

Sowing the Seeds of Discovery

By Ana Pickering

Working on the Timeline of Life

Imagine you are six years old. Imagine learning how the universe began in an explosion 13 billion years ago. Imagine discovering how the elements of the periodic table came from the formation of the stars. Imagine hearing stories that people from different cultures have told for millennia to explain how the world was created. Imagine what else you would want to discover about our marvellous universe ...

Young children learn through direct experiences in their immediate environment. But at around six years children begin to wonder about the world beyond their home and school community. They become intensely curious about the world beyond themselves. Where did everything come from, how did the world begin, why am I here, how long ago were dinosaurs on earth, how big is a trillion trillion, how many stars are in the night sky?

Dr Montessori said that we must give 6 to 12 year olds the universe. To stimulate the child's rich imagination and intense curiosity she felt that the seeds of the learning and understanding must be planted in the childhood years before puberty.

'Since it has been seen to be necessary to give so much to the child, let us give him a vision of the whole universe. The universe is an imposing reality and an answer to all questions. We shall

walk together on this path of life, for all things are a part of the universe, and are connected with each other to form one whole unity. This idea helps the mind of the child to become fixed, to stop wandering in an aimless quest for knowledge. He is satisfied, having found the universal centre of himself with all things.' Dr Maria Montessori To Educate the Human Potential.

In the 3-6 environments the child is introduced first to 'small' ideas that gradually widen into larger concepts; the 6-9 child is introduced right away to large concepts - the largest of all being the beginning of the universe. The cosmic view extends the primary child's amazing imagination to the origins of the universe, the formation of the earth and the succession of life on earth including human evolution and civilization. This big picture approach is shared with the child as a series of stories, sometimes called the Great Lessons. The story telling approach is an important and unique part of the Montessori curriculum. The stories are exciting, and are designed to awaken a child's imagination and curiosity. The child is thrilled with new ideas, awed by the wonder of the universe story and delighted by the inventiveness and innovation that is part of the human spirit.

The Great Lessons, key lessons and ongoing research and discussions exposes the child to a myriad of interconnecting disciplines and the details of each subject are given context by being tied to the bigger picture. Each Great Lesson becomes the springboard for further exploration by the child.

The Great Lessons at Wa Ora Montessori School in Lower Hutt are told to both the primary children and their parents. Principal Jan Gaffney says: 'Each year it is slightly different, but every three years we do a combined story for the whole school, with a darkened room, candles and great drama. The first time we did this we needed to practise, so the night before we invited

the parents to watch. We have done it for three years and it is now a tradition that parents come to the dress rehearsal. This year, the older primary children participated in the presentation of the Great Lesson for the parents and the children.'

Jaimee-Louise Whittington Werry is a 10 year old. She has been at Wa Ora Montessori School since she was three and was excited this year to help present the first Great Lesson: Coming of the Universe to the younger primary children 'It was such a great feeling to see the six year olds open their mouths in awe as a balloon filled with colourful glitter exploded over their heads representing the part of the Big Bang when all the particles of the universe exploded and created the universe.'

Emily Innes and Brent Denham have a six and half year old son, Mika, at Wa Ora Montessori. This was the first Great Lesson night for parents that they had attended. Emily describes: 'The evening began with the teachers telling us three creation stories to set the scene, including the traditional Christian creation story, the Maori legend of Papatuanuku and Ranginui, and a beautiful version of a Native American creation myth. We then entered a room that was in total darkness. Jan appeared, reading by torchlight. Beside her were several students from the 9-12 class dressed in black. She told the story of the creation of the Universe from a scientific point of view, but in a similar tale-spinning way to the previous creation stories, illustrated by various experiments performed by the students and teachers. There was a lot of information, and although all the detail didn't fully sink in, the strong sensory, mostly visual experiences did. The teachers became vibrating atoms joining up to illustrate how stars and galaxies were formed! Moving candles were expanding galaxies. Chocolate was melted in a pan to show how things can change from a solid to a liquid (we got to eat some!). I liked how the Million Cube and a single tiny unit were used to compare the sizes of Earth and the Sun. My favourite part was one of the most simple - a black balloon filled with silver glitter that was burst in the torchlight - a lasting impression of The Big Bang!'

Brent reflects on his own school experience. 'School was mostly alright although I didn't really enjoy the structure of the educational process and having to sit down and keep still all the time. I'm grateful that my current job allows me a much greater amount of autonomy than I ever had at school. I'm sure a Montessori education would have suited me very well.'

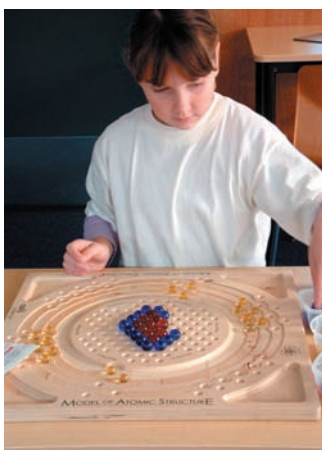
Brent enjoyed his first experience of the Great Lessons and adds, 'If I was a Montessori student I would think I'd probably start drawing space ships which could go forwards and backwards in time so that I could see what happened from the outside... I would ask myself how do we know how life, the stars, space, the Universe was really formed?

How do we prove it?'

Emily agrees, 'If I was a Montessori primary student I would probably first like to go over the story again myself. Maybe I would feel like doing a painting and perhaps some more experiments! I would also like to read more, including some more myths and legends along with the science. Our son Mika was excited about the Great Lesson, and enjoyed it, especially the large vinegar-and-baking soda volcano demonstration. I know he has been working on a space project but I haven't seen it yet.'



Learning about planets in the solar system



Building atoms on the atomic diagram board



Discovering constellations in the southern night sky

Sharon Udy, 6-9 teacher shares the investigations begun after her students heard the first Great Lesson: the Coming of the Universe. 'Most children researched and wrote projects about how the universe was created and the Earth was formed; solar flares, black holes, shooting stars and gravity. Two children took the research further and were interested in how stars form and die. Some students decided to create a model of the solar system. We found out the size of the sun and planets then found out the distance from the sun to each of the planets. The children then measured the diagonal length of the classroom. We then calculated the scale we would need to work in, to fit the sun and all planets in the room. I bought some beach balls and polystyrene balls and the children started working on the planets themselves. We had lots of paper mache and painting going on last term. It will be fascinating to see how long the children continue investigating, researching and sharing their new knowledge about the universe and solar system.'

What is the point of the Great Lessons? Brent responds: 'Montessori teachers share the Great Lessons with the primary school children to whet their appetite for questioning our world and beyond, and to help build a context as to where we sit in the continuum of time, space and learning. It is always valuable to me as an adult to have such reminders that there is so much more to life than the narrow pathways we sometimes find ourselves strolling down.'

Jaimee-Louise has experienced all five Great Lessons. 'My favourite Great Lesson is the story of writing and communication because it is amazing to think what it would be like if we could not communicate or talk to each other. Our teacher asked us to arrange ourselves without speaking or using our hands to sit in an order of how many foreign countries we've visited. We managed to do it by stomping with our feet the number of countries and the other person would stomp back.'

Brent concludes, 'I would encourage other parents to share in one of the Great Lessons. It's quite neat to see what Montessori kids are learning, what they're being exposed to and it also gives you the opportunity to question/assess what you know or don't know about the Universe... as nobody has the complete picture. It might just inspire you to find out a bit more or just reflect on how amazing

it is to be part of the world today!

Through cosmic education children gain a sense of gratitude for the life that has come before us and a sense of openness to all possibilities by understanding that the universe and the earth itself is a living, changing entity. This understanding can bring a more hopeful and meaningful perspective to their lives.

'Human consciousness comes into the world as a flaming ball of imagination. Everything invented by man, physical or mental is the fruit of someone's imagination.' Dr Maria Montessori To Educate the Human Potential.



Great Lesson 1 Coming of the Universe and Earth Story: The story of the beginning of the Universe and the Earth's origins.

Leads to the study of astronomy (the solar system, stars, galaxies, comets, constellations), meteorology (wind, currents, weather, erosion, water cycle, glaciers), physics (magnetism, electricity, gravity, energy, light, sound, heat, friction, motion), chemistry (reactions, elements, atoms, periodic table, compounds, molecules, chemical formulas, equations, experimentation), geology (rocks, minerals, land forms, volcanoes, earthquakes, plate tectonics, eras of the earth), geography (maps, globes, latitude/longitude, climates, land/water forms).

Great Lesson 2 The Origin of Life on Earth: the origins of life on Earth from simple single-celled organisms to plants and animals.

Leads to the study of biology (cells, five kingdoms, dissection, use of microscope), botany (classification, plant kingdoms, families and species, plant functions, parts of plants), habitats (food chains/webs, symbiosis, adaptation, ecosystems, conservation), ancient life (eras of the earth, evolution, extinction, fossil records), animals (classification, animals kingdoms, families and species, adaptation and ecosystems), monera, protista, and fungi (what they are, classification, observation).

Great Lesson 3 The Coming of Human Beings: the story of the origin of humans and development of human civilisations.

Leads to the study of history (timelines, prehistory, ancient civilisations, world history, history of specific countries and continents), human culture (art, music, composers, dance, drama, architecture, philosophy, religion), social studies (current events, government, economics, commerce, mediation, peacemaking, volunteering), discovery and invention (scientists, inventors, scientific method, inventions).

Great Lesson 4 The Story of Language: the story of the development of the written alphabet including the study of pictographs, hieroglyphs, early alphabets, and the invention of the printing press.

Leads to the study of: reading (literature, poetry, non-fiction, myths and folk tales, authors, reading comprehension and analysis), writing (elements of style, function, voice, composition, letter writing, research, study skill), language (origins of spoken language, foreign languages, history of languages, speech, drama), structure (grammar, punctuation, sentence analysis, word study, figures of speech).

Great Lesson 5 The Story of Numbers: the story of the history of symbols, the magic of numbers, the use of geometry, different numbering systems used by humans and the modern decimal system.

Leads to the study of mathematics (operations, fractions, decimals, multiples, squares, cubes, percentages, ratio, probability, algebra), numbers (origins of numbers and systems, bases, types of numbers, scientific notation, mathematicians), geometry (congruency, similarity, nomenclature of lines, angles, shapes, solids, measurement, discovery of theorems), mathematical application (story problems, measurement, estimation, graphs, patterning, rounding, money concepts).