



# Authentic Montessori: The Dottoressa's View at the End of Her Life Part I: The Environment

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**Abstract:** Maria Montessori developed a form of education in the first half of the last century that came to be called by her surname, and research indicates it often has positive outcomes. In the years since its development, tens of thousands of schools worldwide have called their programs *Montessori*, yet implementations vary widely, leading to confusion about what Montessori education is. Although there are varied opinions, here we use Dr. Montessori's books and transcribed lectures to describe the conclusions of her work at her life's end. We term this final conclusion *authentic* in the sense of "done in the traditional or original way," (the primary definition of the adjective in *Oxford English Dictionary*, 2019). We do not claim that the original is superior to variants; this is an issue for empirical science. Our overarching goal is to provide researchers, policy makers, administrators, teachers, and parents with a benchmark from which to measure and evaluate variations from the education method Dr. Montessori bequeathed at the end of her life. In the ongoing search for alternative educational methods, the time-honored and burgeoning Montessori system is of considerable interest. Dr. Montessori conceptualized the system as a triangle for which the environment, the teacher, and the child formed the legs. Part I of this two-part article examines Dr. Montessori's view of what constitutes the environment, in terms of its material, temporal, and social features. An appendix to Part II summarizes the features.

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*I have studied the child. I have taken what the child has given me and expressed it, and this is what is called the Montessori Method.* (Montessori, 1961/2007, p. 2)

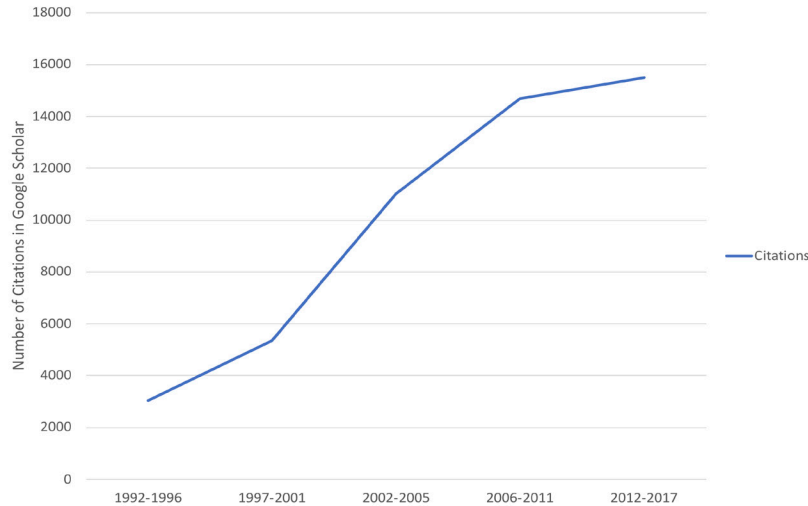


Figure 1. Citations in Google Scholar using “Montessori” as keyword, 1992–2017.

*Montessori* designates an educational method named after its founder, Maria Montessori, who, at the turn of the last century, was one of the first women physicians in Italy and a professor at the University of Rome (O’Donnell, 2007). Tens of thousands of Montessori schools exist worldwide, including the world’s largest school (in Lucknow, India), and they have educated well-known people ranging from Anne Frank and Sean “Diddy” Combs to Julia Childs and Jeff Bezos. There is increasing research interest in Montessori education (see Figure 1), and most research indicates the Montessori system of education has good social-emotional and cognitive-academic outcomes (e.g., Ansari & Winsler, 2014; Besançon & Lubart, 2008; Bhatia, Davis, & Shamas-Brandt, 2015; Brown & Lewis, 2017; Culclasure, Fleming, Riga, & Sprogis, 2018; Debs & Brown, 2017; Dhiksha & Suresh, 2016; Dohrmann, Nishida, Gartner, Lipsky, & Grimm, 2007; İman, Danişman, Akin Demircan, & Yaya, 2017; Kayılı, 2018; Lillard & Else-Quest, 2006; Lillard, Heise, Tong, Hart, & Bray, 2017; Mallett & Schroeder, 2015; Marshall, 2017; Mix, Smith, Stockton, Cheng, & Barterian, 2017; Peng & Md-Yunus, 2014; Phillips-Silver & Daza, 2018; Rathunde & Csikszentmihalyi, 2005a, 2005b; Rodriguez, Irby, Brown, Lara-Alecio, & Galloway, 2005; Sebastian & Matheen, 2016; Yildirm Doguru, 2015). Yet not all studies show better outcomes (e.g., DeVries & Gonçu, 1988; Kirkham & Kidd, 2017; Krafft & Berk, 1998; Laski, Vasilyeva, & Shiffman, 2016; Lopata, Wallace, & Finn, 2005; Ruijs, 2017; Yen & Ispa, 2000), possibly because of differences in implementation (Lillard, 2012, 2019; Lillard & Heise, 2016).

Because the Montessori name is not protected by copyright, Montessori implementation can vary widely. Further, Dr. Montessori was continuously experimenting, and thus principles and practices evolved over her lifetime, “by following the child and his<sup>1</sup> psychology” (Montessori, 2012, p. 7). Here, we attempt to derive Dr. Montessori’s ultimate core principles and practices from her lectures and books, thereby arriving at a description of *authentic* Montessori education, in the sense of “done in the traditional or original way” (*Oxford English Dictionary*, 2019). Our method was to study Dr. Montessori’s books for descriptions of the system; we also reached out to the major repository of Montessori writings, the archives of the Association Montessori Internationale (AMI), which provided teacher-training documentation beyond what Dr. Montessori’s books revealed. Her books are mostly compilations of her lectures; in addition to other talks, almost every year from 1914 to 1951 she gave at least one teacher-training course, resulting in an abun-

<sup>1</sup> Although an ardent feminist, Dr. Montessori used gendered language in keeping with the norm of her time.

dance of sources; we give precedence to the descriptions given in the later courses where they contradict early descriptions, suggesting evolutions in her thinking.

Other sources describe views of how Montessori education should be implemented; one example is “Essential Elements on Montessori Practice in the Public Sector,” which stemmed from work in the 1990s by several Montessori organizations and was instantiated in a rubric created by the National Center for Montessori in the Public Sector (2015). The present article uses source material to explicate issues that Dr. Montessori viewed as important and does not discuss practical issues like school budgets and the teacher pipeline. We also make no claims as to how Montessori education should be implemented; rather, we provide a description of her view of what the system was, at her life’s end, as a benchmark from which alterations can be described or measured.

Our approach is to present the material and theoretical characteristics of the Montessori *trinity*—the prepared environment, the teacher, and the child (Montessori, 2012)—and reference sources so interested readers know where to seek further information. The present article, Part I, presents the prepared environment as a set of features and practices adults enact or adopt. Part II examines the role of the teacher and teacher training and presents a Montessori view of the child. The section on the child begins with Montessori theory about children and their development and ends with what Dr. Montessori regularly observed: social, emotional and academic outcomes. Throughout both articles, research is described for elements of authentic Montessori about which especially pertinent or relevant research exists (for more, see Lillard, 2017, 2018).

It is worth reiterating that what we call “authentic Montessori education” is what Dr. Montessori described in her lectures and writings; we attach no value to “authentic” here. Dr. Montessori adjusted the approach in response to children’s developmental needs based on her observations. Had she lived longer, her ideas would surely have evolved. However, as a variety of interests have changed the Montessori system in a variety of ways, and we cannot know how she would have changed her methodology, it seems useful to explicate authentic Montessori education in the sense of “done in the original way” (*Oxford English Dictionary*, 2019), meaning at the end of Dr. Montessori’s life. Our rendition of authentic Montessori can be used as a benchmark from which researchers, policy makers, administrators, teachers, and parents can measure variations in implementation. Empirical science must determine which alterations are improvements and which are not.

In Montessori theory, the essential elements of education for human development comprise setting children free in a prepared environment with a specially trained teacher; these three features constitute a Montessori trinity (see Figure 2). As noted, the prepared environment, which has many components, is

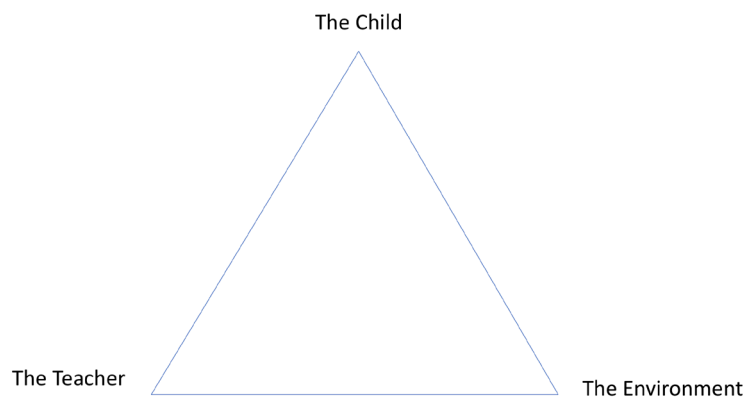


Figure 2. The Montessori trinity.

described in the remainder of this article. Throughout, we use the present tense because at least some Montessori environments currently implement each feature.

### **The Prepared Environment**

*One of the most urgent endeavors to be undertaken on behalf of the reconstruction of society is the reconstruction of education. It must be brought about by giving children the environment that is adapted to their nature. (Montessori, 1949/1974, p. 100)*

Montessori environments are carefully prepared by the teacher to provide opportunities for children's development while protecting children from obstacles to that development. Within the prepared environment, children are free to pursue their natural interests and respond to what Dr. Montessori considered an innate drive to work.

### **The Material Environment**

The material environment consists of the physical space and its contents. In Montessori education, children's mental development and learning come not from a teacher but from directly interacting with Montessori materials: "Place everything necessary in the environment, and then leave the children free to function according to the laws of nature" (Montessori, 2012, p. 186). The classroom space and its contents are beautiful, inviting, and systematically organized. They include a predetermined set of materials and suit children of the ages they serve.

**Suited to the child.** "[A teacher must] conscientiously prepare an environment, placing educational materials about for some clear purpose and introducing the child with great care to the practical work of life" (Montessori, 1956, p. 76). Dr. Montessori's description of the furnishings of a classroom for 3- to 6-year-olds shows how everything is selected to suit the children's abilities, including

*...light furniture that he can carry about; low dressers within reach of his arms; locks that he can easily manipulate; chests that run on castors; light doors that he can open and shut readily; clothes-pegs fixed on the walls at a height convenient for him; brushes his little hand can grasp; pieces of soap that can lie in the hollow of such a hand; basins so small that the child is strong enough to empty them; brooms with short, smooth, light handles; clothes he can easily put on and take off himself; these are surroundings which invite activity, and among which the child will gradually perfect his movements without fatigue, acquiring human grace and dexterity. (Montessori, 1917/1965, p. 151)*

The idea of having furnishings and implements adjusted to children's sizes was unusual in the era (Elkind, 1983; Montessori, 1961/2007, p. 3), although typical children's toys, across cultures, have long been miniatures of adults' tools, allowing children to begin to participate in adult work (Lancy, 2016). Dr. Montessori said, "Small children [in traditional cultures] have a tendency to work in their play, imitating the actions of the adults. They don't consider what they do to be play" (Montessori, 2012, p. 151). She reasoned that because children typically play at the practical work of adults, such activities might serve a developmental purpose better than does play with other kinds of toys that (she noted) only wealthy families could afford.

The Montessori exercises of Practical Life, "which have a useful aim" (Montessori, 1994b, p. 11), employ miniatures of adult tools to encourage intelligent activity of the hands, guided by the mind. Children can relate to the aim of these activities, which they see performed by adults. Indeed, research has shown that, given a choice between pretending to do activities like feed babies and wash dishes versus really doing them, even contemporary American children prefer to actually do things (Taggart, Heise, & Lillard, 2018). Specifically, about 75% of the time, given a choice between pretending to do an activity and actually doing it, children ages 4 to 6 chose the real activity; 3-year-olds chose the real activity 50% of the time. Further-

more, when children chose the pretend activity, they said they did so because they were afraid, incapable, or not allowed to do the real activity (for discussion, see Lillard & Taggart, in press).

In addition to letting children engage in Practical Life activities with appropriately sized objects, the Montessori environment includes objects that are light and fragile because children “will only perfect [their movements if they] can move among fragile objects” (Montessori, 2013a, p. 110), and mishaps are viewed as instructive. Montessori materials are logically and neatly arranged on low shelves, facilitating children’s ability to find and use them.

The materials are also suited to children in another way: they are intended to respond to children’s needs in their current stage of development. The environment for each age level (e.g., 0 to 3, 3 to 6) is said to correspond to core characteristics of children at that stage—discussed in a later section both here and in Part II—because “the task of education is to supply the needs of every stage from the beginning” (Montessori, 1961/2007, p. 53).

*One of the problems of teaching is thus to discover the subjects best suited to children of different ages..., to their different interests. Our experience has demonstrated, for instance, that children are much more interested in learning the alphabet [and writing] at age four than at any other age. (Montessori, 1972, p. 96)*

Dr. Montessori experimented by watching how children of different ages reacted to different materials, and she designated the materials for ages of children for whom she inferred they were best suited. For example, the basic language materials are for children ages 2 to 6 because she found that time to be a sensitive period for language. A child of 7 does not respond to the Sandpaper Letters by realizing that “words are composed of sounds.... Only children at this early age, when they still have the sensitivity for language, do” (Montessori, 2012, pp. 232–233). Further, “the older children have a different form of mind, so the children in the elementary schools could not do what these [younger] children did; they could only learn writing slowly and very imperfectly” (Montessori, 2012, p. 17). The exercises of Practical Life, in which children engage hand and mind in purposeful activities like cleaning a table, arranging flowers to beautify the classroom, or cutting carrots to serve as snacks, are also only for the Primary classroom. Older children, although they do still care for their environments, no longer need a special arrangement of such activities: “The continuation of such exercises would be useless” (Montessori, 1948/1976, p. 17). Given Montessori education’s systematic, hierarchical approach to building intelligence, a key issue for research is how to incorporate into a classroom those older children who lack a Montessori background and therefore did not have prescribed materials or activities during specific developmental periods.

**Specific materials.** Montessori education has a specific set of materials for each age level, grouped into curricular areas (e.g., Language, Sensorial, Cultural, Math, Geometry, Science). The materials are interdependent both within and across those areas, as well as within and across age levels. Practical Life materials, as well as some language materials, are selected and prepared by the teacher, whereas others are commercially available (but can also be homemade). The materials are “the means of development” (Montessori, 1917/1965, p. 86).

The material sets were carefully developed over the years to assist many aspects of children’s development.

*We must not abandon the child to a haphazard choice of objects.... He will try to understand this world, so we must give [a] beautiful, rich environment where a child can be free to choose whatever is necessary for his development. (Montessori, 2012, p. 179)*

Hence, there are objects to assist the development of concentration, organization, movement, and independence for children ages 0 to 6 (e.g., Practical Life and Sensorial materials), and at all levels, materials to assist the development of reading and math, of understanding the biological, physical, and social worlds,



Figure 3. The Timeline of Life. Photograph courtesy of Forest Bluff School.

and so on. The materials for the 6- to 12-year-olds appeal to reason and fuel their understanding of the universe through imagination, such as the Timeline of Life (see Figure 3), which motivates children to explore life on Earth, from the first cell on. In recreating parts of this chart, children face how recently current life forms evolved and explore how different forms mutated into other forms along the way.

Many Montessori materials, for example, the solid cylinders, sound boxes, and geometry cabinet, incorporate *control of error*, in that the materials themselves make clear to children when an error is made, that is, when a cylinder does not fit in its socket, or when, in a sound-cylinder-pairing task, the sounds emanating from the last two cylinders are not the same. Because of natural human tendencies toward precision and perfection (Kubovy, 1999), children are inclined to correct their own errors. Dr. Montessori believed that, just as young children’s walking and speaking gradually improve, so do all their other endeavors. She was not concerned with immediate perfection. She saw what goes on in the classroom as developments that may require a great deal of time and repetition but that will indeed occur if children are given free opportunity to repeat exercises with materials that show them their own errors, just as surely as do balanced, coordinated walking and native-like language.

Authentic Montessori classrooms have specific materials that are hands-on, real, and purposeful: “When I gave the children this scientific material, they preferred it to toys because it responds to an urge in their nature; it enables them to develop” (Montessori, 2012, p. 16). Children select the materials they need for their development, and materials that do not appear to help children are removed from the set: “The material of our schools today is based on the selection that the children have voluntarily made themselves from the mass of things that was placed at their disposal” (Montessori, 1989, p. 64).

An authentic Montessori classroom includes a complete set of Montessori materials for the age level, no less and no more: “This selection [of materials by the children] brought to us the conception that there

must be just that amount and no more” (Montessori, 1989, p. 64). Perhaps an incomplete set limits a child’s development in some areas, since the materials are designed to work together within and across areas of development. Therefore, if a material is missing from the set, aspects of development could be compromised. Dr. Montessori did not leave lists of the materials for each age level, but there are descriptions in her books. For example, *Psychoarithmetic* (Montessori, 1934/2016) details the math materials and *Psychogeometry* (Montessori, 1934/2011) the geometry ones. *The Advanced Montessori Method II* (Montessori, 1916/1965) describes the Elementary materials, and *Creative Development in the Child* (Montessori, 1994a, 1994b) details many of the Primary (and some Elementary) materials, as do *The Montessori Method* (Montessori, 1964) and *The Discovery of the Child* (Montessori, 1962/1967). The materials that are described in her books can be compared with lists provided by Montessori associations; regarding Primary classroom materials, one of us conducted a study of the views of American Montessori Society and AMI teacher trainers about what the essential materials are at the Primary level (Lillard, 2011).

Beyond not omitting any material, neither does an authentic Montessori classroom add material, such as worksheets or commercial toys, to the sets developed by Dr. Montessori. Research supports limiting the materials: children in Montessori classrooms holding only authentic materials performed better on many measures than did children in classrooms supplemented with a variety of other materials (Lillard, 2012; Lillard & Heise, 2016). Logically, adding materials could result in less use of materials developed by Dr. Montessori and her collaborators (e.g., her son Mario). In addition, given that the sequences of materials are carefully planned out, with one material building skills that are applied with subsequent materials (sometimes in other parts of the curriculum), it may be unclear where and how new ones fit. Finally, there is value in parsimony: too much choice is problematic (Schwartz, 2004), and “overabundance debilitates and retards progress” (Montessori, 1917/1965, p. 79). These reasons may explain why children performed less well on a wide range of outcome measures in classrooms that added non-Montessori materials (Lillard, 2012; Lillard & Heise, 2016).

As with any system, it is reasonable to think that improvements can be made to the Montessori materials, particularly if the improvements are suggested by people who deeply understand the materials and how they work together within and across classroom levels. Dr. Montessori and her collaborators adjusted the material sets as needed, and surely the sets would be somewhat different today had they continued. For example, materials for using computers and learning foreign languages would likely have been developed and introduced at appropriate points; there is a reference to an 8-year-old Montessori student choosing to teach himself Sanskrit (Montessori, 1949/1974), suggesting there was an interest in learning an additional language.

In addition to advising against adding different, non-Montessori materials, Dr. Montessori believed the classrooms should have just one set of each material.

*The fundamental fact in preparation of the environment is to have only one set of each type of material. In many schools the teachers that came from our courses thought it would be better and give greater scope to have two whole sets in the school.... But it became evident that the discipline of the school is hereby slackened; and if one lessens the number of sets the discipline returns.* (Montessori, 1989, p. 64)

Among other reasons for not duplicating materials is that if a desired material is in use, a child may choose another, observe, or simply wait until the material has been put back on the shelf and therefore is available. As explained in Part II, Dr. Montessori found that this limitation resulted in courtesy and respect for others.

**Beauty and organization.** The teacher “must put everything in order in the environment. She must see that the material is in perfect order. She must see that everything is attractive so that the children will like the environment as soon as they enter it” (Montessori, 1989, p. 14). Thus, authentic Montessori classrooms

are aesthetically pleasing, because “beauty in the school invites activity and work” (Montessori, 1956, p. 96). Having simple, uncluttered classroom spaces is better for young children’s learning (Fisher, Godwin, & Seltman, 2014), and, indeed, abundant research demonstrates the positive effects of order on children’s development (Lillard, 2017, Chapter 10). Less research is available on children’s aesthetics or the influence of beauty on learning and development, but we do know that children’s concepts of human attractiveness align with those of adults (Langlois et al., 1987).

**Access to nature and other spaces.** Dr. Montessori lectured repeatedly on the benefits of children being in nature, exposed to animals and plants, fresh air and sunlight (Montessori, 1961/2007).

*A child, who more than anyone else is a spontaneous observer of nature, certainly needs to have at his disposal material upon which he can work.... Children have an anxious concern for living beings, and the satisfaction of this instinct fills them with delight. It is therefore easy to interest them in taking care of plants and especially animals.* (Montessori, 1962/1967, pp. 70–71)

Recent research shows the strength of young children’s interest in animals: even when attractive toys were also available in a free-play room, children spent much more time interacting with and talking about animals (LoBue, Bloom Pickard, Sherman, Axford, & DeLoache, 2013). Dr. Montessori noted that “the good we receive from nature is not alone a material benefit, it is also a great intellectual, and moreover, a spiritual benefit” (Montessori, 2013a, p. 179). She also said that “if a school has a garden attached to it, the care of the paths, the weeding of plants, or the gathering of ripe fruit, and so on” can be integral school activities (Montessori, 1962/1967, p. 82). Other research supports the health and cognitive benefits of nature (Berman, Jonides, & Kaplan, 2008; Kabisch, van den Bosch, & Lafortezza, 2017).

Dr. Montessori also suggested that, ideally, schools should allow children fairly open access to different classrooms: “The open door to the other rooms gives a freedom of circulation, between the different [levels], and this circulation is of the utmost importance for the development of culture” (Montessori, 1989, p. 65). The demarcations between classrooms were sometimes very low walls or rows of plants and aquariums (e.g., Montessori, 2013b).

## The Temporal Environment

Montessori classrooms provide uninterrupted 3-hour work periods as is evident in the following quotation.

*Our schools start with three to four hours of work and remain open longer and longer. Children begin to come in the afternoon. Then both the teacher and the children begin to get enthusiastic and remain a few hours longer in school.* (Montessori, 2012, p. 192)

Dr. Montessori appeared to be flexible regarding when children go home. If the school served as day care, she recommended a schedule of 9 a.m. to 5 p.m. or 8 a.m. to 6 p.m. (Montessori, 1964, p. 120): “If the daily schedule is very long, dinner will also form a part of [Practical Life activities]” (Montessori, 1962/1967, p. 82). Another example of a daily schedule Dr. Montessori endorsed was seen in her demonstration of the educational Method at the Panama–Pacific International Exposition held in San Francisco in 1915: the model classroom she set up operated from 9 a.m. to noon each day (Montessori, 1997).

The typical schedule of 3 uninterrupted hours in the morning and, for children 5 to 6 and older, 2 to 3 hours in the afternoon is apparently intended to give children time to become deeply absorbed in work and to develop self-awareness to guide further activity. One sees this in the Montessori work cycle (see Figure 4), which shows that from 9 a.m. to 10 a.m., children will likely choose easy work, followed by a period of false (i.e., apparent but not real) fatigue, when an inexperienced teacher might think children need recess or to gather in a circle. Then, from 10 a.m. to 11 a.m. or noon, what Dr. Montessori referred to as a period



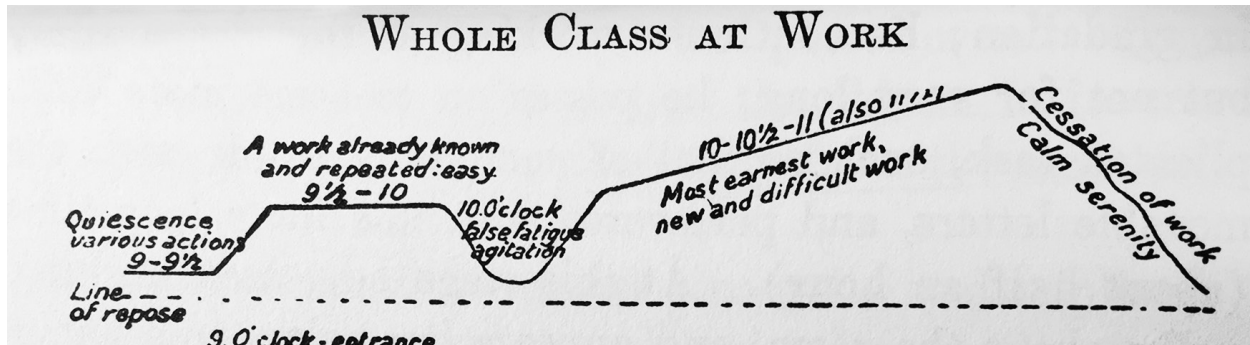


Figure 4. Whole class activity curve. Figure from Montessori (1917/1965), p. 98.

of “much longer duration” than the first and easy work, children engage in their “most earnest work, new and difficult work” (Montessori, 1917/1965, p. 103). Finally, over a period of 30 to 45 minutes (judging by the length of time depicted in the graph in Figure 4), children cease work; she noted that at this time they appeared serene. Ongoing research at the University of Virginia shows these cycles still hold today.

The full Montessori work cycle is thus about three hours long. Dr. Montessori cautioned, “If [children] are interrupted in their cycle, they lose all the characteristics connected with *an internal process regularly and completely carried out*” (Montessori, 1917/1965, p. 99, italics in original). As children develop, the first stage of the work cycle becomes more like the second one, so “all his intellectual occupations are of a higher order, as are also his moral attributes” (p. 106). The major impetus for all this development is the freedom to engage in and maintain focus on work of one’s own choosing, hence not being interrupted during the work cycle (p. 108). Two of the rules Dr. Montessori instilled in teachers are to observe the children and to allow concentrating children to work uninterrupted (Montessori, 1994b).

The importance of the work cycle is noted throughout Dr. Montessori’s books. Children “remain an hour, an hour and a quarter on the same exercise, at an age when [adults typically] want to limit his work to ten or fifteen minutes. [Children] work for whole days” (Montessori, 2013a, p. 22) at the same exercise. Having sufficient time to become absorbed in work is essential to Montessori education: “When a child is continuously interrupted while fulfilling cycles of activity, the child gradually [loses] the courage, the constancy, and the determination necessary for achievement [and] fails to acquire a habit of applying himself to purposeful ends” (Montessori, 1961/2007, pp. 53–54). Dr. Montessori also stated, “We must not interfere with a concentrating child, because something is happening inside that child” (Montessori, 2012). Cycles of deep concentration instigate a series of positive personality changes that Dr. Montessori called *normalization* (meaning “preparation to participate constructively in society,” Shaefer Zener, 2006, p. 1), and any activity that disrupts the flow of concentration is problematic. Although research reexamining these issues in Montessori classrooms is in its early stages, Dr. Montessori’s observations are consistent with work on flow and on task fragmentation in the workplace (Csikszentmihalyi, 1990; Mark, Gonzalez, & Harris, 2005; Mark, Gudith, & Klocke, 2008; Mark, Iqbal, Czerwinski, & Johns, 2014).

Authentic Montessori classrooms do not include a recess time in their schedules unless “the morning is very long” (Montessori, 1994b, p. 56). By “very long,” she likely meant well over three hours, since in describing the activity curve she said false (i.e., apparent but not real) fatigue would lead misguided teachers to take children to recess. Conventional education gains greatly by including recess (Pellegrini & Bohn, 2005) to relieve children from sitting and listening for extended periods, as is increasingly asked even of very young children (Bassok, Latham, & Rorem, 2016). Although recess benefits may apply to children in Montessori environments, it seems unlikely that they do, because Montessori children can move around at will and can choose active work, like (when circumstances allow) taking a soccer ball outside with friends. If parents asked about a gymnasium, Dr. Montessori said, “this is because the parents have not understood

fully. If the children [in a Montessori classroom] are not getting enough exercise, [the teacher] must give them more work to do” (Montessori, 2012, p. 163). Exercise, she said, comes in the normal course of activities, except in schools that unnaturally require children to sit much of the time. Authentic Montessori programs also do not break for specials. Special subjects (e.g., art, music, drama, foreign language) are typically integrated into the classroom, although apparently the Elementary students may receive special instruction during one of the 10 weekly work periods; Dr. Montessori’s granddaughter Renilde told one of us about a weekly music class in her Amsterdam Montessori Elementary school. However, such interruptions would be infrequent, as a “negative action is the interruption of work at fixed times in the daily program. They say to the child, ‘Don’t apply yourself for too long at any one thing’” (Montessori, 1967/1995, p. 241). Clearly, long, uninterrupted work periods are the norm for authentic Montessori.

Although we did not find explicit discussion of it, Dr. Montessori’s books suggest that authentic Montessori classrooms enroll children consistently, with the same pattern each day (i.e., go to and leave school at the same hour), as would be “fixed by the Directress” (Montessori, 1964, p. 70) for several days in a row. For example, she said, “Repetitions awaken [a child’s] interest. To create a cycle of relationship, it is advisable to take the child regularly [to the same environment]” (Montessori, 1961/2007, p. 22). A regular, daily school schedule establishes order, and “the tiny child’s basic need for order takes priority over all other social claims that the world may make of him” (Montessori, 1967/1995, p. 135). Once a routine is established, children know what to expect daily, and research suggests this consistency leads to better outcomes as children thrive on routine and order (Lillard, 2017, Chapter 10). How varying the schedule, and adding specials or recess, affects Montessori student outcomes has not been systematically studied.

## The Social Environment

The social environment of a Montessori classroom includes a relatively large (by American standards) number of children in particular age ranges. Once children begin to concentrate on work, Dr. Montessori claimed they easily adapt to and indeed thrive in the social environment (Montessori, 2012). This sequence of concentration–adaptation–thriving has not been empirically studied, although it is consistent with research on self-regulation (Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009).

**Three-year age groupings.** Montessori classrooms are prepared for a 3-year age mix, in part because children can learn from and teach near peers. Dr. Montessori noted that “the older ones help the smaller ones and the small ones help each other. They show respect for and interest in each other” (Montessori, 2012, p. 233). Mixed age groups also reduce the competition that characterizes middle childhood: “Not only are these children free from envy, but anything done well arouses their enthusiastic praise” (Montessori, 1967/1995, p. 231). She further stated, “There is love and admiration on both sides [i.e., younger and older children]” (Montessori, 1967/1995, pp. 226–227). A third reason for the age mix is variety:

*The charm of social life is in the number of different types that one meets.... To segregate by age is one of the cruelest and most inhuman things one can do.... It breaks the bonds of social life, deprives it of nourishment.... It is an artificial isolation and impedes the development of the social sense.* (Montessori, 1967/1995, p. 226)

While research strongly supports peer learning (Lillard, 2017, Chapter 7), research on multiage classrooms has mixed results (Ansari, Purtell, & Gershoff, 2016; Justice, Logan, Purtell, Bleses, & Hogden, 2017; Veenman, 1995, 1996; Wang & Su, 2009; Winsler et al., 2002). In many of these latter studies, classrooms were set up for whole-class instruction, not individualized instruction; in whole-class instruction settings, mixed age groupings can be problematic (Ansari et al., 2016). In addition, in conventional schools, where children are typically in teacher-led classrooms, they likely interact less and therefore the possible social benefits of interacting with people of different ages may not accrue.

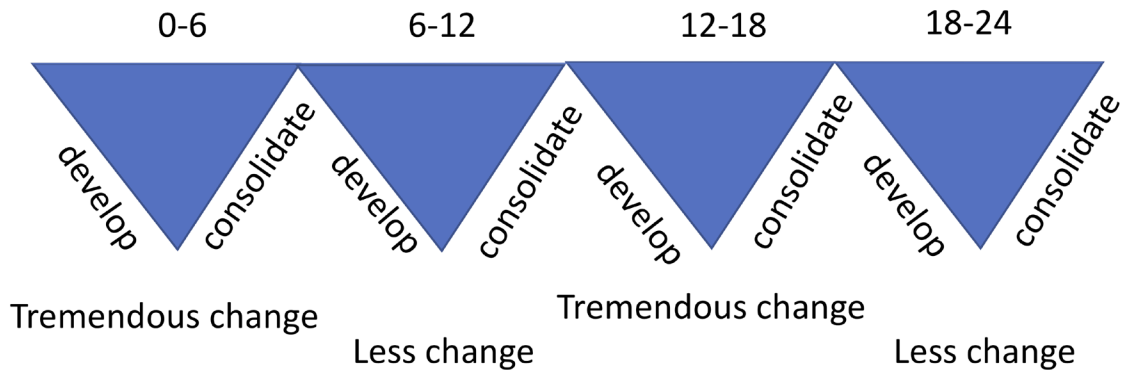


Figure 5. Montessori’s stages (or planes) of development (adapted from Montessori, 2012, pp. 2–28).

**Specific age spans.** Authentic Montessori education mixes ages of specific ranges, in keeping with Montessori theory having four stages of development: 0 to 6 years, 6 to 12, 12 to 18, and 18 to 24 (see Figure 5). Across cultures, people commonly have marked 6 (or 7) years of age as a turning point in development (Rogoff, Sellers, Pirrotta, Fox, & White, 1975); this extends back to Plato (1970). Other early theorists like Comenius (who lived in the 1600s and to whose writing Dr. Montessori refers; see 1948/1976, p. 33) also observed childhood as consisting of four 6-year stages, ending at age 24 (Giardello, 2014).

Dr. Montessori described specific features of children in each stage of development (discussed more in the section on the child in Part II). The first and third stages are times of tremendous change, while the second and fourth are calmer. In addition, the first half of each stage entails more change, and the second half consolidates those changes. Dr. Montessori accordingly also divided each stage into two parts, making eight 3-year spans: 3 to 6, 6 to 9, and so on. During each distinct span, developmental characteristics are similar, and therefore a classroom can serve the needs of all children in that age range.

*We cannot treat children the same way in the different developmental periods. They do not need the same care, the same environment, the same methods. If education is to be based on life, it must be adapted to all these differences.* (Montessori, 2012, p. 24)

For example, Dr. Montessori said, “If we study the psychology of children aged between three and six, we see that movement, and especially the movement of the hand, plays a most important part in mental development of children in this age” (Montessori, 2012, p. 16); research support for this is described elsewhere (Lillard, 2017, Chapter 2). Many of the materials aimed at 3- to 6-year-olds thus educate movement, especially the hand; such materials would no longer be appropriate for 7-year-olds. When there are fewer children, the entire second plane (i.e., ages 6 to 12) is sometimes housed in a single classroom because, according to Montessori theory, there is less change across that stage than in the ones preceding and following it. Thus, authentic Montessori education places children in specific, 3-year age groupings: 0 to 3, 3 to 6, 6 to 9, and so on.

**Class size.** Dr. Montessori clearly stated her views on class size, which is large by American standards today:

*In its best condition the class should have between thirty and forty children, but there may be even more in number. That depends on the capacity of the teacher. When there are fewer than twenty-five the standards become lower, and in a class of eight children it is difficult to obtain good results. The really profitable results come when the number grows; twenty-five is a sufficient number, and forty is the best number that has been found.* (Montessori, 1989, pp. 64–65)

In one lecture, the range was 20 to 40 (Montessori, 2013b); regardless, she believed development was best “when the children are many and the teacher is only one” (Montessori, 1994a, p. 181).

Although Americans often assume smaller class sizes are better for children, research does not clearly support this assumption, even for conventional methods of education. Class sizes in the United States have decreased dramatically since the 1960s, with no increase in performance on tests like the Program for International Student Assessment (PISA)—although, admittedly, the variety of children served might have grown across that time as well, which may be why performance did not improve. Yet class sizes in Asia are typically large (i.e., 35 or more), and their performance on tests like the PISA is high. Most importantly, studies that have experimentally reduced class sizes have produced mixed results (Hoxby, 2000; Stecher, Bohrnstedt, Kirst, McRobbie, & Williams, 2001; Whitehurst & Chingos, 2011). Regardless, given Montessori education’s radically different approach (elaborated below), it is unclear whether conventional classroom research even applies here; formal research on class sizes and outcomes in Montessori environments is needed.

Dr. Montessori’s recommendation for class size was developed through observations and testing; she claimed that, in Montessori education, larger class sizes better support children’s learning. One possible explanation is that because Montessori children learn in part via observation and imitation, in larger classes they can learn more because there are more examples to learn from. Larger classes also supply more potential peer tutors, and they also may be expected to better support social development, just as 3-year age spans may: “When classes are fairly big, differences of character show themselves more clearly, and wider experiences can be gained” (Montessori, 1967/1995, p. 225). Children in Montessori classrooms do have better social understanding (Lillard, 2012; Lillard & Eisen, 2017; Lillard & Else-Quest, 2006; Lillard et al., 2017). It is said that order is maintained in large Montessori classes by a delicate balance of freedom and discipline: “The child... is possessed of marvelous directives that come to him from within and from this social environment that is created for him.... Thirty or forty children work together in beautiful, attractive surrounding especially created for them” (Montessori, 1932/1992, p. 92). In starting a new class, some references (e.g., Montessori, 1961/2007) suggest that sometimes a new classroom may begin with 15 or so of the youngest age group and then expand each year as those children age. Once a classroom is established, Dr. Montessori suggested having eight to 13 children of each of the three ages in a classroom.

#### **Adult visitors.**

*When we have visitors [they] come as guests and we expect them to respect our children as guests respect their hosts.... Guests do not ask, “what are you doing?,” “why did you do that?,” “what does this mean?” [Such questions] can destroy the child’s sense of independence. (Montessori, 1989, p. 8)*

Visitors are often asked to sit quietly and observe in Montessori classrooms: “If we are careful not to interfere with children’s activities and interests so long as they are not harmful, nature will see to the child’s development” (Montessori, 1989, p. 8). Dr. Montessori also described schools with balconies from which teachers-in-training and visitors could observe without interfering with children’s activities: “The only thing we recommended was that the people should be quiet” (Montessori, 1989, p. 67).

**The role of parents.** Dr. Montessori believed that parents play a critical role in their child’s education. Parents are expected to send their children to school on time and well-groomed, “to cooperate with the Directress in the educational work” (Montessori, 1964, p. 61), and to “show the greatest respect and deference” (p. 71). They are also expected to meet regularly with the teacher to give an account of the child’s home life and to get advice from the teacher. The Montessori environment was designed to be a natural extension of the home; the original classroom was an apartment in a housing project where the teacher lived as well. Dr. Montessori seemed to think it important that children have their own space; hence, she called the Primary classroom a *Children’s House*, “where children are masters of the house” (Montessori,

2017, p. 2). Parents' direct involvement is kept minimal because "the child whom we have robbed of his own will [because parents substitute their own will for the child's] becomes difficult" (Montessori, 1956, p. 99). In larger families, children are "more normal because the parents have not time to occupy themselves with each one...with such intensity" (Montessori, 1994a, p. 182). Dr. Montessori clearly thought it important that parents understand the Montessori approach, and she lectured to and wrote articles for parents throughout her life (Montessori, 1956, 2017), but she thought parents should not be directly involved with children's activities in the classroom. In conventional settings, parent involvement is associated with better outcomes, but the typical interpretation of "parent involvement" is incorrect. The typical interpretation is that parents should be in the classroom with children. However, the strongest effects of parent involvement are seen when the term refers to parents having high expectations of children's academic achievement; the weakest (sometimes negative) effects are when it translates to parents helping with homework (Wilder, 2014). Parent involvement, as the term is used in research, is typically not about parents being inside the classroom. The parent-involvement research actually is consistent with Montessori education, in that parents can have high academic standards, and there is no homework for parents to be involved in. Montessori students do their work at school and independently of their parents. Research on how classroom processes and child outcomes may change when parents are present in Montessori classrooms is needed, but even in conventional settings, parents' presence in the classroom does not predict positive child outcomes.

### Summary

In sum, the prepared Montessori environment includes certain material, temporal, and social characteristics that are expressed in Dr. Montessori's books. Although aspects might have changed had she lived longer, what we detailed here describes what she included in her last lectures and thus provides a benchmark description. The environment is beautiful and contains child-sized implements and the full set of Montessori materials and no more. The work period extends for about three hours, morning and afternoon, and may be longer if the school functions as a day care. There are no interruptions in the middle of this period, and specials are absent or rare. There are at least 25 children of particular age groupings that correspond to Dr. Montessori's stages, like ages 3 to 6, with just one teacher. This teacher is a key feature of the social environment and constitutes the second part of the Montessori trinity, described in Part II, which also includes an appendix summarizing the features just mentioned.

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