

St Philip Neri Catholic School Science and Technology Policy

1. Introduction

Science and Technology is a mandatory Key Learning Area. The 2012 Board of Studies NSW Science K-10 Syllabus for the Australian Curriculum is the key resource. Science and Technology play a crucial role in the rapidly changing world we are living in. Children's sense of wonder and curiosity about the natural and made world is fostered through actively engaging in the processes of Working Scientifically and Working Technologically. Children need to be skilled in scientific thought and inquiry as this is a distinct way of finding answers to interesting questions and solutions to important problems, as well as develop an understanding of science ideas and concepts, make informed decisions about the uses of science and technology in their lives as well as in the natural world, locally, nationally and globally, including shaping sustainable futures. Scientific knowledge provides explanations for a variety of phenomena and enables sense to be made of the Natural Environment and the Made Environment. Technology allows students to develop an understanding of design processes that enable people to manage, interpret, shape and alter their environment to improve their quality of life at home, school, in work places and the broader community. As students engage in technology they posing questions, testing ideas, developing and evaluating arguments based on evidence, they demonstrate honesty and fairness in using the skills of Working Scientifically. They need to be able to reflect upon and use technology in a critical way. With the sum total of human knowledge increasing at an exponential rate, the skills of investigating, identifying problems and proposing satisfactory solutions that are sensitive to environmental, social, cultural and spiritual perspectives are imperative. Children need to learn and become literate in our scientific culture and engage with the scientific narratives that describe the natural and made environments, our cosmology and us.

2. Purpose

The purpose of this policy is to provide a clear framework for the systematic teaching and learning of Science and Technology at St Philip Neri Catholic School. The policy shall outline the content to be taught and developed conceptually as well as delineating the continuum of skill development in the processes of Investigating, Designing and Making and Using Technology. The policy makes explicit our commitment to Catholic Discipleship and core values outlined in the Diocesan Mission Statement. It reflects the identity of the school as articulated in the St Philip Neri Catholic School Mission and Vision Statement.

3. Aim

This foster students' sense of wonder and expand their natural curiosity about the world around them in order to develop their understanding of, interest in, and enthusiasm for science and technology. Science helps students to develop competence and creativity in applying the processes of Working Scientifically and Working Technologically to appreciate and understand the Natural Environment and Made Environment as well as enhance students' confidence in making evidence-based decisions about the influences of science and technology in their lives as suck enabling students to

confidently respond to needs and opportunities when designing solutions relevant to science and technology in their lives

4. Beliefs about Teaching and Learning in Science and Technology

Belief 1

We believe all students have the capacity and the right to learn and the need to experience successful learning.

Therefore

Whole school programs need to be continually monitored and evaluated to ensure that the children have experience of quality programs and successful learning.

Belief 2

We believe students are individuals who learn at different rates, with different strengths and with a variety of preferred learning styles.

Therefore

Class programs need to be based upon data from authentic assessment and knowledge of individual learning needs.

Belief 3

Learning is life long, continuous, developmental and holistic; students need to learn how to learn and to actively evaluate their learning.

Therefore

Proficiency in Science and Technology is best developed when skills and content are taught in a systematic, developmental, enquiry based, problem solving, real life and holistic way.

Belief 4

Teaching and learning need to take place in a context of high expectations and in a positive, supportive environment.

Therefore

The teacher needs to provide structures, scaffolds and challenging learning contexts where adequate and appropriate resources are provided and sufficient, dedicated time is allocated to the teaching and learning of science and technology.

Belief 5

Effective learning occurs when students are engaged in learning contexts that are collaborative and draw upon prior experiences, knowledge, understandings and skills.

Therefore

Learning in Science and Technology is best when it occurs within a collaborative environment that structures group work and allows for the supportive and critical mutual sharing of experiences, skills and ideas.

Belief 6

Teaching and learning is informed by explicit assessment and feedback, which in turn will inform future learning pathways.

Therefore

Teaching programs are based on authentic assessment and evaluation.

Belief 7

Parents ought to be encouraged to be actively involved in their children's learning.

Therefore

Parents need to be informed of the content of class programs and provided opportunities to deepen their understanding of the teaching and learning of Science and Technology.

5. Catholic Dimension of Science and Technology

At St Philip Neri Catholic School, we are a community of disciples of Jesus. Science and Technology is an area of learning in which the students are encouraged to develop attitudes, skills and knowledge are a comprehensive perception of the universe, revealed to us in Jesus, that provides insights into the meaning of life and how to live it. This will enable the students to make an informed commitment to the service of man and promote their integral development for the benefit of all by improving the quality of society and the environment, thus making a positive contribution to the wider community.

6. Outcomes

This policy shall ensure that: -

The children will

- 6.1 develop an appreciation of the contribution of science to finding solutions to personal, social and global issues relevant to their lives now and in the future
- 6.2 develop a willingness to use evidence and reason to engage with and respond to scientific and technological ideas as informed, reflective citizens
- 6.3 develop interest and positive, informed values and attitudes towards science and technology
- 6.4 recognise the importance and relevance of science and technology in their lives now and for their future
- 6.4 develop knowledge, understanding of and skills in applying the processes of Working Scientifically
- 6.5 develop knowledge, understanding of and skills in applying the processes of Working Technologically.
- 6.6 develop knowledge of the Physical World, Earth and Space, Living World and Chemical World, and understanding about the nature, development, use and influence of science
- 6.7 develop knowledge of the Natural Environment through understanding about the Physical World, Earth and Space, and Living World
- 6.8 develop knowledge and understanding of the Natural Environment and the Made Environment through the Material World
- 6.9 develop knowledge and understanding of the Made Environment through Built Environments, Information and Products

The teachers will

- 6.10 have a clearly articulated framework for the teaching and learning of science and technology.
- 6.11 have adequate resources for the effective teaching of science and technology.
- 6.12 will use a variety of resources to ensure that quality teaching is apparent
- 6.13 will differentiate the program to ensure all learning needs are met.
- 6.14 will program to ensure that working scientifically and technologically is incorporated into all programs and ensure that these lessons are authentic, realistic to the students' lives and think about the community 'need' and 'want'. The programs allow children to design, investigate and re-invent.
- 6.15 Curriculum perspectives are considered when programming.
- 6.16 Will encourage all students' to think creatively and problem solve.

The parents and community will

- 6.17 be informed as to the content of the Science and Technology curriculum at St Philip Neri Catholic School
- 6.18 be provided with opportunities to develop deeper understandings of how science and technology is taught.

7. References

- NSW Board of Studies 2015 Syllabus and Support Documents.
- School Based Scope and Sequence
- School Based Term overviews
- Diocese of Broken Bay Systemic School Strategic Plan

7. Appendices

The following Appendices have been developed to support the implementation of the Science and Technology Policy.

A. Scope and Sequence- see APPENDIX 1

A Scope and Sequence grid was developed in 2014 and revised annually. The grid ensures that all content strands are being addressed in each of the Stages. The scope and sequence aims to develop key scientific and technological concepts in a developmental manner across the stages.

The Scope and Sequence grid also names a focus process for each Unit of work. This process receives explicit teaching during the Unit. Other processes will be used and developed but in a less significant way.

In 2008 we implemented a new science teaching program called Primary Connections. This was in conjunction with Diocesan Professional Learning project with a neighbouring school within the North Shore Cluster. During this time all teachers consolidated their pedagogical practices pertaining to effective Science and technology teaching and learning. As a result of this the K-6 Scope and sequence was revised and established in order to encompass this new Science program.

NB. This was in line with current Board of Studies mandated practices, policies and procedures.

B. Programming Expectations- see APPENDIX 2

A guide proforma has been developed for Science and Technology to assist teachers in the planning of Units of work. Whilst this proforma is not mandatory at St Philip Neri Catholic School, the elements included on this example are expected to be present in teaching programs.

Teachers are expected to have an organisational statement at the beginning of their Science and Technology program, detailing management practices including safety.

Teaching programs are monitored once each term by the Principal or delegated representative of the Principal (for example the Assistant Principal or Key Reference Teacher for Science and Technology). The person reading the Program gives feedback to teachers shortly after. This is an opportunity for professional development in Science and Technology. Compliance with this policy is also scrutinised at this time.

C. Assessment and Reporting- see appendix 3

All Science and Technology Units are assessed against the stated learning outcomes using the indicators of learning as guides. Assessments are made of children's knowledge and understanding of content strands, skill in using processes and values and attitudes demonstrated.

Children are expected to be reflective of their learning. Formal self-evaluation and peer evaluation tasks are planned for and included as part of the Science and Technology Unit of work.

A piece of Science and Technology work is included in each child's portfolio for each Unit taught. This work is annotated by the teacher and referenced to the stated Outcomes and Indicators. The portfolio is used during Parent/ Teacher interviews to support formal Reporting to Parent processes.

D. Use of ICLT- see APPENDIX 4

ICLT has a significant role to play in enhancing the Science and Technology curriculum. ICLT has application in using the Investigation process and in presenting the outcomes of learning. There are also implication for using ICLT in planning and recording the Design process.

The Using Technology process in the Science and Technology syllabus is the part of the K- 6 curriculum that seeks to empower children as critical users of technology. Viewing technology as a tool and critiquing the impact of technology upon people, communities and the environment are central concepts of the Using Technology process.

Appendix 4 collates syllabus outcomes that have explicitly *technological skill* development articulated.

E. Safety and Tool Usage- see APPENDIX 5

In line with OH&S guidelines, Safe Operating Procedures (SOPs) have been developed for each of the tools used in the Science and Technology Classroom. Procedures have been developed in training, skilling and accrediting children in the safe usage of each tool. A "license" has been developed for each tool detailing the skills displayed by each licensed child. Only children who are licensed can use tools without direct adult supervision. There are safety signs for each tool. These are to be reviewed and displayed at the tool use area each time a tool is used.

Appendix 5 includes a Code of Practice detailing *Before, During* and *After* management procedures for the safe use of tools in the classroom.

Appendix 5 also includes Safety Tips for safe behaviours in the Science and Technology classroom.

F. Links with Literacy and Numeracy

Literacy Links to Science and Technology

Science and Technology offers natural integrative links with the English syllabus. Science and Technology can provide the *content* and a meaningful *context* for an English program. The types of explicit links with Science and Technology would be particularly evident in:-

Speaking and Listening (Communicating)- children are required to discuss, clarify thinking and ideas, negotiate design and investigation tasks, work collaboratively and report upon the work they have been completing.

Reading and Viewing- factual texts related to the science and technology unit being studied would be usefully addressed in Guided Reading and Reciprocal Teaching sessions thereby "building field knowledge" for application in the Science and Technology lessons.

Writing and Representing- the teaching of factual text types to persuade or inform especially, in the form of a report (describing the outcome of investigations, observations), the procedure (detailing how investigations, fair tests, design tasks were accomplished) lends themselves to a natural and mutually supportive integration.

Numeracy Links to the Science and Technology

Science and Technology and numeracy are often thought of as complimentary KLAs. The skills learned in Mathematics are frequently applied in Science and Technology. These links are evident in:

Working Mathematically- science and technology as well as mathematics are helping children to develop an understanding and fluency in mathematics through inquiry, exploring and connecting mathematical concepts such as measurement and proportion will affect scientific experimentation and outcomes. Both also help children to apply problem-solving skills to mathematical and scientific techniques while communicating and reasoning

Number and Algebra- basic operations and understanding of numeracy is required when dealing with empirical scientific investigation as well as describing relationships and apply algebraic techniques and generalisation.

Measurement and Geometry- is a central skill to fair testing and being able to accurately construct during the design process as the skills required to do this are to identify, visualise and quantify measurements and the attributes of shapes and objects, and explore measurement concepts and geometric relationships, applying formulas, strategies and geometric reasoning in the solution of problems

Statistics and Probability- this is an integral part when investigating scientifically, fair testing as the collection, representation, analysis, interpretation and evaluation of data as well as assigning the use of probabilities help to make sound judgements to help inform and improve the outcome of a project.

Integration

Teachers are encouraged to explore these links when planning Science and Technology units of work. As with all integration, specific outcomes and indicators need to be developed and assessed for each of the integrated KLAs.

Science and Technology Scope and Sequence- 2015

Year- Kindergarten

Time	Unit Title	Target Outcomes		
		Working Scientifically and Technologically	Natural and Made Environments	Values
Term 1 10 weeks x 1.5 hours	What's It Made Of? Our environment	Ste-4WS Ste-5WT	Ste-9Me Ste-10ME	Ste-3VA
Term 2 10 weeks x 1.5 hours	Weather in My World/ What Should I wear	Ste-4WS Ste-5WT	Ste-7NE	Ste-2VA
Term 3 10 weeks x 1.5 hours	On the move/ Move It	Ste-4WS Ste-5WT	Ste-6NE Ste-10ME	Ste-1VA
Term 4 10 weeks x 1.5 hours	Staying Alive/ Paddock to Plate	STE-4WS Ste-5WT	Ste-8NE Ste-10ME	Ste-3VA

Science and Technology Scope and Sequence- 2015

Stage- Stage One Years- 1 & 2

Stage	Year	Time	Unit Title	Target Outcomes		
				Working Scientifically and Technologically	Natural and Made Environments	Values
Stage 1	1	Term 1 10 weeks x 1.5 hours	Look! Listen! / What's that sound?	ST1-4WS ST1-5WT	ST1-6PW ST1-13MW ST1-5I ST1-14BE	ST1- 3VA
Stage 1	1	Term 2 10 weeks x 1.5 hours	Up down all around/ Things Change	ST1-4WS ST1-5WT	ST1-8ES ST1-15I	ST1- 3VA
Stage 1	1	Term 3 10 weeks x 1.5 hours	All mixed Up/ How Do I carry that?	ST1-4WS ST1-5WT	ST1-12MW ST1-13MW ST1-16P	ST1- 1VA ST1- 2VA
Stage 1	1	Term 4 10 weeks x 1.5 hours	Playgrounds- past and present/ Schoolyard Safari	ST1-4WS ST1-5WT	ST1-13MW ST1-14BE ST1-10MW ST1-11MW	ST1- 1VA

Stage	Year	Time	Unit Title	Target Outcomes		
				Working Scientifically and Technologically	Natural and Made Environments	Values
Stage 1	2	Term 1 10 weeks x 1.5 hours	Spot the Difference/ Our Daily bread	ST1-4WS ST1-5WT	ST1-10LW ST1-11LW ST1-12MW	ST1- 1VA
Stage 1	2	Term 2 10 weeks x 1.5 hours	Push and Pull/ Toys	ST1-4WS ST1-5WT	ST1-7PW ST1-16P	ST1- 1VA
Stage 1	2	Term 3 10 weeks x 1.5 hours	Water in my World/ Water Works	ST1-4WS ST1-5WT	ST1-9ES ST1-15I	ST1- 2VA
Stage 1	2	Term 4 10 weeks	Watch it Grow / Life, camera,	ST1-4WS ST1-5WT	ST1-9ES ST1-10LW	ST1- 3VA

		x 1.5 hours	action		ST1-11LW ST1-15I	
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Science and Technology Scope and Sequence- 2015

Stage- Stage Two Years- 3 & 4

Stage	Year	Time	Unit Title	Target Outcomes		
				Working Scientifically and Technologically	Natural and Made Environments	Values
Stage 2	3	Term 1 10 weeks x 1.5 hours	Feather, Fur, Leaves/ What Class Are You In?	ST2-4WS ST2-5WT	ST2-10LW ST2-11LW ST2-15I	ST2-3VA
Stage 2	3	Term 2 10 weeks x 1.5 hours	Which came first? /Plants in Action	ST2-4WS ST2-5WT	ST2-10LW ST2-11LW ST2-15I	ST2-1VA
Stage 2	3	Term 3 10 weeks x 1.5 hours	Spinning in Space	ST2-4WS ST2-5WT	ST2-13MW ST2-14BE	ST2-3VA
Stage 2	3	Term 4 10 weeks x 1.5 hours	Surviving the extremes/ Beneath our feet Night and day	ST2-4WS ST2-5WT	ST2-8ES ST2-14BE	ST2-2VA

Stage	Year	Time	Unit Title	Target Outcomes		
				Working Scientifically and Technologically	Natural and Made Environments	Values
Stage 2	4	Term 1 10 weeks x 1.5 hours	Material World	ST2-4WS ST2-5WT	ST2-13MW ST2-11LW	ST2-3VA
Stage 2	4	Term 2 10 weeks x 1.5 hours	Night and day / Growing Pains	ST2-4WS ST2-5WT	ST2-9ES ST2-11LW ST2-15I	ST2-2VA
Stage 2	4	Term 3 10 weeks x 1.5	Smooth Moves/ Making it	ST2-4WS ST2-5WT	ST2-7PW ST2-16P	ST2-1VA

		hours	Move		
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Stage	Year	Time	Unit Title	Target Outcomes		
				Working Scientifically and Technologically	Natural and Made Environments	Values
Stage 3	5	Term 1 10 weeks x 1.5 hours	Its Electrifying/ Light Shows	ST3-4WS ST3-5WT	ST3-7PW ST3-13MW ST3-14BE ST3-6PW	ST3- 1VA
Stage 3	5	Term 2 10 weeks x 1.5 hours	Earth Place in Space/ Solar System time travellers	ST3-4WS ST3-5WT	ST3-7PW ST3-8ES	ST3- 3VA
Stage 3	5	Term 2 10 weeks x 1.5 hours	What's the matter?	ST3-4WS ST3-5WT	ST3-12MW ST3-13MW ST3-15I	ST3- 1VA
Stage 3	5	Term 4 10 weeks x 1.5 hours	Earthquake Explorers /Rebuilding After a Tsunami	ST3-4WS ST3-5WT	ST3-9ES ST3-11LW ST3-15I	ST3- 1VA
Stage 2	4	Term 4 10 weeks x 1.5 hours	Melting Moments/ Heating Up/ Feeling hot, hot hot	ST2-4WS ST2-5WT	ST2-6PW ST2-12MW ST2-16P	ST2- 1VA

Science and Technology Scope and Sequence- 2015

Stage- Stage Three Years- 5 & 6

Stage	Year	Time	Unit Title	Target Outcomes		
				Working Scientifically and Technologically	Natural and Made Environments	Values

Stage 3	6	Term 1 10 weeks x 1.5 hours	Marvellous Organisms	ST3-4WS ST3-5WT	ST3-11LW ST3-10LW ST3-16P	ST3- 2VA
Stage 3	6	Term 2 10 weeks x 1.5 hours	Change Detectives / Let's Celebrate	ST3-4WS ST3-5WT	ST3-12MW ST3-13MW ST3-16P	ST3- 1VA
Stage 3	6	Term 3 10 weeks x 1.5 hours	Essential Energy /Transforming World	ST3-4WS ST3-5WT	ST3-6PW ST3-14BE ST3-15I	ST3- 3VA
Stage 3	6	Term 4 10 weeks x 1.5 hours	Desert Survivors /Surviving a Bushfire	ST3-4WS ST3-5WT	ST3-9ES ST3-10LW ST3-16P ST3-14BE	ST3- 1VA

Appendix 2

Science and Technology: <u>Unit Name</u>	Teacher:
<u>Stage ?</u>	Duration: Term:

Unit context

Target Outcomes

A student:

Unit Overview

Content – Working Scientifically and Working Technologically Skills	Content – Knowledge and Understanding	Teaching, Learning and Assessment Experiences

Resources	Assessment overview	

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Date: 21/04/2015