# Whatever Next?

Mark Treadwell

## A Global Curriculum Framework

# School v2.0

## for the 21st century

www.schoolv2.net


# Acknowledgements

## Mark Treadwell

In the second part of this trilogy on the emergence of School v2.0 we address the global curriculum and the frameworks that support its conceptual nature. Many schools within New Zealand and overseas have inadvertently contributed to the notions contained within this framework. Particular tribute must be paid to those involved in the development of the New Zealand curriculum framework released in 2008. This document and its development have inspired educators within New Zealand and numerous Ministries and Departments of education around the world to rethink the central purpose of education in the 21st century.

The development of this resource is designed to support and underpin the key notions within the New Zealand curriculum framework. Built on the work of the DeSeCo and Eurydice reports released early this decade the Ministry of Education in New Zealand chose to make the competencies the central feature of the curriculum. By making this choice educators acknowledge that the capacity to manage self, participate and contribute (with confidence and passion), to think (in the broadest sense of the term), relate to others and to effectively use symbols language and text underpin the capacity to learn. The explicit teaching of the competencies is a tremendous investment in the future of our learners and in the future of this country.

There are a number of schools who played a significant role in the development of this resource: Greenpark School in Tauranga where most of this is being trialled, Point England School in Auckland who have shown just what can be done when educators believe that the impossible must be done, Ngatea and Hauraki Plains College who have shown that being remote is no excuse for not creating purpose and vision, Eastern Hutt School who assisted in the thinking which contributed to this framework, Windsor School in Christchurch where some of the seeds were first sown for this resource, Opoutere School which showed that caring and humanity combined with innovation demonstrates that a small school can be a big school in the hearts and minds of the learners and their communities, Taihape Area School, where inspirational leadership has transformed an entire community, and so many others . .. . and to everyone who takes the risk to be different and draws a line in the sand and re-evaluates the central purpose of school and who is brave enough to recognise that the emperor really does not have any clothes on; my thanks.

My thanks to the editors principally Kate Hughes at “Type B” and my mother Johanna whose wordsmith I am still reliant on. ☺

My thanks also to my wonderful family who accommodate my indulgent belief that we can all make a difference; your support, encouragement and humour are always appreciated. Home has always been a place that I have looked forward to returning to and the three of you are the reason for that. You each have shown the ability to adapt and transform, never content with just “being” and you have continually tested the edges of life. To have two daughters who are the best of friends in their teenage years and a wife who is my best friend; all these are life’s real blessings.

Mark Treadwell


# Introduction

Mark Treadwell

***"Technological change is not additive, it's ecological. A new technology does not change something, it changes everything"*** Neil Postman[1]

## So what is the purpose of education?

To be quite honest it is blandness; that's right, the purpose of education appears to be to take a totally unique individual and turn them into an androgynous global citizen. Someone who will take their place in a mechanistic global society, won't annoy anybody but will contribute to the ongoing status quo and respond to almost anything with the one word summary of their frustration **"Whatever!"**.

I don't believe this is the thoughtful intention of education systems but it certainly seems to be the result for many learners. A factory turning out homogenous, bland and thoroughly bored individuals who all aspire to being the same; a bit like a giant fast food factory; sameness. They are exceptions of course; brilliant young people who somehow refuse to conform or conform extremely well and who realise their genius. However, they are few amongst many.

I would contend very strongly, that the purpose of education should now be:

> **"To facilitate the outworking of the inherent potential embodied within every child, such that their uniqueness can change the world for the better via their active involvement in their community and their ability to be lifelong learners that are self assured; balancing confidence with humility and having the capacity to apply their abilities with wisdom."**

That this is now possible is the thesis of what you are about to listen to, read or view. Fulfilling potential is not about busyness it is about being synergetic and attaining a life and work balance. Being synergetic is recognising the unique combination of gifts and talents that every individual has and working with these to bring out the genius within. Trying to turn a dancer into a mathematician is an example of not being synergetic. This does not mean that we should never expose a dancer to mathematics but rather we shouldn't expect a dancer to necessarily love and enjoy mathematics or become a mathematician. At the same time it is important to expose everyone to a wide range of opportunities. Unless we have experienced numerous domains of learning, how would we know what may or may not resonate with our innate capabilities?

[1] Postman, Neil. Technopoly: The Surrender of Culture to Technology Vintage; 1993 ISBN-10: 0679745408

The key goal for schools therefore is to expose young people to as many different opportunities as is possible, so that they can discover for themselves what they are inherently good at; what they would do, even if they were told not to do it; what they are passionate about. Many adults today will tell you they don't have a particular passion; ask some of them; ask the person next to you! "What are you passionate about?" Very few adults can verbalise an answer to this question immediately, if at all. This is extremely sad. Fulfilling the potential of the gifts and talents you have is what you have to offer the world; and the world needs every single one of your creative souls.

***"Yes, people need to be able to read, write and speak clearly. And they have to know how to add, subtract, multiply and divide. But given the widening array of possibilities, there is no reason why every child should master the sciences, algebra, geometry, biology, or any of the rest of the standard school curriculum that has barely changed in half a century[2]"*** **Robert Reich**

Discovering what you are innately good at and have the potential to be extraordinarily good at, is a life changing process. That discovery may happen in a fraction of a second but too often it is never unpacked, never realised. That is what schools should be all about; not about factory fodder, blandness and sameness but about uniqueness, about creativity and innovation; about fulfilment. But for most individuals this simply has not been possible . . . until now.

Education is in the throes of the greatest paradigm shift ever experienced . . . ever! As a consequence of this paradigm shift, how we view education and its role in the community is set to dramatically change within a very short time span. This transition is initiating a global "second Renaissance" which will power economies and societies for the next 100 years. This paradigm shift allows learners new flexibility and opportunities, providing a simple underlying architecture for innovation and ingenuity through access to rich information and communication environments via the internet. Within this new environment educators and learners can create dynamic learning communities instantly. In this environment knowledge is interrogated and manipulated and in the process transitions into understanding. With some imagination, understanding can then bloom into innovative and creative ideas and then this innovation and creativity can be applied with wisdom. It is about taking what a person is already innately good at and amplifying it through a personalised learning experience.

Fortunately, outside of school, many of our young people have already adopted this new paradigm. They sit in our classrooms every day and we wonder why they are increasingly disengaged, and they once again reply to every question and statement with the one word summary of their frustration; **"whatever!"**[3] It does not matter how much money governments pump into present education systems, there will be no leaps in capability until they adopt this new paradigm. Once education grasps the critical nature of the paradigm shift and invests in it, only then will we re-engage our learners and only then will they enjoy an unparalleled measure of success which up to now has simply been an impossible dream.

***"My work has led me to an increasing appreciation of the power and resilience of the default culture of public schools – the deeply rooted beliefs, structures, artefacts and symbols of an increasingly dysfunctional and obsolete set of institutions"***[4] **Richard Elmore**

Doing nothing is simply not a choice unless you wish to deliberately empower learners with a dysfunctional set of competencies, skills, knowledge and beliefs about learning which are now almost totally irrelevant in the 21st century, and I do not believe anyone wishes that. You can make a difference; you can change the world and you can do this by synergistically working

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[2] Reich, Robert. "One Education Does Not Fit All." The New York Times; July 11 2000. Also online at http://www.arlingtoncare.org/Docs/Reich%20-%20One%20Education%20Does%20Not%20Fit%20All.htm Accessed June 2007

[3] First identified by Thomas Zengotita P15 "Mediated: How the Media Shapes Your World and the Way You Live in It" Bloomsbury 2005 ISBN: 1582343578

[4] Fullan, Michael, Elmore, Richard & Hill, Peter & Crevola, Carmel. Breakthrough; Corwin Press; 2006; ISBN:1-4129-2642-4

with your own gifts and talents. The amazing thing is that when you do this, life is no longer about working, it is about fulfilling the potential, fulfilling the dream placed within you and there is no greater dream machine than the vocation of education. Suddenly you are not tired, but energised and ready to make a difference in other people's lives, to bring them joy, to challenge what they thought their world was about, and empower them to make a difference in the lives of others.

Education used to be a service industry career; a bit like a pizza delivery person who delivers pizzas, but educators would deliver curricula. That is no longer the case. From today onwards (given that you do read, listen or view this book, podcast, lecture or video), you are a creativity worker, tasked with creating an environment where young people can develop knowledge, build conceptual frameworks and use these to be creative and innovative, developing completely new ideas, thoughts, emotions, products, systems and environments within a moral framework which encapsulates the notion of citizenship.

This lecture, book, podcast or video attempts to map the necessary transitions which provides the potential for transformative learning in the 21st century and provides a guide to the way forward, covering all aspects of teaching, learning and assessment. Welcome to school version 2.0 and I look forward to you joining us, the learners, your colleagues and your communities on the most exciting adventure humanity has ever been offered.

***"A dreamer is one who can only find his way by moonlight, and his punishment is that he sees the dawn before the rest of the world."*** **Oscar Wilde**

# Index




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My thanks for the image on the back cover image which is courtesy the Morgue File (http://www.morguefile.com/) and the photographer is Jules julieorahilly@gmail.com from Ireland (no relation that I am aware of!)

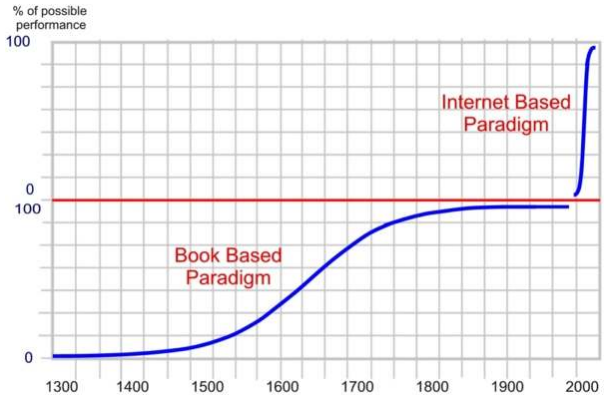
# Sample section of "Whatever: Next!"

## The Format for this Text

This professional learning resource is designed in two parts and provides:

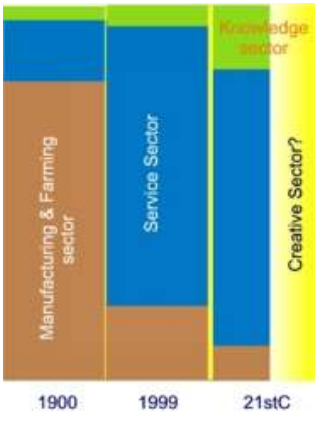
- Background reading on the development of a competency, values based national curriculum.
- A 21st century concept-based scaffold for the competencies and learning areas which schools can apply contexts and content to as well as demonstrate sustainability in order to meet the implementation expectations of the curriculum framework.

The paradigm shift which we wrote about extensively in the first volume of this three-volume series highlighted the transformation from an education system which was focused on the learner remembering extensive amounts of knowledge and where teaching was the focus of the education system. In new paradigm the learner develops a set of key competencies, precisely defined concepts underpinned by knowledge bases and a set of inquiry learning processes which allow the learner to become an independent life long learner. This paradigm shift is made possible by the information and communication technologies associated with the Internet combined with sociological and globalisation transformations allowing collaboration on a scale never seen before.




The Internet has provided us with the capability to communicate far more effectively and also access information far more effectively. However both these tool sets come with their own unique set of issues and these need to be addressed within education system so that these tool sets can be used effectively while at the same time the learners personal safety is assured. Being able to spell the word G-O-O-G-L-E is not the solution to everything and all this does is open up a vast and disorganised library of information. Being able to search effectively, synthesise a wide variety of different resources in different media formats and then distil these into an understanding of the key concepts and subsequently apply these concepts to new contexts is a complex task and one that will take 12-13 years to develop capability around.

***"The concept is grasped; it's just the execution that is elusive"*** **Princess Diaries 2**




Increasingly low paid repetitive work processes were being replaced by robotic systems in the latter half of the 20th-century. The transformation of a workplace dominated by primary industry to one dominated by the service sector workplace was almost complete by the end of the 20th century. Gaining ground now is a second makeover as we increasingly see a greater percentage of people working in the creative sector. The creative sector is being driven by the increasing global demand for "clever" workers who can show initiative and use their creativity and innovation for problem solving on an almost daily basis. In the early 20th century most business was managed by a small percentage of bosses who told the workers what to do. Increasingly workplaces are demanding a greater percentage of their workers to be clever workers who can apply their understanding of concepts to develop innovative and creative solutions.

In order to be creative or innovative it is first necessary to understand the underlying concepts which underpin what it is you are trying to the creative around. Creativity and ingenuity in the workplace is increasing rapidly due to the increasing rates of new knowledge and new understanding becoming available which then has to be applied quickly in order for the primary, service and knowledge sectors to maintain their competitive advantage.

The complication which is now starting to effect global economies is that we simply do not have enough people with the necessary cleverness to drive a far more complex workplace. The world has been able to survive quite comfortably on 2-3 percent of the workforce being clever up until the early-mid 1980s. Now however this percentage is exceeding 10 percent and heading for 20-30 percent in the next 5-15 years. Developing a compulsory as well as ongoing education system that can cope with this dramatic increase in demand for clever people demands an entirely new curriculum with a very different focus. The demand for clever people in the workplace and social place is increasing dramatically and is set to increase still further over the next few decades.

The present focus of the education system has been to reward knowledge. In this case we define knowledge is being able to remember a body of knowledge and recall it at a later date. Increasingly the end point for schools of knowing is being replaced by end point of understanding and being able to apply that understanding creatively and innovatively. Teaching for understanding and the ability to apply that understanding in creative and innovative ways requires a totally different curriculum and teacher pedagogy/andragogy.

That requirement is what this text addresses: a curriculum that meets the needs of 21st-century educators, learners and their communities.

What is also becoming more apparent is that most of the innovation and creativity is not happening within a particular discipline but rather it is happening at the intersection of disciplines and as a result it is becoming increasingly necessary to have a wide range of conceptual understandings in order to develop innovative and creative solutions to needs and opportunities.

By identifying the key concepts which underpin (and are necessary to be effective in our workplaces and social places) it is then possible for educators to be far more effective in defining the key knowledge bases which underpin those key concepts. Much of our education system has focused to the thematic topics where it is unclear which concepts need to be understood. It has not been uncommon for thematic education programs to expose learners to 20+ different concepts within a single unit of work without any of the concepts actually being understood by the learner or made explicit by the educator.

Professional learning for educators has historically been focused on developing increased knowledge within their particular teaching discipline. In the new Internet fuelled education paradigm learning has become a rebalancing process between appropriate knowledge about what is being taught in order to develop key concepts and become lifelong learners combined with effective pedagogy/andragogy to achieve this. The endpoint of education has now become a more complex dynamic between:

- Building key competencies which provide the foundation for learners to engage in learning processes effectively
- Developing relevant and necessary knowledge bases
- Interrogating and manipulating those knowledge bases via inquiry learning to develop an understanding of key concepts
- Ensuring that learners understand thinking processes and can apply their gifts and talents in creative and innovative ways using their imagination
- Creating the ability for learners to become independent lifelong learners
- Ensuring that learners have a range of dispositions which underpin successful integration into a society where knowledge is increasing exponentially
- Developing principles and character which reflect the shared values and ethics of the community

Increasingly schools are required to re-evaluate their purpose set against the seven dynamics proposed above. Understanding the schools purpose and developing a set of shared values and ethics which the community can agree on sets the baseline for building a vision for the school.

Ensuring that educators and learners are provided with a 21st century curriculum is increasingly about balancing competency, principles and character, as well as conceptual understanding of the learning areas. Within this framework there is a particular emphasis on understanding thinking based on the nature of being human. The Best Evidence Synthesis[5] around teacher professional learning and development produced by the New Zealand Ministry of Education provides a substantive body of knowledge around what constitutes effective professional learning in this context. Applying this knowledge to the implementation of this curriculum is critical to the overall success of the curriculum within the school setting.

The next challenge is to develop a curriculum which meets the needs of School version 2.0. What we have seen in the previous text and the introduction that precedes this text is that it has become increasingly clear that what is required to meet the need for increasing numbers of "clever" people is a concept base curriculum. In a concept based curriculum the educator makes the concept explicit to the learners in the form of learning intentions. These learning intentions provide the learner with a framework for building their own knowledge and understanding.

The reason why we have emphasised the global nature of this curriculum is that concepts are context independent and as such are common to all learning throughout the world. The concept framework required in India is exactly the same as that required in Russia, United States, New Zealand or Bolivia. What will be different is the contexts those concepts are applied to. These will be unique to each individual country and in a flexible curriculum framework they will be unique to each particular school and quite possibly unique to the individual learner.

As the creative economy continues to grow significantly, society requires increasing numbers of people who have the capability to be creative across a wide range of learning areas. The paradigm shift we are seeing emerge now makes use of the internet in order to provide the necessary rich information and communication landscape required in order for educators to ask and for learners to answer, rich, open, fertile and high order thinking questions which assists the learner to build understanding. Coupled with more powerful questions, educators are making use of the inquiry learning process to build problem solving techniques and assist the leaner to interrogate and synthesize the knowledge and in the process build well grounded conceptual frameworks of understanding.

***"And this is happening at a global as well as national level – the UN reports that the creative industries already account for more than 7 per cent of global GDP and is expected to reach 11 per cent by 2015."***[6] **DEMOS**

This curriculum focuses on identifying the essential concepts which our learners will need to understand in order to be creative and innovative and live fulfilled lives. Research is also showing that teaching a conceptual curriculum where the learning intention of each lesson is clear and precise provides improved learning outcomes.

All these elements combine to form the emergence of School v2.0; a whole new approach to schooling that is initiated by the internet paradigm shift. School v2.0 is a transformation of the purpose, vision and role of schooling within the community rather than an iteration of what presently happens in schools. Schools that grasp this transformation will provide their learners with huge advantages and prepare them for the demands of the 21st century social and work places. Having a strong vision which is outworked through the development of key competencies encourages the dispositions a learner requires in order to be able to build an understanding of the key concepts and apply these to a wide range of contexts.

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[5] New Zealand Ministry of Education; BES (Iterative Best Evidence Synthesis) Programme http://www.educationcounts.govt.nz/themes/BES accessed November 2008

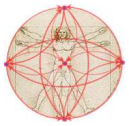
[6] DEMOS; "Education for a Digital Generation"; P21; 2007 http://www.demos.co.uk/publications/theirspace Accessed March 2008

Conceptual understanding is something unique to human beings and as such provides us with a great strategic advantage over all other species. It allows us to learn far more efficiently and apply that learning to context we may never have encountered in the past and create innovative, creative, and ingenious solutions to the many needs and opportunities which we are presented with on a daily basis.

The potential to understand and hence be innovative, creative, and ingenious have far reaching consequences which we need to be fully aware of. The events surrounding 9/11 were symptomatic of the power a small group of innovative, creative, and ingenious individuals could wield, given access to the fantastic information resources and communication tools within the Internet, to bring about the devastating results. They were potentially "model 21st-century learners" in almost every aspect except for the fact that they lacked the wisdom, principles, and character which a moral society would ascribe to. If we are to provide our young people with the capacity to be innovative, created and ingenious we have a moral obligation to provide them with the necessary tools to use this power wisely. If we do not accompany the capacity to be innovative, creative and ingenious with a set of principles and character traits which encourages them to use these powerful learning tools to better the communities they live in then the results could be devastating.

This curriculum scaffold provides a vision containing the necessary competencies, and a framework which encourages understanding in a rich information landscape via scaffolded, concept-based learning objectives within a framework within which learners can develop a set of principles and character traits which are cast in the ether of wisdom.

Welcome to School v 2.0.



# Whatever Next!: Introduction

The framework for the text is around the transformation of education that is now starting to take hold and with it a very different approach to teaching and learning. This new approach will focus on teaching for understanding, through the application of the internet suite of information and communication tools. This necessity is being driven by an increasing need for people to be able to take part in a workplace and a society which increasingly requires and rewards innovation, creativity and "cleverness".

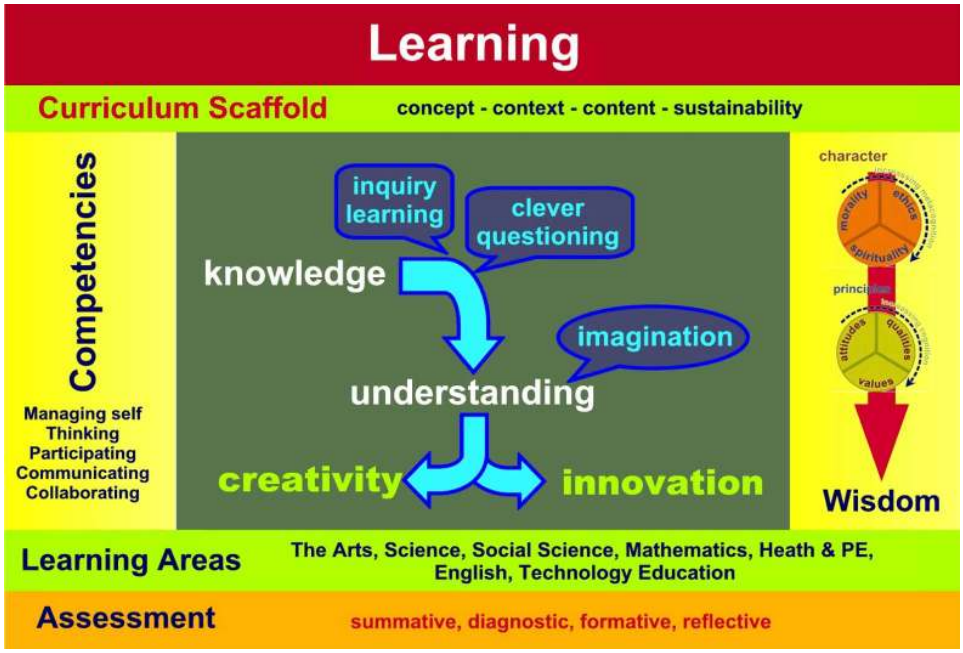
In the previous education paradigm we rewarded the retention of knowledge rather than the understanding of concepts and this approach worked well when we only needed a small percentage of clever people to be able to manage and tell the other 95 percent of population what to do. However, what we are seeing now is a community and a workforce that is demanding far higher levels of initiative, thinking and creativity (clever people). In the previous paradigm 3-5 percent of people within the community were required to be clever and this percentage was achieved comfortably via the intuitive intelligence of a small percentage of the population and the application of their cognitive skills to the knowledge that they had been taught via the "implicit curriculum".

Communities are now demanding a far higher percentage of people who can think creatively and innovatively and in order to achieve this it is necessary to explicitly teach a range of competencies which underpin this capability. The world is currently experiencing an increasing shortage of clever people and our present supply of clever people are moving from one job to another ever more quickly and attracting huge salaries and opportunities in that process. The drought of people with these capabilities is now starting to affect the global economy as each country fights for its share of clever people.

In order to meet this demand for clever people, education systems must now develop teaching and learning approaches which encourage and celebrate creativity and innovation, along with the key competencies which provide the foundation for developing an understanding wrapped around the core of knowledge. The other accompanying key capability is the capacity of a large percentage of people to become lifelong learners in an era when knowledge is increasing exponentially. Those that can develop a lifelong learning capability are able to adapt quickly in an ever-changing world.

The precursor to creativity and innovation is the ability to interrogate and manipulate knowledge (via clever questioning and inquiry learning processes) to form an understanding of the required conceptual frameworks. The endpoint of education has now shifted dramatically from knowing and remembering knowledge to understanding and being able to apply knowledge creatively and innovatively with wisdom to meet needs and opportunities. This "conceptual era"[7] in education will require a completely different pedagogy/andragogy, with educators requiring a raft of new capabilities to develop successful teaching and learning strategies within this new paradigm. In order for the paradigm shift to take place the infrastructures which enable the delivery of high-speed Internet "on demand" is critical. Governments around the world are now beginning to realise the significance of this infrastructure and many are now urgently attempting to put this infrastructure in place.

[7] Pink, Daniel; “A Whole New Mind: Moving from the Information Age to the Conceptual Age”; Riverhead Books; 2005 ISBN 1-57322-308-5




Those governments which develop the technical infrastructure and the educational transformations necessary for this paradigm to be enabled will dominate the 21st century, regardless of their population base or their geographical size. We are entering one of the greatest tipping points in human history where the balance of power will rest on a new tension between the physical resource of countries (growing/mining resource) coupled with the intellectual resource of the majority of their citizens to apply innovative and creative applications to that resource and the resources of other countries who are willing to export their commodities. Underpinning this paradigm shift will be a set of values and character traits which will overlay a new sense of purpose for education. The decisions that countries make reading these domains in the next 5-10 years will dictate their futures for the next hundred years.

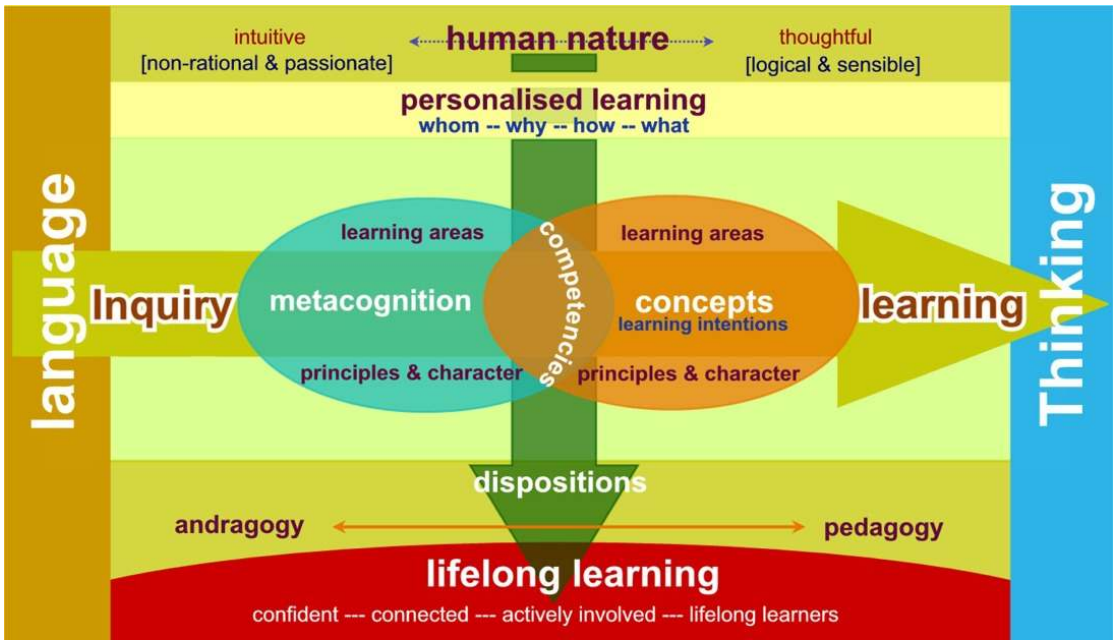
There are two architectural frameworks which underpin any 21st-century national curriculum and in order to save time I have constructed diagrams around both frameworks and I will briefly unpack each of these diagrams. The final text has a full outworking of the diagrams and below is a summary to save time!

## 1. The overarching Framework

The first diagram shows the importance of recognising human nature for what it is and our perchance for a non-rational (not irrational) and passionate approach to thinking rather than necessarily being logical and sensible. Underlining this framework is a desire for personalised learning which reverses the normal planning approach from: what will we teach – how will we teach this – why are we teaching this – and who are we teaching this to (and is this relevant to their needs) – and considers firstly who we are teaching and identifying their specific learning status around that the concepts underpinning the competencies and the key learning areas. To achieve this, educators require rich data sets drawn from online summative, formative and diagnostic reporting tools. These tools include student self/reflective reporting via online portfolios, diagnostic/formative tools such as AsTTle[8], summative testing of core knowledge and student demonstration of understanding, including an ability to demonstrate their capacity to apply that understanding to a range of contexts and problems. Once we know who is in front of us then we can set about answering the questions of why, how and what we should be teaching.

[8]University of Auckland; **As**sessment **T**ools for **T**eaching and **Le**arning (AsTTle) http://www.tki.org.nz/r/asttle/ accessed July 2008

The role of competencies as described in the DeSeCo[9] report are central to the way forward as they form the foundation that underpins success in the academic disciplines. Without the competencies of managing self, thinking, participation and contribution, relating to others and using language, symbols and text, the potential for success within learning areas is going to be severely undermined. By building capacity within the key concepts and encouraging the capability of the learners to reflect metacognitively (on their thinking around both the learning areas and the values and principles which the community and schools wish to encourage), learners have the capacity to develop a set of positive dispositions towards lifelong learning.



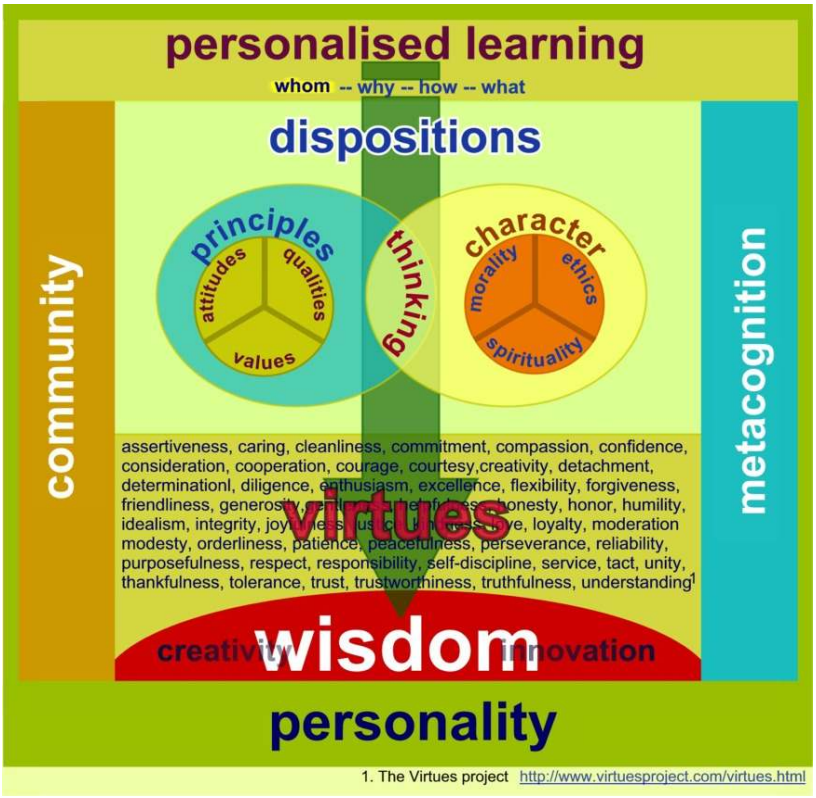

The two key pillars which maintain the stability of this architectural framework are the ability to apply language (oral, written, visual and multimedia) for effective communication, and the ability to understand the thinking process from a contemporary sociological – neuroscientific perspective. Inquiry learning provides the mechanism for interrogating and manipulating and re-presenting the learner's knowledge base and in the process builds understanding via the creation of interlinked conceptual frameworks.

This is all done within a healthy tension between pedagogy (direct instruction) and andragogy (the coaching approach) and provides us with a framework for the development of lifelong learning capability, our stated objective within the New Zealand education framework.

[9] *OECD;* Definition and Selection of Competencies: Theoretical and Conceptual Foundations (DeSeCo); 2000; http://www.deseco.admin.ch/ Accessed Nov 2006

## 2. Principles & Character

The second architectural framework deals with the formation processes surrounding the development of principles and character within our learner's minds. The development of principles and character becomes increasingly important as the purpose of school is now focused on developing the capacity for creative and innovative thinking. Applying creative and innovative thinking has both the potential to be hugely beneficial to community but this same capacity also can be applied in ways which can destroy and undermine community. It all depends on whether that creative and innovative thinking is applied for good or for ill and or their motivation is derived from a person's principles and character.




The notion of citizenship provides a framework for the inclusion of principles and character. As communities increasingly become multi-ethnic, multicultural and global communities the notion of principles, character, virtues and wisdom become of increasing importance as we seek to solve global problems. These solutions will require sacrifice from everyone and the driver for this is the moral and ethical one as well as an economic one.

What the diagram attempts to draw together is the terminology as well as the relationships between each of the terms which are often used interchangeably.

Principles are drawn from our attitudes, qualities and values. A five-year old can have an attitude but not necessarily qualities and values as qualities and values require an increased cognitive capacity. Character is derived from morality, ethics and spirituality. These capabilities may develop overtime via increasing metacognition. Neither the notion of character or principles will form in a consistent manner unless the learner purposefully reflects and thinks on these ideas. Many people assume they have principles but they would be hard pressed to tell you what they are. In essence principles only form when a person thinks through and reflects on their attitudes, qualities and values quite deeply. Once we develop an understanding of our principles and character we begin to be able to express these notions consistently via our virtues.

Wisdom is the creative application of virtues to our decision-making processes. Wisdom requires a significant capacity to apply the virtues creatively and innovatively within the framework of the individual's personality. The two pillars which hold-up this framework are the notion of community and the capacity to reflect on one's thinking (metacognition).

# A Sample Essential Learning Area: Science

## Special notes:

The teaching of science has traditionally been about learners being introduced to some theory and then conducting an experiment, which has been set up and designed by someone else. Experimentation during in the first 7-8 years of school is usually fairly minimal. In a recent National Education Monitoring Project[10] study, the following, somewhat tragic report card was released concerning New Zealand students' progress and thoughts about science

**"Compared to year 4 students, year 8 students were less inclined to use the most positive categories. This pattern has been common in national monitoring surveys. Older students can be expected to be more discerning and critical, as well as more realistic about their own abilities. However, trends across time paralleled those already mentioned for year 4 students. Almost half of the year 8 students would like more science at school. The percentage of year 8 students particularly enjoying science at school dropped from 37% to 24% over eight years, while the percentage with a negative view increased from 15% to 37%. Sixteen percent (compared to 8% in 1999) indicated that their class "never" did really good things in science. There were similar increases in the percentages indicating that they "never" did experiments with everyday things or with science equipment. Only 5% indicated that they thought they would be a good scientist when they grew up, while 38% said that they "didn't know" how good their teacher thought they were at doing science."** [11] **NEMP**

What studies like this clearly tell us is that "students *want* to like science" and have a natural disposition for wanting to explain and explore the scientific world. Many teachers feel inadequate about teaching science, however the new education paradigm puts a learner far more in the driver's seat: learners are introduced to science via their own curiosity, setting their own agendas (with some careful educator guidance) and promoting and conducting their own experiments.

Science is about trying to understand the world; the ability to recognise a problem/issue and design an experiment, interpret the experimental results and make a hypothesis is what science is really all about. By teaching science in this manner we can also take some pressure off the educator who may not "know a lot about science". The inquiry learning process is the perfect vehicle to carry out this mandate.

We have an impact on the inquiry learning process across the cognitively appropriate developmental levels and in each case have passed on the responsibility for designing experiments, carrying them out, recording results, interpreting results and making conclusions including possible hypotheses – to the learner. Most scientific experimentation does not require test tubes! Rather, for the first three-four cognitive levels, it requires everyday items and simple resources. Learners need to play with scientific ideas and begin to build confidence in their ability to think and practice scientifically. As educators we need to give learners the opportunity to build their confidence and their ability to 'do' science, rather than trying to control the knowledge base.

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[10] New Zealand National Education Monitoring Project http://nemp.otago.ac.nz/ 2007; Accessed October 2008

[11] New Zealand National Education Monitoring Project;: Science http://nemp.otago.ac.nz/science/2007/index.htm 2007; Accessed October 2008

# **Science** Key Concepts: Level 1-5

## Curriculum specific Competencies

### Wonderment & Awe

- Our world is wonderfully fantastic and overwhelmingly complex and we are constantly learning more about how it all works
- Science focuses on appreciating as well as attempting to understand our world

### Communicating in Science

- Science is communicated via a wide range of media formats which appeal to different senses
- Science has its own language and the use of scientific language underpins science understanding

### Technology & Science

- Science provides the knowledge and understanding that underpins the creation of new technologies
- A clear ethical framework is required when considering the wisdom of applying new technologies to established and new social contexts

### Participating & Contributing in Science

- Learners develop ideas and scientific values through participating and contributing in science
- Science issues have a direct/indirect impact on everyone, so it is good to engage in scientific debate

### Inquiry (investigating) within Science

- Science is about hypothesising and testing models of understanding
- Scientific inquiry relies on fair testing via a clear methodology and process

## Understanding in Science

### Physical World

- We can represent observed physical patterns via a range of different formats [graphs/equations/diagrams/]
- Energy can be transferred or transformed into other types of energy
- There is a set of universal laws that govern matter, energy, space, and time
- Physical principles can be applied to explain everyday events
- Physical principles can be applied to create innovative applications

### Material World

- The properties of a material dictate its use
- Grouping materials using their characteristics is helpful
- Atomic theory underpins all we observe
- Materials can change by applying different processes
- Chemical reactions represent changes in atomic, crystalline, and molecular arrangements
- Chemical principles can be applied to create innovative solutions

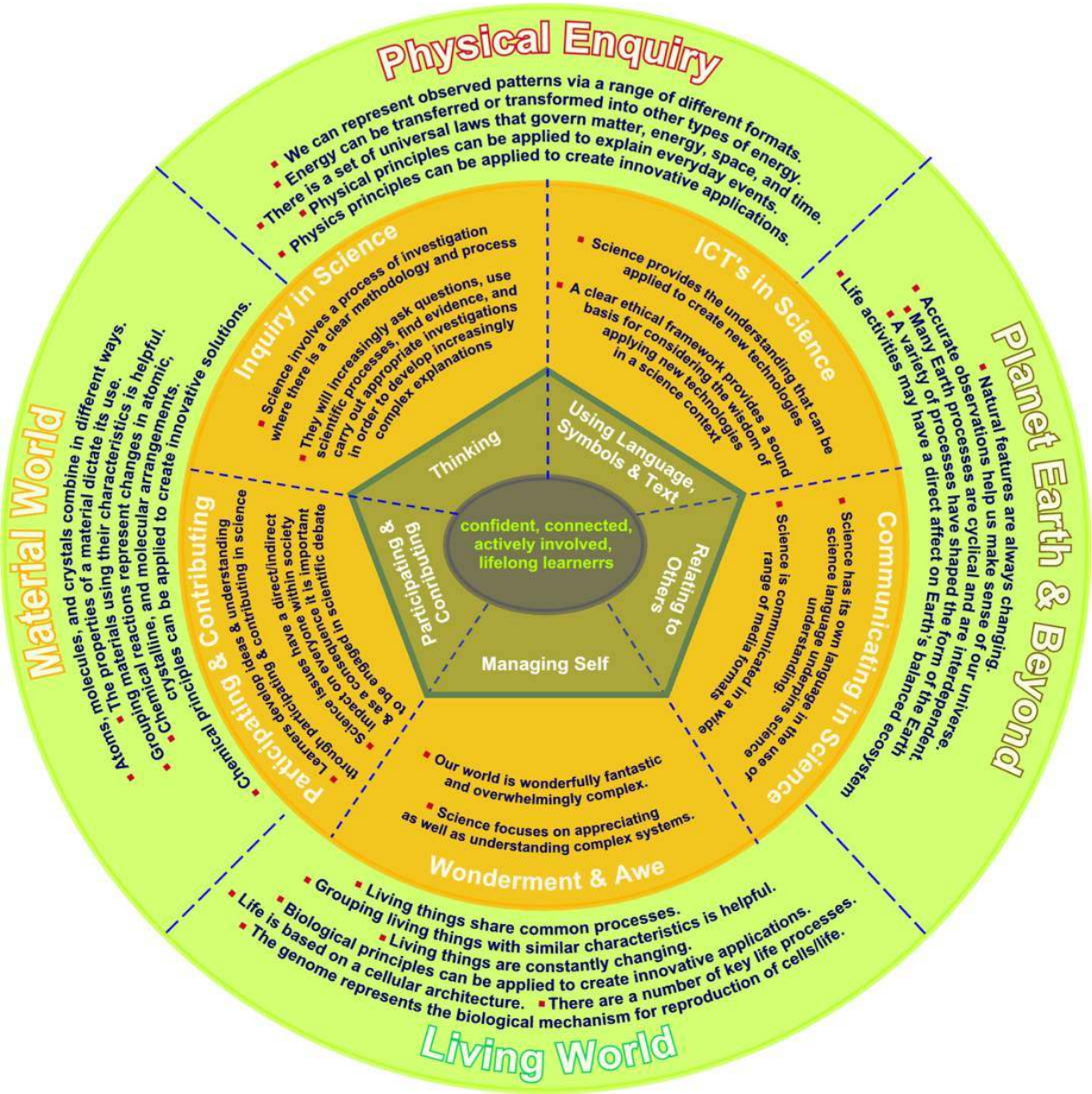
## Living World

- Living things share common life processes
- Grouping living things with similar characteristics is helpful
- Ecosystems contain a range of interdependent systems
- Living things are constantly changing and adapting
- Life is based on a cellular architecture
- Biological principles can be applied to create innovative applications.
- The genome represents the biological mechanism for the reproduction of cells/life

## Planet Earth & Beyond

- Natural features are constantly changing [and this process provides a record of its history]
- Human activity has a direct affect on Earth's ecosystem
- Accurate observations helps us make sense of our universe
- Many earth events are cyclical and are interdependent [and some depend on astronomical bodies other than the earth]
- A variety of processes have shaped and are shaping the form of the Earth and other planets
- Our universe is composed of complex interconnected systems and numerous types of objects

# The Science Framework



| Wonderment and Awe | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|---|---|
| Our world is wonderfully fantastic and overwhelmingly complex. | Our world is amazing, and we take many processes and activities for granted | Patterns and systems show complex interdependencies | Earth systems that appear simple are usually very complex when examined in detail | We simplify complexity to form scientific models and help us understand what we observe | The concept of scale and probability allow scientific ideas to be put into an appropriate context |
| **Learning Intention** | If we carefully observe our world and see what is happening we earn that it is amazing! | We are dependent on many things happening, which we take for granted. If one did not (eg. sun rising or rain falling) we would be in trouble | Simple things – rain falling, breathing, planes flying – are complex, but some core ideas can help us understand how things happen | Accurate models help us understand what happens, so we should always try to refine and improve them via new discoveries | The range in size of objects in our universe is astonishing. Some events are likely to occur, others are unlikely and others will probably never happen |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Science focuses on appreciating as well as understanding our world | | We don't know how everything works or why things happen the way they do | | Science ideas change, resulting in new models of understanding, so we aim to be critically adaptable to new ideas | Extending understanding from a micro to a macroscopic level makes us aware of the complexity of systems |
| **Learning Intention** | | There are so many things we do not understand yet and any one of you could make a new discovery | | To be a scientist means being open to new and novel ideas, then testing whether they explain what is observed | If the microscopic world is complex, then the macroscopic world is intricate beyond belief |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Communicating in Science** | **Level 1** | **Level 2** | **Level 3** | **Level 4** | **Level 5** |
| Science is communicated via a wide range of media formats which appeal to different senses | Science ideas are communicated using many different media | Some science ideas are hard to describe using a single media type | | Many science ideas are abstract and need multimedia prompts in to help us understand them | |
| **Learning Intention** | We see science ideas communicated in many different ways such as television, books and the internet | Due to size or time frames, many scientific ideas are hard to visualise, but using various media can help | | Animations can help us appreciate science ideas we find hard to understand | |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Science has its own language and the use of scientific language underpins science understanding | | Scientific language needs to be precise | Scientific language is used to categorise and show sequence | Interpreting and applying the language of science lets us understand and communicate its ideas | Using scientific language requires the author to be concise, accurate, clear and consistent |
| **Learning Intention** | | Science has a large and specific vocabulary with which to communicate accurately | A lot of science words describe how ideas and things are categorised or sequenced | Science requires a very specific language for it to be understood and communicated | To communicate science ideas, it is important to be concise, accurate, clear and consistent |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

| Technology & Science | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|---|---|
| Science provides the knowledge and understanding which can be applied to create new technologies | | New technologies are often based on scientific discoveries and predictions | Applying scientific theories to creating new technology develops new systems, products and environments | Scientific ideas can be applied in different ways to create different solutions to different needs and opportunities | Scientific ideas underpin technological advancement and there is now a close connection between the two domains |
| **Learning Intention** | | Many new technologies are based on scientific discoveries | Scientific ideas lead to technological applications | One scientific idea can be applied in numerous ways to produce a multitude of applications | Often scientific research is directly linked and funded by technology companies |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| A clear ethical framework is required when considering the wisdom of applying new technologies to established and new social contexts | | Scientific discoveries can have positive and negative consequences for society | Communities need to understand the scientific implications of a new technology before making judgements on its suitability | There can be immediate, short and long-term effects when implementing new technologies | The inter-related, dynamic nature of living systems means there can be unexpected outcomes when we apply new technologies |
| **Learning Intention** | | While most scientific discoveries have benefits for our world some do not | New technologies based on scientific advancements must be scrutinized by the community to assess their long-term value | It is important that the long-term effects of new ideas are tested as these may be different to the short-term effects | Biological/environmental systems are very complex and sometimes it's hard to determine the long-term effects of new ideas and technologies |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Participating & Contributing in Science** | **Level 1** | **Level 2** | **Level 3** | **Level 4** | **Level 5** |
| Learners develop ideas and scientific values through participating and contributing in science | Anyone can come up with scientific ideas if they ask questions, build understanding and test their ideas | By carrying out experiments to test ideas, unexpected results and new ideas can arise | By participating in science, we develop an understanding of its process, including its strengths and weaknesses | Many science ideas and decisions are underpinned by ethical and social issues | Taking part in scientific inquiry illuminates the scientific process and the interpretation of results |
| **Learning Intention** | Thinking about our world and testing our ideas lets us explain our observations | To test whether our ideas might be true, we need to use "fair" experiments | The scientific process is always carried out by people, and sometimes people make mistakes | Science practice has a culture and a set of values, which may skew outcomes and how they are executed | Science is never 100% impartial and by doing "science" this becomes more obvious |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Science issues have a direct/indirect impact on everyone, so it is good to engage in scientific debate | Scientific development affects everyone | Everyone can contribute to science debate via many different forums | There are a number of different drivers behind scientific advancement | Participating in scientific debate demonstrates the importance of precision, consistency and the ability to replicate results | Interpreting the results of scientific processes is complex and there can be different interpretations of experiments |
| **Learning Intention** | Everyone is affected by science ideas | For scientific ideas to be implemented a range of values and ideas must be considered | Most, but not all scientific advancement is done in the best interests of everybody | By doing "science", the value of precision, consistency and the ability to replicate results becomes apparent | Often the outcome of an experiment may not be 100% clear and there may be different interpretations of the results |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Inquiry (investigating) within Science** | **Level 1**[12] | **Level 2** | **Level 3** | **Level 4** | **Level 5** |
| Science is about hypothesising and | Experiments test our ideas to see | Science develops models of how things | A hypothesis is developed from knowledge and | Models of understanding are always changing as | Models represent what we believe may be happening, but |

[12] The levels expressed here are cognitive developmental levels and can only be loosely referenced to age levels

| | | | | | |
|---|---|---|---|---|---|
| testing models of understanding | whether they may be correct | may happen, but we rarely fully understand why things happen or appear as they do[13] | experience then tested via experiments to develop an improved model of understanding | new hypothetical ideas are tested via experiments | they do not always represent what is actually happening |
| **Learning Intention** | We may have a good idea, but we need to test it to see if it works | "Why things happen" can be difficult to work out so we create models to help us understand what we observe | New ideas come from knowledge and experience, and we test them to develop an improved understanding | As more knowledge is hypothesised and more testing takes place, ideas are refined and better reflect reality | Most of our models are estimates of what is really taking place – almost everything we observe is very complicated when investigated in detail |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

| | | | | |
|---|---|---|---|---|
| Scientific inquiry relies on fair testing via a clear methodology and process | A fair test requires there to be no bias in the testing process | Fair testing relies on accurate recording and interpreting of the results of the test/experiment | Fair testing requires us to test just one variable while all other variables are kept constant | Fair testing requires accurate equipment, accurate observations and accurate recording of results |
| **Learning Intention** | It is important to remain impartial when developing a test | If a test/experiment is going to be fair we must accurately record and interpret our results | While testing a variable (dependent) against another (independent) we must keep all other variables constant | The more accurate our testing equipment, the more accurate the results and the more convincing our conclusion |
| **Context** | | | | |
| **Content** | | | | |
| **Sustainability** | | | | |

[13] Harvard-Smithsoinan Center for Astrophysics; Charting the Next Move Annenberg/CPB http://www.hsdvl.org/video.php?record_serial=790 Accessed September 2008

| Understanding Science<br>Physical World | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|---|---|
| We can represent observed patterns by a range of different formats | There are many patterns in the natural world | We need to make good observations in order to see patterns | We can represent patterns in the physical world in different ways | Patterns can help us make predictions | We can graph patterns, which provides us with additional information about events |
| **Learning Intention** | Patterns are everywhere: pictures, things that happen every year, and things that happen each day or every moment | Look for lots of patterns in natural environments and objects. You can see them more clearly by accurately recording events over time | Comparing things that are changing – by recording, drawing and graphing – makes patterns more obvious | Once you know the pattern you can predict what's likely to happen in the future. | Graphs are good at summarising lots of information about events, from them we can predict what may happen in the future |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Energy can be transferred or transformed into other types of energy | There are many different forces and many different forms of energy | Energy must come from somewhere. | Energy can change from one form to another | Energy is always conserved | We can measure energy using accurate observations and specific equipment |
| **Learning Intention** | Forces hold us down, make magnets repel or attract and even blow us over – this energy allows people and machines to work | To work we need energy – food, fuel and electricity are types of energy that supply energy to people and machines | There are different forms of energy and each form can turn into other forms | Energy cannot be destroyed but it can change from one form to another | Energy can be measured in many ways, depending on the form being measured, and some forms of energy are easier to measure than others |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| There is a set of universal laws that govern matter, energy, space, and time | | Different forces have different effects on objects | Forces can cause changes in how an object moves | We can describe forces using different variables which affect each force's resultant actions | Forces can be measured and depend on certain variables |
| **Learning Intention** | | Some forces attract things and some forces push things apart. Not all forces have both effects (there is no anti-gravity force; pity!) | Forces can act on objects and change their speed, or the direction they are travelling in | Forces such as weight depend on variables, like mass and acceleration due to gravity, with each type of force having variables which affect its actions | We can use a range of different ways to measure forces and there are usually a number of different factors that contribute to the nature of the force called variables. |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Physical principles can be applied to explain everyday events | | There are universal laws which govern how objects move and interact with each other | | We are constantly interacting with forces, the result of which can be predicted based on universal laws | Relationships between forces and energy tell us how much energy may be needed to do some work and how much power is produced |
| **Learning Intention** | | How things move and change movement, depends on universal laws that we can use to predict events | | Electrical, gravitational and magnetic forces affect us in different ways | The energy that is transferred to a new form is dependent on the length of time the force is applied |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

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|---|---|---|---|---|
| Physical principles can be applied to create innovative applications | | We can use physical principles to predict how objects interact with each other | The Inquiry process can be used to find new applications of ideas & solve problems | Understanding physical principles provides an opportunity to apply them to meet needs and opportunities |
| **Learning Intention** | | Knowing how objects behave means we can predict their behaviour in controlled situations | Applying the inquiry process to the physical world ideas has been very fruitful. | Based on physical world ideas new products and services can be “invented” |
| **Context** | | | | |
| **Content** | | | | |
| **Sustainability** | | | | |

| Material World | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|---|---|
| The properties of a material dictate its use | Different materials have different properties | | Different properties mean that a material can be used for different applications | | The properties of a material can be applied in a number of ways. |
| **Learning Intention** | There are reasons why we don't we make fabric cars, paper lunchboxes, or metal clothes! | | The properties of a material dictates its use. | | The properties of a material can be changed by heating, adding water, exposing it to chemicals, adding different chemicals . . . |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Grouping materials by their characteristics is helpful | | Some materials have specific properties in common | | We need to make good observations in order to see patterns and sort materials into groups with similar characteristics | Grouping materials can help us make predictions |
| **Learning Intention** | | Some materials can be grouped together depending on their properties | | We can apply simple tests to materials which tell us they belong to groups with similar characteristics | Putting materials in certain groups lets us predict some of the properties without having to test each material |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Atomic theory underpins all we observe | | | | | |
| **Learning Intention** | | | | | |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Materials can change by applying different processes | | Materials can change in different ways when subjected to different processes | Changes in materials can be temporary or permanent | As materials change, they may develop new properties and may be used differently | |
| **Learning Intention** | | Some materials change their characteristics when we apply a process to them | When we change the characteristics of a material, the change can be permanent or temporary | New materials such as Kevlar, carbon fibre, Aerogel, superconducting magnets, Nitinol, conducting polymers, nano materials can be used and applied in new ways | |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Chemical reactions represent changes in atomic, crystalline, and molecular arrangements | | | | We can use symbols and conventions to represent chemical reactions | Properties of materials depend on their molecular and crystallographic structures |
| **Learning Intention** | | | | Chemical reactions can be explained using symbols which summarise the reaction's complexity | Atoms join in different arrangements, and the billions of possible combinations result in the objects we see each day |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Chemical principles can be applied to create innovative solutions | | | Atoms, crystals and molecules can combined in unlimited ways | Understanding chemical principles provides us with the capacity to develop new chemical compounds | New chemical compounds can be applied in new ways to find new solutions to needs and opportunities |
| **Learning Intention** | | | There are unlimited ways in which atoms can combine | By understanding have different chemicals react with each other we can create new chemicals | By developing new chemicals we can then use them in new ways |
| **Context** | | | | | |

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|---|---|---|---|---|---|
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Living World** | **Level 1** | **Level 2** | **Level 3** | **Level 4** | **Level 5** |
| Living things share common processes | Things that are alive, dead or were never alive have particular characteristics | living things share some common processes | Different features of living things carry out particular tasks | Living things have specific features that allow them to live and function in specific niches | Maintaining bio-diverse communities is essential for the survival all the living things in that community |
| **Learning Intention** | We can tell what things are alive, dead or were never alive, by studying their characteristics | Living things do some particular things in similar ways | Living things may look really different, and their features have specific jobs to carry out | Special features allow living things to survive in their unique habitat | We have a responsibility to conserve and maintain biodiversity |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Grouping living things with similar characteristics is helpful | | We need to make good observations in order to see patterns | We can group living things according to their particular characteristics | | Grouping living things can help us make predictions |
| **Learning Intention** | | When we look closer we identify patterns in the features of living things | Knowing groups of living things have similar characteristics helps us understand their inter-relationships and biology | | As groups of living things have similar characteristics of behaviour and function, we can make better predictions of their needs |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

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|---|---|---|---|---|---|
| Ecosystems contain a range of interdependent systems | Fauna and flora are all live in communities | Communities of living things are inter-dependent | Some living things have very specific requirements | The destruction of a single species may have devastating effect on the remaining species in the community | Living communities are operate within an constantly fluctuating equilibrium |
| **Learning Intention** | Animals and plants all live in communities | Living things depend on each other | Some living things require very specific foods/nutrients | If one species is destroyed others may quickly follow suit | Numbers and types of living things in a community are constantly changing |
| **Context** | | | | | Possums, rats, native birds |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Living things are constantly changing and adapting | | We need to make good observations in order to see patterns and changes | Living things tend to go through life cycles | Living things adapt or die out as their environment changes | Living things are based on complex systems and processes |
| **Learning Intention** | | We can draw and record information in tables, and look very carefully to see patterns everywhere in the living world | Each animal and plant goes through a life cycle, growing and changing | Animals have the ability to adapt to changes in their environment as long as they have enough time | Living things are complex, but indentifying life processes and seeing how they are inter-connected helps us understand the nature of living things |
| **Context** | | | | | Energy use, food supply, security, natural and manmade genetic changes |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Life is based on a cellular architecture | | | | Cells form the basis of living things | Cells are composed of specific organelles which carry out specific tasks |
| **Learning Intention** | | | | All living things have the cell in different forms with unique capabilities as basic biological building block | Cells all have some common characteristics we can investigate |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Biological principles can be applied to create innovative applications. | | | Biological principles can be applied in many ways | Biological principles can be adapted to create new opportunities | Clear ethical guidelines are required In order to guide research |
| **Learning Intention** | | | Humans have been manipulating biological principles for millennia | Scientists can adopt or adapt biological principles to create innovation solutions/applications | Many emerging innovations in biology clash with some people's beliefs |
| **Context** | | | Managing bees in hives, herds of cows or cross pollinating flowers | | Cloning, genetic modification, |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| The genome represents the biological mechanism for reproduction of cells/life | | | | The genetic code provides a blueprint for life | Cells reproduce and pass on the genetic code |
| **Learning Intention** | | | | Our code for what and who we are is contained in each cell in our bodies | The ability to pass on and recombine our genetic code creates difference and new possibilities |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

| Planet Earth & Beyond | Year 0-3 | Year 2-5 | Year 4-7 | Year 6-9 | Year 8-11 |
|---|---|---|---|---|---|
| Natural features are constantly changing | Natural features sometimes change slowly | We need to make good observations in order to see patterns | Changes are caused by processes we can observe | By recording changes we can project future events | Small changes over small lengths of time result in massive changes over very long periods of time |
| **Learning Intention** | Trees, the sky, stars at night are all changing and moving, but very slowly | Observations over time show that Earth is continually changing and there is often a pattern to these changes | Erosion, earthquakes, and volcanoes are constantly changing how our Earth looks | If we record changes such as temperature, ozone levels, air pressure and other variables we can start to make predictions about our Earth | Many of the changes that are happening to Earth are changing slowly and we need to make careful observations to notice them |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Human activity has a direct affect on Earth's ecosystem | | Human activity affects the Earths ecosystem | The scale of human activity is now substantially changing the Earths ecosystem | Sustainable practices are critical in order for the Earths to accommodate the human species | The Earths ecosystem is complex collection of equilibriums |
| **Learning Intention** | | What we do affects our planet | The activity of humans is now having a direct impact on the Earths ecosystem | We urgently need to change our day-to-day activities and make them sustainable | Many of the systems that make up the Earths ecosystem have a direct affect on each other |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Accurate observations helps us make sense of our universe | | | Other objects outside of the earth can affect us | Earth is one small part of a universe | Good observations allow us to make predictions |
| **Learning Intention** | | | Stars, comets, "falling stars" and the moon are just some things "out there" that can affect us | We are a small but very important part of a very large universe | To mitigate human impact we need to make good observations that provide key information so we can make decisions for long-term sustainability |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Many Earth processes are cyclical and are interdependent | | Many patterns repeat themselves over short or long periods of time | | All living things are interdependent and dependent on their environment | Predicting global changes requires careful investigation of records and accurate recording over long timeframes |
| **Learning Intention** | | Many of the patterns we observe affect us and our actions can affect earth's natural patterns | | Affecting one environmental system has a flow-on effect on almost all other systems | Climate, geological events and atmospheric events all occur over a long time and changes in these systems are to be expected |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| A variety of processes have shaped the form of the Earth and other planets | | | | Almost every aspect of our Earth is dynamic when viewed over long periods of time | All planets are dynamic and have unique change processes |
| **Learning Intention** | | | | Our planet is anything **but** unchanging: with volcanoes, earthquakes, tectonic movement, atmospheric aberrations and events beyond the earth constantly having an impact. | The earth is one of numerous planets and moons in our solar system, and planets may also exist in other solar systems. These other objects are very different from our planet |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| Our universe is composed of complex interconnected systems and numerous types of objects | | Our world is just a small part of our universe | Earth, other planets and their moon's orbit the sun and this gives rise to a range of different phenomenon | The earth and our solar system are part of the Milky Way galaxy | Our galaxy is just one of millions that make up our universe which contain a huge range of unusual objects |
| **Learning Intention** | | We're just a small part of a very large universe | Night and day, phases of our Moon and different seasons are all due to how each planet and their moons orbit the sun | We are part of a "local" cluster of stars known as the Milky Way galaxy | There are some extraordinarily unusual objects in our galaxy and the millions of other galaxies in our universe |
| **Context** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

# Scientific Inquiry[14]

In the overarching model for teaching and learning which we presented earlier (see diagram 42.20) we presented inquiry as a key capability, which along with the competencies bound the set of curriculum elements into a common framework. Each discipline has its own unique interpretation of the inquiry process, including its own particular modifications. The scientific inquiry process modifies the generic inquiry process.

In the scientific inquiry process the preliminary knowledge often comes in the form of an observation. This may be an observation which has been made many times within many contexts but for some reason the observation being made this time is connected to other embedded concepts and ideas in the mind of the owner and new linkages are made that cause the owner to start questioning or proposing possible new explanations. The result of this may be the learner researching the implications of the observations or the new knowledge following a key line of questioning or a hypothesis.

One of the key issues around scientific inquiry is that in the past most science experimentation has been at the instigation of the teacher/educator. In this model the learner begins at the very early age designing their own experiments. The essence of science revolves around experimentation and developing new models of understanding. It is considered imperative that young scientists learn how to construct appropriate experiments which our fair and are evaluated using quantitative data.

[14] Stewart, Carolyn et all; Southbridge School; “Inquiry Model” http://www.southbridge.school.nz/downloads/inquiry_model.PDF Accessed October 2007

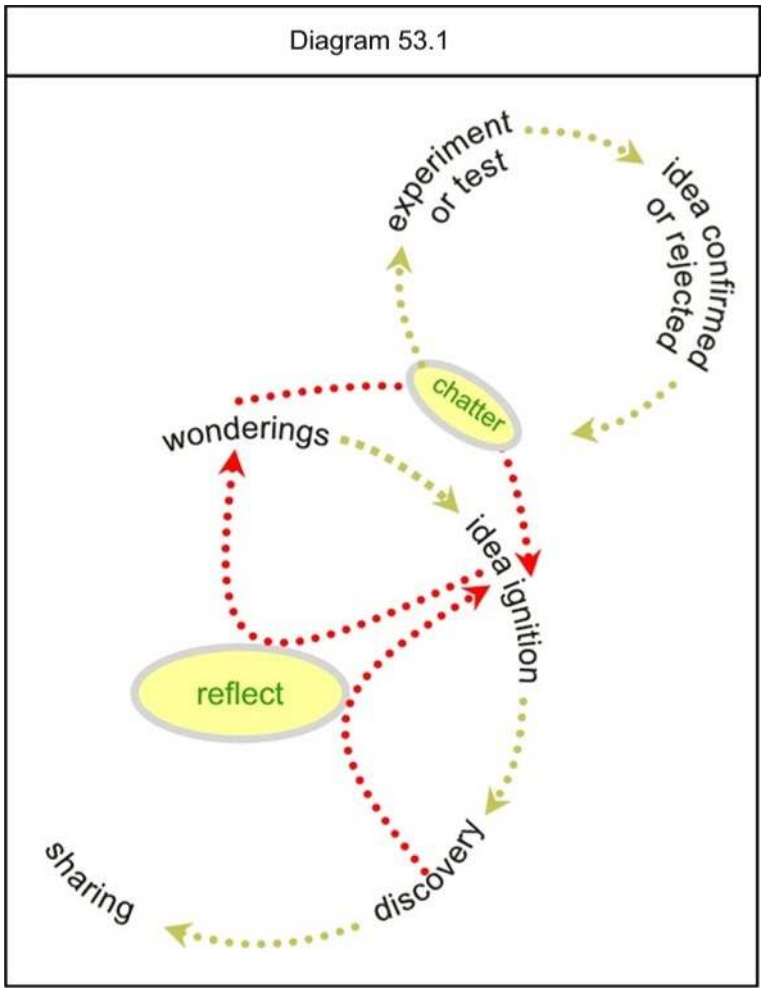
## Level 1 Scientific Inquiry

An observation may be considered only fleetingly, but it may be one that the learner would share with their peers, parent/caregiver, or an educator. This may encourage the learner to pursue more understanding around this observation, or new knowledge that they may have accessed.

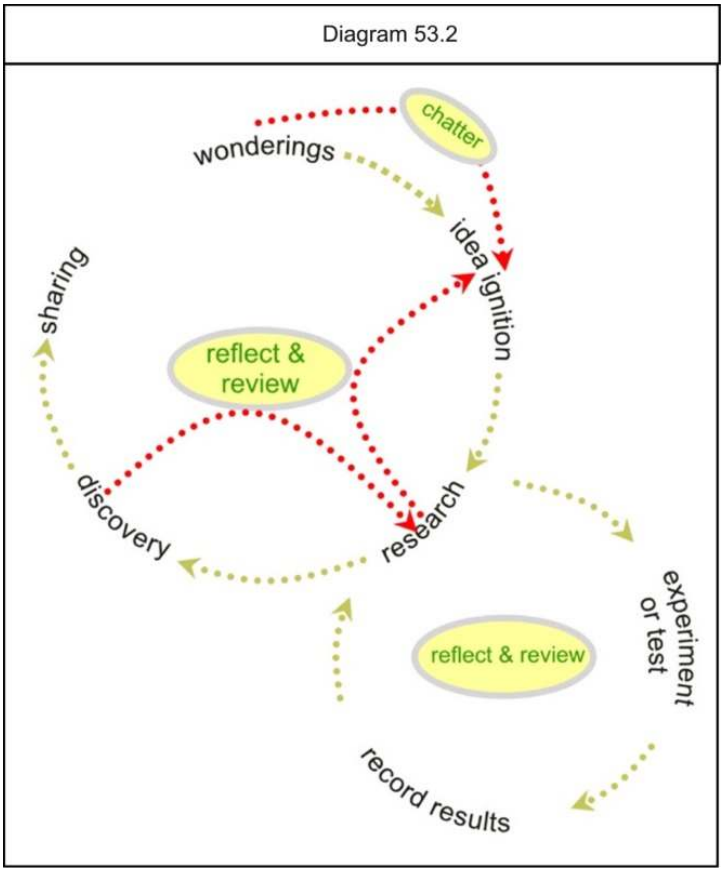
Capturing these opportunities to encourage the learner's desire to understand is a key role of every educator: whether in the formal school sense, or in the home, playground or classroom. Through the first five years at school it is important to introduce the learner to simple tests, experiments or research to see whether the idea is within a framework of understanding that the learner can contemplate, considering their cognitive capabilities.

"Chatter" is the link to the instigation of experimentation, testing or research. Ideas which are ignited through this process and the resulting discoveries can then be shared with their peers, with the classroom and also with parent/caregivers.

Diagram 53.1



## Level 2 Scientific Inquiry




The concept of research is introduced. Experimentation or testing is seen as part of the research process and moves into this phase of the scientific inquiry process.

Too often in science teaching programmes this aspect is completely ignored until late in the tertiary education stage, and yet it is pivotal, both as part of the process of scientific investigation but also an essential element of critical thinking. Interpreting the outcome of an experiment is also introduced at this level, beginning with a very superficial level of approach that builds each year, over five years.

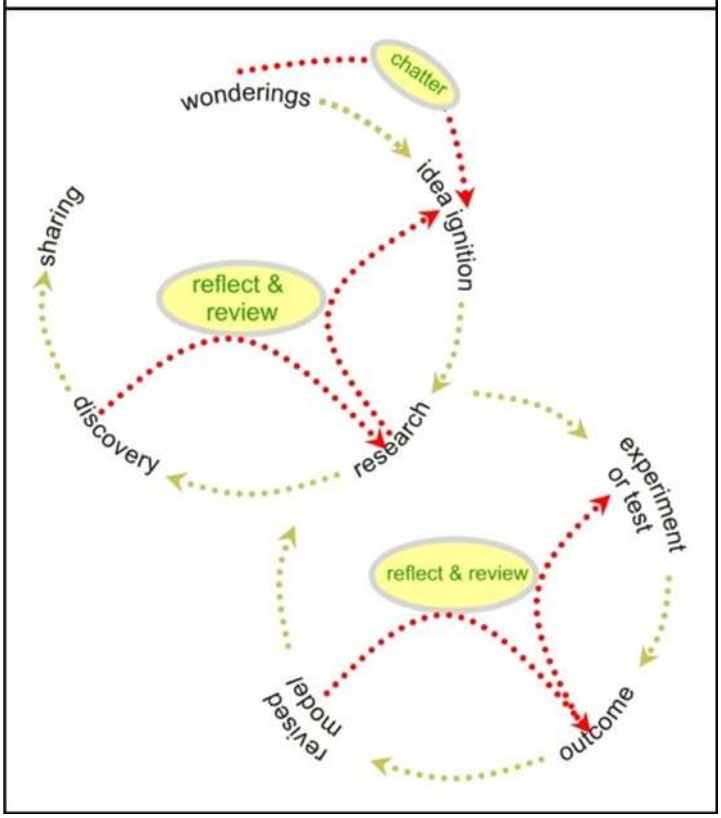
Science is about constantly revising models of understanding. So it is important that learners appreciate the dynamic nature of discovery within science and every other discipline. Students are also encouraged to build capability around the "reflect and review" process during this developmental sequence.

Initially, learners are encouraged to discuss outcomes of testing, experimentation and/or research to look at the implications of what they have discovered, and over time build the capability to review. Reviewing the work which has been done based on their reflections, eventually provides the basis for (in the next phase), iterating experimentation, testing and research to further refine the learner's understanding.

## Level 3 Scientific Inquiry

At this level the concept of research is further developed and the ability to develop a fair test is increasingly expected. The experimentation process and recording of results becomes more accurate and more deliberate.

Diagram 53.3



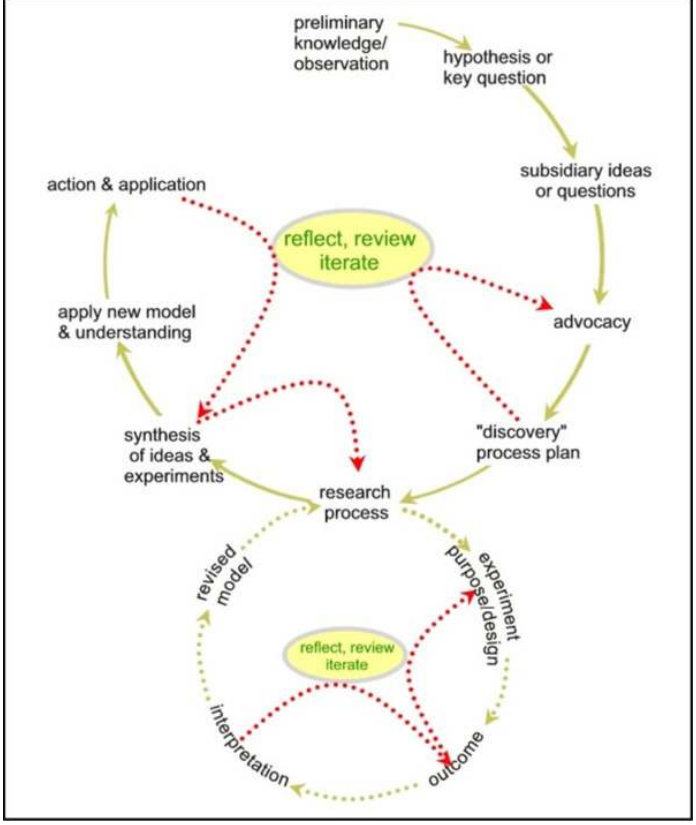

Interpreting an experiment's outcome is also introduced, firstly at a superficial level which builds over the 2-5 years. Thinking critically about how the results influence their ideas/concepts about science is the essence of the scientific process and as such this is a critical developmental stage in science learning.

Science is about constantly revising models of understanding and it is important that learners appreciate this dynamic nature of discovery. Students are also encouraged to build capability around the "reflect and review" process during this developmental sequence. Initially learners are encouraged to discuss the outcomes of testing, experimentation and/or research to look at the implications of their discoveries, and over time build a review capability. Reviewing requires the learner to reflect on their processes to see how they can improve the accuracy of their experimentation.

Reviewing the work by trying the experiment again or revising it to see what difference that makes, provides the basis for (in the next phase), intuitively refining the experimentation process. Testing and refining research and experimentation is a difficult concept that requires learners to go "backwards" in order to go "forwards" in order to develop a better result. This will ideally lead to a greater understanding.

## Level 4 Scientific Inquiry

Diagram 53.4




At this stage, a critical element of the scientific investigation process is the development of “designing” experiments, based around the purpose of the experiment or testing process. At the beginning of this three-year developmental sequence this work is almost superficial in its nature, encouraging the learner to contemplate how they might design a "fair" experiment or a test to see whether a hypothesis has any particular merit.

Designing a “fair” test or experiment requires that the learner understands the concept of variables: elements that may influence or corrupt the results of the test or experiment. It is a critical step forward in scientific inquiry, that learners grasp the importance of all variables staying constant except for the one being investigated.

What has also changed significantly is how the results of the research, experimentation and testing process are synthesised to develop the new model of understanding. The research and the resulting synthesis of ideas become more sophisticated through the three years of development. Educators are also looking for the underlying development of appropriate knowledge and understanding as well as the application of the improved model of understanding. Understanding the implications of how these applications will be applied is also important.

The concept that there are social consequences of scientific investigation comes at an age where cognitively the learner begins to realise the consequences of their actions. In the scientific inquiry process, learners start to investigate: the theoretical and subsequent practical applications of nuclear physics, the internal combustion engine/jet engine, plastics, electricity and many other scientific innovations and inventions which not only create social consequences, but are also having a massive impact on the planet in previously unimaginable ways.

## Level 5 Scientific Inquiry

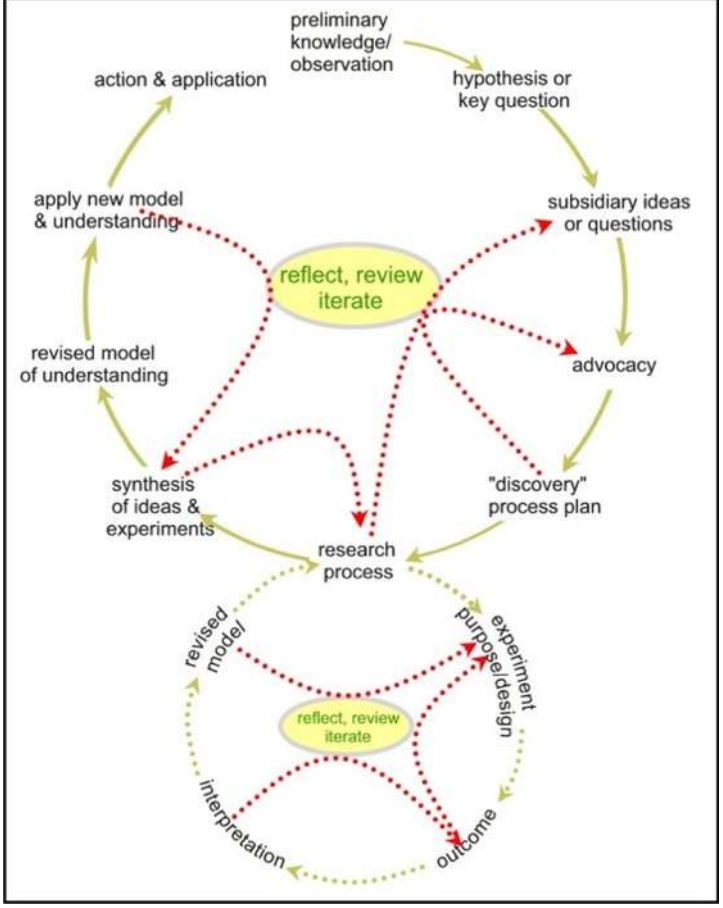
Increasingly sophisticated hypotheses require greater knowledge and experience around "fair" testing procedures, to empower learners to design more sophisticated experiments and tests. In particular this means taking into account error margins: variables which need to be eliminated so that the resulting experimental data can accurately represent the relationship being investigated.

The results of the Programme for International Student Assessment (PISA)[15] increasingly looks at the use of scientific evidence, synthesis of ideas, the ability to draw out conclusions, and the ability of learners to be able to recognise fair testing. These elements are all recognised within the process of scientific inquiry.

Science is progressively being seen as more than simply remembering a body of facts.

***"Science is not a body of facts. Science is a state of mind. It is a way of viewing the world, of facing reality square on but taking nothing on its face. It is about attacking a problem with the most manicured of claws and tearing it down into sensible edible pieces. . . "Many teachers who don't have a deep appreciation of science present it as a set of facts," said David Stevenson, a planetary scientist at Caltech. "What's often missing is the idea of critical thinking, how you assess which ideas are reasonable and which are not.""***[16] **Natalie Angier**

Diagram 53.5




[15] OECD; Program for International Student Assessment; 2008; http://www.oecd.org/dataoecd/15/13/39725224.pdf Accessed October 2008

[16] Angier, Natalie; "The Cannon: A Whirligig of the Beautiful Basics of Science"; P19; Houghton Mifflin Company; 2007 ISBN 0-618-24295-3

# A Sample Competence: Managing Self

Managing self is a critical aspect of growing up. One of our intrinsic responsibilities as educators is to assist in this process. Managing self is a set of capabilities which underpin the successful acquisition of "lifelong learning" capability, and as such now needs to be explicitly taught in classrooms in a developmental and competently appropriate manner.

This competency is about developing autonomy in the context of community i.e. inter-relatedness. This is a critical tension in any community and in the minds of individuals within it.

This competency is about developing a healthy mind and body. The development of this competency is linked closely to the learning area: Health and Physical Education. Managing self and maintaining a healthy body are closely inter-related, and the process of thinking is reliant on a healthy body.

This competency is about developing a reflective, metacognitive approach to managing self. The ability to reflect on the thinking, sitting, being: mentally and physically healthy.

> ***"Perhaps the most compelling reasons to value this competency is that there is highly correlated with learning success in school and in tertiary study. The first PISA study found that students who we using self-regulating learning strategies were more likely to perform to higher levels on the reading literacy scale than students who did not."***[17]
>
> **Rosemary Hipkins**

Interestingly this is one competence that most educators constantly remind learners to develop capability around. Once again, the historical approach of teaching this capability implicitly is not obvious enough to most students. We now realise the necessity to teach this capability explicitly, by building a knowledge base around the competency and then encouraging learners to practice the competency within a wide range of different contexts.

Managing self can be expressed in numerous ways, including everything from demonstrating persistence, to the capacity to be prepared and to show initiative. These competencies take time and experience to develop. Each of the concepts has developmental timelines and in some cases we are expecting learners to manage themselves when they cannot cognitively do so in particular areas. Where learners are unable to develop concepts from a cognitive perspective – but in the interests of safety or self-development need to be able to practice a particular capability – the competency concept may have to be learnt by rote, which is the alternative to learning the concept. This results in the learner having to rote learn each particular contextual application of the concept.

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[17] Hipkins, Rosemary; The Nature of the Key Competencies: A Background Paper; P34; NZCER 2006 http://www.nzcurriculum.tki.org.nz/content/download/442/3585/file/nature-of-k-round-paper.pdf *Accessed October 2008*

# Managing Self

## Managing my Future

- Planning increases effectiveness and efficiency and opens up opportunities
- Setting challenging goals tests commitment
- Understanding my worldview provides a guide to strengths and weaknesses
- Intellectual courage allows new ideas to challenge present understanding
- Lifelong learning is dependent on confidence, connection and active involvement
- Effective time management ensures reliability and opportunity
- A wide range of experiences provides a stronger framework for decision-making

## Managing my Gifts & Talents

- Resourcefulness is more powerful than resources
- Intrigue and curiosity drives learning
- Developing physical and intellectual strengths and weaknesses is rewarding
- Having the confidence to be innovative and creative provides new opportunities
- Risk is almost always uncomfortable; not taking risk is debilitating

## Managing my Emotions

- Awareness and management of conflict points is empowering
- There is a time for cooperation and a time for independence
- Love and respect are powerful emotions
- Success pivots around balancing certainty and uncertainty
- Emotion drives motivation
- Being comfortable in your own skin
- Passionate people drive change
- Managing impulsivity is part of personal discipline

## Managing my Values & Principles

- Moral courage builds character and influence
- Respect for others comes from respect for self
- Curiosity is the doorway to discovery
- Resilience comes from a belief in purpose
- Beliefs stem from worldview and can be changed
- Our values can provide a baseline for our actions

| Managing My Future | Level 1[18] | Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|---|---|
| **Planning increases effectiveness and efficiency and opens up opportunities** | Planning lets people know what will be happening | Planning causes organisers to think through the event or process in more detail | Planning helps predict and solve potential problems | Planning allows you to schedule time and resources . . or: Failing to Plan = Planning to Fail | Planning includes being flexible and adaptable as things change |
| **Learning Intention** | If we plan something, then we know what will probably happen | By making plans, it makes us think through what we will be doing and solve potential issues | By having a plan we can predict what we will need, how much time we will need, and who should be informed | When you plan, you have to think of what things you will need and who will do what needs to be done | Events rarely go strictly according to plan so expect changes to be made and be flexible when considering options |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Setting challenging goals tests commitment** | Completing tasks takes perseverance | Deciding on goals makes you more committed | Setting goals which are challenging encourages extra effort | Developing strategies to meet goals makes them more attainable | It is sometimes necessary to adjust goals to meet new circumstances |
| **Learning Intention** | To finish a job we sometimes have to just keep working at it | Goals set us challenges which we want to achieve so we can see the reason for persevering and being committed | Challenging goals are goals that extend us beyond what we think we can achieve | Some goals are simple and others require us to devise strategies in order to meet them | Setting challenging goals means sometimes we should expect that the goal cannot be met and may have to be revised |
| **Contexts** | | | | Olympic athletes, scientists, researchers, Presidents, Prime Ministers, other leaders… | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Understanding my worldview is a guide to my strengths and weaknesses** | We all see the world differently | Not everyone sees you or your world the same as you do | Sometimes other people can see our strengths more clearly than we can | Sometimes other people can see our overall capability more clearly than we can | Knowing our strengths and weaknesses lets us develop a balanced intellectual and social personality |
| **Learning Intention** | How we see things is different to everyone else | How you see you and how others see you will be different | Sometimes we can see our weaknesses more clearly than our strengths | We need feedback on our strengths and weaknesses from friends | It is important to have a balanced life, in our school and social lives |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Intellectual courage allows new ideas to challenge present understanding** | Where do ideas come from? | It is important to be critical of why you believe what you do | Trusting in your ideas requires good cause | Adapting ideas is required as new knowledge, experiences or ideas are discovered | Feeling confident helps challenge world view notions |
| **Learning Intention** | All ideas come from somewhere | Reflecting on what we believe and why we believe it reaffirms or challenges what we thought we knew | Before we trust in our own ideas or someone else's we need to be able to trust their thinking | To build courage around your ideas and thoughts they must be grounded in knowledge and experience | When you have confidence then you are more likely to challenge your own and others' thinking |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

[18] The levels expressed here are cognitive developmental levels and can only be loosely referenced to age levels

| | | | | | |
|---|---|---|---|---|---|
| **Lifelong learning is dependent on confidence, being connected and being actively involved** | We are all learning new things all the time | Confidence helps us learn faster, and not get too worried when we find learning hard or when we make mistakes | Having other people to work with means learning is more fun and we can help each other | Lifelong learning requires working with others and being actively involved in solving problems | Lifelong learning is about creating new knowledge and understanding |
| **Learning Intention** | If we are reasonably confident then we will "give things a go" | Believing that you can do something means you probably will achieve it | We can team up with others and make good social connections when learning and thisenables us tolearn from the different skills and worldviews of others | We learn best when we get involved and become active participants in the learning process | We don't know what we don't know so we constantly need to keep inquiring about our world |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Effective time management ensures reliability and opens up opportunities** | Time can only be used once | Good use of time relies on planning it wisely | "Busy-ness" doesn't always equate to getting good results | Reflecting on the productivity of time use provides an indicator of effectiveness | |
| **Learning Intention** | | If we don't plan to use time wisely then it tends to disappear and we have nothing to show for it | Planning use of time requires allocating amounts of time to each part of the process | With practice, learners can estimate how long it will take to do different jobs within the inquiry process | |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Experiences and knowledge provide a stronger framework for decision-making** | Choosing an option means comparing each option | Making a decision requires knowledge about the options on offer | Having some experience with the options on offer is likely to result in a good decision | Decision-making requires a combination of experiences and knowledge | To make the best decision it is important to anticipate the possible outcomes of each option |
| **Learning Intention** | It is important to know what the differences are between our options | Making a decision is easier if you know more about what you are deciding | In decision making experiences about the options makes decision makes a good choice more likely | In decision-making, experience and knowledge of the options makes a good choice more likely | Understanding the consequences of each option means making a good choice is more likely |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

| Managing My Talents & Gifts | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|---|---|
| **Resourcefulness is more powerful than resources** | There are many ways to solve problems | The first solution to mind may not be the best solution | Coming up with a number of solutions gives us options | Brainstorming, synthesis of ideas and lateral thinking offers other possibilities | Being resourceful can solve problems with fewer resources |
| **Learning Intention** | Most problems have more than one solution (Eg. What's the best way home from school?) | We tend to choose the easiest or the best-known solution but this may not be the best solution | With too few or too many options, good decisions are less likely | To increase the number of solutions we should conduct brainstorming and mind mapping exercises | The best solution is often the simplest and often the one that uses the least resources |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Intrigue and curiosity drives learning** | Curiosity encourages a desire to understand what is observed | Individuals quite often have particular themes or ideas which stimulate their curiosity | Ideas that are intriguing often attract our attention | As understanding increases and the ability to question increases, our intrigue increases | If we know what drives someone's curiosity, this can be used to drive learning |
| **Learning Intention** | If we like doing something, we are usually quite good at it | We are often curious about particular themes such as animal life, astronomy or motors | Ideas which are intriguing attract our interest because we want to find out the rest of the story | The more we understand, the more questions there are | We are always keen to learn about things that make us curious |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Developing physical and intellectual strengths and weaknesses is rewarding** | Working on our strengths is enjoyable and initiates good feedback | Competence within our areas of weaknesses is important | Inevitably our strengths will eventually rely on areas where we have weaknesses | We can gain competence in all areas | Establishing levels of competence across all areas increases the possibilities for innovation and ingenuity |
| **Learning Intention** | We like doing what we are good at | We need to make sure we improve on our weaknesses so we are competent | At some point we each need a level of competence in areas where we may have weaknesses | There is no truth to the idea that people are not capable of being good at certain things | Innovation and ingenuity are limited if we only have ideas in some specialised areas |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Having the confidence to be innovative and creative provides new opportunities** | Learn to like yourself | Building confidence means setting realistic but challenging goals | Manage self talk, ensuring that it is positive and has substance. Be inspired by others[19] | Ensure that issues are kept in perspective | Confidence comes with experiences which encourage and challenge our thinking |
| **Learning Intention** | Liking yourself is the first part in building confidence | Confidence can be built by setting challenging goals and meeting them | It is important that when we talk about our own ability to ourselves we talk in a positive manner | Everybody has weaknesses and strengths, and our weaknesses need to be kept in perspective | When thinking and knowledge is challenged and we meet that challenge, it builds our confidence |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

[19] Robbins, Tony; "Why do we do what we do?"; YouTube http://www.youtube.com/watch?v=Cpc-t-Uwv1I&feature=related Accessed October 2008

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|---|---|---|---|---|---|
| **Risk is usually uncomfortable; not taking risk is debilitating** | There are risks everywhere | Managing risk means assessing the risks we face, then putting strategies in place to offset those risks | Risk decreases with increasing knowledge and understanding | Risk can be assessed and perceived risk is often greater than the real risks | Wisdom is required to judge risk |
| **Learning Intention** | Life is dangerous | Through good planning we can manage risk | By having a greater knowledge and understanding of the risks we face we can prepare for the outcome of risk | Quite often perceived risk and the real risk are quite different | It takes experience and knowledge to make wise decisions when judging the amount of risk we are opening ourselves up to |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

| Managing My Emotions | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|---|---|
| **Awareness and management of conflict points is empowering** | We all have feelings | We get angry for many reasons | Conflict can happen because we misunderstand each other | Conflict is inevitable but can be resolved through sharing ideas about our differences | Differences in worldview cause conflict but there are common elements in everyone's worldview |
| **Learning Intention** | We have many different feelings | Sometimes our feelings may include anger towards others | Often we feel angry at someone because we misunderstand something they did or said | Conflict is inevitable, but being strong enough to talk through the conflict can quickly defuse it | Because we will see the world differently we can sometimes wrongly interpret what we see |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **There is a time for cooperation and a time for independence** | We need each other for lots of reasons | Sometimes we work best on our own and sometimes we get better results working with others | Cooperation requires that each member contributes | The contribution of individual members to a group is almost never equal | No one else shares our worldview, so there will be a balance of cooperation and independence |
| **Learning Intention** | We enjoy having lots of friends and family to talk with | There are times we like to work on our own and times when we need to work with other people | Working together means that everyone has to contribute | Each person contributes different resources, ideas, inspiration, knowledge, communication, and fun | A balance of cooperation and independence depends on personality, expertise and feelings |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Love is the most powerful emotion** | We all love other people | Other people love us and that shapes our character and who we are | Love is an emotion, and as such does not need to be rationalised or justified | People we love and that love us won't always agree with each other | To maintain love, the words Sorry, Thank You and Please are essential |
| **Learning Intention** | We love those people closest to us | The people closest to us love us for who we are | Emotions aren't things we decide to feel, but we can choose to manage and change or sustain them | People will disagree with each other all the time, which doesn't mean they don't love us | One of the keys to sustaining friendship and love are the words Sorry, Thank You and Please |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Success pivots around balancing certainty and uncertainty** | We like surprises and we also like knowing what is going to happen in our lives | When things are uncertain we can be anxious unless we are confident in solving our problems | We need to take risks to discover and learn, and risk-taking causes uncertainty | We need to be comfortable with a degree of uncertainty | We gain confidence in uncertain times by increasing our knowledge and understanding of our world |
| **Learning Intention** | We love surprises and we love knowing what is going to happen – both release emotions | Being able to solve problems allows us to be confident in changing times | People who love us will try and reduce the risks we take | Life is less predictable than ever and we need to learn to live with this | Understanding our world gives us frameworks which can adapt quickly to changing times |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Emotion drives motivation** | Motivation depends on what interest us | Failing is part of learning | Motivation can be increased via well-directed and structured questions by others | Motivation can be increased via well-directed and structured questions by self | Emotion drives motivation |
| **Learning Intention** | If we are interested then we will be motivated | The person who is not failing regularly is not trying hard enough | Ideas we have knowledge about and intrigue us, are ideas we are motivated to learn more about | If we can ask ourselves questions then we can be self-motivated | If we feel emotion about a particular idea then we will be internally motivated |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Being "comfortable in your own skin" is key to fulfilment** | Everyone has a range of gifts and talents packaged within a personality | We can be more confident if we know what we are good at and work on improving our areas of weakness | Being comfortable "in your own skin" is foundational to happiness | In life there will be good times and hard times and it is important to get a big picture perspective before making major decisions | It is important we do not take ourselves and our actions too seriously |
| **Learning Intention** | Everyone comes complete with a set of gifts and talents wrapped within a personality | If we know our strengths and what needs work, we can build confidence by filling in the gaps | We need to be happy with who we are, and not try to be something we were not designed to be | Good times and bad times develop character and in the bad times we can learn much more | We need to work with ourselves and our environment and learn to laugh at ourselves |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Managing impulsivity** | Impulsive behaviours can be good or bad | Reflecting on consequences before acting on intuition is important | Knowing which behaviours affect other people negatively helps reduce personal stress | Strategies to manage ongoing impulsivity can help manage more extreme behaviours | Wisdom is knowing when to take time to reflect before acting |
| **Learning Intention** | Impulsive people can be fun but sometimes dangerous | In some situations we should reflect on our thinking before taking action | We need to realise when our actions cause other people distress | Everyone makes mistakes, making the same mistake often needs to be dealt with | Wisdom is knowing when to apply the rules and when to disregard them |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Passionate people drive change** | We enjoy being with people who are enthusiastic | We are inspired by other people | People who inspire us are generally passionate people | Passion comes from a deep belief in an idea or principle, and realising our responsibility to influence others | Always reflect, review and question what you are passionate about as passion can sometimes blind us to the truth |
| **Learning Intention** | People who have lots of energy and ideas are fun to be with | What other people do can motivate us to do even better | People who are passionate about their beliefs often achieve a lot in life | Deeply held beliefs and values underpin passionate lives | It is important to reflect on what we are passionate about |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

| Managing My Values & Principles | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|---|---|
| **Moral courage builds character and influence** | Knowing what the “right thing” to do is, allows you to build moral courage | Moral courage is doing the “right thing”, even when it is not easy | Hard decisions help build moral courage | Wisdom is demonstrated through moral courage | Applying wisdom with consistency means practicing social risk-taking |
| **Learning Intention** | In order to do the "right thing" you need to know what the "right thing" is | It is easy to do the right thing when it is easy to do the right thing! | Doing the right thing in difficult situations helps build moral courage | By applying moral courage you also build wisdom | To make wise decisions sometimes requires talking to your peers in a different way |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Respect for others comes from respect for self** | Everyone deserves respect for who they are | Sometimes people are different in some way | Difference adds diversity to our world and we should learn from diversity, and not fear it | Integrity means looking for the good in others, but realising that respect for self requires discipline | When people feel good about themselves, they will respect others |
| **Learning Intention** | Respect is about appreciating people for who they are rather than what they do | Everyone is different in some way | It is differences that attract us to people as much as similarities | Respecting self requires discipline | Feeling good about yourself helps other people respect you |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Curiosity is the doorway to discovery** | The world is a curious and unpredictable place | People are curious and unpredictable | It takes discipline to follow our curiosity and discover explanations | Following curiosity involves taking risks and developing lifelong learning capabilities | Seeking out answers and explanations will ensure that life is full of curiosity |
| **Learning Intention** | We understand little about the world and there is so much to learn | People often do not act in a predictable way | Curiosity initiates learning, but discipline completes it | Curiosity, discipline and risk are key to developing lifelong learning | |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Resilience comes from a belief in purpose** | People respond differently to bad news | Resilience relies on our ability to adapt to new circumstances | Adapting to new circumstances requires us to be resourceful | Resilience means having people who are there for us in good times and bad | Resilience is easier when you stand back and take a long-term view of life |
| **Learning Intention** | Bad news has a different effect on each person | Being resilient means overcoming hardship and disappointment | Resilience also means adapting to and learning from new circumstances | Resilience requires discipline combined with support and encouragement | Taking a long-term view can make it easier to overcome short-term disappointment |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |
| **Beliefs stem from worldview and can change** | We all have beliefs about our world and the people we share it with | Our worldview influences what and who we believe and trust in | We can have quite strong beliefs and ideals about how we should behave | Who and what we believe, will change in nature and in depth | When we take beliefs seriously we commit to them and help ensure they become a reality |
| **Learning Intention** | What we believe can change: from believing in Santa, to believing we hate chocolate | Our experiences in the past sometimes affect the people we choose to trust | We know how we should react or behave, but we can be tempted to take short cuts or not quite do as we would hope | Our ideals and beliefs keep changing, both in what we believe and how deeply we hold those beliefs | Committing to our beliefs comes from reflecting on and questioning them, as well as experiencing challenges to them |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Our values can provide a baseline for our actions** | We all have different attitudes to different ideas, places, people, objects and activities | Values are deeply held ideas which guide our behaviours | When we reflect on our values and know them deeply, we can react intuitively to events | Reflecting on our vales reinforces them | Our values will change over time |
| **Learning Intention** | Different values and beliefs affect how we behave | How deeply we believe in our values will affect how we behave | If we are clear and reflect on our values, we will apply them intuitively | Reflecting on and questioning our beliefs reinforces them, and refines our behaviour | By reflecting and questioning we will adapt our values and change how we react to events |
| **Contexts** | | | | | |
| **Content** | | | | | |
| **Sustainability** | | | | | |

# A Sample Unit of work

The full text explains the complete process of implementing the curriculum scaffold that follows. The scaffold only extends to level 5 which for some students would equate with the end of year 10. A brief overview:

## Stage 1:

The scaffold contains the concept framework and the interpretation of each of the developmental concepts in terms of the learning intention which would be made explicit to the learners in a language they can relate to.

The table is composed of two sections

- The specific "learning area competency" concepts e.g. "Science Specific Competencies"
- The learning area concepts e.g. "Understanding in Science"

- A working group of staff are provided the scaffold and they review the development of the concepts and check that it is appropriate for their learners. The group then develops possible contexts for a particular at a particular level from the concept progressions in "Understanding in . . . ." section of the table. A level one Social Science concept has been chosen for this exemplar.
- Appropriate contexts are then inserted into the table
- Once the contexts are defined this will help the staff to define the content that will need to be learnt in order for that concept to be developed. The content statements should be brief and to the point rather than lengthy dissertations.
- Links can then be made to the relevant curriculum competencies and the key competencies which will also be taught explicitly in this unit of work.
- The final task in this stage is to decide on how the concepts will be sustained from one level to the next. Unlike the thematic approach to teaching and learning, learners are expected to maintain their understanding over time as the understanding of each concept is required in order to develop the next concept in the sequence. Ideally this task will be completed by the same staff group who decided on the contexts

| Social Science: World View | Level 1 |
|---|---|
| **Our world view is influenced and expressed via our interaction with language, symbols and text** | **Learning Area (Social Science)** |
| **Level specific concept** | How we see the world is different to other people |
| **Learning Intention** | We often disagree on ideas about what we like to eat, wear and who are friends are |
| **Contexts** | 1. Family 2. Classroom 3. Unique cultures |
| **Content** | 1. Beginning the year<br>2. What are our attitudes to new people<br>3. Welcoming new people<br>4. Co-construct a process for welcoming new people (Inquiry) |
| **Links** | Hyperlink to curriculum competence and key competence within the school Learning Management System |
| **Sustainability** | Using the welcoming process each time a new student arrives<br>Reflection on friendships and relationships in classroom and in family |

## Stage 2:

- The next stage is to look at which of the "curriculum competencies" link in with the specific learning area concepts (e.g. Science). Educators may select more than one competency but not more than three as it must be remembered that these competencies will have to be taught explicitly and just be implicit in what is being learned.
- The final task in this stage is to identify which "key competencies" will be covered in this "unit of work"

| **Social Science: World View** | **Level 1** | | |
|---|---|---|---|
| **Our world view is influenced and expressed via our interaction with language, symbols and text** | **Learning Area (Social Science)** | **Curriculum competence (Social Science)** | **Key Competence (Participating & Contributing)** |
| **Level specific concepts** | How we see the world is different to other people | Everyone can help shape the future | Participating and contributing: Each person has their own personal responsibilities |
| **Learning Intention** | We often disagree on ideas about what we like to eat, wear and who are friends are | You can change the future by doing something kind, considerate or thoughtful each day | Everyone has personal responsibilities |
| **Contexts** | 2. Family 2. Classroom 3. Unique cultures | | |
| **Content** | 5. Beginning the year<br>6. What are our attitudes to new people<br>7. Welcoming new people<br>8. Co construct a process for welcoming new people (Inquiry) | Everyone joining the class is unique<br>Therefore all will have unique attributes to contribute to the class | Actions & Consequences<br>All members have some responsibilities<br>3. Rules<br>4. Obligations<br>• Attitudes<br>• Choices |
| **Links** | Hyperlink to curriculum competence and key competence within the LMS | | |
| **Sustainability** | Using the welcoming process each time a new student arrives<br>Reflection on friendships and relationships in classroom and in family | | |

## Stage 3:

- This stage provides a scope and sequence for the teaching and learning program associated with the concepts which are to be learnt. The first step is to include a unit plan which provides a sequence of core events which comprise this unit.

| | |
|---|---|
| **Unit Plan** | Responsibilities and obligations within the class and school<br>Attitudes to new people<br>Awareness of cultural and personal differences<br>Developing a welcoming process |

- The time frame for the unit is then decided. Units can vary from 1 hour through to several weeks BUT the intent is to be as efficient as possible and not start filling up the unit to last a specific length of time. Initially this will be an educated guess which will be refined over time as experience with this approach to planning increases.

| | |
|---|---|
| **Time Frame** | 2 weeks: integrated into the language competency program |

- The inquiry approach should also be noted and the outlines for this are associated with each curriculum scaffold in the scaffold document provided.

| | |
|---|---|
| **Inquiry approach** | Hyperlink to Level 1 Inquiry model and also to the curriculum competency<br>Social attitudes, and beliefs will form the basis for social decision making |

- The final task is to assign some assessment guidelines. A formative assessment framework can be found on the MoE web site. http://www.minedu.govt.nz/index.cfm?layout=document&documentid=11249&data=l [link is on the bottom of the page to the PDF download]

| | |
|---|---|
| **Assessment** | Each student practicing the welcoming process and taking a responsibility.<br>Each student reflecting on this in the “smiley face” journal<br>Each student reflecting on this via their oral sharing time |

The final concept framework table will now look like the one below:

| **Social Science: World View** | **Level 1** | | |
|---|---|---|---|
| Our world view is influenced and expressed via our interaction with language, symbols and text | **Key Competence** | **Curriculum competence** | **Learning Area (SS)** |
| **Level specific concept** | Participating and contributing: Each person has their own personal responsibilities | Everyone can help shape the future | How we see the world is different to other people |
| **Learning Intention** | Everyone has personal responsibilities | You can change the future by doing something kind, considerate or thoughtful each day | We often disagree on ideas about what we like to eat, wear and who are friends are |
| **Contexts** | 5. Family 2. Classroom 3. Unique cultures | | |
| **Content** | Action: Consequences<br>All members have some responsibilities<br>6. Rules<br>7. Obligations<br>• Attitudes<br>• Choices | Everyone joining the class is unique<br>Therefore all will have unique attributes to contribute to the class | 9. Beginning the year<br>10. What are our attitudes to new people<br>11. Welcoming new people<br>12. Co construct a process for welcoming new people (Inquiry) |
| **Links** | | | Hyperlink to curriculum competence and key competence |
| **Sustainability** | Using the welcoming process each time a new student arrives<br>Reflection on friendships and relationships in classroom and in family | | |
| **Unit Plan** | Responsibilities and obligations within the class and school<br>Attitudes to new people<br>Awareness of cultural and personal differences<br>Developing a welcoming process | | |
| **Time Frame** | 2 weeks: integrated into the language competency program | | |
| **Inquiry approach** | Hyperlink to Level 1 Inquiry model and also to the curriculum competency<br>Social attitudes, and beliefs will form the basis for social decision making | | |
| **Assessment** | Each student practicing the welcoming process and taking a responsibility.<br>Each student reflecting on this in the “smiley face” journal<br>Each student reflecting on this via their oral sharing time | | |

By approaching teaching and learning in this manner at least three concepts are covered each time a curriculum concept is taught. The following table outlines the number of Learning Area concepts at each level and given that each level is approximately associated with two years of teaching and learning we can approximate the length of a unit of work.

| Learning area/level | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **The Arts** | 14 | 14 | 14 | 14 | 14 |
| **English** | 14 | 16 | 16 | 16 | 16 |
| **Mathematics** | 16 | 18 | 17 | 15 | 10 |
| **Science** | 6 | 11 | 12 | 17 | 18 |
| **Social Science** | 9 | 13 | 14 | 14 | 14 |
| **Technology Education** | 7 | 12 | 12 | 12 | 12 |
| **Languages** | N/A | N/A | N/A | N/A | N/A |
| **Total** | 66 | 73 | 85 | 88 | 84 |

This provides a guideline to the average time which could be spent on learning any one concept. Averaging the number of concepts at 77 and given that there are on average 368 days of teaching and learning over the two year period for each concept, educators have available approximately 5 days/learning are concept. Bearing in mind some concepts will only a few hours and some will take weeks this is a reasonable schedule. It is important to realise time frame covers the learning areas and the competency concepts.

The development of principles and character are embedded within the competencies and do not require a separate teaching and learning program. Schools will need to edit their competencies to reflect the dispositions they would like to see developed in their learners and the specific virtues which would reflect those dispositions. The development of wisdom is covered in the competence of thinking and is an embedded concept throughout the entire curriculum.