Narrative, meaning making and personal development: Teachers' storied experience in Montessori, Steiner and other primary classrooms

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Publication Details
Appendix A

Maria Montessori and the Montessori Method

Maria Montessori (1870-1952) was the first woman to earn a doctor of medicine degree in Italy. She decided to apply her knowledge of scientific method to learning environments and effectively revolutionised education. Her ideas for schooling were formulated during her directorship of a day care centre at the San Lorenzo Housing project where she created a school called Casa di Bambini for 3-7 year olds in 1907. From observing children working quietly with concrete educational materials, she developed a methodology in total contrast to the teacher-directed, rote learning method of the day. By 1909 she had opened four schools and started her first teacher-training programme. In the next few decades, schools were opened in the U.K., the United States, and throughout Europe. When Mussolini closed her Italian school in 1934, Maria moved to Holland which became her base until her death. However, she continued to lecture and teach worldwide including a stay of two years in India in the 1940’s where she formulated many of her ideas for a cosmic or integrated curriculum for the primary school. Today there are thousands of schools and teacher-training programmes worldwide.

Montessori taught modern educators that the school environment must be especially prepared for children and modified according to the developmental stages of physical, intellectual and social growth. She viewed learning as a developmental and constructive process with nature and nurture interacting in the child’s process of fulfilling potential. She also believed that recognising and responding to a child’s sensitive periods for learning would help the child to develop skills in language, movement, sense perception, order and social relations in early childhood. Montessori visualised a child-centered triad with the child at the peak making choices about his/her own learning while supported by an environment that included self-correcting, multi-sensory materials and child-sized furniture. The teacher assumed the role of a guide or facilitator. Rewards and punishments did not have a role in this triad which was based on the respect of the teacher and child for each other, the environment, and the learning process. Montessori viewed children’s development in 6 year cycles: three years of active
and rapid development including dramatic physical development followed by three years of consolidation of skills and less dramatic changes. The Montessori curriculum is based on three-year cycles, which allows for benefits of multi-age grouping including lesson presentations that cater for a wide spectrum of development. In addition, the three-year age span means older children have the opportunity to be models for younger children as well as having the opportunity to consolidate skills by teaching others.

It could be said that Montessori’s method supported her philosophy that science could be applied to education to encourage autonomy and responsibility. She believed that if these qualities of self-construction are nurtured in children, then peace could result. In contrast, she claimed that the authoritarian model of education disempowered people and thus contributed to the emergence of dictatorships and consequent wars.

The aim of Montessori education is to develop each person’s ability to the fullest extent while celebrating and enhancing his or her own uniqueness and cultural background. The goal of education is the development of autonomous, competent, responsible (to themselves, other humans, and the environment), adaptive citizens – lifelong learners and problem solvers. Respect, competency, responsibility, self-initiative, and self-management are valued. (Barron, 1992, p. 268)

Appendix B

Rudolf Steiner and The Waldorf Schools

Rudolf Steiner (1961-1925) was an Austrian born scientist, philosopher and educator who earned his doctorate in mathematics and science in 1891. Like Montessori, he believed that by changing the fundamental ways in which children were educated, spiritual insight would be attained and peace ensured. He was influenced both by Western science and by Germanic Christianity and the modern spiritual movement that found its primary sources in Hinduism.

The first Waldorf school, sponsored by industrialist Emil Molt, was opened in 1919 in the Waldorf-Astoria cigarette factory in Stuttgart, Germany. It was co-ed, tuition-free and “a radical departure from contemporary educational norms” (Lemmo, 1997). The movement spread and the first USA Waldorf School opened in Manhattan in 1928. Today there are over 700 Waldorf schools in 40 countries.

Steiner based his pedagogy on Anthroposophy – a philosophy supporting the understanding of the whole human being as body (thinking), soul (feeling), and spirit (willing) (Childs, 1991; Sloan, 1996). He believed that the purpose of education should be to support the student’s unfolding towards his/her full potential in all these dimensions. He drew a parallel between the individual’s development of consciousness and historic development of civilisations. For this reason, the curriculum was based on fables, fairy tales and mythologies that paralleled this development and thus would cater to the child’s level of understanding. Subjects are taught imaginatively and artistically and the curriculum is viewed as an ascending spiral with regards to knowledge and spiritual insight.

The curriculum is designed to respond to various phases of child development. The first seven years, the child experiences that the world is good through imitation, repetition, ritual and fantasy. In great contrast to the Montessori movement, there is a strong emphasis on the importance of oral tradition in these early years and thus reading and writing are not introduced until after age seven. The teacher is like a ‘traditional’ parent whom the child can both imitate and assist in experiencing whole processes such as bread baking or jam making (Wishart, 2000).

In the second seven-year cycle, from ages 7-13, through his/her imagination, the child experiences that the world is beautiful. Steiner views development in terms of energy in the thought system, feeling system and will. At this age the student continues the growth of the rhythmic system through motion, language and music which Steiner viewed as also helping to create a balance between will and thought. Steiner placed a great emphasis on the imagination at this age and artistic activities including experience with music, shape, and form help him/her to form images. He believed that “it is this vital picture-making capacity that gives life and insight to
logical and conceptual thinking” (Sloan, 1996, p. xv). Art, movement and music are thus interwoven with studies in all subjects. The teacher who ideally teaches the children for the entire seven-year cycle is a benevolent leader whom the child can emulate.

The third cycle, ages 14-21 is characterised by rational judgement and an experience that the world is true. As the student of this age becomes a complete being, he/she no longer needs the external teacher, and the role of teacher becomes that of guide or facilitator. The student of this age is encouraged to make decisions and explore the world in which he/she lives.

(Childs, 1991; Edmunds, 1992; Wilkinson, 1993; Finser, 1994; Marshak, 1997; Sloan 1996; Lemmo, 1997).
Appendix C

The Reggio Emilia Approach

Reggio Emilia is a city of 130,000 people in northern Italy. It is home to an innovative early childhood education programme. Here, in 1945, at the end of the Fascist dictatorship and WWII, the women joined with the men left after the war and founded and built schools for their children. The teachers wanted to develop new ways of teaching in tune with democratic society and looked to Dewey, Piaget and Vygotsky for inspiration. Educator, Loris Malguzzi, became the director of the schools and defined the characteristics of the socioconstructivist pedagogy that would become known as the Reggio Emilia approach. In 1963 the city government took over running the peoples’ schools. By the end of the 70’s, the schools for young children in Reggio Emilia had grown to 19 in number and the building of infant-toddler centres had begun. In the 80’s the international scene became interested in Reggio. Children’s work was sent around the world in an exhibit and international teachers began visiting Reggio to learn how to implement this approach.

The Reggio Emilia environment is beautiful and highly personal. It is arranged to encourage interaction and choice. Relationships are valued and children often work in small groups. Multi-media are used for symbolic expression as children explore a project area. Languages – or modes of expression – include words, movement, drawing, painting, building, sculpture, shadow play, collage, dramatic play and music. The emergent curriculum often results in long-term projects based on interests determined in dialogue with the children. The children’s work is carefully documented by transcripts of discussions, photographs and portfolios. The work is valued, shared with the parents and the community and used for professional growth and communication.

Loris Malguzzi emphasises three key points of the Reggio Emilia approach: socioconstructivism, careful reflection in the program that is constantly evolving and “to do nothing without joy”.

(Edwards, Gandini, Forman, 1993; Hendrick, 1997)
Appendix D

Interview Questions

1. How do you use narrative in your classroom?

2. Tell me about the children’s own narrative creations (samples appreciated)

3. What do you believe is gained by using narrative (stories or poems) in the classroom?

4. How do you see story as related to your philosophy or the philosophy or ethos of your school?

5. What opportunities do you have to explore your personal narrative in the school setting?
8. What are some stories that are meaningful to you as an adult?

Additional helpful information:

• When and where did you do your training? What type of training?

• What have you drawn upon that you have found particularly beneficial? Reading? Resources? Models? Mentors? Workshops?

• In what school systems have you taught and what grades have you taught?

• How long have you been teaching?

Gay Ward '98-'99
Dear Name of Principal,

I am a former primary school teacher and have taught several grade levels in the past eight years. I am currently engaged in PhD research at The University of Notre Dame Australia exploring the use of narrative across the curriculum in primary schools. I am collecting data through observations and in-depth interviews with teachers working in schools representative of various methodologies and curriculum formats. (eg. Government, Montessori, Steiner, Catholic, etc.) I am interested in noting the similarities and differences in the use of narrative in different classrooms.

I seek your permission to ask _____________________________ if I might interview her/him out of school time as I feel her/his ideas regarding the use of story will provide valuable insight for my study. If____________________________ is willing and it can be arranged without disruption to the students, I would also be interested in observing the class on a prearranged morning or afternoon that is convenient for her/him.
Because this is a non-funded study, I am not able to provide remuneration but I would be delighted to share my findings with you or any of your staff who are interested. I feel that a compilation and sharing of ideas for using narrative to create meaning in primary education is potentially interesting for all educators of this age group. I also assure you that requests for anonymity will be respected in any presentation or publication of my work. Unless otherwise specified, designated pseudonyms will identify the teachers and the schools will only be identified by type and location. (eg. Catholic Primary School #3, Western Australia or Montessori School #2, Ohio, USA, etc.)

If the teachers interviewed wish to provide samples of children’s work to clarify points, I would ask that children be identified only by age and gender and that parental permission be gained for sharing this work in an anonymous way.

I would greatly appreciate it if you would give the attached letter to ________________ if you have no objection to her/his participation in my study so that I might arrange a suitable interview time. I will phone in a few days to follow up this letter.

Yours sincerely,

Gay Ward
Appendix F

Interviewer’s address
Interviewer’s email
Interviewer’s phone number
Date

Teacher
Name of Primary School
Address

Dear Name of Teacher,

I am a former primary school teacher and have taught several grade levels during the last eight years. I am currently engaged in PhD research at The University of Notre Dame Australia exploring the use of narrative across the curriculum in primary schools. I am collecting data through observations and in-depth interviews with teachers working in schools representative of various methodologies and curriculum formats. (e.g. Government, catholic, Montessori, Steiner, other independent, etc.) I am interested in noting the similarities and differences in the use of narrative in different classrooms.

I seek your permission to interview you for a few hours out of school time as I feel your ideas regarding the use of story will provide valuable insight for my study. I am attaching some of the questions that I will pose to you. If you are willing and it can be arranged without disruption to the students, I would also be interested in observing your class on a prearranged morning or afternoon that is convenient for you.
Because this is a non-funded study, I am not able to provide remuneration but I would be delighted to share my findings with you or any of your associates who are interested. I feel that a compilation and sharing of ideas for using narrative to create meaning in primary education is potentially interesting for all educators of this age group. I also assure you that requests for anonymity will be respected in any presentation or publication of my work. Unless otherwise specified, pseudonyms rather than actual names will identify the teachers and the schools will only be identified by a number, type and location (e.g. Catholic Primary School #3, Western Australia or Montessori School #2, Ohio, USA, etc.).

If you wish to provide samples of children’s work to clarify points, I would ask that children be identified only by age and gender and that parental permission be gained for sharing this work in an anonymous way. I am attaching a sample permission form for this purpose.

If you are willing to be interviewed, I would greatly appreciate it if you would contact me to arrange a mutually convenient time. Thank you for your assistance.

Yours sincerely,

Gay Ward
Appendix G

Parental Permission Form

Date ___________________________

Dear __________________________, 

I have agreed to assist Mrs. Gay Ward, a primary teacher and a Notre Dame Ph.D. student, in her research on the varied uses of narrative in the primary school classroom. In explaining how we use story in our class, it will be helpful to me to share some of the students' work.

I ask your permission and that of your child, ____________________, to share some of his/her work with Mrs. Ward. I will provide a copy identified only by age and gender so anonymity will be preserved. If you have any
concerns regarding the use of your child's work in this way, please let me know by the end of next week.

Yours sincerely,
Appendix H

I understand that my interview responses are being used in conjunction with Gay Ward’s research on

Title: *Narrative, meaning making and personal development: Teachers’ storied experience in Montessori, Steiner and other primary classrooms.*

In the thesis and any related publications I would like to be referred to

<table>
<thead>
<tr>
<th>Thesis</th>
<th>Related Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>by my own name</td>
<td></td>
</tr>
<tr>
<td>by a pseudonym</td>
<td></td>
</tr>
<tr>
<td>by either my own name or a pseudonym</td>
<td></td>
</tr>
</tbody>
</table>
In the thesis forward, I understand that Gay will be thanking participants who will be
listed by name, not school or type of school. In this instance, I would like to be
referred to by

☐ my own name

☐ the pseudonym used in the text

__________________________                     _______________
Signature       Date
Appendix I

Observation Sheet

School ___________________________       Grade____________

Type of School: ____________________________

Adults and roles: ____________________________

______________________________

Classroom Environment:

Seating arrangement:

Displays:

Other:

Lesson:
Subject: _________________________    Topic: _________________________

Story used or reference to narrative? __________________________________________

Means of delivery of lesson _________________________________________________

How children arranged during lesson _________________________________________

Evidence of theme? _________________________________________________________

**Follow-on:**

Type of activity _____________________________________________________________

Grouping (individual, paired, small group) _________________________________

Evidence of peer tutoring? ________________________________________________

Teacher role during follow-on _____________________________________________

**Additional Information:**
Evidence of use of narrative in the class?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

Indication that narrative used across subjects? ________________________________
_____________________________________________________________________
_____________________________________________________________________

Additonal Comments:
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

Observer: ________________________________

Date: ________________
Appendix J

Sample Coding – Montessori

Q.S.R. NUD.IST Power version, revision 4.0.
Licensee: Gay Ward.

PROJECT: Narrative, User Gay Ward,
(1) /Montessori
(1 1) /Montessori/Curriculum and Story
(1 1 3) /Montessori/Curriculum and Story/Conditions for Learning (learning principles)
(1 1 3 1) /Montessori/Curriculum and Story/Conditions for Learning (learning principles)/Cambourne -Natural Learning
(1 1 3 1 5) /Montessori/Curriculum and Story/Conditions for Learning (learning principles)/Cambourne -Natural Learning/Approximation
(1 1 3 1 11) /Montessori/Curriculum and Story/Conditions for Learning (learning principles)/Cambourne -Natural Learning/Engagement
(1 1 3 1 1 12) /Montessori/Curriculum and Story/Conditions for Learning (learning principles)/Cambourne -Natural Learning/Engagement/Demonstration
(1 1 3 1 2) /Montessori/Curriculum and Story/Conditions for Learning (learning principles)/Cambourne -Natural Learning/Immersion
(1 1 3 1 6) /Montessori/Curriculum and Story/Conditions for Learning (learning principles)/Cambourne -Natural Learning/Response
(1 1 3 1 3) /Montessori/Curriculum and Story/Conditions for Learning (learning principles)/Cambourne -Natural Learning/Responsibility
(1 1 3 1 4) /Montessori/Curriculum and Story/Conditions for Learning (learning principles)/Cambourne -Natural Learning/Use
(1 1 3 2) /Montessori/Curriculum and Story/Conditions for Learning (learning principles)/Collaboration
(1 1 5) /Montessori/Curriculum and Story/Grouping
(1 1 5 1) /Montessori/Curriculum and Story/Grouping/individual
(1 1 5 2) /Montessori/Curriculum and Story/Grouping/Small group
(1 1 5 3) /Montessori/Curriculum and Story/Grouping/Whole class
(1 1 2) /Montessori/Curriculum and Story/Integrative Process
(1 1 2 3) /Montessori/Curriculum and Story/Integrative Process/Fiction and Non-Fiction
(1 1 2 4) /Montessori/Curriculum and Story/Integrative Process/Narrative Base
(1 1 2 4 1) /Montessori/Curriculum and Story/Integrative Process/Narrative Base/historical narrative
(1 1 2 4 2) /Montessori/Curriculum and Story/Integrative Process/Narrative Base/myth base
(1 1 2 6) /Montessori/Curriculum and Story/Integrative Process/rituals and traditions
(1 1 2 5) /Montessori/Curriculum and Story/Integrative Process/Story Path
(1 1 2 1) /Montessori/Curriculum and Story/Integrative Process/Universal Themes
(1 1 4) /Montessori/Curriculum and Story/Stages of Lesson
(1 1 4 2) /Montessori/Curriculum and Story/Stages of Lesson/Montessori stages
(1 1 4 2 2) /Montessori/Curriculum and Story/Stages of Lesson/Montessori stages:"Show Me"
(1 1 4 2 1) /Montessori/Curriculum and Story/Stages of Lesson/Montessori stages:"This is"
(1 1 4 2 3) /Montessori/Curriculum and Story/Stages of Lesson/Montessori stages:"What Is"
(1 1 4 1) /Montessori/Curriculum and Story/Stages of Lesson/Whole Language Stages (e.g. Reid and Green)
(1 1 4 1 1) /Montessori/Curriculum and Story/Stages of Lesson/Whole Language Stages (e.g. Reid and Green)/Engagement
(1 1 4 1 2) /Montessori/Curriculum and Story/Stages of Lesson/Whole Language Stages (e.g. Reid and Green)/Exploration
(1 1 4 1 4) /Montessori/Curriculum and Story/Stages of Lesson/Whole Language Stages (e.g. Reid and Green)/Presentation

570
(1 3 2 1)  /Montessori/Integration-Aspects of language curric. and language modalities/Told and Read Stories/Told
(1 3 2 1 2)  /Montessori/Integration-Aspects of language curric. and language modalities/Told and Read Stories/Told/student
(1 3 2 1 1)  /Montessori/Integration-Aspects of language curric. and language modalities/Told and Read Stories/Told/Teacher
(1 4)  /Montessori/Personal Narrative
(1 4 2)  /Montessori/Personal Narrative/Student
(1 4 2 2)  /Montessori/Personal Narrative/Student/ Mont and life issues
(1 4 2 3)  /Montessori/Personal Narrative/Student/journalising
(1 4 2 1)  /Montessori/Personal Narrative/Student/Sharing stories, news
(1 4)  /Montessori/Personal Narrative/Teacher
(1 4 1 4)  /Montessori/Personal Narrative/Teacher/journalising
(1 4 1)  /Montessori/Personal Narrative/Teacher/Life Events
(1 4 1 1)  /Montessori/Personal Narrative/Teacher/Sharing teaching
(1 4 1 3)  /Montessori/Personal Narrative/Teacher/Stories
(1 2)  /Montessori/Philosophy and Story
(1 2 5)  /Montessori/Philosophy and Story/Fostering Collaborative learning
(1 2 3)  /Montessori/Philosophy and Story/Meaning
(1 2 3 4)  /Montessori/Philosophy and Story/Meaning/Authentic Voice
(1 2 3 2)  /Montessori/Philosophy and Story/Meaning/Cognitive
(1 2 3 2 1)  /Montessori/Philosophy and Story/Meaning/Cognitive/Dev. concepts - Mont.
(1 2 3 2 7)  /Montessori/Philosophy and Story/Meaning/Cognitive/Emot. Intell.
(1 2 3 2 3)  /Montessori/Philosophy and Story/Meaning/Cognitive/Gender differences and cultural differences
(1 2 3 2 2)  /Montessori/Philosophy and Story/Meaning/Cognitive/Learning Style
(1 2 3 2 6)  /Montessori/Philosophy and Story/Meaning/Cognitive/Memory
(1 2 3 2 4)  /Montessori/Philosophy and Story/Meaning/Cognitive/Multiage
(1 2 3 2 5)  /Montessori/Philosophy and Story/Meaning/Cognitive/Special Needs
(1 2 3 3)  /Montessori/Philosophy and Story/Meaning/meaning and interest
(1 2 3 1)  /Montessori/Philosophy and Story/meaning/Philosophic
(1 2 3 1 4)  /Montessori/Philosophy and Story/meaning/Philosophic/Community and Uniqueness
(1 2 3 1 3)  /Montessori/Philosophy and Story/meaning/Philosophic/Develop cosmic sense, interdependent life
(1 2 3 1 1)  /Montessori/Philosophy and Story/meaning/Philosophic/spiritual values and virtues
(1 2 3 1 2)  /Montessori/Philosophy and Story/meaning/Philosophic/Story to teach about society
(1 2 1)  /Montessori/Philosophy and Story/Narrative and School Philosophy
(1 2 1 1)  /Montessori/Philosophy and Story/Narrative and School Philosophy/Montessori Philosophy
(1 2 1 2)  /Montessori/Philosophy and Story/Narrative and School Philosophy/Montessori Philosophy/Cosmic Curriculum
(1 2 1 1 2)  /Montessori/Philosophy and Story/Narrative and School Philosophy/Montessori Philosophy/Critique
(1 2 1 1 3)  /Montessori/Philosophy and Story/Narrative and School Philosophy/Montessori Philosophy/envir.
(1 2 1 1 4)  /Montessori/Philosophy and Story/Narrative and School Philosophy/Montessori Philosophy/Imagination
(1 2 1 1 1)  /Montessori/Philosophy and Story/Narrative and School Philosophy/Montessori Philosophy/Imagination
(1 2 1 3)  /Montessori/Philosophy and Story/Narrative and School Philosophy/Relig. Phil.
(1 2 2)  /Montessori/Philosophy and Story/Narrative as Part of Teaching
(1 2 2 2)  /Montessori/Philosophy and Story/Narrative as Part of Teaching/Contrast others in school
(1 2 2 1)  /Montessori/Philosophy and Story/Narrative as Part of Teaching/Influences
(1 2 2 1 3)  /Montessori/Philosophy and Story/Narrative as Part of Teaching/Influences/Children's authors

573
Montessori Philosophy and Story
Narrative as Part of Teaching
Influences
Children's authors
L. Hathorn
Mem Fox
Collaborative Learning and Teaching
Children's authors
Kieran Egan
(1 2 2 1 4)
First Steps
(1 2 2 1 2)
Kieran Egan
(1 2 2 1 7)
(1 2 2 1 9)
Other phil./Csikszentmihalyi
Other phil./Emot. Intell.
Other phil./Reggio Emilia
(1 2 2 1 9 1)
Virtues and Nurt. Spirit
(1 2 2 1 1)
Whole language
(1 2 4)
Role of Teacher
(1 2 4 8)
Assessment
(1 2 4 4)
Dealing with child's personal problems
(1 2 4 1)
Facilitator of learning
(1 2 4 3)
Finding resource to match where child is
(1 2 4 5)
Foster collaborative learning
(1 2 4 6)
Impart info
(1 2 4 7)
Impart values
(1 2 4 2)
Material maker
(1 2 4 9)
Parent Education
(1 5)
Samples and Examples
(1 5 2)
Student's work
(1 5 2 4)
Creative story
(1 5 2 3)
Description
(1 5 2 2)
Group Book
(1 5 2 9)
pers. narr.
(1 5 2 1)
Retell
(1 5 2 5)
Whole language activities
(1 5 1)
Teacher's Programmes
(1 5 1 3)
Teacher's Programmes/Biography and Autobiography
(1 5 1 1)
Fables, folktale, fairytale
(1 5 1 7)
Integrated Prog.
(1 5 1 2)
Myths
(1 5 1 4)
Novels
(1 5 1 8)
other stories
(1 5 1 5)
Teacher's Programmes/Poetry
(1 5 1 6)
Religious stories

(1 5)

Montessori Samples and Examples

Student's work

Creative story

Description

Group Book

Teacher's work/pers. narr.

Retell

Whole language activities

Teacher's Programmes

Teacher's Programmes/Biography and Autobiography

Fables, folktale, fairytale

Integrated Prog.

Myths

Novels

other stories

Teacher's Programmes/Poetry

Religious stories
Appendix K

God Who Has No Hands

From the beginning people have been aware of God. They could feel Him [sic] though they could not see Him, and they were always asking in their different languages who He was and where He was to be found. “Who is God?” they asked their wise men. “He is the most perfect of beings” was the answer. “But what does He look like? Has He a body like us?” “No, He has not got a body. He has no eyes to see with, no hands to work with and no feet to walk with, but He sees everything and knows everything, even our most secret thoughts.” “And where is He?” “He is in Heaven and on this Earth. He is everywhere. What can He do?” “Whatever He wishes.” “But what has God actually done?”

“What He has done is all that has every happened. He is the Creator and Master who has made everything; and all the things He has made obey His will. He cares and provides for them all and keeps the whole of His creation in the most wonderful harmony and order.

In the beginning there was only God. Since He was completely perfect and completely happy, there was nothing He needed. Yet out of His goodness He chose to create and all that He willed came into being: the heavens and the Earth, all that is visible; and all that is invisible. One after another He made the light, the stars, the sky, and the Earth with its plants and animals. Last of all He made man. Man like the animals was made out of particles of the earth; but God made him different from the animals and like Himself, for into his body which would die He breathed a soul which would never die.”

Many people thought this was just a tale. How could someone with no hands and no eyes make things? If God is a spirit who cannot be seen or touched or heard, how could He have made the stars that sparkle overhead, the sea which is always astir, the sun, the mountains, and the winds? How could a spirit make the birds and fishes and trees, the flowers and the scent they shed around them? Perhaps He could make invisible things, but how could He make the invisible world? It is all very well, they thought, to say that God is everywhere, but who has ever set eyes on Him? How can we be sure He is anywhere? They tell us He is the Master whom everybody and everything obeys, but why on earth should we believe that?
And really it does seem impossible. We who have hands could not do these things, so how could someone who has no hands do them? And can we imagine animals and plants and rocks obeying God? The animals do not understand when we talk to them, so could they be obedient? Or the winds and the sea and the mountains? You can shout and scream and wave your arms at them, but they cannot hear you for they are not even alive, and they certainly won’t obey you.

Yes, that is how it seems to us. But, as you shall see, everything that exists, whether it has life or not, in all that it does and by the very fact of being there, actually obeys the will of God.

God’s creatures do not know that they are obeying. Those that are inanimate just go on existing; those that have life move and go on living. Yet every time a cool wind brushes your cheek, its voice, if we could hear it, is saying: “Lord, I obey.” When the sun rises in the morning and colours the glittering sea, the sun and the sunbeams and the water are also whispering, “My Lord, I obey.” And when you can see birds on the wing, or fruit falling from a tree, or a butterfly hovering over a flower, the birds and their flight, the tree and the fruit and its fall to the ground, the butterfly and the flower and its fragrance are all repeating the same words: “I hear, my Lord, and I obey.”

At first there was chaos, and darkness was on the face of the deep. God said: “Let there be light,” and there was light. Before that there was only the deep: an immensity of space with no beginning and no end, indescribably dark and cold. Who can imagine that immensity, that darkness and coldness?

When we think of the dark, we think of night; but our night would be like brilliant sunshine in comparison with that darkness. When we think of cold, we think of ice. but ice is positively hot if you compare it with the coldness of space, the space that separates the stars; as hot, you might say, as a blazing furnace from which no heat can escape. In this measureless void of cold and darkness light was created. There appeared something like a vast fiery cloud which included all the stars that are in the sky; the whole universe was in that cloud, and among the tiniest of stars was our own world. But they were not stars then; as yet there was nothing except light and heat. So intense was the heat that in the substances we know – iron,
gold, earth, rocks, water – were gases, as insubstantial as the air. All those substances, all the materials of which the Earth and the stars are composed were fused together in one vast, flaming intensity of light and heat – a heat which would make our sun today feel like a piece of ice. This raging fiery cloud of nothingness, too huge to imagine, moved in the immensity of freezing space, which was also nothingness but too huge to imagine, moved in the immensity of freezing space, which was also nothingness but infinitely vaster. The fiery mass was no bigger than a drop of water in the ocean of space; but that drop contained the Earth and all the stars, which are really blazing suns millions of times bigger than the Earth.

As this cloud of light and heat moved through empty space, little drops fell from it. If you swing the water out of a glass, some of it holds together as it falls and the rest breaks up into separate drops. The countless hosts of stars are like those drops. Only instead of falling they are moving round in space, in such a way that they can never collide or meet again. They are millions of miles form each other.

Some stars are so far away from us that it takes millions of years for their light to reach us, even though light travels 186,000 miles in one second. God gave them special laws which they have always obeyed. They seem free, whirling dizzily through space with nothing to stop them, but they are all tied to their courses by an invisible string which is the will of God.

Two of these drops were our world and our sun, which move on their own course through space. The Earth moves round the sun, but it travels like a spinning ball, ceaselessly revolving round itself and always revolving at the same speed.

When God’s will called the stars into being, there was no detail He had not planned. Every scrap of the universe, every speck which we might think too tiny to matter, was bound to behave according to the rules He had made. For the drop of the blazing cloud which became our world He decided that there should no longer be chaos. Instead of a burning confusion of gases, there was to be air and water and rocks.

God’s arrangement was wonderfully simple. The blazing mass of the Earth was made up of infinitesimal particles and it was they
themselves that would be transformed into rocks and water and air. The shape they took depended upon how hot or cold they were. Those particles, inconceivably small and all merged together, were whirling at a fantastic speed. As they cooled, they moved more and more slowly, clinging closer and closer to each other and occupying less and less space. It is this law of God’s which has given us what we call the three physical states of matter; everything we know is either a gas or a liquid or a solid, and which of the three it is at a given moment depends on how hot or cold it is. Why then, we may ask, are there such millions and millions of different types of particles, each with its special dislike for others. Just like human beings, they are attracted to some individuals, and refuse to have anything to do with others. So they form themselves into different groups.

In the solid state, God has made the particles cling so tightly together that they are almost impossible to separate. They form a body which will not alter its shape unless great force is applied to it. If a piece is broken off – if, for instance, you start chipping a flint – the particles still cling together; the flint and the chips remain solid pieces of stone.

When it came to liquids, God said to the particles, “You shall hold together while you are inside a vessel and take the shape of the vessel you are in. Outside, you shall flow and spread filling every hollow and crevice in your path. You will be able to move and roll over each other, you will push downwards and sideways, but not upwards. (That is why, though we can put our hands in water, we could not plunge them into a rock) And, since you do not cling so tightly to each other, you take up more room than the particles of a solid. And to the gases God said, “Your particles shall not cling together at all. They can move freely in all directions.”

This was the simple plan God devised for the particles, and so it is that they form themselves into solids and liquids and gases. But He added certain conditions. Unless, He said, the temperature is very, very hot – hotter than the heat of the sun – or very, very cold – like the cold of outer space – you shall not be gases, or liquids, or solids all at the same time. But as a certain degree of heat some of you shall be solid, some liquid and some gaseous. And if the heat increases, solids will become liquid, and the liquids will turn into gases which will mix with the other gases, but not all the solids will become liquid at the same degree of heat.
And He gave another law: All of you shall have weight, but you will not all have the same weight. And those that are heavier will attract those that are light.

These were the laws God gave. And in obedience to those laws the little drop of nothingness which has made our world when on turning and turning and moving round and round the sun. The Earth and the sun and the stars were balls of gas – gas which contained in itself all the elements of which our world, the Earth, is made up – and they moved on their courses through space, which is so cold that ice is hot by comparison. If you put your hand into ice-cold water, it becomes cold. For the same reason, the stars and the sun and the Earth gradually grew colder as time went on, and the smaller balls cooled more quickly than the latter. The Earth, which is tiny compared with the sun, has become quite cold outside, while the sun is still blazing in the heavens.

As the gases of which the Earth was formed cooled down, they obeyed the laws God had given them. One after another, at the appointed temperature, they became first liquid and then solid; and as they became liquid or solid, their particles would join the other particles to which they were attracted and form new compound substances; and the heavier substances attracted those which were lighter. When you throw a stone into a pond, it sinks to the bottom. Similarly, the heavier liquids sank toward the center of the Earth’s ball, and those that were lighter floated above them like oil floating on water. Thus, they arranged themselves in layers according to their weight; but all of them were attracted to the heaviest in the center and to this day each layer is still pushing on the layer below it. While this was going on and each group of elements that had joined together was obeying the special laws God had given it, the whole Earth which they formed was also obeying His laws and continuing to spin on its course round the sun.

As the surrounding gases cooled slightly, the boiling liquid also began to cool and thicken into a paste. The liquid at the center remained intensely hot, but it was pushed on all sides by the enormous weight that lay over it, one compound on top of another. It was nothing like cool enough to turn into a solid, but all the same, it began to solidify because of the sheer pressure from above. Some of the upper layers were semi-solid pastes, others remained liquid, all pushing against
one another with all their might. Sometimes a mass that was pushed on
both sides found itself squeezed on top of its neighbours, and in this
bending process hollows might be formed, which were immediately
filled with liquid. And above them all stretched a sea of flaming
gases.

Can you imagine the dance of the elements?

By the law God had given them, as they cooled their bulk grew
smaller and their weight increased. So when they soared up to meet
the utter coldness of enveloping space, they shrank in size and back
they fell into the raging fire they had left.

Here they grew hot and light again, light enough to rise up once
more, carrying with them part of the heat from below which was
taken off into space, and when they returned Earthwards, they
carried down some of the ice from outer space into the heart of the
fire. This process, which went on endlessly, is still happening in the
sun today. The heat that the sun gives us from all those millions of
kilometres away is heat that it cannot keep for itself. The surface
particles of the sun, like those of the Earth when it too was a flaming
mass, are doing the double task of carrying away heat and bringing
cold. How marvelous it is, and how simple is the law God has made!
If you become hot you expand, and as you expand, you become
lighter and soar upwards, like a bubble of air in water. But, if you
become cold, you shrink and fall downwards, as a grain of sand sinks
to the bottom of a tank. Because of this law, the Earth gradually
changed from a band of fire to the Earth we know. This was the law
that the tiny radiant particles obeyed as they danced their exultant
dance; particles too minute to be seen or even imagined, yet
numerous enough to have produced the world.

For hundreds, thousands, millions of years the dance went on. More
and more gases became liquid, more and more liquids solidified, and
with the continuous assault of cold from outer space, the Earth
shrank in size and became wrinkled like an apple that has been left in
a cupboard. The wrinkles are the mountains and the hollows
between them are the oceans; and above them is the air we breathe.

Rocks, water, air – solids, liquids, gases: each is what it is because of
its degree of temperature. Today, as it was yesterday and a million
years ago, God’s laws are obeyed in the self-same way. The world
spins round and round itself and round and round the sun. and today, as it was a million years ago, the Earth and all the elements and compounds of which it is composed, as they fulfill their task, whisper with one voice:

“Lord, thy will be done; we obey.”

Maria M. Montessori
Appendix L

The Coming of the Universe: The Big Bang

How beautiful the flowers are, and the trees, the blue sky, the stars and the sea! How beautiful are our great cities! How beautiful things are!

But a long time ago, there was nothing. Nothing. No stars, no mountains, no Earth. Nothing. There was only a great space which had no beginning and no end. There was darkness and cold, and nothing more. We think that the night is dark, but our night is like daylight compared to the darkness then. When we think of ice, we think of cold, but ice is warm compared to the coldness then.

But there was something in the midst of this darkness – something that was not seen. There were little particles of dust – hydrogen particles – drifting in the loneliness and emptiness of space.

At a certain moment, we don’t know why or how, the particles united. At that moment, when the particles untied, there appeared a great light. (Pop balloon and flash camera.) There was a cloud of light greater than we can imagine, and it contained all the light in our universe. Everything was contained in this cloud, even the sun. This cloud was luminous and radiant, full of heat and light. The heat was so hot that everything was a gas. Iron was a gas; gold was a gas. The luminous cloud, larger than we can imagine, moved through the cold and darkness, and as it moved, it left great drops of light. (Start spinning stars on the walls). These great drops were to become stars. One of these drops was our sun.

These future stars moved in two ways: they spun like a top, and they moved along a path. As they moved, they seemed free, but they were not free. They had to obey certain laws.

When the fiery cloud that was to become our sun was born, it was a million times larger than it is now, and though it was a fiery gas, it was not so hot as it was to become. Our future sun moved in two directions. It too spun like a top and it moved along a path. It seemed free, but it was not free. It too had to obey certain laws.

At a certain moment, the turbulent cloud that was to become our sun, drew in many particles of dust, and gradually it made itself into a centre of gravity. As a result, it drew in even more particles, and at the center, it began to grow. As it grew heavier, it spun even faster, and it became hotter, until it glowed, as we now see the sun. It has glowed like that for 5 billion years at least, and will continue to glow at least another 5 billion years.

The sun was just one star among all the other stars moving in space, and the Earth was just a speck, compared to the size of the sun.

The sun doesn’t look so big to us, but that’s because it is so far away. The sun is 93 million miles away from the Earth. The light from it takes about 8 minutes to reach...
Do you know how fast light travels? Light travels at 186,000 miles per second. If you click your fingertips, light has gone around the Earth 7 times already. If we were to travel to the sun at 55 miles per hour it would take us about 220 years to reach the sun. The sun is, in fact, 1 million times larger than the Earth.

One of the swirling spinning circles of glowing particles flung off from the sun was the planet Earth. There was a difference among the particles that formed the Earth; some were attracted to one another and united, and others moved away from one another. The particles assumed three states which we call solid, liquid, and gas. Everything we know is either a solid, a liquid, or a gas depending on how hot or cold it is. Each state has a different law. In the solid state, the particles cling so tightly together that they are almost impossible to separate. They form a body which will not change shape unless great force is used. And even then the chips remain solid pieces.

There is another law for liquids. The particles will hold together while inside a container and take its shape. Outside they will flow and spread, filling every crevice in the path. They will not cling closely to each other as the particles of a solid, but will be able to moved and roll over each other. That is why, thought we can put our hands in water, we cannot plunge them into a rock. The particles of liquid will push downwards and sideways, but not upwards. Since they do not cling so tightly to each other, they take up more room than the particles of a solid.

The gases have another law. The particles will not cling together at all. They can move freely in all directions.

And so it was, the particles formed themselves into solids, liquids, and gases. But there are certain conditions. Not all solids become liquids, or liquids become gases at the same degree of heat.

Since the Earth was small, it cooled more quickly. The stars and the sun and the Earth gradually grew colder as time went on. The stars, being larger, are still today, balls of fire. The Earth cooled and became viscous and solid.

Can you imagine the dance of the elements?

The elements, as they were heated, soared up to the coldness of space. They shrank in size and fell back into the raging fire they had left. Here they grew hot and light again, light enough to rise up once more, carrying with them part of the heat below, which was taken off into space. When they returned Earthwards, they carried down some of the ice from outer space into the heart of the fire.

For hundreds, thousands, millions of years the dance went on. Finally the particles settled down like tired dancers, and one after another, they became first liquid, then solid. As they changed to liquid or solid, some of them joined with others to form new substances. The heavier ones went nearer to the heart of the Earth and the lighter ones floated above them like oil floating on water. With continuous attack of cold from outer space, the Earth shrank in size and became wrinkled like an apple that has been left in a cupboard.
Gradually the crust of the Earth was formed. As the surface of the Earth cooled, many gases and molten liquids felt trapped beneath this think crust. The churning molten mass underneath constantly wanted to get out. It burst through the weak points, outpouring lava with smoke and flames. It was a terrible fight. These eruptions are called volcanoes and occasionally still happen in various parts of the world. From these volcanoes, wave upon wave of lava spread across the original crust.

There was no water in liquid form at that time, so there were no rivers, lakes, or seas, only hot rock everywhere. The Earth gradually became wrapped in a thick cloud of smoke which the sun’s rays no longer could come through. After a long period of time, water in the upper part of this cloud blanket was able to condense and rain began to fall, only to be changed back into steaming clouds before it could reach the sizzling surface of the Earth. Eventually, the first raindrops splashed on the warm rocks, only to be boiled away again. The Earth began to cook quicker now, so at last, rain began to trickle down the slopes and collect in little pools. The rains continued for thousands of years. Storms of great fury raged over the land. Water flowed across the rocky land and filled the hollows.

As more and more water poured down, the clouds thinned, and the sun finally broke through and smiled down on its daughter Earth, lighting a landscape of rocky landmasses and shallow seas. Upon the whole Earth, there was not living thing, but everything was beautiful, and thus life could begin.