Bioscience Ethics Education Curriculum for Pre-Schoolers to Elementary Age Children

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Chapter 1: **Introduction**

Background

Human ethical thinking about the relationships between Nature, science, medicine and ethics began long before their written record. Accrued insights on topics such as truth, justice, freedom, mercy and compassion, have paved the way for the development of science-based understanding in surprisingly modern terms. For instance; the core of the Hippocratic tradition (the ethical standard for physicians effectively unchanged over two thousand years) primarily declares "*do no harm*". Hippocrates understood that embedded within the physician's healing powers; there is also the capacity to harm. In several versions of the Hippocratic Oath, it is clear that there are two ways to do harm: errors of commission and errors of omission. A physician can harm a patient with what he knows; but even more so, with what he does not. Categorically, education (Latin: *educatio* "rearing" or "bringing up") has always been central to human life. Systematic instruction, usually of the young, provides people with the knowledge, skills and wisdom necessary for them to become active members of society. In its widest sense education include life-long processes of development and maturation, but is more commonly restricted to those influences brought to bear on children, adolescents and young adults preparing for the workforce. In ancient times the Greeks were one of the first civilizations to provide schooling and organized instruction (education). Jewish education also developed early, following along the line of Old Testament injunctions regarding the training of children, and the Arab world too was very scholarly. The 12th Century saw the rapid development of learning in Europe during the Renaissance, heavily indebted to both Arabic and Hebrew scholarship. With the rise of Christianity, schools were instructing this religious doctrine as well as subjects such as the liberal arts, grammar, logic, arithmetic and music. It is now generally recognized that the state has a duty to provide education for all its citizens, for example, the United Nations Development Programme's Human Development Index[1] uses adult literacy and education enrolment as two of its four measures used to rank countries into its global development network. Consequently, most of the technologically developed world has good literacy and compulsory schooling for children.

Moving to modern times, the complexity of controversial ethical issues emerging from new possibilities brought about by advances in science, and its technological applications, has created an urgent need to accelerate the

[1] https://en.wikipedia.org/wiki/Human_Development_Index

knowledge bridge from the laboratory to the general community at large. Importantly, to adequately respond to the challenges that our technologically-based existence has created, a deeper understanding of biological systems is essential. This requisite is universally acknowledged and workable frameworks incorporating new bioethical elements into existing educational programs are gradually being worked into university education curriculae. Unfortunately, the majority of tertiary courses are specialized with limited breadth of choice within a career stream. This may not be preparing us for the integrated and adaptive thinking required to identify and address global environmental and bioethical problems at a trans-disciplinary level.

Critically under-resourced is a syllabus earmarked for teachers and parents relating to the normal development of consciousness revealing ethical mindfulness in young children during their early and pre-school years. This calls for dynamically communicating by actively involving children in learning about current global socio-technological issues because, ultimately, science-based change will impact the younger generations most powerfully. Each child carries its own history and set of values gained from its earliest life experiences and, certainly, there have been commendable developments internationally that include topical issues in science and ethics in their early education syllabus. However, more needs to be done. Teachers and students need more guidance when negotiating tomorrow's increasingly complex and potentially risky socio-environmental decision-making processes. By broadening the available resources for early learning, the present education program will promote additional understanding of growth and development in early childhood. To this effect the present project is a neutral platform where stakeholders with diverse backgrounds may get together to incorporate updated science-based understanding and create adaptive knowledge adjustments.

Essentially the most important aspect of the present bioscience ethics program is to assist young schoolers to recognize evolving ethical topics and acquire unbiased effective means of conversing about them with others.

Bioscience Ethics

As noted above a deeper understanding of biological systems is essential to adequately respond to the challenges that our technologically-based existence has created. To this end, the new transdisciplinary field dubbed 'bioscience ethics' provides unique opportunities for advancing biological understanding within the scaffolding of ethics. In essence, bioscience ethics[2] facilitates free and accurate information transfer from applied science to applied bioethics. Its major elements are increased understanding of biological systems, responsible use of technology, and curtailment of ethnocentric debates to be more in tune

[2] Student text: I. Pollard, Bioscience Ethics, Cambridge: Cambridge University Press 2009.

with new scientific and environmental insights. The fundamental feature of this discipline is its breadth. This is important because bioscience ethics interweaves many diverse subjects in the process of gathering specialist scientific knowledge for bioethical review. For example, a fresh alternative fitness-enhancing survival model could be to expand beyond bioethics' existing framework governing the traditional strictly delineated guidelines of human and animal bioethics, and include responsibility for sustaining the life support structures existing within ecological systems. In essence, transcend the restrictive anthropocentric in favour for the unrestrictive biocentric. This simple example demonstrates that integrating science into the teaching and practice of ethics is important because science plays a crucial role in the learning of ethical behaviour. In the final analysis science is the product of human activity, and as such it inevitably involves a wide variety of value-laden choices and judgements, many of which have ethical dimensions. For example, are we ethically justified in committing a large fraction of the federal research budget to fossil fuel and nuclear energy investigations as opposed to those involving renewable energy resourcing, or should we be concerned about premature publicity regarding research outcomes that have not yet been fully accepted as valid by the scientific community? In brief, scientists, because of their special knowledge and because of the support they demand from society, have a social obligation to apply themselves with the uses that society creates from science-based technologies and to assist the lay public to make informed choices about the applications of science. Underestimating such critical aspects of learning must, inevitably, diminish a scholar's comprehension of the true nature of science and of ethics.

Learning Objectives for Teaching Bioscience Ethics

1) Stimulate the scientific imagination and resourcefulness quiescent in the young.
2) Aid children to spot ethical issues.
3) Assist in communicating key bioscience ethical thoughts and perceptions.
4) Stimulate a sense of identity and connection.
5) Praise young schoolers when they effectively respond to ethical variances and discrepancies.

The present project reinforces conventional learning and broadens it by opportune inclusion of bioscience ethical topics that efficiently highlight specific objectives as listed above. The major goal is to stimulate interest and interactive communication. The activities presented in the 'Learning Exercises' are primarily designed for the early childhood years up to 5 years of age to elementary-age children up to approximately 10 years of age. The accompanying text explores the evolution of ethical consciousness, future possibilities and recommended reworking of ethical boundaries that enhance mature decision–making in harmony with changing technology. However,

whilst taking into account the wide range of existing social and group playoffs flexibility must be maintained. Flexibility is essential to make adjustments in sync with the particular requirements of the group; such as period of childhood development, or other need. The most appropriate game adjustment is up to the teacher to decide.

Chapter 2: **The Biology of Behaviour and Cognition**

A strong operational education system is integral to individual success, social cohesion and national prosperity; however, modern educators have to be increasingly conversant with a wide diversity of learners in order to prepare future citizens with the sophisticated skills needed to participate in our expanding knowledge-based global society. The kind of training needed to develop the ability to think critically, be creative, solve complex problems and master complex subject matter, is much more demanding than that needed to impart routine skills. Good teachers empower their students by their ability to skilfully utilize a range of teaching approaches to cater for the diverse learning needs of every schooler. Internationally, a growing body of research confirms teacher quality as one of the most important factors influencing scholarly achievements. Significantly, learning needs to be dynamic and rewarding where good educators provide the necessary rich, interesting and well-structured learning experiences.

The following recollections are enlightening childhood memories of 'My Favourite Teacher' program [3].

"*I can't remember in terms of maths, English or spelling what my teacher taught me, but I remember what she taught me about being a good human being. She demonstrated by example a moral code. Of decent values — to do to others as you would have them do to you. This memory of her teaching stays with me vividly still.*"

"*What I remember most is how excited my teacher was by his subject, so in love with it, that my moderate capacities in the subject didn't really matter.*"

"*You did not feel in any way that common experience that most of us have in childhood, that there is a line between the adult and the child – a separation defining rank.*"

"*And at that crucial time in your life when an adult's interest can really make a difference, my teacher was genuinely interested in us. So thank you, teacher. I'm still not great at maths but you bought me a lot of joy, and that's nothing to be sniffed at.*"

[3] All in the Mind – ABC Radio National (Australian Broadcasting Cooperation) wants to know who your favourite teacher was, and why.
Published: 23 June 2014 (*www.abc.net.au/radionational/programs/lifematters/6954196*).

"*He had a good sense of humour and a strong social conscience, but the main thing I remember about my favourite teacher was that he was a great adventurer. And much more as anyone else, he helped instil in me a curiosity for the outside world, and a love of travel.*"
"*My teacher had given me the gift of self-believing in my logical-thinking ability*."
"*My high school physics teacher left a lasting impression in my life. He gave me self-confidence by particularly calling me to answer his questions in class, and giving me attentive encouragement.*"

As can be seen from the recollections of childhood memories above, good education shapes both the academic and emotional identities of students, and teachers have a key role to play. Effective education is influential in connecting individuals, cultures and communities across borders and, if successful, plays a critical role in raising awareness of global issues that impact society. Never before have we had so many opportunities to connect and communicate with different cultures and languages, both inside and outside Australia. Societies all over the world have increasingly become multiculturally enriched by Indigenous knowledge, and the aspirations of migrants, transnationals and displaced peoples. The caring component in the present syllabus is that education in the classroom will not shy away from potentially controversial issues deep-rooted in, for instance, colour and ethnicity[4]. To-day increasing numbers of adoptions are transracial – where the child and the adopting family are from different cultures, races or countries. Group difference can be enriching through honest interchange of feelings explored by means of discussion and game plays. By learning to think through the give-and-take of reasoned arguments, children will learn to consider other's points of view and be respectful in dealing with difference and variance.

The learning exercises described throughout the text intend to stimulate pleasure whilst imparting knowledge and skills valuable for early bioscience ethics education. All learning exercises can be conveniently adapted to different levels of difficulty depending on the youngsters' age, capability or choice.

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[4] Armstrong. S. & Slaytor. B. (ed). *Amara*. In: The Colour of Difference – Journeys in Transracial Adoption. Sydney: Federation Press 2001; 27-32.

Learning Exercise 1
Title: Misunderstanding of Heredity

Teacher Background

Many social customs, viewpoints, judgments, behaviours and the like are formed by cultural influences and not through genetics, yet misunderstanding of heredity pursues us to this day. In the 19th and early 20th Centuries, for example, the general public believed that difference in class, wealth and gender roles were inherited biologically so an aristocrat or nobleman would feel justified in considering all of his privileges as 'birthrights' sanctioned not only by law but also by biology. However, from all perspectives we are the unique and unpredictable combination of our genes, our environment and our culture. And, if we are going to build a shield against destructive prejudice, we need to dig out ignorance and create flexible ways of understanding our place within the framework of actuality.

The Game

The children are invited to line up in a U-shaped continuum reflecting the progression of a discernible trait as selected; height, hair colouring, skin tone or other depending on choice or availability (see sketch below). This arrangement will quickly reflect a continuum of variance with near neighbours being most similar stationed centrally with the most dissimilar progressively moving towards the extreme ends of the line's continuum. The game is best repeated a number of times using different characteristics – including ideas and feelings – thus building a variety of continuums that compel partakers to move to appropriate new positions. This simple exercise stimulates awareness and valuable exchange of ideas. As noted in the figure, certain individuals at opposite ends of the U-shaped continuum for one trait (for example height) may end-up close to each other when a different characteristic is selected.

U-Shaped Continuum of Variance

Discussion

Emotions that we notice in others can carry a wide variety of meanings so an initial step in understanding may be to invite the game participants to express

their own impressions and points of view as they perceived them which may also include interpreting nonverbal signals; such as body language and facial expressions. Useful questions are 'How did you feel when ….?' 'Is it okay to fit in different places in the continuum?' 'Is it really important to be in a certain place in the continuum to be considered "best friends"?' and so on.

Follow-up discussion may ask 'where certain physical characteristics; such as eye colour, height, skin colour, may come from'.

Learning Exercise 2
Title: Different and Similar

Teacher Background

Equality before the law, freedom of speech and movement, and the right to vote are principles that most of us take for granted but they do not always apply in practise. For example, poverty, ignorance and exclusion violate the right of having a measure of control over one's personal environment. Therefore, notice must be taken about the urgent need for a functioning inclusive constitution that enshrines the right to a healthy environment and local legislation to ensure it. What in its broadest sense does a 'healthy environment' mean?

1) Clean air.
2) Clean water.
3) Clean soil and food.
4) Resources that provide all an equal share in the environmental opportunities for healthy growth and development.
5) Biodiversity which by providing biological stability is the source of these critical environmental prerequisites as identified.

The big question is do we know enough to manage our planet? While adults 'play' with this question, the pre-schooler can learn about science's power over our individual lives. Science is about discovering the world, finding patterns and wondering 'why'. Simple imaginative play sessions are an ideal way to provide early learners a safe, exciting and wonder-filled environment in which to explore, discover and be young scientists.

The Game

Schoolers will discover what dissolves in water. Take three matching glasses of room-temperature water and place them side by side; then add table salt to one glass, sugar to another and vegetable oil to the last one. Invite volunteers to mix each glass and see what happens to the things that were added to the water. Students are then invited to taste the salt and sugar water. Even though the salt or the sugar cannot be seen they are still in the water. What

about the water with the oil? Explain that water and oil are two substances that are immiscible – a term that describes when two or more liquids will not mix together to form a homogenous combination. These observations could well lead to a discussion about the many ways that the individuals within the group of 'young scientists' are different and/or similar from one another. Encourage the children to detect their differences and similarities over a wide range of physical, emotional and social characteristics because, in the final analysis, we need to accept, and tolerate, natural diversity which makes us stronger, more interesting and better able to adapt to change. For younger children two glasses – table salt or sugar – may be more suitable.

Discussion

Refer back to human difference and its reputed significance. It may be helpful to, for example, compare two glasses of water – one clear the other coloured by means of a drop of food colouring. Note that the two solutions look different but taste the same.

A Guide to Developmental Milestones

It is important to understand how children take in stimuli from the environment and use it to grow. Developmental milestones are abilities that most children are able to perform by a certain age. Basic categories are as follows:

Physical milestones involve both large-motor skills and fine-motor skills. The large-motor skills are usually the first to develop and include sitting up, standing, crawling and walking. Fine-motor skills involve precise movements such as grasping a spoon, holding a crayon, drawing shapes and picking up small objects.

Cognitive milestones are centred on a child's ability to think, learn and solve problems. For example, learning how to respond to facial expressions or learning to recognize basic shapes.

Social and emotional milestones are centred on youngsters gaining an understanding of their own emotions and the emotions of others. These milestones also involve learning how to interact and play with others.

Communication milestones involve both language and nonverbal communication. For example, a one-year old becoming adept at using words while and a five-year old learning some of the basic rules of grammar.

At times, however, children without any cognitive or physical problems at birth may not reach certain developmental milestones during the stage or time period they are considered most receptive. The cause may be injury, illness, caregiver neglect or even abuse, or other such as shortage of food or medical care making it difficult for the child to accomplish all the basic requirements it

needs to gain certain predictable abilities at certain expected times. When this occurs affected children will generally have a harder time gaining developmental milestones and may require special attention and resources designed to help them to compensate for their loss. It is important to note that developmental milestones are guidelines only as each child is unique. .

Learning Exercise 3
Title: Cooperative Games with a Ball

Teacher Background

An understanding of child development is essential because it allows adults to fully appreciate the mix of cognitive, emotional, physical, social and educational growth that children have to negotiate from birth onward. An integral part of this developmental process is play. When a child engages in play, whether it's rolling a ball back and forth with a sibling or friend or dressing up imagining a particular scenario, the child is developing important social skills like learning to take turns, how to cooperate and getting along with others as well as focusing on creativity and imagination. The mix of all these experiences helps children to understand the world around them. Depending on age, mood and social setting, there are several different types of play that a child can be involve in. Parallel play can be observed when two children are having fun playing side by side in their own world. Despite having little social contact, children who parallel play actually learn quite a bit from one another like, for instance, taking turns or mimicking each other's actions. Parallel play is an important bridge to the later stages of play. Associative play is considerably different from parallel play. Associative play also features children playing separately from one another but they are involved with what each are doing like, for example, creating a city with blocks. As they build their individual buildings, they are talking to one another, and engaging each other. Associative play is an important stage of play because it helps the participants to develop a variety of important skills; such as socialization, problem solving, cooperation and language development. Through associative play children begin to make real friendships. Lastly, cooperative play is where all the stages come together and children accurately start playing together. Common in older pre-schoolers (or in younger pre-schoolers who have older siblings or have been around), cooperative play brings together all of the social skills the child has been working on and places them into action. Whether they are building a puzzle together, playing a board game, playing indoors or outdoors with a group, cooperative play really sets the developmental stage for future interactions as the child matures into an adult.

The Game[5]

Depending on the size and what it is made of, ball games can be played indoors or outdoors whilst at all times facilitating the development of gross and fine motor skills, stimulating creativity and supporting cooperative team behaviour. By mixing and matching some of the ideas listed below, it should be possible to create fresh combinations of fun activities that are particularly suitable for pre-schoolers. Since movement provides overall strength, flexibility and coordination, it is also important to note that gymnastic activities programs for pre-schoolers and kindergarteners are essential – especially if combined with other sports (such as ball games) and a healthy dose of fun.

1) Roll It: Any type of ball will do but if played with a younger child it is a good idea to consider using a ball made with soft materials and comfortable for clutching. The game starts by sitting on the ground facing each other while positioning the legs open in front so they create a corral for the ball. Commence by rolling the ball back and forth and note increasing skill as revealed in the game; for example, catching the ball before rolling it back, or bouncing it back, or clapping before catching the ball. Numerous other possibilities can be developed like naming the person you are rolling it to.

2) Keep it Up: A beach ball works best for this game where the object is to keep the ball in the air for as long as possible. As this game creates enthusiastic elbowing, it's a good idea to set distinct boundaries of where the game is to be played. Another variation is to deflate the beach ball slightly and then have your pre-schooler count how long it takes the ball to fall to the ground. Blown up or deflated – will the ball fall faster or slower? Balls of different weights may also serve the purpose.

3) Colour It: This game needs a spare beach ball or a ball in need of an artist's touch and some markers or paint to decorate it. Other 'balls' like beach pebbles or appealing small rocks also serve well – especially rewarding if the stones are collected by the young artist before embellishment (see Figure 1).

4) Bowling: Set up ten (or any other number) of an item like empty water bottles, blocks or whatever and position the pre-schoolers some distance away from the markers. Coach them to roll a ball at the markers. How many can be knocked down? What happens if the ball is rolled faster? What happens if the position of the "pins" is changed? What, if any, effect do different ball weights have?

[5] http://preschoolers.about.com/od/activeplay/a/Fun-Ball-Games-For-Preschoolers.htm

For the following suggestions plenty of space is required and that everyone understands the rules of the game before they start.

5) Follow Directions: While younger pre-schoolers will likely have trouble with a formal game of kickball, it is possible to construct a fun game that is similar. In this simpler version, the teacher is positioned on the "pitcher's mound" some distance from a particular child and rolls a playground-type ball forwards while calling out a directive such as ‘jump over it’, ‘kick it’, ‘roll it back’, and so forth. Once the pre-schooler has done what was instructed he/she runs to first base.

6) Keep it Up (Foot Style): Play is as described above, but the challenge is to keep the ball in the air as long as possible by using only the feet.

7) Towel Toss: The aim of this game is to use beach towels to throw and catch a lightweight ball between players. Young ones will have difficulty at first but once learned will definitely become engaged. Another enjoyable approach is to use a parachute with the children tossing it about from its outer edges (see photo below).

8) Say it: Everybody is positioned in a circle (or in the case of a pair, across from one another). Each participant will take turns calling out a category; like colours, flowers, animals, vegetables, place names, whatever but before the ball is tossed, the thrower must designation something from the category as named. For example – call ‘animal’ response ‘possum’.

9) Keep Away or Monkey in the Middle: Good for three or more participants. The point of the play is to simply keep the ball away from one player by either throwing (or rolling) the ball to someone else or running with it. Care needs to be taken that little children are not stuck being "it" for too long a time.

10) Through the Hoop: Either lie a hula hoop on the ground and encourage the pre-schooler to bounce a ball into it or have one participant hold the hoop up and have others toss the ball through. Judge how far away one can stand from the hoop and still make a goal.

Discussion

Discuss how ball games promote bonding, or demonstrate fair play, or highlight different physical abilities and how the game may progress even if the players do not have a common language.

Now may also be a good opportunity to initiate discussion about the importance of emotional intelligence (EI) when at play. Emotional intelligence refers to the ability to perceive, control and appropriately evaluate environmental circumstances. Or, in more academic terms, EI identifies the process of interpreting different sources of information and the ability to connect thoughts, feelings, points of view and appropriate behaviour.

Figure 1: ‘Her precious beach pebble’ – embellished by a 4-year old artist.

Sensitive Periods in Child Development

In teaching human biology, the traditional approach to growth and development has been to address all kinds of physical changes in the body, from conception to death. Emotion, on the other hand, is a concept that has been largely ignored because it has to deal with feelings that are highly individual and which defy any attempt at objective biological definition. To understand how children move between developmental milestones it is important to understand how children take in stimuli from the environment and use them to grow. Many nurturing programs are based on the fact that the most important years of a child's brain development and learning patterns occur from infancy to age five. This insight is supported by research which has shown that babies and toddlers' brains are more flexible with regard to learning to understand and use language than are older children's brains. The present bioscience ethics curriculum takes advantage of these early years of opportunity by highlighting fresh insights in the varied methods that pre-schoolers use to move into and out of their lifetime learning and education-collecting experiences. In order to address learning challenges effectively, we need to concentrate on key innate age-related characteristics that facilitate normal learning and memory retention in the young. Conspicuous intrinsic characteristics in young children are:

1) Strong sense of identity.
2) Strong connection with their world and a wish to contribute to it.
3) Strong sense of innate wellbeing.
4) Rich imagination.
5) Confident and involved learners.
6) Effective communicators.

A commendable strategy to maximize the developing intrinsic characteristics as listed above is to facilitate the development of sensitive and effective communications skills.

Learning Exercise 4

Title: Perspectives on Story Telling

Teacher Background

"Tell me and I forget,
Teach me and I learn,
Involve me and I remember"
(Attributed to Confucius)

Developing thinking skills and practices will enable the young learner to work multiple perspectives that form the basics of a rounded education. Adults, for thousands of years, have told stories to entertain and to teach their children about culture, values and norms. Listening to stories excites the child's imagination and stimulates curiosity that provides valuable information. Stories

help turn abstract ideas into understanding because storytelling engages with characters and narratives to make links between the child's own experiences and those of others – all valued insights into different ways of perceiving the world's operational order (see Chapter 3).

The Game

Young scholars may be challenged to re-tell a well-known story from a different perspective. For example, *Little Red Riding Hood* (by the brothers Grimm) re-worked from the perspective of the 'kind' wolf or Marcus Pfister in *Milo and the Magical Stones* posing both positive and negative ends to the story. By reworking possible story conclusions it becomes imaginable to re-work a happy or a sad ending meaningfully. In this case the theme was all about making wise ecological choices. Another option conducted with humour may involve bringing together disparate ideas or symbols as stimulated by specific parts of the story book. For example, cut up a familiar picture story book into frames and invite the participants to re-order the sequence of the story. In order to make this exercise more difficult and challenging separate frames (or pages) of the story and distribute them among individuals in your group while instructing them not to show their particular frame until the group, as a whole, has completed the order of the rest of the story. Other variants on the theme would be to remove the last picture of the story and ask the schoolers to think of, or draw, a suitable conclusion. Interpreting an issue from differing perspectives encourages a tolerance of difference and stimulates ethical understanding.

Discussion

Discuss with the group whether it was fun to reconstruct a story from differing perspectives or points of view; ask them to retell the story by, for example, stopping their story telling / play-acting to question ways certain characters in their story are evolving. Continue by asking questions like whether ethical thoughts differ by experiencing contradictory challenges. For example, is it possible that mental states signifying gratitude, empathy, greed, envy or environmental indifference alter among those from different backgrounds, cultures or Nations?

Chapter 3: **Normal Developmental Processes: Learning and Growing**

Specific development depends on the unique interactions between genes and environment, but the precise timing of this interplay can be critical. This is because at each phase of development an individual becomes sensitive to particular environmental cues with resulting effects and responses impacting on subsequent stages of development. Put simply, normal developmental processes are the product of genetics and environment working as one complex informational unit where their separate contributions cannot be isolated under normal conditions. Prenatal and postnatal development takes place in an environmental context; that is, the continuum of the individual's changing surroundings and life experiences. Epigenetic (environmental) influences become more evident the older an individual becomes. Age, education, experience, conditioning and disease all shape appearance, thought, emotion and behaviour. However, it is important to note that when working on a specific story that the players will not notice that the game also contains an important message or messages. That is; the story's subtle meaning should sink into the child's sub-conscious to be retrieved when future circumstances require it.

The following age-related indicators highlight and integrate the complex learning developmental processes in children across their early childhood age ranges.

1: Infancy – birth to 3 months of age

From the moment of birth, babies are inundated with sensory experiences that they are eager to explore. Babies watch their parents by roaming their eyes around, they want to move toward the comforting touch of caregivers and they use their mouths to trace and taste just about anything they can get into their mouths. As they grow into toddlers, their abilities to control balance, movement and fine-motor skills become increasingly accomplished. During the first year of a child's life, physical milestones are concentrated on the infant learning to master self-movement, hold objects and hand-to-mouth coordination. Thus to summarize most babies begin to:

- Use rooting, sucking and grasping reflexes.
- Slightly raise the head when they are lying face down.
- Hold head up for a few seconds with support.
- Clench hands into fists.

- Tug and pull on their own hands.
- Repeat body movements.

Learning Exercise 5
Title: Neural Networking – Early Stages

Teacher Background

Almost all neurons (nerve cells) are present at birth but most are not connected into functioning networks. The connecting processes (called synapse formation) are rapid during the first year of life when brain activity resembles closer to adult than newborn by 12 months of age. Areas of greatest cognitive development and growth are sensorimotor (both sensory and motor networks), the visual cortex and later the frontal lobes – also known as the prefrontal cortex. Significantly, time spent at play promotes the expansion of activity zones of the mind and are, therefore, crucial learning tools during these early stages of development.

The Game

Sight, sound, touch, taste, smell – these are the ways babies first learn about the world around them. That is why the best infant toys are usually brightly coloured noisemakers; such as coloured mobiles (musical ones for extra interest) and mirrors which babies love to grasp and hold. Best toys are those that babies can manipulate and explore; such as activity quilts or covers decorated with differing textures and attachments that may even squawk, jingle or rattle when shaken. Later on soft balls to drop and retrieve are excellent learning toys as they begin to teach the infant dexterity and the concept of cause and effect. However, an opportune word of caution here: extra care should be taken to make sure that all soft cloth toys made for children in this age group, and a little older, do not have attachments with sharp edges or points that can be torn off or broken and swallowed.

Discussion

In addition to enjoying the toys described above babies and toddlers also love bathtub games where floating toys initiate much love and delight – especially when all kinds of water play; such as filling, emptying and splashing, is allowable.

2: Infancy – 3 to 6 months of age

Babies begin to develop greater agility and strength. While babies cannot yet talk, this does not mean that they are not communicating. As noted above, early "conversations" rely on sounds, gestures, eye gaze and facial expressions that help set the stage for later language development. From the age of three to six months, most infants are beginning to:

- Imitate simple vowel and consonant sounds.
- Exchange facial expressions with caregivers, such as smiling when a parent smiles.

Facial expressions are among the most universal forms of body language. Reflect for a moment about how much an individual is able to express just by means of facial expressions; for example, a smile may indicate approval or pleasure, while a frown may signal disapproval or sorrow. In many instances, facial expressions reveal our true feelings; for example, while we may say that we are feeling fine, the look on our faces may convey otherwise. Expressions used to convey fear, anger, sadness, empathy and happiness are similar throughout the world as are a variety of other facial expressions tied to particular emotions such as joy, surprise, and despondency.

Learning Exercise 6
Title: Neural Networking Continued

Teacher Background

Maturation of frontal lobe networking continues. The speed and efficiency of movement increases, spatial working improves and emotional regulation becomes stronger. Quality time spent at play promotes networking which grows more sophisticated whilst coordinating the interplay between structure and function and advancing the progress of socio-behavioural characteristics. Importantly, as physiological developmental processes mature social behavioural patterns may well develop in synchrony. Behaviour is subjected to the same evolutionary pressures that drive morpho-physiological traits and are connected with adaptations that attain evolutionary success.

The Game

In basic terms effective play games resemble those described in the previous learning exercise but, as the increasing skills in infancy are growing, more focus on the relationship between brain, behaviour and cognitive learning is advisable. Using ‘happy’ songs or books with different facial expressions; such as happy, sad, angry, excited and so on are useful supports.

Discussion

In order to fully understand brain and behaviour relations over the course of development one must gather converging data from a variety of sources. Morphological and physiological correlates of behaviour are much more easily understood and recorded in the adult than in the infant. It is hoped that this curriculum will serve as a catalyst for further thinking about the substantial gaps in our understanding of the relationship between brain and behaviour across the progressive phases of development.

3: Infancy – 8 to 12 months of age

As infants become more physically and cognitively adept, they are able to explore the world around them in greater depth. Sitting up, crawling, and walking are just a few of the physical milestones that allow infants to gain a greater mental understanding and appreciation of the world around them. As they approach one year of age, most infants are able to:

- Understand the concept of object permanence, the idea that an object continues to exist even though it cannot be seen.
- Imitate gestures and some basic actions.
- Respond with gestures and sounds.
- Like looking at picture books.
- Manipulate objects by turning them over, trying to put one object into another, and so on.

Learning Exercise 7

Title: The Developing Infant Brain: Implications for Cognition, Language and Social behaviour

Teacher Background

Synapse formation continues to expand to reach about 1,000 trillion which is about twice the density of the adult brain (synapse pruning takes place later in development). Remarkably, the toddler's brain is twice as active compared to the adult brain and as motor development continues at a rapid pace, the structurers of the brain that are sensitive to language and social-emotional responses also expand accordingly.

Considerable research effort has been directed in evaluating the importance of the frontal lobes during infancy. This brain region plays a major role in a large number of cognitive tasks and is of particular interest because of its protracted developmental course. The period between 8 and 12 months is crucial in the development of the frontal lobes and is an excellent time at which to conduct studies which examine behaviour and brain function in parallel.

However it is also important not to look at brain zones in isolation but to consider developmental change in the connectivity between zones across the whole brain. Crucially important is to note that brain and behaviour relationships are extremely complex and that behaviour is likely to rely on circuitry dispersed across the whole brain, rather than a distinct circumscribed area. It is, thus, likely that the networks used in developing of a skill will be different from those seen in the mature brain, or indeed at different times in the developing infant brain.

The Game

Action is the name of the game – best those that promote the further development of gross motor skills. Children in this age group delight in running, jumping, climbing and zipping around on 'ride-on' toys such a low tricycle or foot-to-foot vehicles permitting them to reach magic places. Of course, in order to prevent activity mishaps adult supervision needs to be available at all times to assess risk benefits. Low climbing toys, large soft balls and outdoor items like a sandbox or wading pool are also good choices for developing gross motor skills.

Discussion

Targeting toy and other entertaining encounters to the likes and abilities of each child is important as is the degree of assistance or guidance provided. Choice of interactive games, songs and stories that reinforce, for example, eye-hand coordination and understanding of spatial orientation, are main features to consider. One of the most enjoyable of toys are block sets because they epitomize just about the most open-ended, mind-expanding toy model made for children – and adults too, of course! Other creative, tactile and mind pleasing choices are modelling clays, tambourines, xylophones, drums and other simple musical noisemakers.

Again, as noted above, caretakers have to ensure that toys are made of nontoxic materials with no sharp edges, points or small parts that can be removed or broken off and swallowed.

Chapter 4: Normal Developmental Processes: Developmental Milestones in Empathy

Now is an opportune time to update and reinforce learning about empathy. Empathy is about being aware of how others feel, it's about being able to look at a situation from someone else's perspective and being able to regulate one's own emotional reactions accordingly. Although empathy is complex, young children are very capable of developing it (see Chapter 4). A good start would be to communicate using simple 'feeling' words and continue teaching more complex feelings as the child's ability to understand emotions increases. When reading books to your child, for example, just pause and ask the toddler how certain characters in the story are likely to feel. Learning empathy is essential because children need to develop the ability to identify, verbalize and understand their own feelings and those of others (see Learning Exercise 4 'Perspectives on Story Telling' in Chapter 2). A child that does not show remorse or who does not respond to affection by the age of 3 years, may have significant behaviour problems later in life. Research has demonstrated that aggressive and violent behaviour in adults can frequently be traced back to early childhood behavioural problems. Therefore, learning empathy at an early age may be instrumental in preventing possible behavioural difficulties later in life.

Emotions are central to our daily lives and are at the root of disorders such as anxiety, depression, drug abuse and other life-style diseases. Now more than ever before pre-schoolers and kindergarteners have to channel their innate energies to reach developmental milestones in a rapidly changing world. In response, modern educators have to be more knowledgeable with a wide range of learning in order to create future citizens with the sophisticated skills increasingly demanded of them.

1: Early childhood from 1 to 2 years of age

After reaching a year of age, children's physical, social, and cognitive development grows by leaps and bounds. Cognitive theory is concerned with the development of a person's thought processes. It also looks at how these thought processes influence ways we understand and interact with the world. Importantly, children at this age spend a great amount of time observing the actions of adults, so it is vital for parents and caregivers to illustrate applicable behaviour. For many parents encouraging their child's intellectual development is a major educational concern, fortunately however, children are eager to learn right from the beginning. While prescribed education will soon become a big

part of a growing child's life, those earliest years are mostly influenced by close family relationships, particularly those with parents and other caregivers. This means that parents are in a unique position to influence and help shape how their children will learn, think and develop into adults.

It needs to be emphasized that children develop a sense of trust when caregivers provide reliability, care, and affection. A lack of this will lead to anxiety and mistrust.

Most one-year-olds begin to:

- Understand and respond to words.
- Identify objects that are similar.
- Tell the difference between "Me" and "You".
- Imitate the actions and language of adults.
- Can point out familiar objects and people in picture books and their surroundings.
- Learn through playing, exploring, dancing and having fun.

Learning Exercise 8
Title: Looking at Different Images of Feelings

Teacher Background

Understanding and showing empathy is the result of many social-emotional skills that develop in the first years of life. Some especially important milestones include a) establishing a secure, strong, loving relationship with parents and caregivers and b) beginning to use social referencing which implies an ability for the child to begin to look to a parent, or other, to gauge his or her reaction to a particular situation or person (parental response will strongly influence ways the child will respond). Between 18 and 24 months is also the time when the child will develop 'a theory of mind'; that is, when a child first realizes that, just as he or she has, others also have their own thoughts, feelings and ideas which may, or may not, be different from their own. A theory of mind overlaps with the ability to recognize self in a mirror signalling a firm understanding of oneself as a separate person. It's important to realize that examples of strong, respectful relationships and interactions with others will teach children to learn, and emulate, such behaviours.

The Game

Make up games with current and suitable themes that empathize and educate the schoolers by questioning potentially fearful situations like "how does the dog barking make you feel" or that analyse a particular behaviour such as "Nui is feeling sad because you took her toy car – please give it back." This

approach also helps children to learn to empathize with others who are experiencing difficult feelings.

Discussion

Although the best training for empathy begins in infancy, it is never too late to start. Infants and pre-schoolers learn best by how their parents and caregivers treat them when; for example, they are upset, frightened, frustrated or in pain. Behaviour that is close to true empathy becomes evident when a child makes a valid connection between personal private feelings and those of others. For example; a two-year-old sees a friend crying so may offer that friend a toy he's been playing with. By this behaviour the child is giving something that has made him feel good wishing that it may also make the friend feel better. In summary, true empathy is when emotion is associated with the feelings of others.

2: Early childhood from 2 to 3 years of age

At two years of age, children are becoming increasingly independent. Since they are now able to better explore the world, a great deal of learning during this stage is the result of their own experiences. Importantly, children at this stage need to develop a sense of personal control over physical skills and a sense of independence – one reason that they seem to have an endless array of questions about each and everything around them. Parents can also pose their own questions to help their young ones become more creative in solving problems such as Catch-22 brainteasers. By encouraging young children to come up with original solutions, parents and care givers encourage both intellectual development and self-confidence. We all know that success leads to feelings of pride and autonomy while failure results in feelings of doubt and embarrassment.

Most two-year-olds are able to:

- Sort objects by category (animals, flowers, trees, etc.)
- Stack rings on a peg from largest to smallest.
- Imitate more complex adult actions (playing house, pretending to do laundry, etc.)
- Identify by name their own reflection in the mirror.
- Respond to simple directions from parents and caregivers.
- Name objects in a picture book.
- Match objects with their uses.

Learning Exercise 9
Title: Using Action Songs to Promote Learning

Teacher Background

All children need to jump, bounce, skip and hop, and it is not difficult to encourage them to do so! But when children move to music they receive much more than just exercise. They develop their gross motor skills supporting developing coordination, balance, concentration and cognitive abilities (see section on *Sound, Music and Empathy*). Children love action songs especially when they encourage imaginative and hilarious creative movements (note figure below). Action songs promote healthy group activities and fill-in those bad weather days when children cannot go outside to play.

When children take a moment to sing, dance, move, and laugh, they can return to their other activities feeling happy, energized and renewed. More and more schools are realizing the significant values of 'brain break' exercises in the classroom. However, brain breaks are also perfect for pre-school, kindergarten and elementary children.

The Game

Action songs provide the opportunity to supply the child's daily requirements of love and parental engagement. Taken all together dancing, singing and having fun are the social and emotional nutrients that embed love and attachment in a child's life which then become the grounding foundations supporting all future relationships.

The following are two pleasure promoting 'Action Songs' created as a resource for fun as well as providing educational materials related to health, science, and the environment we live in (website access provides accompanying music).

The Ants Go Marching[6]

The ants go marching one by one, hurrah, hurrah
The ants go marching one by one, hurrah, hurrah
The ants go marching one by one,
The little one stops to suck his thumb
And they all go marching down to the ground
To get out of the rain, BOOM! BOOM! BOOM!
The ants go marching two by two, hurrah, hurrah
The ants go marching two by two, hurrah, hurrah
The ants go marching two by two,
The little one stops to tie his shoe
And they all go marching down to the ground
To get out of the rain, BOOM! BOOM! BOOM!
The ants go marching three by three, hurrah, hurrah

[6] www.theteachersguide.com

The ants go marching three by three, hurrah, hurrah
The ants go marching three by three,
The little one stops to climb a tree
And they all go marching down to the ground
To get out of the rain, BOOM! BOOM! BOOM!
The ants go marching four by four, hurrah, hurrah
The ants go marching four by four, hurrah, hurrah
The ants go marching four by four,
The little one stops to shut the door
And they all go marching down to the ground
To get out of the rain, BOOM! BOOM! BOOM – and so on!

And the Green Grass Grew All Around[7]

Words by William Jerome | Melody by Harry Von Tilzer
There was a hole in the middle of the ground
The prettiest hole that you ever did see.
Well, the hole in the ground
And the green grass grew all around and around
And the green grass grew all around.
And in this hole there was a root
The prettiest root that you ever did see
Well the root in the hole
And the hole in the ground
And the green grass grew all around and around
And the green grass grew all around.
And on this root there was a tree
The prettiest tree that you ever did see
Well the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around and around
And the green grass grew all around.
And on this tree there was a branch
The prettiest branch that you ever did see
Well the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around and around
And the green grass grew all around.
And on this branch there was twig
The prettiest twig that you ever did see
Well the twig on the branch
And the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground

[7] http://kids.niehs.nih.gov/games/songs/childrens/green-grass-grew/index.htm

And the green grass grew all around and around
And the green grass grew all around.
And on this twig there was a nest
The prettiest nest that you ever did see
Well the nest on the twig
And the twig on the branch
And the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around and around
And the green grass grew all around.
And in this nest there was an egg
The prettiest egg that you ever did see
Well the egg in the nest
And the nest on the twig
And the twig on the branch
And the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around and around
And the green grass grew all around.
And in this egg there was a **bird**
The prettiest bird that you ever did see
Well the bird on the egg
And the egg in the nest
And the nest on the twig
And the twig on the branch
And the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around and around
And the green grass grew all around.
And on this bird there was a wing
The prettiest wing that you ever did see
Well the wing on the bird
And the bird on the egg
And the egg in the nest
And the nest on the twig
And the twig on the branch
And the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around and around
And the green grass grew all around**.**
And on this wing, there was a feather
The prettiest feather that you ever did see

Well the feather on the wing
And the wing on the bird
And the bird on the egg
And the egg in the nest
And the nest on the twig
And the twig on the branch
And the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around and around
And the green grass grew all around.

Discussion

Children's health and wellbeing are influenced by interactions between environmental and genetic factors. Meaningful discussion can swiftly follow inspiration gained from any number of song lines that match individual ideas and interests of the participating children. New ideas could also be generated by mix-n-match aspects from the two differing Action Songs. For example; water pollution and possible health effects on wildlife.

http://www.songsforteaching.com/movement.htm

3: Preschool 3 to 4 years of age

Children become increasingly capable of analyzing the world around them in more complex ways. As they observe things, they begin to sort and categorize them into different groupings, often referred to as schemas. A schema is a cognitive framework or concept that helps organize and interpret information. Importantly children need to assert a measure of control and power over their environment which helps them to streamline interpreting the vast amount of information available there. Success in this stage leads to a sense of purpose; subjected to too much controlling force leads to experiencing disapproval resulting in feelings of failure. Since children are becoming much more active in the learning process, they also begin to pose questions about the world around them. "Why?" becomes a very common question around this age. However it needs to be noted that over reliance to schemas can also make it difficult to accept new information which does not conform to previously established ideas about the world.

Now may also be an opportune time to ask the children if they have heard of the ***Golden Rule***: "Do to others as you would want them to do to you, or don't do to others what you would not want them to do to you?" Helpful discussion themes may revolve around bullying. For example; ask them whether children who bully care about the feelings of others and do they treat others the way they themselves would want to be treated. Alternatively, discuss ways that they would like others to communicate with them so that they might, in turn, commune with others. For example; "*I like to be invited to play, so I will invite someone else to play with me*'. Describe how bullying can lead to feelings of anger, frustration and fear that may result in feelings of wishing to hurt someone or lead to acts of violence in turn.

At the age of three, most kids are able to:

- Demonstrate awareness of the past and present.
- Actively seek answers to questions.
- Learn by observing and listening to instructions.
- Organize objects by size and shape.
- Understand how to group and match objects according to colour.
- Have a longer attention span of around 5 to 15 minutes.
- Asks "why" questions to gain information.
- Learn and practice empathy as demanded by life as lived.

Learning Exercise 10
Title: The Golden Rule

Teacher Background

As documented above empathy is about being aware of how others feel, it is about being able to look at a situation from someone else's perspective and being able to regulate one's own emotional reactions accordingly. The "Golden Rule," or "treating others as you wish to be treated," is the practical understanding and application of empathy as gained through compassion. Learning about the rule's applications remains high priorities in education curriculae although theoretical issues can outweigh common practicalities. However, educators can employ a variety of games, activities and scenarios to clarify how children can learn to respect others.

The Game

A: Draw it

Distribute crayons, markers, scissors, paper and other useful utensils. Before beginning this exercise make certain that the Golden Rule has been explained taking care not to overreach the children's age range and level of understanding. Each student is invited to draw a picture of someone either following or violating the Golden Rule. Drawings can then be shown and explained by the young artist to be followed by general discussion sessions as shaped from contributions made by others in the group. Depending on the individual situation, a number of smaller sub-groups could be organized to debate, in simpler terms, a particular point of view; such as, whether an individual drawing represents an example of someone treating others as they would wish to be treated themselves. This game may seem to be more suitable for older children; however, it's rewarding to perceive the degree of maturity of some four-year-olds when they are challenged by issues of importance to them.

B: Act it

Each child is encouraged to act out differing ways to follow the Golden Rule. For example, the children are invited to think about a possible performance for two different situations. In one scenario, a person does not follow the Golden Rule. In the second scenario, the person follows the Golden Rule. In the first scenario, the actor might get angry when a teacher; for example, unintentionally blames him for being selfish. In the second scenario, the student might react calmly and immediately forgive the teacher for the unintentional accusation. Following examination may involve ways the characters could behave differently to follow the Golden Rule; whether similarities or differences were noticed between solutions involving differing scenarios.

Discussion

Care needs to be taken that the games chosen will support bonding and discourage disclosure of past violations of the Golden Rule. Discussion should centre on characteristics such as kindness, respect, fairness, forgiveness, trust and honesty. These will encourage understanding and thoughtful consideration of others and the environment.

4: Preschool 4 to 5 years

This is the fastest growth period for the frontal lobe networks promoting speed of processing memory and problem solving. As they near school age, children become better at using words, imitating adult actions, counting and other basic activities that are important for school preparedness. They also need to develop a sense of personal identity while, at the same time, coping with new social and academic demands. Success leads to competence and loving relationships with others, failure result in isolation, loneliness and feelings of inferiority.

Most four-year-olds are able to:

- Rhyme.
- Name and identify many colours.
- Draw the shape of a person.
- Count to five.
- Tell where they live.
- Draw pictures that they often name and describe.
- Fill ‘bucket books’ to show children how easy and rewarding it is to express kindness, appreciation and love by filling an invisible bucket.

Learning Exercise 11
Title: Memory Games

Teacher Background

Memory games can provide fun in different ways indoors or outdoors; they generate invaluable childhood recollections whilst promoting application, strength and coordination – cards or kites, take your pick. Learning how to launch and control a kite will help the youngsters develop coordination and critical thinking skills in a memorable practical setting. Card games, on the other hand, provide invaluable memory exercises plus the thrill of success in winning.

The Game

A basic card game may follow any number of rules where the rules can readily be reworked according to the wishes of the players. The following is a simple fun-laden example. To start the game, put all cards face down on the table so that the images are not visible, mix them and align them. The first player reveals two cards if they match, he wins otherwise he hides again. It is then the next player to return two cards and so on ... The aim of the game is to try to memorize the location of different cards and when the player put face up successively two identical cards forming the pair he wins them. When the player wins a pair, he can play again. The game is over when all pairs were found. The player who won the highest number of cards wins the game.

Discussion

Losing is not always fun and games but it can be both mind expanding and useful. We say it's not about winning – it's about having fun and being happy for whoever the winner is. Memory connects with basic skills such as counting numbers, shapes, location and understanding of spatial orientation. Teachers need to explain the connection between losing and emotional competence; that is, exact expression of ones experiences and to manoeuvre future strategies to ones benefit.

How Can Parents Help Children Reach their Cognitive Milestones?

Children are eager to learn right from the very beginning so, while education will become a major part of a growing child's life, the earliest years are hugely influenced by close family relationships – in particular those with parents and other caregivers. This means that parents are in an exceptional position to help shape how their children learn, think and develop. In the home, parents can encourage their children's intellectual abilities by helping them make sense of the world around them. When an infant shows interest in an object, parents can help the child touch and explore the item as well as saying what the object is. For example, when a baby looks intently at a toy like a rattle, the parent might pick it up and place it in the infants hand saying something like "*Do you want the rattle?*" whilst shaking it to demonstrate what it does. As toddlers grow older, parents and caregivers must continue to encourage their children to actively explore the world and honestly try to answer their endless questions about everything. Parents need also to pose their own questions to help their toddler become more creative problem solvers. By asking open-ended questions such as "*What do you think would happen if ...?*" parents stimulate involvement and cooperation. By encouraging children to come up with original solutions to problems, parents can inspire intellectual development and self-confidence. Importantly, children want to do what they see you doing so support them until they can do this independently.

Sharing Communication Skills

Stories help brain function in young children; especially stories of shared experiences which can strengthen the mind and stimulate love and maturity. Children need to be listened to so they must be encouraged and supported by words and body language. In order to maximally develop social and emotional skills, children also need to have the opportunity to play with others, explore their own abilities, and express their feelings. It is also a good practical idea to offer choices so that youngsters can begin to individualize their own preferences – while still maintaining limits, off course. It is also advisable to minimize blame as this induces pessimism and makes toddlers afraid to talk about their own negative feelings. Remember that empathy and understanding has to be shared early in life with parents and others close by (see Learning Exercise 10 The Golden Rule). Young children suck in everything around them and self-esteem is generated when they are told how much they mean to you. It is said that for every negative comment you need five positive comments. Family interactions and games boost a child's self-esteem – note witticism "*Family that plays together stays together*".

Importantly, please note that the present bioscience ethics program is a strong call for active involvement of the child in the discussion and decision making processes. For this to occur, there needs to be more background knowledge provided to parents/educators about the natural sequences and variations of developmental processes exhibited by growing children. Timely learning/teaching initiatives should start early in infancy and be well established by the time pre-school environments are encountered. Targeted early learning will endure throughout the child's subsequent growth and educational experiences. Ideas and strategies useful as teaching tools can come, as required, from wherever – the media, the theatre, dream analysis, in talk-bash radio and from documentaries but most importantly from the children themselves.

Utilities to Assist Playfulness Whilst Promoting Learning Skills[8]

Below is a summary list, organized into categories, of skills that youngsters are expected to learn in pre-school.

Elementary Shapes

1. Identify circles, squares and triangles.
2. Identify squares and rectangles.
3. Identify cubes and pyramids.

Count up to 3, 5 or other

1. Count dots.
2. Count shapes.
3. Count objects.
4. Count frames.
5. Represent numbers.

Comparing or Linking (fewer or more)

1. Compare groups.
2. Compare in a chart.
3. Compare in a mixed group.

Compare Positions

1. Inside and outside.
2. Left and right.
3. Left, middle and right.
4. Above and below.
5. Top and bottom.

Classify

1. Same.
2. Different.
3. Same and different.
4. Classify by colour.
5. Classify and sort by colour.

Size

1. Long and short.
2. Tall and short.
3. Light and heavy.
4. Holds more or less.
5. Compare height, mass and capacity.
6. Wide and narrow.

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[8] https://au.ixl.com/math/preschool

Learning Exercise 12
Title: Connecting by Means of Patch and Brush

Teacher Background

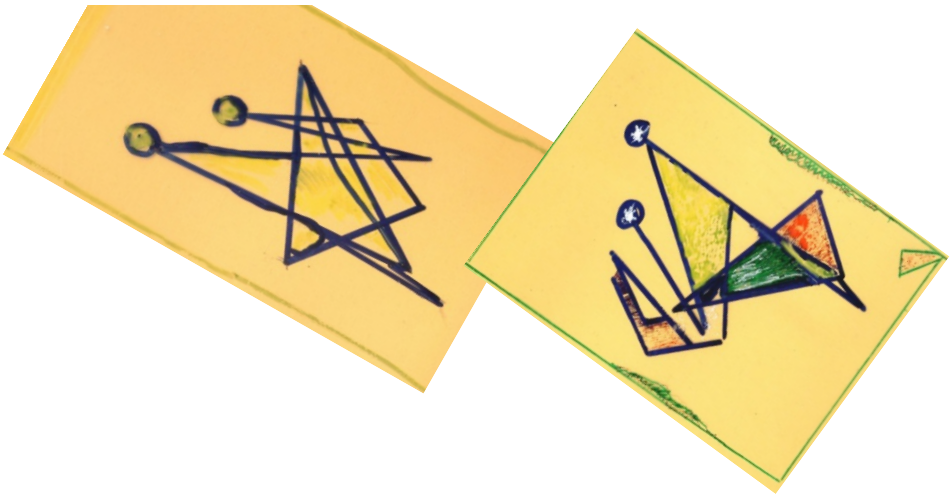
Young schoolers also need to be encouraged to think about happiness both in an individualistic approach, as well as an early stage in normal social development. As described above, significant at this stage is for the child to begin to orientate towards the wellbeing of others – to become aware of ways other people feel, and to recognize global needs by empathizing with strangers or people who live outside their neighbourhoods. These children, as adults, will experience trust, integrity and hope for creating our planet a safer place. In this context education makes a transgenerational difference globally.

The Game

The following activity stimulates communication by sharing individual thoughts and creative skills. What needs to be supplied is a mix of paper, cloth, cardboard, plastic and other available 'waste recyclables' for the pre-schooler to cut up into 'special' shapes and structures. The resulting fragments and shapes are displayed, in various combinations, on the floor creating a simple flexible and growing collage (panel a). Some of these abstract forms can then be re-sorted, recut and re-connected into more thoughtful arrangements and shapes. Differing arrangements and shapes are linked, where judged appropriate, by means of filling shapes with colour and/or connecting with strokes of paint as agreed by group discussion, suggestion and stories (panel b). The final result is a vivid, roughshod assemblage of captivating forms as built from a unique combination of various materials and ideas generated cooperatively by the young artists (see thinkable example below). Importantly, the original "waste" material cut-outs have evolved into a 'once-off' original picture. In addition to fun, this game clearly demonstrates the rule that the sum of an assembly's parts does not necessarily yield the whole since new properties result in a whole that cannot be predicted from the sum properties of its individual parts (see Chapter 5 '*Levels of Structural Organization of Living Things*'). The result is a playful mix of basic science and artistic judgement.

Discussion

Since this game encourages cooperation with friends in diverse situations, to participate stimulates analysis, creativity, debate and learning.



(a) **(b)**

Imagining, Creating, Learning

Children learn best when they use their imagination. Pre-schoolers, in particular, have vivid imaginations that assist in developing their skills – an indispensable ingredient used in learning about themselves and their expanding physical and private worlds. An active inner imagination not only promotes understanding about the present existence but also awakens curiosity about future environments and possibilities. Note the sophisticated thought processes as illustrated in Figure 2 by a youngster contemplating life ahead. The importance of fantasy play in developing the imagination cannot be overestimated – no matter whether play means 'cops and robbers', 'house and home'; or play means paints, crayons, dough, costumes, glue; or being a bird gliding through the sky; or making a mess by any other means – all involve active exploration of new opportunities to grow. Central for the child is having the chance to actively participate and self-create opportunities to develop personal innate skills as opposed to being a passive participant of someone else's stories gained from computers, television or video games.

Many children enjoy playing games that allow them to become different characters. Parents/teachers can develop scenarios that draw on a variety of emotions. For example, a scene might involve a small number of participants playing a game with one other being exclude from joining the group but eager to do so. At the conclusion of the scene as acted out, the participants are asked to describe their different feelings as they developed whilst playing the game. What did it feel like to be each character; what did the outsider feel like when he/she was prevented from joining the game? Or would the participants plan the game differently next time round; or how could they make up for hurting the outsider's feelings? These kinds of situations help children to detect the characteristic signs of differing emotions and how to effectively react to such specific feelings. More advanced developments could be created by asking the

children to come up with a scene depicting an event and emotion as well as a response to that event and emotion.

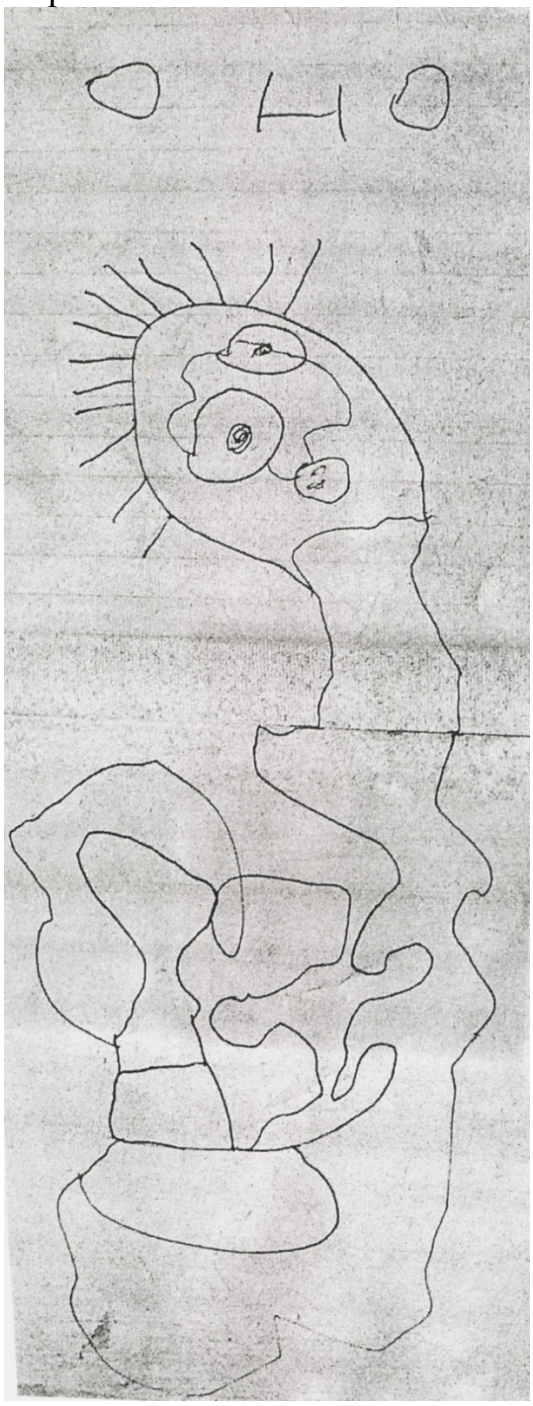


Figure 2: Imaginings of growing up drawn by a 3-year 8 months old pre-schooler

Sound, Music and Empathy

The importance of sound and music should not be underestimated. Human relationships with music begin at birth if not before and play an indispensable role in the formation of our identity. Pregnant women have recurring periods of activity and rest to which the fetus accommodates where the fetal activity patterns closely follow the maternal day / night activities and endocrine rhythms. Maternal environmental factors, such as the circadian rhythms of hormones, uterine contractions and body temperature, are significant in the entrainment of the fetal biological clock. Thus mother and child share rhythms of sleep and wakefulness, eating and socializing. The baby's capacity for social interaction begins to develop in the 3 months before birth. By 28 weeks, the fetus' hearing is much as it will be after birth, and the fetus hears and responds to speech, learning the rhythms before the words. The newborn selects and filters visual and auditory stimuli and can recognize its mother's voice and the voices of those close to her. Instinctive baby care is based on near universal experience, singing to, rocking, swinging, swaddling and holding babies close; these show up in all cultures in various forms. Babies are soothed by singing – the rhythm of singing is probably the way fetuses hear their mothers' voices in utero – and by being held firmly, reflecting the uterus as a tight swaddle with the contractions of pregnancy providing frequent 'hugs'.

New research is providing valuable evidence that music can stimulate empathy although little is known about the underlying psychological processes involved. Empathy (or sometimes referred to as 'compassion') is a fundamental feature of human relations and requires both cognitive and emotional

components that enable a person to recognize the psychological and mental states of others and, importantly, possessing the ability to respond to these with appropriate reactions. Emotion and emotional expression is the preverbal communication system genetically preprogramed but shaped by life's experiences. As reviewed in Chapter 4 '*Normal Developmental Processes*', the newborn from the very first, makes use of emotional signals of joy, sadness, anger and disgust to stimulate the parents to empathize with its basic needs for love and protection. Significantly, attachment and emotional expression between offspring and others go hand in hand with the development of the emotional self. Listening to music likewise is a universal feature of human development and also requires components of cognitive and emotional processing. When we listen and are exposed to music we perceive the emotional and psychological content in music, interpret the thoughts, feelings, and skill of the musicians from auditory and visual cues. Empathy is thus connected with the emotional reactions to music.

Listening to music or playing an instrument is one of the few physiological activities that involve using the whole brain providing benefits for learning, focussing attention and acquiring bodily (athletic) coordination. Music also has the power to enhance some higher brain functions such as stimulating learning by means of finely tuned intellectual (IQ) and emotional (EQ) intelligence quotients. An in-tune intelligence quotient designates the aptitude and skill to perceive and assess the emotions of self, others and groups. It is these characteristics that make music intrinsic to all nations and cultures. Music also helps to reduce depression and provides relief from chronic pain as caused by a typical range of painful conditions such muscle pain, head ache and so on. Pain relief follows the release of endorphins as the brain responds to discomfort; hence, music therapy is increasingly being employed in hospital settings.

Benefits of Music and Learning to Play an Instrument[9]

Dancing to music provides children with healthy movements in a dynamic and fun laden atmosphere. Toddlers to schoolers aged 15 months to 6 years respond strongly to the joy of dancing to music where they may incorporate elements of ballet, jazz ballet, tap and hip hop and other enjoyable activities. Parent and teacher involvement accompanied with extra options such as bright, colourful props, encourage children's imagination and creativity in a nurturing environment. As each child expresses its individual creativity and self-confidence, constructive interaction with others is increased. Central to music listening are recognition, interpretation and feeling which, in turn, drive

[9] http://www.parents.com/kids/development/intellectual/benefits-of-music-lessons/

empathy. In addition, music and dance help the child to fine-tune the ear and enhance skills needed for learning and social interaction. In academic terms, the following lists music's value in assisting children to reach their full genetic potential in reading, writing, mathematical skills, and much more.

1. Music improves academic skills

Music and maths are highly intertwined. By understanding beat, rhythm, and scales, children are learning how to divide, create fractions, and recognize patterns. As pre-schoolers grow older, they'll start reciting songs, calling on their short-term and eventually their long-term memories. Using a cue (mnemonic device) to learn is a method that can later be applied to other memory skills (see '*Learning to Read' in next section*). Learning a musical instrument may also assist young children to understand basic physics. For instance, plucking the strings on a guitar or violin teaches children about harmonic and sympathetic vibrations providing the joy to explore these basic scientific principles.

2. Music develops physical skills

Certain instruments, such as percussion, help children develop coordination and motor skills as they require the co-ordinated movements of the hands, arms, and feet. String and keyboard instruments, like the violin and piano, demand different actions simultaneously from right and left hands. Thus; in addition, musical instruments assist in developing ambidexterity further enhancing coordination and perfecting timing.

3. Music cultivates social skills

Group classes require peer interaction and communication, which encourage teamwork because children must collaborate to create their music. Since the team is working towards a common goal, it is important for individual group members to know and follow their individual part within the larger group.

4. Music refines discipline and patience

Learning an instrument teaches delayed gratification. Playing an instrument teaches the young to persevere through hours, months, and sometimes years of practice before they reach specific goals; such as performing with a band. Group lessons, in which students learn to play the same instruments in an ensemble also improves patience as they must wait for their turn to play individually. While waiting for their turn and listening to their companions play, they learn to show their peers respect, be attentive, sit still and be quiet for nominated periods of time.

5. Music boosts self-esteem

Lessons offer a forum where children can learn to accept and give constructive criticism where the constructive feedback turns into a positive chance boosting the building of self-confidence. Group lessons, in particular, may help young children understand that nobody, including themselves or their peers, is faultless, and that everyone has room for improvement.

6. Music introduces children to other cultures

By learning about and playing a variety of instruments and musical arrangements, younger ones discover how music plays a critical role in other cultures. For instance, bongos and timbales may introduce children to African and Cuban styles of music. Versatile instruments, such as the violin and piano, can accompany a wide repertoire of styles, including the traditional Australian didgeridoo, or yidaki, and clap sticks. The importance to familiarize children with other cultures at a young age cannot be overemphasized since this fosters open-mindedness about difference and traditions beyond their own.

Importantly, all of the above promote departure from a state of self-centeredness while endorsing immersion into the subjective involvement of the group experience. Music is pro-social as it emphasizes the value of comprehending and appreciating the skills of altogether.

Learning Exercise 13
Title: Being Caring and Identifying Feelings

Teacher Background

As frequently restated in this project, one of the most important life skills is empathy; that is, understanding and responding with caring to what others think and feel. Children are less likely to hurt and more likely to help someone if they can imagine themselves in that person's place and can share that person's thoughts, feelings and background.

The Game[10]

Start by questioning and discussing with your schoolers as to what can be done to help others feel better and how can they identify how someone else feels. The answers that are given are very important especially if described together with appropriate facial and overall body language expressions. Likely answers could be making a sad face, not laughing when others laugh, crying,

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[10] *https://specialed.spps.org/uploads/empathy_activities.docx*

not looking at anyone, playing alone and so on. Discussion such as these would lead to 'how can we cheer up children who feel bad and help them to feel better'? Possible answers here could be to pay attention to them, pat them on the back, ask them if they would like to play with you and so on. The use of role-play is a proven first-rate method of helping children to recognize ways an individual who is feeling hurt behaves and how to help that person to feel better. One suggestion would be to divide the group into pairs and then ask one of the pair to pretend that he or she has been browbeaten and feels bad while the other of the pair pretends to be a bystander who tries various ways to make the hurt youngster feel better – then have the pairs switch roles and repeat the activity. For younger children one could pair them of with educators or other adults present.

Discussion

The final discussion with the whole group would be to reinforce how the bystanders could tell that the browbeaten members were feeling and how the bystanders made this person feel better. It also needs to be pointed out how an act of kindness is the opposite of mistreatment because it helps another person to feel good instead of bad; in other words, it gives the child a good feeling rather than taking away a good feeling.

Learning to Read[11]

Learning to read is one of the most important and joyful skills for all children. Traditionally reading starts in the home where much of a child's early learning takes place. Studies show that children who come from homes where reading is prioritised are fortunate compared to their peers. The following lists essential bases that guide sequential accomplishments in achieving reading capabilities.

1. Phonemic awareness: The ability to hear and manipulate the different sounds in words.

Children develop phonemic awareness by learning about simple rhyming sounds, symbols, syllables, words and phonic songs. From the earliest instructions a child will learn to recognise rhyme, match letters and sounds, and listen to how sounds work to make words (see 'Benefits of Music' in previous section).

2. Phonics: Recognising the connection between letters and the sounds they make.

[11] http://www.readingdoctor.com.au/letter-sounds-1-pro/

Phonics is the process of mapping the sounds in words to written letters. This is a very important reading skill that all children require. Children learn how to decode words into sounds and encode sounds into words when they begin to write and spell; which happens whilst enjoying a wide range of activities that feel like games and keep the child interested and engaged as they play. Typically, reading lessons are reinforced with books that are matched to the child's current ability and which encourage them to enjoy the challenge of reading under their own control.

3. Vocabulary: The ability to understand the meaning of words, their definitions, and their context.

Having an ever increasing vocabulary is a fundamental part of academic success. As the number of words a child learns increases the better it will be at reading and understanding the text. As the number of words that the child understands increases the better the child's working vocabulary becomes.

4. Reading Comprehension: Understand the meaning of text – both in story books and information books.

In nonfiction books, readers gain new information, increase their vocabulary and link what they read with other sources of information to deepen their levels of understanding of new topics and concepts. Great readers are involved in the stories they read. They imagine the characters and the adventures they have. They think about what is happening as they share the emotional journey of the book's characters and ponder about personal scenarios for their future selves as cunningly portrayed in 'Bloogs Blowing By' (Figure 3).

5. Fluency: The ability to read aloud with speed, understanding and accuracy.

Fluency is crucial for children as they build their reading skills. Many skills build reading fluency which include good phonic decoding skills, an increasing number of high frequency words recognised at sight, and the amount of time children spend reading books at an appropriate level. The more children read, with speed and accuracy, the better they become at understanding the contents of their reading.

Figure 3: “Bloogs Blowing By” demonstrates innate humour and curiosity as drawn by a five-year 8 months old youth.

Early Learning: Summary

Almost all the neurones constituting the adult human brain are formed prenatally when neurological domains are formed. Subcortical structures controlling motor, sensory and reflex functions emerge first, followed by the development of the centres underlying instinct, emotional response and postural behaviour. These are succeeded by the cortical centres associated with higher functions involving attention, awareness and understanding. Cognition is a collective term for the psychological processes involved in the acquisition, organization and use of knowledge. It includes perception, memory, attention, problem-solving, language, thinking, judging, reappraising and imagery. Memory allows experience to become knowledge. Emotions have an experiential component and play an essential role in growth and development, social relations, and mental or physical wellbeing with the two continuously interacting via the neuroendocrine, immunological and other biological systems.

The capability to express varying emotions appears progressively in the course of infant development, reflecting mainly genetic effects in the early stages, and psychosocial conditioning and environmental factors in later ones. Insufficient emotional and/or an excessive amount of negative stimulation in the early stages of life are likely to result in a higher risk of mental health problems down the track. On the positive side, however, the brain remains functionally plastic throughout the prenatal-neonatal periods and infancy, allowing it to adjust neurophysiologically and, increasingly, to adapt to the prevailing environment. Importantly, the brain's psychological achievements and consequent behavioural repertoire – which gradually characterizes the adult personality, depends largely on the prenatal neurophysiological development and postnatal maturational accomplishments during infancy. In the present context the long-term consequences of brain-targeting effects of parental lifestyle habits should be noted. The role of the early environment in relation to increase risk in adulthood of developing certain chronic diseases of adaptation may now be expanded to include behavioural functions susceptible to environmental manipulation at critical periods in growth and development. In essence, what the brain learns to feel in the early years is important for the future health of the economy and the social wellbeing of its citizens. More than ever before, as we are entering a new technological era, scientific considerations must be embedded in ethics. What can be a stronger argument for universal investment in continuing parenting education?

Chapter 5: **Early Bonding and Social Relations**

"*Human beings are sociable from the very beginning – that is to say, our bodies are biologically organized and ordered for social interaction and communication. Consequently, it is not possible to draw the boundary between the body of nature and the body of cultures with any precision, certainty, and finality*"[12].

Parenting is one of the most responsible tasks that we are ever likely to undertake, yet society takes it for granted that parents intuitively know what to do. Scientific studies into typical interactions between parent and child are, sadly, under-represented in the general literature. This paucity is grave for the reason that the foundation for normal development is set during fetal and early postnatal life; that is, prenatal and postnatal development takes place in an environmental context where the continuum of the individual's changing surroundings and life experiences are realized. As described in Chapter 3, the processes of growth and maturation are the products of genetics and environment working as one complex informational unit where their separate contributions cannot be isolated under normal conditions. Epigenetic (or environmental) influences become more evident the older an individual becomes. Age, education, experience, conditioning and disease all shape appearance, thought, emotion and behaviour. The significance of pregnancy as an experience for the mother must also not be neglected. Normally both the mother and newborn adapt easily because the relationship established during pregnancy continues to develop postnatally.

It is easy to see how social interactions within the family can be influenced by the baby's particular characteristics. Newborns differ in their motor activity, irritability and responsiveness, but they all engage in basic social relations. Soon after birth the infant will recognize the facial and olfactory characteristics of persons mostly in contact with him or her, especially if the most constant attendant is the mother and she is breastfeeding (for the duration of lactation a progenitor molecule of the steroid hormone 4-α-andosterone concentrates in the nipple region and acts as a pheromone assisting in speedy

[12] David, Michael Levin. Meaning of the History of the Body: Toward a Postmodern Medicine. In: 'Consciousness & Healing: Integral approaches to Mind-Body Medicine'. Editors Marilyn Schlitz and Tina Amorok with Marc S. Micozzi. Elsevier Churchill Livingstone, St. Louis, Missouri 2005. Page 93.

mother-infant bonding). A pheromone, usually olfactory, is a chemical substance that is secreted by one individual to stimulate and attract another member of the same species. The mother's breast pheromone triggers head turning towards the nipple which helps to guide the infant to nurse. In addition, the mother's unique odour signature has natural tranquilizer properties that assist in furthering mother-infant attachment. To summarize, evolving socialization skills are aided by the effects of hormones, including pheromones, which provide the offspring with a concept of self as derived from familial circumstances. Mammalian bonding – especially strong in humans – is complex utilizing variables that may reinforce life as experienced in childhood with the quality of potential parental care provided to a next generation.

Experiments demonstrate that non-human primate females reared in a socially-deprived environment risk making poor, aggressive and rejecting mothers. Human bonding which integrates numerous unpredictable variables makes it impossible to draw any possible parallels linking childhood distress and parental care. Put simply, basic needs for food, closeness and sucking comfort should be satisfied and failure to satisfy these simple early needs can lead to distress as the infant does not understand reasons, only needs. Learning depends on the timing of reward and the repetition of the stimulus. Early learning is also linked to conditioning and helps set subsequent behavioural patterns. As a consequence, behaviours relating to crying, sucking, smiling, clinging, eye contact, sound and movement can be seen as early mechanisms fostering attachment. They are also important mechanisms signalling the baby's genuine need for nurturing care.

Characteristically, familial interactions among each other and with the new-born baby form the basis of the infant's subsequent social, emotional and personality development. By the second half of the first year of life, the infant will begin to develop an ethical system based on the world it has previously experienced. Ethical awareness forms a basic part of psychological development ensuring that the infant grows up to be a stable and well-rounded individual. Since the quality of early interpersonal interchanges are so crucial, care needs to be concentrated on peak phases of social development that fluctuate around two and a half and persist until around five years of age (see '*A Guide to Developmental Milestones*' in Chapter 2). These crucial early years also pass the interval when the young child becomes responsive to actions and reactions enacted by groups of individuals in the area. At this time friendships will be shaped when children play together and come up with creative ideas for their co-operative playtime. This is also the appropriate time to introduce the basic ethical principle of consideration for others when interacting cooperatively.

Cooperation is one skill that benefits tremendously from direct experience. Giving your child the opportunity to interact and play with others is one of the best ways to teach your child how to relate to others. While a toddler may find playing with other children frustrating at times (since they typically

lack patience and the ability to share), interaction will gradually improve with age and experience. As children play and interact, they also begin to develop social problem-solving skills. Early attempts might involve conflict and disagreements with siblings and peers, but eventually children learn how to negotiate and compromise with others. Intuition, or the ability to read other's needs and moods, is an especially valuable gift in circumstances when, instead of the mother (or surrogate, or older playmate) anticipating the child's needs, the child has to learn to anticipate the needs of others. To summarise, if a child is to thrive, its simple needs must be respected. These in general, include gentle but unambiguous discipline mixed with gaiety, love and a sense of humour.

Teaching Empathy and Cooperation from the Global Perspective

Parents can enhance empathy and build emotional intelligence by encouraging their children to think about how others feel. An effective way to start is by questioning your child's own feelings, by asking questions such as "How did you feel when your treasured statuette broke?" or "How did that story make you feel?" Reflective questions such as these enable children to express their own emotional reactions and begin asking questions about how others may feel under similar circumstances. "How do you think Lucy felt when you snatched away the toy she was playing with?" By posing genuine questions, children will learn to reflect about how their own actions might impact on the feelings of those around them. Reinforcement not only makes young ones feel good about themselves, it also helps them to understand why certain behaviours are desirable and worthy of praise. Helping youngsters to feel good plays an important role in developing a sense of empathy and emotional competence. By creating a positive climate where children are allowed to share their feelings, children will naturally begin to become more generous and thoughtful. In summary; social competence not only involves the ability to cooperate with peers, it also includes such things as the ability to show empathy, express feelings, and share generously. Happily, there are numerous ways that can assist youngsters to develop these all important socio-emotional skills.

Environmental Ethics

Environmental ethics as a discipline concerns itself with human relationships vis-a-vie the natural environment. Modern environmental ethics only developed into a specific scientific discipline in the 1970s. This development was due to the increasing awareness in the 1960s of the effects that technology, industry, economic expansion and population growth were having on the environment. Increasing awareness at the time was speeded by the publication of two important books; Rachel Carson's *Silent Spring* published in 1962 and Paul Ehrlich's *The Population Bomb* published in 1968. Since then environmental issues; such as pollution, depletion of natural resources, dwindling plant and animal biodiversity, the loss of wilderness, the

degradation of ecosystems, and climate change have all been included within an ever expanding range of bioscientific harms. We, as Global citizens must address the fundamental questions of "what obligations do humans have with respect to the environment" and if any "why". Different answers to these questions have led to the emergence of quite differing environmental ethics. The Kyoto Protocol (adopted in Kyoto, Japan, on 11 December, 1997), for example, could have been regarded as the first real global attempt to deal with the problem of climate change. The Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its Parties by setting internationally binding emission reduction targets. Unfortunately, without the willing participation of all large polluters together with an agreed reduction in greenhouse gas emissions, many regard the protocol a failure.

Learning Exercise 14
Title: Integral Ecology

Teacher Background

Integral ecology means respect for creation where emphasis is on our mutual interconnection with one another and with Nature in all its complexity; which also necessarily includes science and technology. In its simplest form integral ecology demonstrates how inseparable are the bonds uniting concern for Nature with justice for the underprivileged, commitment to society and meaningful peace. As we have already learnt, the quality of a child's environment has a particularly powerful influence on emotional development and young children, in particular, identify with their living surroundings. The wide natural world in its diversity, beauty and power provides them with that state of happiness that exists when the body and mind are together – alienation from Nature causes pain. Consequently, our earth must be respected and preserved for both itself and for future generations and what better way than to assist the very young in developing a meaningful sensitivity for other life forms?

The Game

Games can be readily developed from readings of books such as *Snuddlepot and Cuddlepie*, the children's classic created by the Australian author and illustrator May Gibbs. Gibb's *Gumnut Babie*s (Figure 4) has over the generations been one of Australia's most loved story sequence as was established by her fictional characters celebrating their first Centennial birthday in 2016.

Figure 4: May Gibb's iconic bare-bottomed Gumnut Babies have helped to transform the unique Australian bushland into a whimsical imaginary world where wattle flower babies and other distinctive Australian fauna and flora may dwell and evolve.

Conservation and care for our environment are the overriding themes of all Gibb's books. Sharing the beauty and uniqueness of the Australian bush and all its creatures is exceptionally valuable for stimulating learning in young probing minds. Humour, friendship, courage and the rewards of sacrificing oneself for others are attracting themes to learn from. Creating Nature stories provide an excellent basis for building new perspectives. Young children respond positively to high quality literature, as demonstrated by the popularity of Dr Seuss' book *The Lorax* or indeed *Snuddlepot and Cuddlepie.* Suitable environmental education should not only be factual but also encourage involvement with strong feelings for ecology, endangered species and the biological future of the planet creating practical participation throughout. With

the aid of the characters illustrated in popular children's books, numerous possible game alternatives can be created that challenge the young to re-tell a favourite story from differing perspectives (see 'Perspectives on Story Telling' in Chapter 2).

Discussion

It was Australia's isolation which gave rise to its unique life forms but, because of this isolation it is also particularly vulnerable to the introduction of robust foreign species. Free from their traditional competitors, introduced species are able to outcompete indigenous plant and animal species. Another factor in Australia's habitat destruction is its semi-arid climate under which the land is unsuitable to foreign agricultural management techniques developed to suit European climate and soil conditions. By contrast, Australian Aboriginal culture is based on a striking connectedness with the natural surroundings. The 'Dreaming' legends tell of the spirit world and teach that living people are the custodians of Earth Mother who has to be respected and protected at all times. When Aboriginal children are born they are given a child name; at puberty they are given an adult name designating living things for which they are responsible. With adulthood full environmental responsibility, as custodians of all living things, is expected. Describing the world through the Australian Indigenous context is known as Aboriginality.

Love of Nature – the Importance of Bonding with the Natural Environment

Humans have lived, evolved and adapted in intimate contact within their natural environments for most of their evolutionary history. More recently, in the Mesolithic Age around 15 000 years ago and coinciding with the cultivation of plants and the domestication of animals, our ancestors began to dwell in stable constructed environments. Whereas children's environments have gradually become more urbanized, youngsters still, until recently, had unrestricted access to natural spaces and the world at large where they could spend valuable recreation times in the open. Human beings of all ages have an innate sense of kinship with Nature that drives them to connect and unite through open-air explorations free to play, explore and interact – all of which is essential for the early development of optimal growth and resilience in the young. Accordingly, humans have always been drawn to illustrate their 'nature-based genetic coding' and instincts that connects them to natural phenomena as symbolized in the arts, writing, calligraphy, scribbling or whatever – it's portrayed everywhere.

To recapitulate, until recently growing children still had access to the natural world as they were encouraged to spend their recreation times on

sidewalks, streets, playgrounds, parks and other greenways. Nowadays, however, a good percentage of recreation time is spent indoors where the electronics are. By experiencing life predominately plugged into their media technology, the child becomes increasingly disconnected from face-to-face communing with friends and the natural world. As referred to above, children are born with a natural sense of relatedness to open landscapes and these desires need to be nurtured from their earliest years. As can be seen from Figure 5, instinctive feelings of continuity with Nature are validated in creations, legends and mythologies set in nature and populated by intuitive characters. Child development with little or no regular contact with the natural world constrains the process of socialization when the children themselves begin to feel separate, apart from the natural world where nature herself is seen as something to be controlled, dominated and feared rather than understood and loved (biophobia or a fear of the natural world instead of biophilia or love for it).

Figure 5: Larger-than-life characters at the Kuji Children's National Park (Mt Aso Japan).

Learning Exercise 15
Title: The Child as Part of Nature

Teacher Background

Although large animals such as rhinos, tigers, elephants and whales are critically endangered and will be massively missed – especially by future generations of children – when they are gone, it is the loss of the collective role that the disappearing microorganisms, plants and animals play within the biosphere that is of greatest concern. We must learn to live on Earth in partnership; otherwise the results of our unsustainable destructiveness will push Earth herself to a new state of existence. Climate change is the crisis of our time and we desperately need a fundamental shift in the ways we understand our place within the biosphere. To continue as we are demonstrates an abysmal ignorance and a denial of humanity's unique attributes of evolving intelligence and accumulated wisdom. Developing children's empathy with the natural world should be the main educational objective for pre-schoolers and young schoolers. It is the early experiences that provide structure to values and attitudes towards the world that children inhabit. The potential long-term benefit of eco-centric games is to raise awareness and knowledge about current environmental issues. Through the enjoyment of imaginary games and storytelling children are more likely to learn and develop their resourcefulness and creativity. To practice an imaginary (pretending) situation helps to come up with alternative ways of being and of seeing an issue from differing perspectives. This, in turn, results in more inventiveness and better problem solving skills.

The Game

Children learn best when they are engaged in their learning and when it matters to them. There are many ways of constructing and deconstructing any particular game idea where kids could flexibly imagine being someone else involved in dangerous or exciting adventures and which, serendipitously, could also stand as lessons to engage the 'actors' in issues of global significance. For example:

Scenario 1: The context is an Animal Park, the children are representing park rangers and the scenario is an endangered rock wallaby that has been injured by hunters (Figure 6). The children have to make up the population of animals and human staffers by acting and also include; for example, the animal enclosures and other features of the park such as workshops, laboratories and so on. The wallaby is being treated and one of the actors has to represent a veterinary scientist. The scenario takes on its own pace allowing for helpful imaginative communication and learning from the 'conservationists' perspective. The strengths of imaginative scenarios are the engagement of flexible teacher-student relationships where the class and teacher adopt variable professional

positions allowing the relationship to become dynamically collaborative within the imaginary developments.

Scenario 2: The context is a hidden UNESCO World Heritage Area. This wilderness, situated on a mysterious ridge of land, is hidden from the rest of the world where a team of expert scientists strive to protect, observe and study a colony of ancient creatures previously thought to be extinct. Working under difficult conditions and in constant danger the scientists' responsibilities are both to the animals themselves and to the ecology of the area. The children representing the creatures and the scientists are concerned that while they work as a team they must also be careful not to damage the wilderness's environment and to work in utter secrecy, keeping the ridge and its inhabitants away from the world's prying eyes and those who might look to exploit or damage it.

The above two scenarios are imagined but do reflect real world settings. An effective strategy is to encourage those involved to choose and develop a particular theme and possible protagonists. For younger children the chance to grow and enjoy learning about plants, whether in pots or outdoors, is also a pleasurable way to involve them in natural settings; as are books such as Jeannie Baker's *Where the Forest Meets the Sea* that introduces a collage of illustrations featuring a primeval wilderness in tropical North Queensland, Australia. This book and others like it take the reader on an extraordinary visual journey to exotic, primordial wildernesses, which like so many others are now being threatened by development.

Figure 6: Wallaby with a 'Joey'. We should think more in terms of living in harmony with Nature and its creatures rather than on the basis of their conquest and overexploitation.

What is UNESCO

UNESCO stands for United Nations Educational, Scientific and Cultural Organisation. It is an agency of the United Nations (UN) which is an international organisation that is currently made up of members from 192 nations around the world. Its purpose is to develop cooperation between all the countries in international security, economic development and social equality. UNESCO has five major programmes: education; natural sciences; social and human sciences; culture; and communication and information. These assist to promote peace, security and international cooperation among the countries of the world.

It is well known that certain environments on Earth are of universal value so they need to be protected by assigning them on the World Heritage List. There are currently over 700 natural and cultural sites on the list and include the Taj Mahal in India and the Great Barrier Reef in Australia. Typically, UNESCO's communication and information programmes promote the flow of ideas and knowledge so that Globally we may all experience sustainable development. Australia is a key partner for UNESCO in the Asia Pacific region. Australia was one of the first nations to join UNESCO on 4th November, 1946.

Levels of Structural Organization of Living Things: Summary

At every level, the biology of the ecosystem is shaped by long-term intimate associations with larger organisms such as animals, plants and microorganisms. The fundamental truth is that all systems whether people, economy or Nature are interdependent because life-sustaining systems are closed and not open-ended. Now more than ever before, modern science raises unique ethical questions that demand a cautious (or precautionary) approach in their application. At minimum it needs to be widely recognized that the sum of a system's parts does not yield the whole since new properties, called "emergent" properties, result in a whole that cannot be predicted from the sum properties of its parts. An emergent property is, therefore, an additional characteristic that an entity gains when it becomes part of a bigger system; that is, the whole is more than the sum of its parts. Emergent properties help living organisms to better adapt to their environments and increase their chances of survival. In biology, for example, all living organisms (the biosphere) from the simplest bacteria to human beings, display levels of organization forming a self-regulating, dynamically stable whole (Figure 7). As shown in the Figure, living things have different levels of organization where smaller parts combine to make increasingly complex systems.

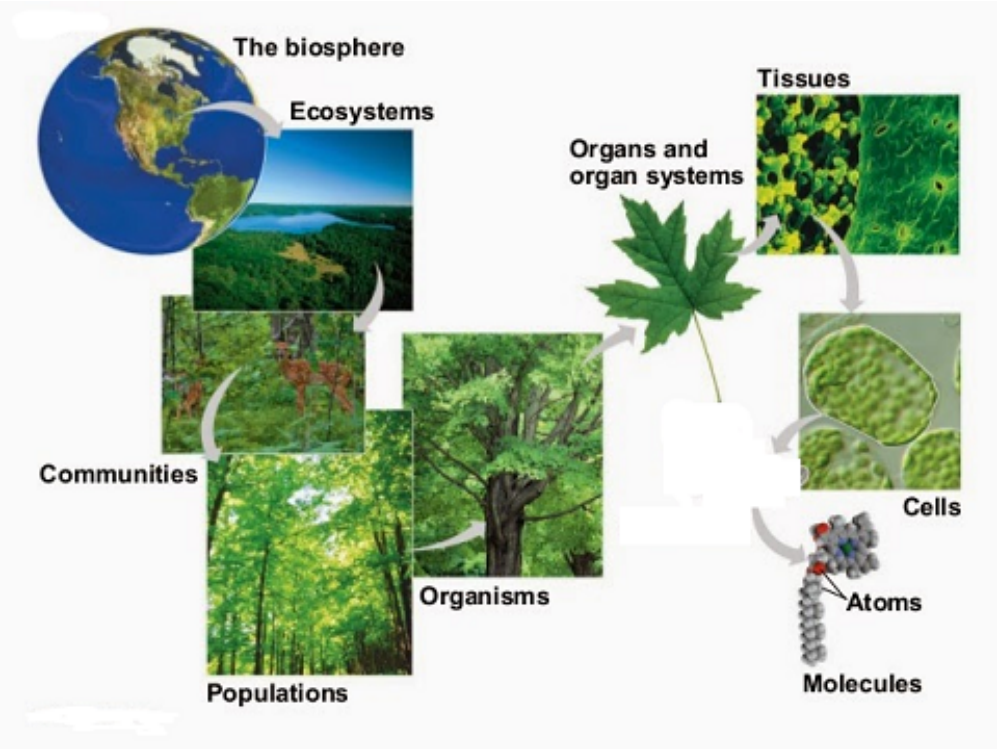

Figure 7: Levels of structural organization of living things where smaller parts combine to make increasingly complex systems such as molecules to tissues, tissues to organs and organ systems, organ systems to organisms, organisms to populations, populations to communities, communities to ecosystems and finally ecosystems to the biosphere.
(http://study.com/academy/lesson/emergent-properties-definition-examples.html)

Since all life is interconnected our relationship with the biosphere is uniquely complex and also the primal relationship encoded in our genes. There are several basic instinctive human responses to the natural world; responses such as pleasure, love, awe and reverence which are universally aroused by the beauty and mystery of the non-human. Children, in particular, identify strongly with Nature. Children feel naturally happy and possess an 'ethic of care' when in their outdoor environments. This feeling alleviates a child' alienation due to unfamiliarity of the outside world – it's just like being 'at home'.

THANK YOU CHILDREN OF THE WORLD FOR YOUR WISDOM
(“Gin Gin Gira Gira” Takaoka City, Toyama Prefecture, Japan)

ABOUT THE AUTHORS

Irina Pollard (BSc; PhD) is a biologist with special expertise in stress physiology, reproduction, developmental toxicology, environmental ethics and bioethics. She has also initiated and developed new ways of communicating science described as bioscience ethics. Bioscience ethics is an unencumbered secular means that facilitates free and accurate information transfer from applied science to applied bioethics. Pioneered by Irina, bioscience ethics has become an internationally recognized discipline, interfacing science and bioethics within professional perspectives such as medical, legal, bioengineering and economics. She is author of more than 100 research articles in international refereed journals, three books written for students and the general community, several contributions in edited books and numerous popular articles written for the media, conference proceedings and so on. She regularly contributes her research findings and has given many invited papers at National and International Conferences including the former USSR, Europe, United Kingdom, China, Japan, India, Thailand, Indonesia, Malaysia, Israel, Canada and the United States of America.

Her chief academic contributions are in the area of lifestyle and environmental stresses and their effects on reproductive capacity, development and long-term health across the generations. These major topics are reviewed in her student text book '*Bioscience Ethics*' (Cambridge University Press, 2009). Her transdisciplinary research has generated a deep concern for social justice and, as a result, she is also active in community education by way of contributions to societies such as the Eubios Ethics Institute and serving on Hospital Ethics Committees such as the International Union of Biological Sciences Bioethics Committee – a U.N. affiliated organization through which she became involved in several international bioscience-bioethics education projects. These have progressed through continuing membership on UNESCO's School of Ethics where her course *Bioscience-BioEthics International* features in the Bioethics Core Curriculum and as Australia's Unit Head of the International Network of the UNESCO Chair in Bioethics (Haifa). These and other openings provide her with welcome opportunities to present popular seminars, lectures and workshops as visiting scientist at local and international institutions.

Irina is also founding member of the Bioscience-Bioethics Friendship Co-operative (BBFC) web portal which is freely accessible at http://www.bioscience-bioethics.org/. This portal provides admittance to educational materials in the area of stress physiology, reproduction, toxicology-

teratology, environmental ethics, and access to other useful links for those interested in bioscience and bioethics.
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Amara Zintgraff (Diploma in Community, Child & Youth Services) has a long held passion for social justice in everyday life which reflects in her early childhood education programs and daily care practices. The following summarizes Amara's philosophy "I believe that children are worldly citizens and have amazing ideas and a voice that should be heard. I feel privileged to have the role of educator and to be able to spend time with these children learning alongside them". In 2015 she was nominated in the category of Early Childhood Educator of the Year. Since attaining a permanent full time job at Tigger's Honeypot, Amara has been active in creating invaluable inroads into childhood education which will in future initiate new opportunities advancing the professional development and career opportunities of dedicated teachers such as herself. Importantly, she has activated mentorship programs with dedicated teams on ways to effectively spread the impact of fresh knowledge skills within existing educational settings. Key international initiatives have centred on social justice and implementation of progressive change. Significantly among these is participation in Ngroo training conferences and working with OrphFund in Kenya and Uganda. Ngroo Education Incorporated works to improve the opportunity for Australian Aboriginal children to achieve their potential by increasing their level of participation in mainstream early childhood services and settings while OrphFund is a volunteer based organisation helping abandoned, orphaned and vulnerable children around the world. These and similar activities have opened fundraising opportunities for OrphFund and also other organisations such as Doctors Without Borders, the Sydney Children's Hospital and Rough Edges. Initiatives such as these will ensure that local children will become aware of what individuals need to survive and thrive in life and find ways they can, in turn, help those less fortunate than themselves – they will remember their early education and will similarly promote it in their future lives.

Modern educators are recognising that diversity contributes to the richness of our society and provides valid evidence based ways of knowing. For Australia this insight also includes promoting greater understanding of Aboriginal and Torres Strait Islander ways of knowing and being. In this respect Amara has developed new ways of promoting social change through providing authentic experiences for the children including their families in her care. She aims especially to develop closer partnerships with Australian Indigenous communities. Feedback to date has been excellent where the families express pride on hearing about the work their children are doing to better the world that

we live in and when they attend events that include family participation in topical discussions or in fund raising efforts towards worthy causes. Her skills and enthusiasm are growing to an extent that she is a popular educator mentoring her fellow colleagues, especially on issues surrounding social justice and how to effectively implement them.

NOTES:

Eubios Ethics Institute Publications (Books sent by SAL post, Journal by Airmail - Price included)

Eubios Journal of Asian and International Bioethics (Annual subscription) NZ$90

Shaping Genes: Ethics, Law and Science of Using Genetic Technology in Medicine and Agriculture by Darryl Macer, Oct. 1990, 421pp. NZ$50

Equitable Patent Protection in the Developing World by William Lesser, May 1991, 150pp. NZ$40

Attitudes to Genetic Engineering: Japanese and International Comparisons (Bilingual) by Darryl Macer, May 1992 330pp. NZ$40

Human Genome Research & Society Eds: Norio Fujiki & Darryl R.J. Macer July 1992 ISBN 0-908897-03-0 (English), 230pp. ISBN 0-908897-04-9 (Japanese), 240pp. NZ$40

Intractable Neurological Disorders, Human Genome Research and Society Eds: N. Fujiki & D. Macer Feb. 1994 ISBN 0-908897-06-5 (English), 320pp. ISBN 0-908897-07-3 (Japanese), 340pp. NZ$40

Bioethics for the People by the People by Darryl Macer,... May 1994 ISBN 0-908897-05-7, 460pp. NZ$50

Bioethics in High Schools in Australia, Japan and New Zealand, by D.Macer, Y.Asada, M.Tsuzuki, S.Akiyama, & N.Y.Macer March 1996, ISBN 0-908897-08-1, 200pp.(A4) NZ$50

Protection of the Human Genome and Scientific Responsibility (English and Japanese Bilingual) Editors: Michio Okamoto, Norio Fujiki & D.R.J. Macer, April 1996, ISBN 0-908897-09-X, 210pp. NZ$40

Bioethics in India Eds: Jayapaul Azariah, Hilda Azariah & Darryl R.J. Macer June 1998 ISBN 0-908897-10-3, (includes 115 papers) 403 pp. (Printed in India) NZ$60

Bioethics is Love of Life: **An alternative textbook** by Darryl Macer, July 1998 ISBN 0-908897-13-8, 152pp. (Note 2nd edition published on iTunes Store as an iBook in 2015) NZ$40

Bioethics in Asia Eds: Norio Fujiki & Darryl R.J. Macer, (includes 118 papers from Nov.1997 conferences, ABC'97 Kobe and Fukui Satellite) June 1998 ISBN 0-908897-12-X, 478 pp. October 1999 ISBN 0-908897-14-6 (Japanese), 320pp. NZ$50

Ethical Challenges as we approach the end of the Human Genome Project Editor: Darryl Macer, April 2000 ISBN 0-908897-15-4, 124pp. NZ$40

Bioethics Education in Japanese High Schools ***(in Japanese only)*** Editor: Darryl MacerApril 2000 ISBN 0-908897-16-2, 112pp. NZ$40

Bioethics and the Impact of Human Genome Research in the 21st Century Eds: Norio Fujiki, Masakatsu Sudo, & D.R.J. Macer March 2001 (English and Japanese bilingual, 350pp).NZ$50

Bioethics in Asia in the 21st Century Eds: Song Sang-yong, Koo Young-Mo & Darryl R.J. Macer August 2003 ISBN 0-908897-19-7, 450pp. NZ$50

Challenges for Bioethics from Asia Ed: Darryl R.J. Macer November 2004 ISBN 0-908897-22-7 656 pp. NZ$70

A Cross Cultural Introduction to Bioethics, Editor: Darryl Macer 2006, 300pp. (A4) NZ$50 (Note 2nd edition published on iTunes Store as an iBook in 2015)

Bioethics in Iran, Editor: Alireza Bagheri, 2014. ISBN 978-0-908897-25-4 262 pp. NZ$50

Bioscience Ethics Education Curriculum for Pre-Schoolers to Elementary Age Children, Irina Pollard and Amara Zintgraff,. 2017 ISBN 978-0-908897-28-5, 60pp. (A4) NZ$50

Getting Along: The Wild, Wacky World of Human Relationship, Laura R. Ramnarace 2017 ISBN 978-0-908897-29-2, 73pp. (A4) NZ$50

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