermore, research suggests that instruction with concrete materials can have a positive effect on student achievement and learning.

Montessori's recommendations concerning the provision of educational choice are scattered throughout her writings. Both the AMI and the AMS describe choice opportunities that typically occur in Montessori environments on their websites, but neither organization provides specific guidelines for implementing classroom choice in their school standards. The NAEYC makes classroom practice suggestions that are consistent with many of Montessori's recommendations on this dimension, and like Montessori, also recognizes the developmental importance of choice opportunities for young children. Research supports the notion that occasions for choice can be beneficial to children by showing that intrinsic motivation increases when children are presented with alternatives.

While Montessori clearly emphasizes not interrupting the young child's work activity in her writings, she only implies, rather than specifically states, that a 3-hour work period is desirable. Both Montessori associations support long, uninterrupted work periods on their websites and in their school standards; however, only the AMI specifically supports the idea of a 3-hour work period. The importance of extended activity periods is also recognized by the NAEYC. Nonetheless, the organization does not specify the length of an extended period or indicate that these intervals of time should be uninterrupted. The ideal work period length has not been examined

empirically, although research does suggest that 30 or 45-minute periods result in more advanced activity than 15 minute periods. Research also indicates that shifting attention from one activity to another may be very difficult for young children and that they tend to engage in an activity until information processing has been completed.

The 3-year multiage grouping in early childhood classrooms recommended by Montessori is consistently supported by the AMS and the AMI in their standards and website literature. While the NAEYC is not opposed to mixed-age grouping, stating that this strategy is not only permissible, but desirable in its accreditation criteria, it does not directly recommend this type of grouping in its guidelines for developmentally appropriate practice. Research suggests both social and cognitive advantages associated with mixed-age grouping at the early childhood level particularly when cooperative learning and peer teaching have been encouraged.

Montessori emphasized individual presentations rather than whole group lessons in her writings, but did not specify when and how small group presentations should be used in early childhood classrooms. Although the AMS acknowledges the use of all three presentation formats, like the AMI, it does not stress the use of one-on-one instruction in its standards or on its websites. Consistent with Montessori, the NAEYC recommends individualized interactions with children and limiting the time spent in teacher-led large group activity. These NAEYC suggestions are supported by research showing greater benefits associated with one-on-one instruction.

Although Montessori never published a set of guidelines for classroom practice, her writings and those of her son contain recommendations that describe the Montessori system of education. In this literature review, Montessori's writings were examined to

determine her recommendations and rationales for five dimensions of Montessori practice. It was found that Montessori recommended: (1) the use of her manipulative materials and real-life activities in her early childhood classrooms, (2) granting children freedom in a structured environment (e.g., allowing children to make their own activity choices, choose whether to work with others, and participate in a lesson or not; permitting a child to use an activity after observing another child's use of the material), (3) providing children with a long, uninterrupted work period, (4) mixed-age grouping of children with a 3-year age span, and (5) giving individual rather than whole group presentations.

It is not clear from Montessori's writings whether she viewed it as permissible to incorporate play or other non-Montessori educational materials into the Montessori environment. It is also unclear whether: (1) children should be permitted to use more than one material at a time, such as combining the sensorial apparatus, (2) snack should be an individually chosen or group activity, and (3) a material could be used in a different way than originally intended. Although implied, Montessori did not specifically recommend a 3-hour work period, nor did she clarify the role of small group presentations in the early childhood classroom.

The AMI and the AMS both recommend the use of the Montessori didactic materials and real-life activities, recognize the importance of a long, uninterrupted work period, and require that affiliated schools multi-age group children in a 3-year age span. Neither organization, however, specifically outlines how opportunities for choice should be actualized in the classroom, or whether most lessons should be individualized rather than given to the whole group. It is also unclear from both organizations' standards and

website literature in what way, if any, the Montessori materials and activities could be supplemented in the classroom.

The NAEYC standards for developmentally appropriate practice that are consistent with Montessori's recommendations include: (1) providing children with a variety of developmentally appropriate, challenging materials, (2) offering many opportunities for choice, (3) making extended activity periods available, and (4) emphasizing individualized interactions over whole group activities. Although the NAEYC recognizes multiage grouping as desirable, the organization does not specifically recommend this practice in its accreditation criteria.

There is research support for all five dimensions of Montessori practice: providing children with concrete materials, occasions for educational choice, extended activity periods, mixed-age grouping, and one-on-one instruction were all shown to be beneficial to children in a variety of investigations. More research is needed in each of these areas, particularly at the early childhood level and in Montessori environments.

CHAPTER III METHODS

The purpose of this study was to examine how Montessori early childhood educators have implemented the Montessori approach and factors influencing their enactments of the method. A literature review examining differences in Montessori education identified five dimensions of practice that have been inconsistently implemented in American Montessori schools. In this study, teachers' implementation of these practices was used to investigate the extent to which Montessori early childhood programs could be classified into subgroups. Also of interest was whether teachers were intentionally or unintentionally making changes to the model, and whether these changes were related to situational circumstances, teacher's disagreement with Montessori's perspectives, or practitioner's beliefs about classroom management and motivation. A survey consisting of a semistructured phone interview was used in this research to investigate the implementation practices of Montessori early childhood educators and the factors contributing to teachers' implementation differences.

This chapter will describe: (1) the population and sample used in this study, (2) how data was collected, (3) the development, piloting, and description of the phone interview, and (4) data analysis procedures.

The Population and Sample

The target population in this study consisted of educators currently teaching in Montessori early childhood classrooms located in four counties in the San Francisco Bay Area. An early childhood classroom was defined as one serving both preschool and kindergarten-aged children, preschool age only, or kindergarten only. Teachers

instructing in classes serving toddlers or those in combined kindergarten and first grade classes were not considered part of the target population. Only classrooms containing 12 or more children were included in the investigation.

When the study was initiated, there were approximately 220 Montessori early education programs located in the greater San Francisco Bay Area. These schools ranged in size from one to nine classrooms. Most of the schools were independently operated, and were not affiliated with a larger organization. No information was available documenting how many teachers in these programs were trained in the Montessori method or how many had obtained certification from an accredited Montessori teacher education program.

Six Montessori teacher education programs were in operation in the targeted metropolitan area when data was collected for this study. Three of the training centers were associated with the American Montessori Society (AMS). Three other teacher education organizations--the Association Montessori Internationale (AMI), the National Center for Montessori Education (NCME), and the Pan American Montessori Society (PAMS)—offered one program each. While both the AMI and the AMS have existed since 1929 and 1963 respectively and are internationally recognized, the NCME and PAMS are smaller associations organized in the 1970s to promote Montessori education and provide teacher education both within and outside of the United States.

The programs included in this study were selected from four Bay Area counties to maximize variation in implementation. The sample was selected from a comprehensive list of Bay Area Montessori early childhood programs in the four counties of interest. This list was compiled by merging listings of schools created by various Montessori

organizations and by consulting the yellow pages in each region. Of the 130 schools on the initial list, 28 did not qualify because they no longer considered themselves a Montessori school, served children at the wrong age level, were too small (had 11 or fewer children), or were no longer in operation.

Thirty-six schools on the list qualified for the study, but administrative staff or the teachers selected chose not to participate⁴. The remaining 67 schools (66% of those potentially qualifying) agreed to participate in the research and one teacher from each school was interviewed. One interview was dropped from the study because it was later determined that the teacher was no longer actively directing a classroom. The schools participating in the study mainly served children from middle-class families.

Most of the 66 teachers included in this study (97%) were certified Montessori early childhood educators (see Table 1). The majority of teachers (48 or 75%) held AMS certification. Eleven of the teachers (16%) were certified with AMI, and four (6%) had trained with a local center affiliated with PAMS. None of the teachers had received NCME training, and one practitioner had been trained through St. Nicholas in London. Of the 64 credentialed Montessori educators, 42% had obtained their certification within the past 10 years; 30% completed their training 11 to 20 years ago, and 24% had been certified for more than 20 years. Only four males were included in the sample.

Two-thirds of the teachers interviewed were in 31-50 years of age. Only 12% of the teachers were between ages 21 and 30, and 24% of the participants were over 50 years of age. This trend toward older educators in the sample could help to explain the

⁴ Nonparticipating schools indicated that they did not wish to take part (often citing time constraints), agreed to participate but did not call back, or did not respond to phone messages soliciting their involvement in the investigation.

relatively high percentage of participants holding college degrees: 23 teachers (35%) had obtained their bachelors degree, and 23 (35%) indicated that they held an advanced degree. Two-thirds of the teachers had been teaching in their current job for 10 years or less. The ethnicity of the sample reflected the racial diversity that exists in the Bay Area. While 62% of the teachers were Caucasian, 12% were Latino, and 10% were Asian. Nine participants described themselves as of mixed ethnicity or other.

Table 1

Demographic Characteristics of the Sample

<u>Gender</u> %		
Male	6.1	<i>n</i> = 4
Female	93.9	<i>n</i> = 62
<u>Teachers' Age</u> %		
21 – 30	12.1	<i>n</i> = 8
31 – 40	34.8	<i>n</i> = 23
41 – 50	27.3	<i>n</i> = 18
51 – 60	21.2	<i>n</i> = 14
61 and over	4.5	<i>n</i> = 3
<u>Teachers' Ethnicity</u> %		
African American	0	<i>n</i> = 0
Asian	10.6	<i>n</i> = 7
Caucasian	63.6	<i>n</i> = 42
Latino	12.1	<i>n</i> = 8
Mixed Ethnicity/Other	13.6	<i>n</i> = 9
<u>Montessori Certification</u> %		
Yes	96.9	<i>n</i> = 64
No	.01	<i>n</i> = 1
In Training	.01	<i>n</i> = 1
<u>Type of Montessori Training</u> %		

AMI	17.2	<i>n</i> = 11
AMS	75.0	<i>n</i> = 48
PAMS	6.2	<i>n</i> = 4
Other	7.8	<i>n</i> = 5
<u>Year of Montessori Certification</u> %		
1960s	1.5	<i>n</i> = 1
1970s	15.6	<i>n</i> = 10
1980s	26.5	<i>n</i> = 17
1990s	42.2	<i>n</i> = 27
2000s	14.1	<i>n</i> = 9
<u>Years Teaching in Current Job</u> %		
0 – 5	24.2	<i>n</i> = 16
6 – 10	30.3	<i>n</i> = 20
11 – 15	9.1	<i>n</i> = 6
16 – 20	12.1	<i>n</i> = 8
21 – 25	6.1	<i>n</i> = 4
26 – 30	3.0	<i>n</i> = 2
<u>Highest Level of Education</u> %		
Associates	30.3	<i>n</i> = 20
Bachelors	34.8	<i>n</i> = 23
Advanced Degree	34.8	<i>n</i> = 23

Data Collection

Montessori schools with early childhood education programs in the four selected San Francisco Bay Area counties were contacted and their directors asked whether they would be willing to have a teacher interviewed by phone for the study. If the program consisted of only one classroom, the head teacher was asked to participate. In classrooms with more than one teacher, or in schools with multiple classrooms, random selection was used to identify the teacher who would be asked to take part in the interview. Only teachers who taught in morning programs were invited to participate in the study. If the identified teacher was not interested, a second teacher was identified

and asked to participate. Arrangements were made to interview the selected teachers by telephone at their convenience. Prior to being interviewed, participating teachers were read an informed consent form and were asked verbally whether they agreed to participate in the research. Interviews were conducted over a three-month period beginning in late October 2003.

Instrumentation

Interview Development

A telephone interview survey was developed to examine the implementation practices and perspectives of Montessori early childhood educators. During the first phase of the instrument's development, research highlighting differences in Montessori enactment was analyzed to determine which classroom practices to consider in the investigation. Once the most frequently altered dimensions of Montessori practice were identified, an analysis of Montessori's writings was undertaken to investigate her recommendations with respect to each dimension. Research revealing variation in Montessori implementation as well as Montessori's own writings was used to determine which aspects of the five dimensions to assess in the survey. Interview questions were written to assess the important aspects of each dimension. For instance, because Montessori recommended a long, uninterrupted work period, the length of the work period in addition to whether it was interrupted or not was examined in the interview.

A study of Montessori expansion in the United States and an extensive review of research on teacher education served as a foundation for developing a conceptual model depicting the factors influencing a teacher's enactment of the Montessori method (see Appendix A). Within this conceptual model, the American Montessori movement is

situated in a broader cultural context that reflects long-established views about knowledge, teaching, and learning. This cultural context has not only influenced Montessori teacher training and school policies and procedures, but has also affected the knowledge and beliefs maintained by the Montessori teachers themselves. As a consequence, established views about education are perceived as playing a central role in how the approach has been adapted and implemented. Interview questions were developed to assess some of the factors that may influence a teacher's implementation of the approach.

A third set of interview questions was created to examine teacher's beliefs about classroom management and motivation. These questions, modeled after the *Problems in Schools* questionnaire developed by Deci and his colleagues (Deci, et al., 1981), address problem situations that typically occur in a Montessori early childhood classroom. For each problem situation, or vignette, the teacher was asked to rate how comfortable he or she would be to responding in five different proposed ways. The purpose of this question was to measure the extent to which the teachers were *controlling* as opposed to *autonomy-supporting* in their orientation to classroom management and motivation. The initial set of questions consisted of eight vignettes each with five possible responses that a Montessori teacher might make to the problem situation.

Demographic questions about the teachers themselves and their classrooms were also developed and included in the fourth section of the interview.

Piloting

The survey questions were piloted with three educators who had just completed their Montessori early childhood internships and five experienced Montessori early

childhood educators who were not currently teaching at this level, but who had taught in a 3- to 6-year-old classroom within the past 5 years. The interview was administered to this group and each teacher was asked to provide feedback about the survey. Based on the responses and comments of these practitioners, some survey questions were rewritten or modified to help make the questionnaire clear and understandable to Montessori early childhood teachers.

In addition, the classroom management and motivation problem situation questions were piloted as a written questionnaire to a group of 12 students completing their Montessori teacher education. An analysis of both the student responses as well as those obtained from the initial piloted group revealed that three problem situations were answered in a manner most consistent with the original instrument. These vignettes were included in the interview, and a final draft of the interview protocol was piloted with three educators currently teaching in Montessori early childhood settings. Minor changes were made to the protocol following these interviews⁵.

Instrument Description

The final version of the telephone interview contained 59 questions about the implementation practices and motivation orientation of Montessori early childhood educators. The interview was semistructured, containing both closed-ended and open-ended questions, and consisted of four parts (see Appendix B).

The first part of the interview examined teachers' enactment of the five dimensions with 19 of the survey's 59 items. Teachers were asked to choose the description that best

⁵ Although establishing the validity and reliability of the interview questions was beyond the scope of this dissertation, extensive observation in a range of Montessori classrooms and open-ended questions within the interview protocol served as crosschecks for the instrument.

described how children had been grouped in their classrooms to assess the extent that mixed-age grouping had been implemented. The work period dimension was examined with two questions, one about classroom scheduling and another assessing whether specialists taught enrichment activities that interrupted the work period. To investigate presentation format, the teachers were asked what percentage of material demonstrations they gave to the whole group, to small groups, and to individual children, and whether they introduced materials during circle time.

Five interview items elicited information about classroom materials. One asked participants whether 12 key Montessori exercises were available in their classrooms. Another asked teachers to indicate what percentage of activities in their classrooms were traditional Montessori materials and extensions. Teachers who augmented these materials were asked to indicate what percentage of the supplemental activities was play-oriented as opposed to educational. The teachers were also asked whether they provided their children with fragile materials and store bought workbooks or worksheets.

The interview assessed two aspects of choice: general freedom within the classroom, and choice related to the materials. In the general freedom category, one item each evaluated whether: (1) snack was a group or an individual activity, (2) children could work together or were encouraged to work individually, (3) all children participated in circle, and (4) children could choose to participate in individual presentations. Items examining choice (related to the materials) assessed whether: (1) children could choose their own work activities, (2) children were permitted to use a material for a different purpose than it was intended, (3) children were allowed to

combine certain materials (i.e., the sensorial materials), and (4) children could work with or explore a material that hadn't been presented to them yet.

Prior to analysis, the 19 dimension items assessed in this part of the interview were converted to a score. Items with a numerical value were recorded as is. Questions with “no, to some extent, yes” answers were scored as a 1, 2, or 3 with a 3 representing responses most consistent with Montessori's recommendations and/or with child-centered perspectives. A composite score was also created for the eight choice items.

Data from this interview section was used to address the first two research questions of the study—whether teachers could be classified into meaningful subgroups based on their implementation of the Montessori method, and if so, what characteristics defined each subgroup.

The second part of the interview contained 12 items assessing potential reasons why Montessori teachers implement the practices they do. Five questions examined situational constraints that could prevent teachers from directing their classrooms the way they ideally would. The circumstances considered were: (1) limited resources or funding, (2) children with behavior problems or special needs, (3) school policies and procedures, (4) parental concerns and demands, and (5) lack of planning or preparation time. Six items investigated the teachers' agreement with the five dimensions of Montessori educational practice assessed in part one of the interview. An additional question examined the extent to which teachers' believed they had intentionally modified Montessori's practices. Items in this section were scored on a 5-point Likert scale.

By examining factors influencing how Montessori teachers have implemented the approach, this interview section addressed the third research question of the study—to what extent are Montessori teachers intentionally or unintentionally modifying the method, and if changes are being made, whether these modifications are due to situational factors and/or to teacher perspectives that differed from Montessori’s recommendations.

During the third part of the interview, the participants were asked to rate how comfortable they would be responding in different ways to a set of problem situations that could occur in their classrooms. Piloting of eight vignettes modeled after the *Problems in Schools* questionnaire developed by Deci and his colleagues (Deci, et al., 1981), indicated that three situations were answered in a manner most consistent with the original instrument. Therefore, these vignettes were included in the interview to measure the extent to which teachers were controlling as opposed to autonomy-supporting in their orientation to classroom management and motivation.

Each interview vignette was followed by five possible teacher responses. One response was highly controlling (HC), another moderately controlling (MC), a third was moderately autonomy supporting (MA), and a fourth was highly autonomy supporting (HA). Unlike the original Deci instrument, a fifth response was added to each vignette to assess whether the teacher assumed a laissez faire attitude toward motivation and limit setting. During the interview, test participants rated how comfortable they were with each of the 15 response items on a 7-point Likert scale. Scores from this portion of the interview were used to address the fourth research question, i.e. what role do

teachers' beliefs about motivation and classroom management play in shaping classroom practices?

The interview's fourth section contained questions about the teachers themselves (age, ethnicity, prior teaching, etc.) and about their classrooms. This information was used to assess the association between type of program and various demographic factors such as training type or level of schooling attained.

Data Analysis

Preparation of the Data

The interview data were examined for completeness and out-of-range or mislabeled cases. There was no missing data except for certification information for the two teachers who were not yet certified.

Implementation Factor Measures

Modification

The mean score for the item assessing the extent that teachers had intentionally modified Montessori practices in their classrooms was used as a measure of modification. Scores on this item ranged from 1 (*little modification*) to 5 (*greatly modified*).

Situational Constraints

A composite score for the five items examining situational constraints was used as a measure for this variable. The scores included in this measure consisted of: (1) limited resources or funding, (2) children with behavior problems or special needs, (3) school policies and procedures, (4) parental concerns and demands, and (5) lack of planning or preparation time. Each item was rated on a scale from 1 to 5 with 1 indicating that

situational constraints impacted the teachers' ability to implement the Montessori approach the way they ideally would to a minimal extent, and 5 indicated that situational factors affected their implementation to a great extent ($\alpha = .45$).

Agreement with Montessori Practices

A composite score for the six items investigating the teachers' concurrence with the five dimensions of practice associated with Montessori education was used as a measure of agreement with Montessori practices. The items examined agreement with: (1) having a mixed-age group of children spanning at least three years, (2) providing children with a 3-hour uninterrupted work period, (3) giving initial material presentations to individual children rather than to the whole group, (4) permitting children to choose whether to work with others, when to have snack, and to participate in lesson and circle time, (5) allowing children to choose their own work even if they haven't had a lesson first and how they'll work with a material, and (6) providing children with a full range of Montessori materials, activities, and extensions rather than play or other supplemental activities during the work period. These items were rated on a 5-point scale ranging from total disagreement with the item (1) to total agreement (5) ($\alpha = .57$).

Motivation Orientation

A motivation orientation score was created by applying the formula used in the original *Problems in Schools* questionnaire with the 12 interview items examining the teachers' comfort level with different responses to potential problem situations in their classrooms. This formula consisted of: Motivating style = 2(highly autonomous) + (moderately autonomous) – (moderately controlling) – 2(highly controlling) (Reeve,

Bolt, & Cai, 1999). The score obtained from applying this formula was standardized to reflect the assessment's rating scale of 1 (*very uncomfortable*) to 7 (*very comfortable*) and served as a measure of motivation orientation in this study ($\alpha = .76$).

The three laissez-faire items imbedded in the assessment of motivation orientation were averaged to create a separate measure for this orientation ($\alpha = .55$).

Descriptive Statistics & Correlations

Analysis of the interview data began by examining the descriptive statistics for each of the 19 items representing the five dimensions of practice, and each score that was used to compare the subgroups. Correlation analysis was then conducted with a set of dimension items to identify variables that were significantly associated.

Cluster Analysis

Cluster analysis was used to identify subgroups of teachers. This statistical technique is used to classify previously unclassified material into homogeneous groups based on a particular set of characteristics (Everitt, 1993). The objective of this analysis is to create clusters in which the entities or subjects in each group are similar to one another, but different from other groups based on the same criteria. Whereas factor analysis is used to identify latent factors and their indicators, cluster analysis is a technique specifically developed for grouping observations (i.e., participants) (Sharma, 1996).

Two clustering techniques were used in this research. The hierarchical agglomerative method using Wards algorithm was employed to identify initial cluster solutions. The k-means iterative reallocation method was then used to evaluate these solutions. By performing both statistical procedures, variance within clusters can be

minimized and a more accurate topology can be obtained (Huberty, DiStefano, & Kamphaus, 1997).

Four variables representing four of the five dimensions were submitted to the cluster analysis. These variables included: (1) extent of mixed-age grouping (i.e., 1, 2, or 3 age levels), (2) length of the work period, (3) percent of lessons given to the whole group rather than to small groups or individual children, and (4) percent of classroom materials identified by the teacher as traditional Montessori materials or extensions. Due to the large number of choice items (eight), and with each representing a distinct aspect of choice, this dimension was not included in the initial analysis but was instead used to compare the groups once a cluster solution had been determined.

Detecting Outliers

The existence of outlying teachers was examined by calculating the Euclidean distance from the score vector for a given teacher to the score vector for each teacher interviewed. The maximum distance for each teacher was set aside and a distribution of the maximum distances, ranging from 4.04 to 52.00, was determined. An examination of this distribution for potential outliers revealed a small gap between one of the teachers and the other 65 educators. Once a cluster solution was determined, the analysis was run both with and without the potential outlier. Exclusion of this observation made no difference in the analysis and therefore the teacher was not removed.

Number of Clusters

A four-cluster solution appeared to fit the data best. This was determined by comparing the R-squared values and the cubic clustering criteria values of a two-, three-, four-, and five-cluster solution. An R-squared value of .72 exceeded the expected overall

R-squared value of .68 and indicated that grouping the teachers into four clusters significantly explained 72% of the variability in responses across the four variables included in the analysis.

Post-Typology Analyses

Once a cluster solution was identified, multivariate analysis of variance (MANOVA) and chi-square tests were conducted to determine significant differences among three of the four subgroups—one cluster was eliminated from further analysis due to small sample size.

MANOVA was employed to examine group differences with the continuous dimension and demographic variables. The dimension variables included in this analysis consisted of (1) number of work period interruptions, (2) percentage of small group and individual presentations given, (3) frequency of material presentations at circle, (4) number of key materials available (out of 12), (5) whether store bought workbooks or worksheets were provided, (6) percentage of supplementation with play-oriented activities, and (7) whether fragile materials were available in the classroom. Of the demographic variables, only number of years in the current job and years since certification were included in this analysis.

Analysis of variance (ANOVA) was then used to follow up where significant and nearly significant differences in the MANOVA were found. ANOVA was also conducted with the three dimension variables submitted to the cluster analysis (i.e., work period length, whole group presentations, and percentage of materials).

Pearson's chi-square tests were conducted with the mixed-age grouping cluster analysis variable, the eight choice items, and the remaining categorical demographic

variables (i.e., age, ethnicity, education level, type of certification, prior teaching experience, teacher training program, years since certification, and years in their current job) to further examine differences between the three groups. Information obtained from the ANOVA and chi-square analyses was used to examine the characteristics of each subgroup.

MANOVA was also conducted to investigate the association between group membership and factors potentially influencing a teacher's implementation of the approach. These items included: (1) the extent that teachers had intentionally modified the Montessori approach, (2) situational constraints, (3) agreement with Montessori practice, (4) motivation orientation, and (5) laissez-faire attitudes toward classroom management. ANOVA was used as a follow up wherever significant differences were found.

CHAPTER IV RESULTS

This chapter describes the findings for a study investigating the implementation practices of Montessori early childhood teachers. The following questions were examined in this research:

- (1) To what extent can Montessori early childhood education programs be classified into meaningful subgroups based on teachers' implementation of practices associated with Montessori education?
- (2) If clusters can be identified, what characteristics define each subgroup?
- (3) To what extent are Montessori teachers intentionally or unintentionally modifying the method, and if changes are being made, to what extent are these due to situational factors or to perspectives that differ from Montessori principles?
- (4) What role do teachers' beliefs about motivation and classroom management play in shaping classroom practices?

To answer these questions, descriptive statistics are provided for the four dimension variables submitted to the cluster analysis and for each composite score measuring factors potentially influencing a teacher's implementation of the approach. Correlation analysis results for a set of dimension variables are reported, and a summary of the cluster typologies is presented. Results from a series of post-typological analyses are described. In conclusion, each research question will be addressed based on these findings.

Descriptive Statistics

Cluster Analysis Variables

Although this investigation was concerned with five dimensions of Montessori practice that have been inconsistently implemented in American Montessori schools, only four dimension items were submitted to the cluster analysis due to the large number (eight) and distinct nature of the items representing the choice dimension. Once a cluster solution had been determined, the eight choice variables were then used to compare the resulting subgroups.

The descriptive statistics for the four dimension variables submitted to the cluster analysis revealed a broad range of responses (see Table 2). When asked to describe how children had been grouped in their classrooms, 65% of the teachers reported that they implemented mixed-age grouping in a 3-year span, 25% indicated that they had grouped children in a 2-year age span, and 9% did not implement multiage grouping in their classrooms. This suggests that while mixed-age grouping may still be the norm in many of these Montessori environments, there is variation in how children have been grouped.

The teachers also differed in the amount of free choice activity time they provided each day and in the extent that they presented materials to the whole group. While work period lengths averaged 1 hour and 34 minutes ($M = 94.17$ minutes), the standard deviation and range of responses was large ($SD = 33.67$, range = 90) indicating a lack of consistency among the participants on this dimension. Similarly, the teachers reported that they demonstrated materials to the whole group an average of 35% of the time that they gave presentations ($M = 35.02$). The standard deviation, however, was large ($SD =$

28.82), and responses ranged from 0% to 100%. This indicates high variability and a low degree of consistency between the teachers on this item as well.

Finally, a range of responses was obtained for the percentage of Montessori materials available in each teacher's classroom. The mean on this item was 84% and the standard deviation was 18.52. This indicates that many of the teachers provided their children with supplemental play and/or educational activities in addition to traditional Montessori materials during their classroom work periods.

Taken together, these findings indicate a lack of consistency among the teachers on the four dimension variables submitted to the cluster analysis. The range of responses provided by the participants on key aspects of Montessori education suggests that there is considerable variability in how the approach has been implemented.

Table 2

Descriptive Statistics for Cluster Analysis Variables

Dimension	Range	Mode	Median	Mean	S. D.
Mixed-Age Grouping	1-3	3	3	2.56	0.66
Work Period Length	45-195	60	90	94.17	33.67
Whole Group Lessons	0-100	10	30	35.02	28.82
Montessori Materials	10-100	100	90	84.18	18.52

Implementation Factor Measures

Modification

As shown in Table 3, the mean score for the single item examining the extent that teachers had intentionally modified Montessori educational practices, ranging from little or no modification (1) to greatly modified (5), was 2.6 ($SD = 1.11$). Twelve of the

teachers (18%) reported little or no intentional modification in their classrooms. Forty-two participants (64%) rated this item a 2 or a 3, indicating moderate modification, while 12 teachers (18%) acknowledged significant modification to the method by rating this item a 4 or 5. These findings indicate that most of the participants were aware that Montessori practices were being modified in their classrooms.

Situational Constraints

A much lower total mean score and smaller standard deviation was obtained for the five situational constraint items ($M = 1.67$, $SD = .56$, range = 1 – 3.2). The constraints impacting the teachers the least were limited resources or funding ($M = 1.45$, $SD = 1.01$) and school policies and procedures ($M = 1.59$, $SD = 1.01$). The circumstances having the greatest impact on the teacher's implementation were children with behavior problems and special needs ($M = 1.78$, $SD = 1.01$) and lack of planning or preparation time ($M = 1.83$, $SD = 1.03$). The teachers were fairly equally divided on whether parental concerns and demands prevented them from implementing the approach the way they would in a perfect world ($M = 1.70$, $SD = .91$).

These results suggest that for a number of Montessori teachers, situational constraints have impacted their ability to implement the approach (the way they ideally would) to a moderate extent. The findings provide support for the notion that some practitioners may have modified Montessori practices due to situational constraints.

Agreement with Montessori Practice

The total mean score for the six items assessing teachers' agreement with practices associated with Montessori education was a 3.95 indicating general agreement with the

practices, but not total concurrence. While the standard deviation was relatively small ($SD = .62$), there were substantial differences in agreement on individual items.

The teachers were most in agreement with having a mixed-age group of children spanning at least 3 years ($M = 4.53$, $SD = .85$). The participants also concurred with the choice item assessing general classroom freedom ($M = 4.38$, $SD = .89$), but were in less agreement with the choice item related to material use in the classroom ($M = 4.09$, $SD = 1.06$). There was a similar level of consensus, but with more teachers taking a middle position, on the item assessing whether children should be provided with a full range of Montessori materials rather than supplemental activities during the work period ($M = 4.07$, $SD = 1.14$). There was even less concurrence between the educators on whether initial material presentations should be given to individual children rather than to the whole group ($M = 3.65$, $SD = 1.18$), and the teachers were in least agreement about whether children should be provided with a 3-hour uninterrupted work period ($M = 2.93$, $SD = 1.38$).

These findings suggest that although the participants were in general agreement with Montessori practices, many were in less agreement, or disagreed with specific items. This indicates that some teachers are not in full agreement with key practices associated with Montessori early childhood education.

Motivation Orientation

A score for the motivation orientation items modeled after the *Problems in Schools* questionnaire was obtained by applying the formula used with the original instrument (Deci et al., 1981). This score was standardized to a 7-point scale that resulted in a total mean score of 5.67 and a standard deviation of .67. Scores ranged from 3.33 to 7, and

the most common score was 5.55. These results indicate that there was a high degree of consistency in the teacher's responses. As a group, the subjects tended to be moderately to highly autonomy-supporting in their orientation to classroom management and motivation.

An average of each teacher's responses across the three laissez-faire items was taken to create a composite score for this motivation orientation. The mean score on this scale was 3.04 with a mode of 1 (median = 3.17, $SD = 1.49$, range = 1-7). The large standard deviation and the broad range of scores on this scale suggests that while some teachers were content with not redirecting children during the scenarios presented, many were not very comfortable with this hands-off orientation to classroom management.

Table 3

Descriptive Statistics for Implementation Factor Measures

Implementation Factor	Range	Mode	Median	Mean	S. D.
Modification	1-5	2	2.5	2.61	1.11
Situational Constraints	1-3.2	1.2	1.6	1.67	.56
Agreement with Montessori	2.6-5	3.7	4	3.95	0.62
Motivation Orientation	3.33-7	5.56	5.76	5.67	.67
Laissez-Faire Attitude	1-7	1	3.17	3.04	1.49

Correlation Analysis

Correlation analysis was conducted with the eight choice dimension items, an average of the choice items, the four cluster analysis variables, and five additional dimension items.

Choice Correlations

A number of the choice variables were significantly correlated. As presented in Table 4, there was a strong association between Material Use and Lessons Optional ($r = .42, p < .001$), Material Use and Working Together ($r = .44, p < .001$), and Working Together and Circle Optional ($r = .36, p < .00$). Circle Optional was also significantly correlated with Lessons Optional ($r = .34, p < .01$). There were less strong, but still significant correlations between Snack and Circle Optional ($r = .25, p < .04$), and Circle Optional and Work Choice ($r = .25, p < .04$). These findings indicate that subjects who permitted children to use a material for a different purpose other than what it was intended for were more likely to allow children to choose whether to participate in a lesson or not and to work alone or with others. Teachers who required most or all children to attend circle were more likely to not give children a choice of participating in a lesson or not; to structure snack as a group, rather than an individual activity; to limit children's choices in working with others; and to require children to complete some specific work, such as a language and a math exercise, rather than providing children with complete free choice of activity.

Some choice items were also significantly correlated with dimension variables. A significant association existed between Snack and Whole Group Lessons ($r = -.34, p < .01$), Interruptions ($r = -.25, p < .04$), and Circle Presentations ($r = .26, p < .00$). Explore Material was correlated with Circle Presentations ($r = -.38, p < .00$), and Whole Group Lessons was correlated with Explore Material ($r = .30, p < .01$). Work Choice was weakly, but significant correlated with Work Period ($r = .27, p < .03$), and Lessons Optional was weakly associated with Whole Group Lessons ($r = .25, p < .04$).

These results indicate that teachers who structured snack as a group activity were also more likely to present materials to the whole group rather than to individual children or in small groups, and to interrupt the work period by pulling children out for instruction with specialists and/or by splitting the free choice period into two shorter activity periods. Subjects who allowed children to explore materials that had not yet been presented tended to also present materials during circle time. Similarly, a greater number of circle presentations was associated with permitting children to explore materials that hadn't been presented yet. Finally, teachers who provided a longer work period were less likely to give group lessons, and those that did tend to give many whole group presentations were more inclined to make individual lessons optional rather than required.

Table 4

Correlation Analysis: Choice Variables

	1	2	3	4	5	6	7	8
1. Individual Snack	—							
2. Work Together	.11	—						
3. Circle Optional	.25*	.36**	—					
4. Work Choice	.21	.09	.25*	—				
5. Material Use	.10	.44**	.16	.15	—			
6. Lessons Optional	.05	.23	.34**	.07	.42**	—		
7. Explore Material	-.16	.14	.09	.08	.13	.02	—	
8. Combine Material	.14	.11	.23	.24	.12	.05	.11	—
9. Mixed-Age Group.	-.05	.00	-.10	.10	-.06	-.09	-.05	.16
10. Work Period	.17	-.15	.16	.27*	-.12	-.12	-.31*	.17
11. Whole Group	-.34**	.10	-.13	-.20	.17	.25*	.30*	-.21
12. Materials: Percent	.06	-.14	-.10	.07	-.15	-.07	-.13	-.01
13. Individual Lesson	.21	-.12	.08	.21	-.24	-.18	-.21	.22
14. Circle Present.	.26*	-.17	.14	.15	-.07	-.18	-.38**	.16
15. Interruptions	-.25*	-.07	-.08	-.05	-.03	-.07	.14	-.20
16. Materials: Number	.17	-.07	.12	.04	.11	-.02	-.04	.23
17. Small Group	.17	-.04	-.01	-.02	.01	-.17	-.22	-.03
Mean	2.51	2.54	1.98	2.79	2.74	2.79	2.74	2.77
SD	.83	.61	.89	.48	.53	.51	.59	.52
<i>n</i>	66	66	66	66	66	66	66	66
Range	1 – 3	1 – 3	1 – 3	1 – 3	1 – 3	1 – 3	1 – 3	1 – 3

* $p < .05$, ** $p < .01$ *Dimension Correlations*

Many dimension variables were also significantly correlated (see Table 5). Work Period length was strongly associated with Whole Group Lessons ($r = -.45, p < .001$),

Individual Lessons ($r = .48, p < .001$), and Circle Presentations ($r = .53, p < .001$). There were also strong correlations between Whole Group Presentations and Small Group Lessons ($r = -.48, p < .001$), Individual Lessons ($r = -.70, p < .001$), and Circle Presentations ($r = -.57, p < .001$). A weaker association existed between Whole Group Presentations and Number of Materials ($r = -.27, p < .03$), and between Small Group Lessons and Circle Presentations ($r = .27, p < .02$). Individual Lessons also correlated with Circle Presentations ($r = .34, p < .00$). For this group of teachers, providing children with a longer work period meant fewer whole group presentations and a greater number of individual lessons. As would be expected, teachers who gave a higher percentage of whole group lessons gave fewer individual and small group lessons. A high number of whole group presentations were also somewhat indicative of fewer traditional Montessori materials in the teacher's classroom.

Mixed-age grouping was associated with four dimension variables including Whole Group Lessons ($r = -.33, p < .01$), Individual Lessons ($r = .30, p < .01$), Circle Presentations ($r = .32, p < .01$), and Number of Materials ($r = .34, p < .00$). This indicates that teachers who had children in a mixed-age grouping of three or more years were somewhat more likely to give fewer whole group lessons and a greater number of individual presentations. These same teachers also tended to have a greater number of traditional Montessori materials in their classrooms.

Finally, Percentage of Material was weakly associated with Interruptions ($r = -.26, p < .04$), Individual Lessons ($r = .27, p < .03$), and Number of Materials ($r = .29, p < .02$). Teachers who maintained a greater percentage of Montessori materials and extensions in their classrooms, rather than supplementary play and other educational activities, were

more likely to interrupt the work period by pulling children out for specialized instruction and/or by splitting the free choice period into two activity sections. These subjects were inclined to give more individualized lessons and to have a higher number of traditional Montessori materials in their classrooms.

Table 5

Correlation Analysis: Dimension Variables

	1	2	3	4	5
1. Mixed-Age Grouping	—				
2. Work Period	.21	—			
3. Whole Group Lessons	-.33*	-.45***	—		
4. Materials: Percent	-.06	.23	-.03	—	
5. Choice Average	-.01	.04	-.05	-.11	—
6. Individual Lessons	.30**	.48***	-.70***	.27*	.02
7. Circle Presentations	.32**	.53***	-.57***	-.09	.02
8. Interruptions	.13	.20	.03	-.26*	-.15
9. Materials: Number	.34**	.05	-.28*	-.29*	.14
10. Small Group	.05	.14	-.48***	.05	-.05
	6	7	8	9	10
6. Individual Lessons	—				
7. Circle Presentations	.34**	—			
8. Interruptions	.00	-.06	—		
9. Materials: Number	.23	.19	-.13	—	
10. Small Group	-.14	.27*	.01	.11	—
Mean	38.48	1.62	1.11	10.98	24.59
<i>SD</i>	25.33	.82	1.96	1.49	19.62
<i>n</i>	66	66	66	66	66
Range	0 – 100	1 – 3	0 – 7	6 – 12	0 – 75

* $p < .05$, ** $p < .01$, *** $p < .001$

Cluster Analysis

Cluster analysis was used to classify the teachers into subgroups. The participants' scores on four variables representing four of five dimensions of Montessori practice

were submitted to the analysis. These variables consisted of: (1) Mixed-Age Grouping, (2) Work Period Length, (3) Whole Group Lessons, and (4) Percent of Montessori Materials. The dimension of choice was not included in this analysis due to the large number of choice items, but was used instead to compare the clusters after a solution had been identified.

The cluster analysis indicated that a four-group solution was a legitimate classification of the teachers in this sample. The following typologies describe the resulting subgroups and show how these differ from one another with respect to both the cluster analysis and choice variables. Names were assigned to the clusters based on the consistency of the teachers' implemented practices with Montessori's recommendations as well as an examination of the attributes of each group.

Cluster Topology

Cluster 1

As shown in Tables 6 and 7, most of the 12 teachers in this cluster implemented mixed-age grouping in a 3-year span (92%), gave few whole group presentations (range = 0 to 10%), and provided lengthy work periods ranging from 125 to 195 minutes ($M = 2$ hr 34 min). On average, these teachers classified 91% of the activities available in their classrooms as traditional Montessori materials and extensions.

The majority of cluster 1 teachers (83%) offered snack as an individual activity, and children were permitted to make their own activity choices with no specific requirements in all but one of these classrooms (see Tables 8 and 9). Only one teacher in this group imposed some restrictions on children combining sensorial materials, and a majority of these educators allowed children to use a material for a different purpose

than it was intended for (67%) and permitted children to choose whether to participate in an individual presentation or not (75%). Whereas just over half of the teachers in this cluster allowed children to choose to participate in circle (58%), fewer than half (42%) permitted children to explore or work with a material that hadn't been presented yet. Seven of the 12 teachers limited children's working together by designating activities as a work for one person or two people, or by disallowing this altogether ($n = 2$).

For the most part, the teachers in this cluster implemented practices that were consistent with both Montessori's writings and the recommendations of the AMI and the AMS. Therefore, this group was labeled *traditional*, and could be distinguished from the other groups by its lengthy work period, very low rate of whole group presentations, and consistent use of mixed-age groupings spanning 3 or more years.

Table 6

Summaries and Percentages: Cluster Analysis Variables

Cluster Analysis Variables	C 1 <i>Traditional</i> ($n12$)	C2 <i>Contemporary</i> ($n24$)	C 3 <i>Blended</i> ($n27$)	C4 <i>Explorative</i> ($n3$)
Mixed-Age Grouping	3 age levels	2-3 age levels	2+ age levels	3 age levels
Work Period Length	2 hr 34 min	1 hr 29 min	1 hr 14 min	1 hr 12 min
Whole Group Lessons	3 %	19%	64%	28%
Montessori Material	91 %	87%	85%	23%

Table 7

Summary Statistics: Cluster Analysis Variables

Dimension Variables	Cluster 1 <i>Traditional</i> <i>n = 12</i>		Cluster 2 <i>Contemporary</i> <i>n = 24</i>		Cluster 3 <i>Blended</i> <i>n = 27</i>		Cluster 4 <i>Explorative</i> <i>n = 3</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Mixed-Age Grouping	2.92	.29	2.58	.58	2.30	.78	3.00	0
Work Period	153.75	19.79	89.37	16.44	74.44	17.17	71.67	12.58
Whole Group Lesson	3.17	4.40	19.29	9.22	63.89	18.88	28.33	30.14
Montessori Material	91.50	12.27	87.21	11.11	85.00	13.52	23.33	23.09

Table 8

Choice Summaries: Percentage of Teachers Permitting the Activity

Choice Variables	C 1	C2	C 3	C4
	<i>Traditional</i> (<i>n12</i>)	<i>Contemporary</i> (<i>n24</i>)	<i>Blended</i> (<i>n27</i>)	<i>Explorative</i> (<i>n3</i>)
Individual Snack	83%	88%	56%	67%
Work Together	42%	66%	67%	67%
Circle Optional	58%	38%	26%	67%
Work Choice	92%	92%	67%	100%
Material Use	67%	75%	85%	100%
Lessons Optional	75%	71%	96%	100%
Explore Material	42%	88%	93%	100%
Combine Material	92%	88%	70%	100%

Table 9

Summary Statistics: Choice Variables

Choice Variables	Cluster 1 <i>Traditional</i> <i>n = 12</i>		Cluster 2 <i>Contemporary</i> <i>n = 24</i>		Cluster 3 <i>Blended</i> <i>n = 27</i>		Cluster 4 <i>Explorative</i> <i>n = 3</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Individual Snack	2.75	.62	2.79	.59	2.18	.96	2.33	1.15
Work Together	2.25	.75	2.58	.58	2.63	.56	2.67	.58
Circle Optional	2.33	.89	1.96	.91	1.78	.85	2.67	.58
Work Choice	2.92	.29	2.92	.28	2.59	.64	3.00	0
Material Use	2.58	.67	2.67	.64	2.85	.36	3.00	0
Lessons Optional	2.67	.65	2.62	.65	2.96	.19	3.00	0
Explore Material	2.25	.75	2.79	.59	2.89	.42	3.00	0
Combine Material	2.92	.29	2.83	.48	2.63	.63	3.00	0

Cluster 2

Of the 24 teachers in this cluster, 15 (62%) implemented mixed-age grouping with a 3-year span, 8 (33%) multiage grouped with a 2-year span, and one teacher lead a single-aged classroom. The average work period length for this group was 1 hour and 29 minutes, and teachers reported providing whole group lessons an average of 19% of the time that they gave presentations (range = 10-40%). Just over half of the teachers in this group (54%) estimated that 90% to 100% of the materials in their classroom were traditional Montessori activities ($M = 87.21$).

Like cluster 1, the teachers in this group tended to facilitate individual snack (88%), accepted children making their own work choices without requirements (92%), and allowed children to combine sensorial materials (88%). Similarly, most of these teachers accepted children using a material for a different purpose than what it was intended for (75%), and permitted children to decide whether to participate in a lesson or not (71%). However, a greater percentage of teachers in this group, in contrast to cluster 1, allowed children to work together (66%) and to work with or explore a material that

hadn't been presented yet (88%). In addition, fewer teachers in this group permitted children to choose whether to attend circle (38%).

In general, the teachers in this cluster differed from the traditional group by providing children with a shorter work period, giving a somewhat higher percentage of whole group lessons, and not adhering as closely to mixed-age groupings with a 3-year age span. Overall, these teachers tended to implement aspects of traditional Montessori education, but not to the same extent as teachers in the *traditional* cluster. In some situations, the teacher implemented two or three practices consistent with Montessori's recommendations while at the same time enacting one or two less consistent practices such as a 2-year mixed-age grouping or a higher percentage of whole group presentations. In other cases, a number of traditional practices were modified, but not to a great extent. For example, one teacher provided a 1 hour 45 minute work period, had a 3-year mixed-age grouping, gave 20% of her lessons to the whole group, and 90% of her classroom materials were authentic Montessori. While the traditional model had been modified in this classroom to some extent, the changes made were not excessive. This cluster has been labeled *contemporary* to reflect the moderate changes made by the teachers in this group to the traditional Montessori model.

Cluster 3

With 27 teachers, this was the largest of the four clusters. The teachers in this group emphasized whole group presentations ($M = 63.89$, range = 30-100%) and provided work periods that averaged 1 hour and 14 minutes. While 52% of the cluster 3 educators used mixed-age grouping in a 3-year span, 30% employed mixed-age grouping spanning 2 years, and 18% maintained same-age classrooms. Forty-eight percent of these teachers reported that 90-100% of the activities in their classrooms were traditional Montessori materials and extensions ($M = 85.00$).

The teachers in cluster 3 were more likely than the cluster 1 and 2 practitioners to structure snack as a group activity and less likely than cluster 1 teachers to limit a child's exploration or work with a material that hadn't been presented yet. Only 2 of the 27 teachers (7%) indicated that they would redirect a child under these circumstances. Like cluster 2, the teachers in cluster 3 generally permitted children to work together (33%

enacted some restrictions), and use a material for a different purpose than it was intended. In contrast to clusters 1 and 2, a greater percentage of cluster 3 teachers structured children's work choices, required children to participate in circle time, and allowed children to choose whether to participate in an individual lesson or not. In addition, fewer teachers in cluster 3 permitted children to combine the sensorial materials.

Whereas the *contemporary* teachers had modified traditional Montessori practices to a limited extent in their classrooms, cluster 3 teachers tended to combine aspects of Montessori education with other practices often associated with early childhood education. For example, many teachers in cluster 3 encouraged open exploration of classroom materials during a somewhat limited free choice period, and emphasized whole group lessons and activities (e.g., snack) rather than the guided individualized instruction and extended periods of uninterrupted work time typically associated with Montessori education. On the other hand, many cluster 3 teachers implemented mixed-age grouping and equipped their classrooms primarily with Montessori materials and extensions. Consequently, this cluster was labeled *blended* to capture the mix of Montessori and other early childhood practices that were implemented in these classrooms.

Cluster 4

This cluster, consisting of only 3 teachers, differed from the other clusters in material availability and children's opportunities for choice. Whereas the teachers in clusters 1, 2, and 3 on average classified most of their classroom materials as Montessori (92%, 87%, and 85% respectively), teachers in this cluster reported that, on average, only 23% of their classroom materials were traditional Montessori activities (range = 10-50%).

The cluster 4 teachers also stood apart from the others in that all three teachers indicated that they allowed children to use a material in a different way than intended, make their own work choices, explore or work with a material that hadn't been presented yet, combine sensorial materials, and choose whether to participate in an individual lesson. In three situations, one of the three teachers placed limitations on the

amount of choice available—one teacher expected most children to attend circle, snack was a group activity in one classroom, and one teacher placed some restrictions on children working together. Rather than maintaining a range of perspectives on these choice items, as was common in the other cluster groupings, the teachers in cluster 4 were consistent with one another in allowing children many opportunities for choice in their classrooms.

Like the *traditional* group, cluster 4 teachers implemented mixed-age grouping with a 3-year span. In contrast to the cluster 1, the teachers in this group averaged a 1 hour and 12 minute work period (range = 60-85). The cluster 4 teachers differed substantially from one another in the amount of whole group lessons they provided. One teacher used a whole group format for presenting materials 60% of the time, another did so 25% of the time, and the third teacher didn't give any presentations, whole group or otherwise.

This cluster has been labeled *explorative* due to the teachers' emphasis on choice, particularly in respect to how materials are used, and the use of a range of early childhood materials including some Montessori, but also play and other educational activities.

Typology Comparisons

The *Contemporary* group had the smallest maximum distance (33.36) from a cluster centroid to an observation suggesting that this cluster was the most homogeneous of the four groups (see Table 10). With a slightly larger maximum distance (36.85), the *explorative* group was close to the *contemporary* group in homogeneity. Both the *blended* and *traditional* groups had greater maximum distances (46.72 and 52.00 respectively) indicating more heterogeneity with the *traditional* group being the most diverse.

As shown in Table 8, the *contemporary* and *blended* clusters were the closest to one another as indicated by the distance between their cluster centroids (Distance = 47.08). Both the *traditional* and *explorative* clusters were also closer to the *contemporary* group than to any other group with distances of 66.50 and 66.90. The clusters that were the farthest apart from one another were the *traditional* and *explorative* groups.

Table 10

Distance Between Cluster Centroids

Cluster	<i>n</i>	Nearest Cluster	Distance
Traditional	12	Contemporary	66.50
Contemporary	24	Blended	47.08
Blended	27	Contemporary	47.08
Explorative	3	Contemporary	66.90

Post-Typology Analyses

A series of analyses were conducted to determine significant differences between three of the four groups (cluster 4 was omitted due to small sample size). The clusters were compared using three sets of variables that included: (1) all dimension items assessed in the interview, (2) demographic characteristics, and (3) scores assessing implementation factors. Findings from these analyses were used to further study the characteristics of the clusters, and to assess the role of intentional modification, situational factors, agreement with Montessori, and motivation orientation in shaping classroom practices.

Dimension Variables

Analysis of variance (ANOVA) suggested that the three clusters differed from one another on two of the three continuous dimension variables submitted to the cluster analysis. As illustrated in Table 11, the mean scores of the three clusters significantly differed from each other on Work Period Length ($F(2,60) = 88.38; p < .001$) and Whole Group Presentations ($F(2,60) = 106.52; p < .001$), but not on Percent of Material. T-tests

conducted with the Mixed-Age Grouping variable indicated differences approaching significance between the three groups on this dimension ($\chi^2(4, n = 63) = 8.21, p = .08$).

Table 11

Summary Statistics: Variables Submitted to Cluster Analysis

Cluster Analysis Variables	C1	C2	C3	F-Test ¹	p	Post Hoc Contrasts
	<i>Traditional</i> Mean (SD)	<i>Contemporary</i> Mean (SD)	<i>Blended</i> Mean (SD)			
Work Period Length	153.75 (19.79)	89.37 (16.44)	74.44 (17.17)	88.83	.000	C1>C2>C3
Whole Group Lessons	3.17 (4.40)	19.29 (9.22)	63.89 (18.88)	106.52	.000	C1<C2<C3
Montessori Materials	91.05 (12.27)	87.21 (11.11)	85.00 (13.52)	1.14	.33	
Mixed-Age Grouping	2.92 (.28)	2.58 (.58)	2.33 (.78)	$\chi^2 =$ 8.21	.08	C1>C3

¹df = 2,60

There were significant differences between the three clusters on two of the eight choice items. The *traditional* cluster differed from clusters 2 and 3 on Explore Material ($\chi^2(4, n = 63) = 17.09, p < .01$) indicating that teachers in the *contemporary* and *blended* clusters were more likely than the *traditional* teachers to allow children to explore and work with materials that hadn't been presented yet. Cluster 3 differed from the other two groups on snack ($\chi^2(2, n = 63) = 7.38, p = .02$). This indicates that the *blended* cluster was somewhat more likely to structure snack as a group activity than the practitioners in the other two clusters. The clusters did not differ significantly on Working Together ($\chi^2(4, n = 63) = 3.74, p = .44$), Circle Optional ($\chi^2(4, n = 63) = 3.83, p = .43$), Work Choice ($\chi^2(4, n = 63) = 6.87, p = .14$), Material Use ($\chi^2(4, n = 63) = 3.16, p = .53$), Lessons

Optional ($\chi^2(4, n = 63) = 6.47, p = .17$), and Combine Material ($\chi^2(4, n = 63) = 3.70, p = .44$).

As shown in Table 12, there were differences between the clusters on three other dimension variables. The *traditional* teachers, on average, gave a greater percentage of individual lessons than the *contemporary* and *blended* educators, and the *contemporary* teachers gave a higher percentage of individual lessons than the *blended* practitioners ($F(2,60) = 27.41; p < .001$). These results were expected given that the three groups differed from one another in the amount of whole group presentations they provided. In addition, cluster 2 scored significantly higher than cluster 3 on the percentage of small group lessons given ($F(2,60) = 8.51; p < .001$), and both *contemporary* and *blended* clusters presented materials more frequently at circle time than the *traditional* cluster ($F(2,60) = 42.22; p < .001$), a finding that is also consistent with differences between the groups on whole group presentations. There were no significant differences between the clusters on Interruptions ($F(2,60) = .26; p = .77$), Number of Materials ($F(2,60) = .95; p = .39$), supplementation with Play Materials ($F(2,60) = 1.44; p = .24$), Workbook Use ($\chi^2(4, n = 63) = 7.15, p = .13$), or Fragile Materials ($\chi^2(4, n = 61) = 2.52, p = .64$). This indicates that the teachers in the three groups were equally likely to interrupt the work period, supplement with play materials, and provide children with key Montessori materials, workbooks or worksheets, or fragile materials.

Table 12

Summary Statistics: Dimension Variables

Dimension Variables	C1	C2	C3	F-Test ¹	p	Post Hoc Contrasts
	<i>Traditional</i> Mean (SD)	<i>Contemporary</i> Mean (SD)	<i>Blended</i> Mean (SD)			
Individual Lessons	66.83 (18.91)	45.96 (21.67)	21.11 (15.40)	24.97	.000	C1>C2>C3
Circle Presentations	2.92 (.28)	1.50 (.66)	1.11 (.32)	42.61	.000	C1>C2=C3
Interruptions	1.25 (1.96)	1.23 (1.86)	.81 (1.83)	.26	.77	
Material Number	11.37 (1.72)	11.29 (1.03)	10.68 (1.65)	.95	.39	
Small Group Lessons	30.00 (17.32)	34.71 (21.60)	15.00 (13.16)	7.65	.001	C2>C3
Play Material	2.25 (7.19)	17.50 (28.09)	14.48 (29.15)	1.44	.24	
Individual Snack	2.75 (.62)	2.79 (.59)	2.18 (.96)	$\chi^2 =$ 7.38	.02	C1=C2>C3
Explore Material	2.25 (.75)	2.79 (.59)	2.89 (.42)	$\chi^2 =$ 17.09	.00	C1<C2=C3

¹df = 2,60

Demographic Variables

The clusters only differed from each other on one demographic variable: type of certification. The teachers in the *traditional* cluster were significantly more likely to be AMI certified than the teachers in either of the other two clusters ($\chi^2(4, n = 61) = 10.07$, $p = .04$). The groups did not differ on their age ($\chi^2(8, n = 63) = 5.04$, $p = .75$), ethnicity ($\chi^2(8, n = 63) = 4.96$, $p = .76$), education level ($\chi^2(4, n = 63) = 5.52$, $p = .24$), prior teaching ($\chi^2(2, n = 63) = 1.48$, $p = .48$), teacher-training program ($\chi^2(14, n = 61) =$

20.09, $p = .13$), years since certification ($F(2,60) = 1.56$; $p = .22$), or years in their current job ($F(2,60) = .44$; $p = .65$).

Implementation Factor Variables

As shown in Table 13, the MANOVA revealed a significant difference between the groups on agreement with Montessori practices ($F(2,60) = 7.34$; $p < .001$), and a near significant difference on laissez-faire orientation to classroom management ($F(2,60) = 3.03$; $p = .06$). The clusters were not found to differ on their averaged scores for modification ($F(2,60) = .53$; $p = .53$), situational factors ($F(2,60) = .95$; $p = .39$), and motivation orientation ($F(2,60) = .56$; $p = .57$).

Univariate tests revealed that *traditional* educators, on average, scored higher than the other two groups on agreement with Montessori practices ($F(2,60) = 8.25$; $p < .001$); the other two clusters did not differ from one another. This indicates that with an average mean score of 4.53, out of a possible 5, teachers in the *traditional* cluster were in greater agreement with Montessori's ideas than both the *contemporary* ($M = 3.95$) and the *blended* teachers ($M = 3.75$).

The ANOVA with the laissez-faire variable just reached significance ($F(2,60) = 3.18$; $p = .05$). On average, the *traditional* teachers scored significantly higher than the *blended* teachers indicating that this group was more comfortable with a laissez-faire attitude toward classroom management than the educators in cluster 3. There were no differences between cluster 1 and cluster 2 on this variable, or between cluster 2 and cluster 3.

Table 13

Summary Statistics: Implementation Factor Variables

Cluster Analysis Variables	C1	C2	C3	<i>F</i> -Test ¹	<i>p</i>	Post Hoc Contrasts
	<i>Traditional</i> Mean (<i>SD</i>)	<i>Contemporary</i> Mean (<i>SD</i>)	<i>Blended</i> Mean (<i>SD</i>)			
Modification	2.59 (1.31)	2.40 (.92)	2.67 (1.05)	.53	.59	
Situational Constraints	1.80 (.59)	1.57 (.59)	1.77 (.50)	.96	.39	
Agreement Montessori	4.53 (.35)	3.95 (.49)	3.75 (.66)	7.37	.001	C1>C2=C3
Motivation Orientation	5.88 (.92)	5.66 (.52)	5.58 (.70)	.56	.57	
Laissez-Faire Attitude	3.83 (1.65)	3.06 (1.49)	2.57 (1.33)	3.03	.056	C1>C2=C3

¹*df* = 2,60

Summary

Post-typological analyses comparing three of the four clusters revealed a number of significant differences between the groups. The three groups could all be distinguished from one another on work period length, whole group presentations, and individual lessons. There were significant differences between two of the three clusters on Individual Snack (C1=C2>C3), Explore Material (C1<C2=C3), Small Group Lessons (C2>C3), and Circle Presentations (C1>C2=C3). A difference approaching significance also occurred between the *traditional* group and the *blended* cluster on mixed-age grouping. Although the clusters only differed on one demographic variable—the *traditional* educators were more likely to be AMI certified—there were differences between the groups on two of the implementation factors. The *traditional* teachers were

in greater agreement with Montessori practices than teachers in the other two groups and maintained more of a laissez-faire orientation toward classroom management than the teachers in the *blended* cluster.

Research Questions and Summary

Question One: To what extent can Montessori early childhood education programs be classified into meaningful subgroups based on teachers' implementation of practices associated with Montessori education?

The cluster analysis revealed that Montessori early childhood education programs could be classified into distinct subgroups based on teachers' implementation of four practices associated with the approach. A four-cluster solution was found to fit the data best. The identification of subgroups is consistent with descriptive and correlation data indicating variability in how the approach has been implemented and a number of significantly correlated variables.

An interpretation of each cluster based on the cluster analysis and choice variables revealed that the four groups differed in the extent to which they implemented practices typically associated with Montessori education. Whereas the *traditional* group adhered closely to authentic Montessori methods, emphasizing mixed-age grouping, a long work period, and individually presenting an exercise to children before they are permitted to select the activity, the other three clusters were less consistent in their implementation of traditional procedures and often blended aspects of the Montessori system with other early childhood educational practices. The extent and nature of the integration depended on the subgroup, and within each subgroup, on the particular educator. While teachers in the *contemporary* cluster tended to adjust traditional practices to a limited extent in one

or more areas, teachers in the *blended* subgroup were more likely to synthesize aspects of traditional Montessori education with practices associated with other models of early childhood education, such as whole group instruction and a more limited period of free choice.

Teachers in the *explorative* cluster specifically incorporated some elements of Montessori education into their classrooms, i.e., mixed-age grouping and a high level of choice, while at the same time did not implement other aspects such as the use of traditional Montessori materials and an extended work period. The identification of subgroups within this sample of teachers suggests that these classifications, or other Montessori subtypes, may be found more extensively, and that approaching the method as a set of model subtypes may be a more accurate and useful way to view the Montessori system of education.

Question Two: If clusters can be identified, what characteristics define each subgroup?

A series of post-typological analyses was conducted with three of the four clusters to further examine characteristics defining the subgroups. The analyses revealed significant differences between the clusters on seven dimension variables and on one demographic variable.

In addition to providing a significantly longer work period and fewer whole group presentations, the *traditional* subgroup differed from the others by being less likely to allow children to explore or work with a material that hadn't been presented yet. Although five of the *traditional* teachers did indicate that exploration of a new material was permitted, seven reported that they restricted this activity in their classroom to some

extent or completely. The teachers in this cluster were also more likely than teachers in the other groups to be certified by AMI, and more likely than teachers in the *blended* cluster to offer snack as an individually chosen activity. A near significant difference between the *traditional* teachers and the other practitioners on mixed-age grouping suggests that the *traditional* teachers may be more inclined to use multiage grouping in a 3-year span than teachers in the other clusters.

The teachers in the *contemporary* cluster differed significantly from the *traditional* teachers by offering a shorter work period, more whole group and fewer individual presentations, and more opportunities for exploring materials that hadn't been presented yet. These teachers did, however, provide a significantly longer work period, fewer whole group presentations, and more individual and small group lessons than teachers in the *blended* cluster. They were also more likely than the *blended* subgroup to offer snack as an individual activity.

Teachers in the *blended* cluster provided more whole group instruction, fewer individual presentations, and a significantly shorter work period than the *traditional* and *contemporary* teachers. These educators were more likely than the *traditional* teachers to permit children to explore materials that hadn't been presented yet, and less likely than *traditional* and *contemporary* practitioners to structure snack as an individual activity. The *blended* teachers also gave more small group lessons than teachers in the *contemporary* subgroup.

In these analyses, the cluster subgroups could not be distinguished from one another on a number of dimension items and most demographic variables. Visual examination of response counts for each cluster confirmed that there were no differences

between the groups in their response patterns on most of the demographic variables and on many of the dimension items including whether individual lessons were optional or not, fragile materials were provided, and children were permitted to work together. The cluster typologies, however, did show that there were subgroup differences to some extent on whether workbooks were provided and circle was an optional activity, and the extent that children made their own work choices and were allowed to combine the sensorial materials. These findings suggest that the groups did not differ from one another on many items, but that some differences may not have been detected due to the number of possible response categories (three for each choice item) and/or the small size of the sample.

Question Three: To what extent are Montessori teachers intentionally or unintentionally modifying the method, and if changes are being made, to what extent are these due to situational factors or to perspectives that differ from Montessori principles?

To address this research question, descriptive statistics for the implementation factor scores were examined, and a MANOVA was conducted comparing the average modification, situational factors, and agreement with Montessori scores of the teachers in the three largest clusters.

As reported earlier, most of the teachers interviewed were aware that Montessori practices were being modified to some extent in their classrooms ($M = 2.6$). When asked to rate the extent that they had modified Montessori educational practices on a scale from 1 to 5 with 1 representing little or no modification and 5 representing greatly

modified, 82% rated this item a 2 or above. This indicates that the majority of teachers in this sample were making some intentional changes to the Montessori method.

When the three clusters were compared on the modification item, there were no differences between the groups. Each cluster's average was within a few tenths of the overall mean score of 2.6, and the standard deviation was similar for the three groups ranging from .92 (cluster 2) to 1.31 (cluster 1). An examination of responses revealed that whereas 58% of the *traditional* teachers rated the modification item a 1 or 2, 50% of the *contemporary* cluster and 44% of the *blended* teachers also rated their extent of modification as a 1 or 2. This indicates that even though the clusters significantly differed in the extent that they implemented key practices associated with Montessori education, the groups were similar in viewing their own modifications as minimal or moderate. Even the *blended* group, which maintained an average work period of 1 hour and 14 minutes and emphasized whole group presentations, included teachers who did not see themselves as substantially altering the method. These findings suggest that a minority of teachers may not be aware that they have changed traditional Montessori practices in their classrooms, and therefore may be unintentionally modifying the method.

There is evidence that situational factors have prevented some teachers from implementing Montessori education the way they would in an ideal world. Overall, 53% of the teachers surveyed averaged a 2 or above on this implementation factor indicating that situational circumstances were impeding their enactment of the Montessori approach to some degree. When the mean scores of the three clusters were compared, however, no differences were found between the groups—teachers in the *traditional*

cluster were just as likely to encounter situational constraints as teachers in either the *contemporary* or *blended* subgroups. These findings suggest that the modification occurring in many of the teachers' classrooms could not be attributed to the situational constraints assessed in this interview. While situational circumstances may have contributed to how the approach had been implemented in some cases, this item did not distinguish between teachers in this sample who had and had not significantly altered the Montessori method in their classrooms. As a result, situational circumstances are not viewed as playing a major role in explaining why teachers have made changes to the Montessori approach.

The group differences found between the *traditional* practitioners and the *contemporary* and *blended* educators on agreement with Montessori practices indicate that this factor could help to account for dissimilarities in implementation. Whereas the *traditional* teachers were in very high agreement with practices associated with Montessori education scoring an average of 4.53 out of 5 on this scale, the teachers in the other two clusters were in less agreement. Teachers in the *contemporary* subgroup obtained an average score of 3.95, while the *blended* teachers averaged a 3.75. These scores show that although the cluster 2 and 3 teachers were in general agreement with Montessori procedures, there were areas of practice that they were less strongly in favor of or that they disagreed with. As described earlier, a number of teachers in this sample were not in agreement with a 3-hour work period and/or with giving presentations individually. These results support the conclusion that teachers who are in less agreement with Montessori practices are also less likely to implement practices associated with Montessori education in their classrooms.

Question Four: What role do teachers' beliefs about motivation and classroom management play in shaping classroom practices?

The motivation orientation and laissez-faire attitude scores of the three clusters were compared in order to examine the role that teacher's beliefs about management and motivation play in shaping classroom practices. No differences were found between the groups on the motivation orientation scale. The clusters obtained standardized averaged scores ranging from 5.88 (cluster 1) to 5.58 (cluster 3) on this measure, indicating a moderately high degree of autonomy-supporting behavior among the teachers in all three groups. The moderate standard deviations obtained for each cluster ($SD = .92, .52, \& .70$) show that while some teachers were highly autonomy supporting in their motivation orientation, a few were more moderately controlling. These findings suggest that teachers' beliefs about classroom management and motivation—specifically those related to autonomy supporting behavior—do not distinguish between practitioners who implement practices traditionally associated with Montessori education and those who do not.

A significant difference was found between the *traditional* and *blended* teachers on their laissez-faire attitude scores. Whereas the *traditional* educators demonstrated somewhat more tolerance toward a laissez-faire approach to classroom management by averaging a 3.83 (out of 7) on this scale, the *blended* teachers on average obtained a 2.57 indicating that they were less comfortable with this orientation to discipline. Compared to the *blended* teachers, the *traditional* practitioners were less likely to redirect a child who had not followed a classroom procedure. This finding suggests that teachers' beliefs

about when to intervene and when not to could play a role in distinguishing between teachers with a more traditional interpretation of Montessori education and practitioners with a more revised approach to the method.

CHAPTER 5 DISCUSSION AND CONCLUSION

This study has examined whether Montessori early childhood programs could be classified into meaningful clusters, and has described the characteristics defining each identified subgroup. This investigation also explored whether Montessori teachers were intentionally or unintentionally modifying the method, and examined the role of potential implementation factors, such as situational constraints and teachers' beliefs in shaping classroom practices.

This chapter presents a summary and discussion of results, and describes limitations to this research study. In closing, implications and directions for future research are presented.

Summary of Findings

The Montessori early childhood teachers in this study were classified into four meaningful subgroups based on their implementation of practices associated with Montessori education. Three of the clusters significantly differed from one another on work period length and on the amount of whole group versus individualized instruction they provided. A fourth cluster could be distinguished from the other three groups by providing significantly fewer Montessori learning materials in their classrooms and greater opportunities for choice.

One cluster, consisting of 12 teachers, tended to implement authentic Montessori practices and was therefore labeled *traditional*. The practitioners in this group emphasized a long work period (2 1/2 to 3 hours), individualized instruction, and mixed-age grouping across 3 or more years. These teachers equipped their classrooms primarily

with traditional Montessori materials and extensions. Furthermore, the *traditional* teachers were inclined to structure snack as an individually chosen activity and to permit children to make their own work choices. This group contained a higher percentage of AMI trained teachers than the *contemporary* or the *blended* subgroups, and the teachers in this group were also more likely than the other educators to limit a child's exploration of a material that hadn't been presented yet.

The 24 teachers in the *contemporary* cluster also implemented elements of authentic Montessori education, though not to the same extent as the *traditional* educators. This group provided a work period averaging 1 hour and 29 minutes, and demonstrated materials to small groups or individual children an average of 81% of the time that they gave presentations. The *contemporary* teachers supplemented the Montessori materials in their classrooms to a greater degree than the *traditional* teachers, and provided multiage grouping spanning mostly 3 years, but in some cases only 2 years. In addition, these practitioners generally facilitated individualized snack, permitted children to explore an exercise that hadn't been demonstrated yet, and allowed children to make their own activity choices. The majority of the *contemporary* teachers were AMS certified.

Teachers in the *blended* cluster combined elements of the Montessori approach with practices typically found in other models of early childhood education. The 27 educators in this group emphasized whole group instruction, provided relatively short work periods (averaging 1 hour and 14 minutes), and grouped children in mixed-age classes spanning 2 or 3 years or in single-aged classes. This group permitted children to explore materials that hadn't been presented yet, and tended to require children to be

present at circle time. The *blended* teachers were also more likely than the other educators to provide snack as a group activity and to guide children in their work choices. Most teachers in this cluster were AMS certified.

The *explorative* teachers, like the *blended* educators, integrated aspects of the Montessori system with other approaches to early childhood education. The three teachers in this cluster used mixed-age grouping in a 3-year span and presented children with many opportunities for classroom choice. Yet these practitioners provided a short work period (averaging 1 hour and 12 minutes) and only included a limited quantity of Montessori materials in their classrooms. Furthermore, the *explorative* teachers tended to emphasize whole group lessons, although one practitioner did not provide any instruction at all. The AMS certified one teacher in this group; the other two were AMI credentialed.

Most of the Montessori teachers in this sample reported that they had modified Montessori practices to some extent in their classrooms. However, no statistical differences in modification were found among the subgroups suggesting that some teachers were unaware that the practices they implemented were inconsistent with basic Montessori tenets. This implies that a minority of teachers seems to be unintentionally altering Montessori educational practices in their classrooms.

Situational factors were found to prevent some teachers from implementing the Montessori approach in the way they ideally would have liked, but these factors did not distinguish between the subgroups. Instead, a number of teachers in each of the three largest clusters encountered some degree of situational constraints. This indicates that while situational circumstances may influence implementation, this factor does not

contribute significantly in explaining implementation differences between the subgroups.

The teachers' agreement with Montessori practices was found to differentiate between members of the *traditional* cluster and those in both the *contemporary* and the *blended* subgroups. Whereas the *traditional* practitioners were in high agreement with practices associated with Montessori education, the *contemporary* and *blended* educators had significantly less overall agreement. This finding indicates that concurrence with Montessori principles was associated with implementing Montessori practices in the classroom.

While the clusters did not differ from one another on motivation orientation, the *traditional* practitioners scored statistically higher than the *blended* teachers on the laissez-faire attitude scale. These findings show that beliefs about classroom management and motivation did not play a major role in distinguishing between teachers whose practices were more or less aligned with a traditional approach to Montessori education. Teachers in each of the clusters ranged from highly autonomy supporting to moderately controlling in their motivation orientation and on average were moderately high in their degree of autonomy-supporting behavior. The higher scores of the *traditional* practitioners compared to the *blended* teachers on the laissez-faire attitude scale indicates that these teachers would be somewhat less likely to intervene when a child had not followed a classroom procedure. Taken together, these results imply that beliefs about classroom management and motivation may play a role in shaping classroom practices, but do not appreciably distinguish between those enacting a

traditional model of Montessori education and those implementing a more revised version of the approach.

Discussion of Results

Cluster Identification

The identification of Montessori program subtypes in this sample suggests that the participating teachers may have been implementing distinct models of Montessori education. Chattin-McNichols (1992) describes three parts to the Montessori method—the theory and philosophy, the Montessori model, and actual programs. A Montessori model consists of information about the ideal classroom based on Montessori’s writings and what is presented in teacher training courses. It is at the model level that information about preparing the environment, classroom procedures, teacher expectations, etc., is provided. With a number of well-established Montessori training programs situated in the Bay Area, it is likely that the educators participating in this study were introduced to specific models of Montessori education through their teacher training. Had the educators only been enacting their own interpretations of the method, it is questionable whether meaningful subgroups with similar characteristics would have emerged.

Although no significant differences could be found between the clusters based on teacher training program, possibly due to the large number of training centers represented (six in the Bay Area) and the relatively small number of teachers in the study, educators in the *traditional* cluster were significantly more likely to be AMI certified than practitioners in either the *contemporary* or the *blended* clusters. The *traditional* educators were also found to be more in agreement with Montessori practices

than the teachers in the other two clusters. This suggests that the participants who were trained with the AMI may have been operating from a different model of Montessori education than the teachers who were educated in programs not affiliated with the AMI. The finding that AMI graduates tended to be in agreement with Montessori's principles and were likely to implement traditional procedures would be expected given the association's emphasis on authentic practices and the AMI's tight control of its teacher training and affiliated schools.

Of the 48 AMS certified teachers in this study, 44 had completed their education at one of four Bay Area AMS teacher-training programs. Despite having received training in programs affiliated with the same organization, the AMS-educated teachers made up the majority in each of the three primary subgroups identified in this study. There was also a tendency for teachers from the same training program to be grouped in the same cluster. For example, of the 15 teachers educated at one Bay Area Montessori teacher-training center, two were classified as *traditional*, four as *contemporary*, and nine as *blended*. These findings suggest that different AMS training program models have contributed to the identification of Montessori subtypes in this study. Variation in AMS models of Montessori education would be probable given the organizations early emphasis on integrating the Montessori method with American educational practices.

Cluster Characteristics

The clusters identified in this study differed from one another primarily in work period length and in quantity of whole group instruction, but also in extent of opportunities for choice, and to some degree, in use of mixed-age grouping. Only the *explorative* group differed from the others in percentage of Montessori materials

available. These subgroup differences may in part be attributed to discrepancies between Montessori's writings and the guidelines of the AMI and the AMS. While the AMI emphasizes a 3-hour work period, Montessori's writings were inconsistent on this dimension, and the AMS does not specify how long its recommended large blocks of uninterrupted time should be. On the other hand, Montessori's writings clearly stressed individual rather than whole group presentations, but neither the AMI nor the AMS emphasizes one-on-one instruction in their standards for classroom practice available through the internet. Furthermore, the AMS and the AMI discuss opportunities for classroom choice in their literature in a manner consistent with Montessori's writings on this topic. These ideas, however, have not been converted by either the AMS or AMI into specific guidelines for implementing educational choice in the Montessori environment. The inconsistencies and ambiguities described here could lead to confusion among Montessori followers and contribute to the interpretation differences documented in this study at either the practitioner, school, and/or teacher-training level.

Whereas the AMI and the AMS are, like Montessori, vague about or differ from one another on their recommendations for work period length, lesson format, and classroom choice, all three advocate the use of Montessori materials and multiage grouping across 3 years in their publications. Despite consensus on these practices, the clusters varied to some extent on both dimensions. The move to align Montessori education with conventional early childhood practices could help to explain the variations on these and other dimension items. As described earlier, compatibility with a potential adopter's values and beliefs increases the likelihood that an innovation will be adopted (Rogers & Shoemaker, 1971). New ideas viewed as too complex and difficult to

implement would also be expected to encounter resistance. Therefore, as Montessori education grew in popularity in this country, elements of the method that were least consistent with standard early childhood practices may have been modified. For instance, since an extended work period and individualized, rather than whole group instruction, were incompatible with typical teacher-directed approaches, these procedures could have been altered to make Montessori education more consistent with cultural beliefs and expectations about how children should be educated. An emphasis on whole group instruction, rather than on presenting materials individually, based on each child's interests, abilities, and level of understanding also simplified the approach and therefore reduced the method's complexity.

Teacher-training programs may have differed in the extent to which they have adjusted Montessori procedures to better align with conventional educational practices. As a result, model differences related to teacher-training modifications of the approach, as well as individual adaptations, could help to explain the implementation disparities identified in this investigation. Whereas the *traditional* teachers did not merge Montessori and conventional preschool practices, the *contemporary* teachers maintained a Montessori framework with some modification, and the *blended* and *explorative* educators synthesized Montessori and typical early childhood procedures. Together with confusion about what Montessori education is and isn't, the move to reconcile disparities between Montessori's recommendations and more typical early childhood practices could account for many of the implementation differences identified in this investigation.

Modification, Constraints, and Agreement

The teachers in this study were found to have both intentionally and unintentionally modified the Montessori method, and both situational constraints and agreement with Montessori's perspectives were found to play a role in explaining why teachers had deliberately or inadvertently revised the approach. Although the subgroups differed significantly in the extent to which they had implemented key Montessori practices, the clusters were not found to diverge in their modification ratings—the *blended* teachers viewed themselves as having revised the method to the same extent as did the *traditional* teachers. It is feasible that the *blended* teachers who did not recognize the significant revisions they made to the approach were operating from a Montessori model that differed from more traditional versions. Another possibility is that these teachers viewed their interpretations of Montessori education as existing within the realm of acceptable modifications. In either case, the *blended* teachers who did not acknowledge changes to the approach lacked a clear understanding of what constitutes authentic Montessori practices. These teachers would therefore be limited in their ability to implement the method in a more traditional manner. While the number of *blended* teachers falling into this category was relatively small (18%), this finding suggests that some Montessori teachers could be better educated about the directives of the approach.

Although situational circumstances did not distinguish between the clusters, practitioners in each subgroup encountered some constraints that limited their ability to implement Montessori in the way they ideally would have liked. Whereas children with behavior problems, and lack of planning and preparation time had the greatest impact on these educators, school policies and procedures did not influence this sample to a great

extent. Given the range of Montessori interpretations that coexist in the Bay Area, it was believed that this constraining factor would have taken on more significance. That it did not may be explained by the participating Montessori teachers being able to find employment in schools that maintained a philosophy similar to their own. Another possibility is that a number of teachers interviewed for this study were the owners of their schools and therefore developed their own policies.

Agreement with Montessori's recommendations was found to differentiate between the *traditional* teachers and the others—those who were in greater disagreement with Montessori's perspectives were more likely to revise the approach. What is unclear from these findings, however, is in what way lack of agreement with Montessori's ideas and lack of authentic implementation were related. For some teachers, not agreeing fully with Montessori practices may have been a conscious decision based on knowledge of Montessori principles, but also beliefs about teaching and learning that differed from Montessori's perspectives. For other teachers, not fully concurring with particular practices may have been rooted in a lack of information and/or misunderstanding about what comprises authentic procedures. Some teachers, as indicated above, were not aware that they were modifying Montessori procedures in their classrooms. It is unlikely that teachers who are not fully informed about what does and does not constitute Montessori education would enact or agree with practices that vary substantially from more familiar early childhood procedures. Therefore, while nonimplementation of Montessori practices may have been associated with both perspectives that differed from Montessori's, and a conscious choice to revise the approach, it is also possible that it

was related to a lack of information or confusion about what Montessori education is and a concomitant unconscious alteration of the method.

Both of these explanations are consistent with Zener's (1994) finding that teachers didn't agree with Montessori's recommendations when they misunderstood her ideas, disagreed with her perspectives, or had difficulty carrying out the theory in practice. These explanations are also compatible with the results of Chaney's (1991) examination of philosophy-enactment disparity. In that investigation educators were found to enact their own interpretations of the early childhood education models they implemented and to dismiss philosophical elements of the approach that they didn't understand.

Motivation Orientation

It was hypothesized that educators who preferred a more teacher-directed approach to Montessori education may be less autonomy supporting in their orientation to classroom management and motivation than teachers who enacted more child-centered practices. That premise was not supported in this research. One explanation for the lack of differences between the clusters on this scale is that the teachers in each subgroup enacted the Montessori model that they were familiar with and the teachers did not preselect one approach to Montessori education over another. This may have been the situation for some teachers in this study given the lack of general information available about how teacher-training programs differ philosophically from one another, and the limited number of teacher education programs in a given area.

It is also possible that the sample was too small, especially in the number of *traditional* teachers, to detect differences between the subgroups. While the teachers in each cluster obtained average scores at the low end of the highly autonomy-supporting

spectrum, when the rating percentages of the subgroups were broken down a somewhat different picture emerged. Whereas 37% and 33% of the *contemporary* and *blended* teachers obtained ratings of 6 or 7 on the motivation orientation scale, 58% of the *traditional* practitioners scored these ratings. Similarly, 8% of the *traditional* teachers and 8% of the *contemporary* educators received scores of 3 or 4 on the scale. Of the *blended* teachers, 19% acquired ratings of 3 or 4. This pattern of results suggests that there were some differences, particularly between the *traditional* and the *blended* educators that may have been obscured when the scores were averaged.

The difference found between the *traditional* and *blended* teachers on laissez-faire attitudes could be attributed to the *traditional* educators choosing an alternative Montessori technique for redirecting children's behavior. For example, rather than immediately correcting a child's transgression of a classroom procedure, the teacher may instead observe the child's activity and later review the correct method for carrying out the procedure in a large or small group demonstration. Another possibility for cluster differences on this measure is that the *blended* teachers lean toward a more teacher-directed approach to Montessori education, and as a consequence assume a more active role in monitoring children's classroom behavior. Whereas the traditional teachers may be comfortable with children correcting one another's behavior and gradually learning to monitor their own conduct, the *blended* teachers may prefer a more hands-on approach to guiding children's classroom behavior.

Limitations of the Study

In this study Montessori early childhood teachers were interviewed by telephone about their classroom practices. As with all survey research, there are certain limitations that must be taken into account when interpreting and generalizing these results:

- (1) The teachers were asked to self-report on practices they implemented in their classrooms that may or may not have been consistent with model expectations. The teacher's responses, therefore, could have been biased and not totally accurate descriptions of what regularly occurs in their classrooms.
- (2) It is unknown whether the schools and teachers who agreed to participate in the study were similar to those who did not choose to take part. It is possible that schools/teachers who are inclined to participate in this type of research are more committed to authentic Montessori practices than those who chose otherwise.
- (3) Only 66 teachers located within a single metropolitan area in the United States participated in the study. It is unlikely that this sample is representative of Montessori early childhood programs in general, and in particular, with those located in more remote and less urbanized areas.
- (4) Although random sampling was used, in a few instances school directors handled this process and it is unknown in those cases to what extent the participants were actually randomly selected.
- (5) The interview questions used in this study were developed for this particular project. Validity and reliability issues were not explored.

Implications and Future Direction

The identification of distinct Montessori clusters in this sample of teachers suggests that similar subgroups may be found elsewhere. Further research on a large scale is needed to determine whether this is true, and whether the same program differences identified here can be documented more extensively. If other Montessori teachers can be similarly classified, practices that distinguish the subgroups from one another could be compared to determine which are the most beneficial to children. For those interested in comparing Montessori and other models of early childhood education, the results of this investigation underscore the importance of defining what is meant by Montessori education and only evaluating programs that match this definition.

The finding that some teachers did not agree with Montessori's recommendations and that a number of practitioners were inadvertently modifying the approach suggests that these educators had developed models of Montessori education that were inconsistent with Montessori's ideas. Further research is needed to determine why alternative methods have emerged, and if found to be a consequence of teacher training, whether this was intentional or unintended. If these results were not deliberate, teacher education centers will need to reevaluate their programs and modify accordingly. Training programs intentionally altering the approach should be clear about this objective. Exploring what attracts pre-service teachers to Montessori in the first place and whether the preconceptions of teachers-in-training are consistent with their later understandings could also be investigated. In addition, further study is needed to assess the effectiveness of different approaches to Montessori teacher education.

Based on the results of this study, Montessori organizations with accrediting authority may wish to reexamine their teacher training and school affiliation criteria to determine whether some revision may be called for. To help avoid confusion, these organizations may also want to clarify their positions on key Montessori practices. Most importantly, these findings highlight the need to establish limits for acceptable variability in Montessori implementation. Research comparing the benefits of different models of Montessori education could help with this process. In addition, assessing the motivation orientation of a larger group of teachers in relation to their classroom practices would help to establish whether beliefs about management and motivation distinguish between teachers who assume a more child-centered approach towards Montessori education and those who maintain a more teacher-directed orientation.

While all the schools in this study used Montessori in their names, or claimed to follow a Montessori approach, the programs they offered differed considerably. This disparity can be confusing particularly to parents who may read that Montessori education is one thing, yet find something very different in practice. Providing parents with a more comprehensive picture of the Montessori system of education would assist them in making informed decisions about their children's early schooling. This research project has been a step in that direction.

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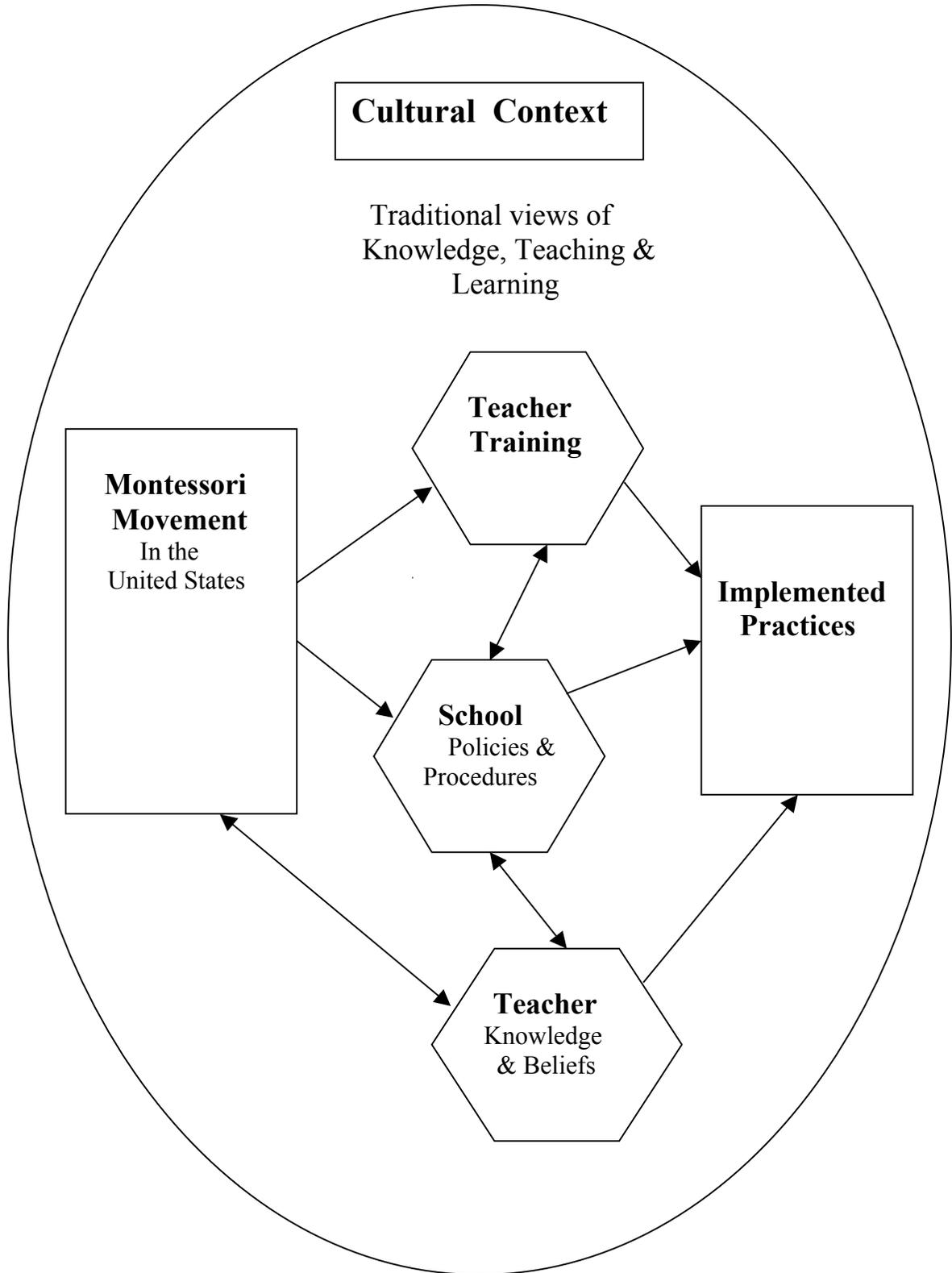
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Appendix A

Conceptual Model: Montessori Implementation Factors



Appendix B

**Montessori ECE Implementation Practices
Interview Script & Score Sheet**

Interview # _____

Scheduling & Time Use

- 1) Montessori teachers generally divide the school day into different activity periods. How have you scheduled classroom time during the morning in your program? For example, when do children arrive? When do you have circle, etc.

Work period: _____

Circle(s): _____

- 2) Do children have snack at some point during the morning? • Is snack a group or individual activity?

_____ group snack _____ individual _____ both

1 = group
2 = both
3 = individual

- 3) During the work period, can children work together or are they encouraged to work individually?

_____ together _____ individually _____ mix

1 = individual work
2 = only some together
3 = mostly choose

- 4) Do all children participate in circle time?

_____ yes _____ no _____ some choice

1 = required
2 = a little choice
3 = mostly choose

- 5) Do children choose the activities they'll work with during the work period?

_____ yes _____ no _____ some choice

1 = little or no choice
2 = some choice
3 = mostly choose

Materials & Activities

- 6) Many teachers provide their children with play or educational activities in addition to traditional Montessori materials and extensions. What percentage of the activities available in your classroom during your work period are traditional Montessori materials and extensions, and what percentage are supplemental activities such as toys, dolls, board games, or non-Montessori educational materials?

_____ % Montessori (6) _____ % Supplemental

_____ yes _____ no _____ to some extent 2 = to some extent
 3 = permitted

18) Which of the following materials are currently available at your school for use in your classroom?

_____ knobbed cylinders _____ the metal insets
 _____ sand paper letters _____ the golden bead material
 _____ dressing frames _____ binomial & trinomial cubes
 _____ geometric cabinet _____ moveable alphabet
 _____ wood/metal polishing _____ stamp game
 _____ number rods _____ 3 or more puzzle maps _____ # of materials

19) Which of the following 3 descriptions best describes how children have been grouped in your classroom:

- a. Most children are of the same age 1 = one age
 b. The children are primarily of two age levels 2 = two age levels
 (such as 3 and 4s or 4s and 5s) 3 = 3-4 yr age span
 c. The classroom serves children from 2 1/2 or 3 to 5 or 6 years of age

Now I'd like to ask you some questions about the type of Montessori program you've implemented and some of the factors that have influenced your implementation of the method:

Teachers often modify traditional Montessori practices and principles to better accommodate the needs of the parents and children served by their programs.

20) How would you rate the extent that you have intentionally modified Montessori educational practices on a scale from one to five with one representing little or no modification and five representing greatly modified:

little or no modification 1 2 3 4 5 greatly modified

Sometimes situational circumstances prevent teachers from directing their classrooms the way they would in a perfect world.

On a scale from one to five, rate the degree that each of the following situational circumstance has impacted your ability to implement the Montessori approach the way you ideally would. Use one to represent to a minimal extent and five to represent to a great extent:

21) Limited resources or funding:

minimal extent 1 2 3 4 5 great extent

22) Children with behavior problems or special needs:

minimal extent 1 2 3 4 5 great extent

23) School policies and procedures:

minimal extent 1 2 3 4 5 great extent

24) Parental concerns and demands:

minimal extent 1 2 3 4 5 great extent

25) Lack of planning or preparation time:

minimal extent 1 2 3 4 5 great extent

How would you rate your agreement with the following practices associated with Montessori education on a scale from one to five with one representing total disagreement and five representing total agreement:

26) Providing children with a 3-hour uninterrupted work period:

total disagreement 1 2 3 4 5 total agreement

27) Having a mixed age group of children spanning at least 3 years:

total disagreement 1 2 3 4 5 total agreement

28) Giving initial material presentations to individual children: (rather than to the whole group)

total disagreement 1 2 3 4 5 total agreement

29) Permitting children to choose whether to work with others, when to have snack, and to participate in lessons and circle time.

total disagreement 1 2 3 4 5 total agreement

30) Allowing children to choose their work even if they haven't had a lesson first and how they'll work with a material provided this is done productively.

total disagreement 1 2 3 4 5 total agreement

31) Providing children with a full range of Montessori materials, activities, and extensions rather than play or other supplemental activities during the work period.

total disagreement 1 2 3 4 5 total agreement

MOTIVATION ORIENTATION

The next set of questions deal with how comfortable you would be responding in different ways to certain problem situations in your classroom. I'll read you a vignette of a problem situation followed by 5 possible responses. For each response I'd like you to indicate how comfortable you'd be reacting in this way on a scale from 1 to 7 with 1 being very uncomfortable, and 7 being very comfortable.

So here's the first one:

A. Simon, a 4 year old, has taken 6 crackers for snack when a drawing indicates that only 4 crackers should be taken. How comfortable would you feel doing each of the following:

- 32) Ask Simon to return or throw away the extra crackers stating if he doesn't do so he won't be allowed to have snack the following day.

very uncomfortable 1 2 3 4 5 6 7 very comfortable

- 33) Have Simon return or throw away the crackers emphasizing that children in this class are expected to not take more than their share.

very uncomfortable 1 2 3 4 5 6 7 very comfortable

- 34) Ignore the situation hoping that another child will point out the mistake.

very uncomfortable 1 2 3 4 5 6 7 very comfortable

- 35) Refer to the picture of 4 crackers and ask Simon how he could make the amount he's taken look like the amount that is on the card.

very uncomfortable 1 2 3 4 5 6 7 very comfortable

- 36) Point out that other children haven't taken that many and ask him to make his amount the same as the others.

very uncomfortable 1 2 3 4 5 6 7 very comfortable

Two 3-year-old girls have selected the pink tower to work with and are arguing over who was there first. How comfortable would you be with each of the following responses:

- 37) Discuss possible solutions and have the girls decide which one they will select.

very uncomfortable 1 2 3 4 5 6 7 very comfortable

- 38) Explain to the girls that they'll need to take turns and that they should know better than to fight over a material.

very uncomfortable 1 2 3 4 5 6 7 very comfortable

- 39) Point out how nicely two other children are sharing an activity and encourage the girls to arrive at their own solution.

very uncomfortable 1 2 3 4 5 6 7 very comfortable

- 40) Tell the children that if they don't work together with the material that neither will be allowed to use it.

very uncomfortable 1 2 3 4 5 6 7 very comfortable

- 41) Assume the girls will resolve the conflict on their own and go on to something else.

very uncomfortable 1 2 3 4 5 6 7 very comfortable

Elena has once again left her rug out and is now completing another activity. How comfortable would you be responding in each of the following ways:

- 42) Roll the rug up for Elena since she is already engaged in another activity.
- very uncomfortable 1 2 3 4 5 6 7 very comfortable
- 43) When Elena finishes concentrating on her activity, remind her that she has left a rug out.
- very uncomfortable 1 2 3 4 5 6 7 very comfortable
- 44) Have Elena roll up her rug pointing out that she is a big girl now and should remember to return the rug before starting another activity.
- very uncomfortable 1 2 3 4 5 6 7 very comfortable
- 45) Inform Elena that if she doesn't put her rug away she won't be allowed to continue the activity she is currently engaged in.
- very uncomfortable 1 2 3 4 5 6 7 very comfortable
- 46) Remind Elena that children in the classroom put their rugs away before beginning to work elsewhere.
- very uncomfortable 1 2 3 4 5 6 7 very comfortable

DEMOGRAPHIC INFORMATION

- Now I have a few questions about you and your classroom:* 47) Gender: _____ male _____ female
- 48) How many children are currently enrolled in your group? _____
- 49) How many paid staff members are usually in your classroom at one time, including yourself? _____
- 50) Which best describes your age:
- a. 21-30 b. 31-40 c. 41-50 d. 51-60 e. 61 and over
- 51) Which of the following best describes your ethnic or racial background:
- a. Asian b. African American c. Caucasian d. Latino e. Mixed ethnicity f. Other
- 52) How long have you worked in your current job at this school? _____ years _____ months
- 53) What is your highest level of education:
- a. Associates (AA) or 2 year college degree
b. Bachelors or 4 year college degree
c. Advanced degree (Masters, Doctorate)
- 54) Do you hold a Montessori early childhood certificate? Yes No Will soon
- 55) (if yes) What type of Montessori certification do you hold?
- a. St. Nicholas b. NCME c. AMI d. AMS e. Other: _____
- 56) Where did you receive your Montessori training? _____
- 57) What year was your Montessori certificate granted? _____

58) Did you teach prior to your Montessori work? Yes No 59) If so, for how long? _____ yrs