

STS is central to VELS

The Science Talent Search competition has run successfully for more than 55 years. It is a proven vehicle for encouraging creative and self-motivated project work and each year enthruses thousands of students from Prep to VCE to engage in science.

STS is for everyone. It offers sections that allow creativity and open ended multi-disciplinary projects. It enables students to pursue any interest that has a scientific basis: hobbies, technology, multi-media, computer programming, the arts, games and almost any other interest or talent. In eight of the ten sections students have an open choice of topics.

For these reasons STS fits ideally into the VELS philosophy of teaching and learning.

Science Talent Search section choices:

- Experimental Research
- Games
- Computer Programs and Simulations
- Creative Writing
- Working Models
- Inventions
- Posters – Scientific Wallcharts
- Science Photography
- Video Productions
- Class Project

Table 1 (below) maps the explicit links between STS and VELS regardless of project focus. There are many more possible links depending on the nature and topic focus of the projects chosen.

Table 1: Matching of STS sections with VELS strands, domains and dimensions

Strand	Domain	Dimension	STS sections (see key below)											
			C	W	G	M	I	F	P	R	V	S		
Physical, Personal and Social Learning	Health and Physical Education													
	Interpersonal Development	Building social relationships Working in teams			✓								✓	✓
	Personal Learning	The individual learner Managing personal learning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Civics and Citizenship	Civics knowledge & understanding Community engagement												
Discipline-based Learning	The Arts	Creating & making Exploring & responding			✓	✓	✓	✓	✓	✓		✓		
	English	Reading	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Writing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Speaking & listening	✓		✓	✓	✓	✓	✓		✓	✓		
	The Humanities													
Languages Other Than English (LOTE)														
	Mathematics	Measurement, chance & data									✓			
	Science	Science knowledge & understanding Science at work	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Interdisciplinary Learning	Communication	Listening, viewing & responding Presenting	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Design, Creativity and Technology	Investigating & designing			✓	✓								
		Producing			✓	✓								
		Analysing & evaluating			✓	✓								
	Information and Communications Technology (ICT)	ICT for visualising thinking ICT for creating ICT for communicating	✓				✓					✓		
	Thinking Processes	Reasoning, processing & inquiry Creativity Reflection, evaluation & metacognition	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

C = Computer Programs & Simulations

I = Inventions

R = Experimental Research

W = Creative Writing

F = Scientific Photography

V = Video Productions

G = Games

P = Posters & Scientific Wallcharts

S = Class Project

M = Working Models

STS and the science domain: discipline based learning

Let's look briefly at just a few ways that STS can integrate with the two dimensions of the science domain. There are many more that could be included, but space precludes an exhaustive coverage.

Science at work

Use the Junior **Experimental Research** section as a vehicle for students to 'design and perform controlled experiments' or for 'testing formal understandings in controlled studies using appropriate experimental tools' (Level 5 learning focus statements).

Experimental research also features in Level 6 – 'students design and conduct scientific investigations of their choice in ways that lead to the collection, interpretation and presentation of valid data' or students could 'investigate sources of waste generated within the community' (p. 90 VCAA 2005) as part of their STS **Intermediate Division Experimental Research** project. These are just a few possibilities derived from the learning focus statements and with a small amount of thought you will be able to compose a lengthy list of ideas at each level.

Working models is another explicit example of an STS section that fits ideally with the VELS learning focus statements. Use **Junior Computer Programs** to 'use a range of tools (eg. computer models, images and simulations) to explain and interpret observations' (Level 5



learning focus). Use the **Intermediate Working Models** or **Inventions** section to illustrate or produce products that 'explore and communicate the responsible use and management of natural and processed resources' or develop a working model to illustrate 'energy flow through ecosystems' or 'cycling of matter in ecosystems' (Level 6 Learning focus).

If we look at the **progression points** for each level we find many more explicit connections with STS approaches and the Science at Work dimension. For example, progression points include:

- design and reporting of experiments (**STS Experimental Research**): VELS Science at work: 4.25, 4.5, 4.75, 5.25, 5.5, 5.75, 6.25, 6.5, 6.75.
- design and construction of a simple model (**STS Working models**): VELS Science at work: 4.25, 4.5, 4.75.
- development and use of working model or visual aid (**STS Working Models; Posters and Scientific Wallcharts; Computer Programs and Simulations**): VELS Science at work: 5.25, 5.5, 5.75.
- development of a product or invention (**STS Inventions**): VELS Science at work: 6.25, 6.5, 6.75)

Science knowledge and understanding

If you look at the judging criteria for each STS section (see STS Handbook) you will see that underpinning all STS projects is demonstration of understanding of the science concepts behind the project work, so the projects and related assessment can easily be designed to enable direct linking with science knowledge and understanding standards and progression points.

Working with other disciplines

Many STS projects provide excellent opportunities to build interconnections with other disciplines. Some science teachers team up with the English department for creative writing projects or perhaps to help their students develop skills to communicate their project knowledge and understanding at judging day; or with the Arts department to help with poster design or scientific photography; others work with Information Technology teachers to assist with computer programs; others with media experts to assist with video and DVD productions. There are as many cross-discipline opportunities as you wish to create.

Interdisciplinary learning

Communication: All Science Talent Search projects require students to present information in either written and/or visual form to communicate their science concepts. In addition, you can include a component that requires each student or group to talk about their project to the whole class, or to other groups in the school. Students can also communicate their project outcomes in the school newsletter, write to local newspapers or display their work at open days, for example. At public Judging Day all students must verbally communicate with two judges about the development of their project and the science they have learnt and presented in their project. They receive constructive feedback, which includes suggestions for improvement. Bursary winning entrants have additional opportunities to communicate their science knowledge and understanding to sponsors and other visitors at Exhibition day.

Design, creativity and technology: With a bit of creativity and lateral thinking, STS sections such as Working Models, Inventions, Computer Programs and Video Productions can incorporate investigating and designing a product, producing the product, analyzing and evaluation of the product. The **Inventions** section is particularly well suited to this domain.

Thinking processes: Development of projects for all sections of Science Talent Search involves reasoning, processing, inquiry, creativity, reflection, evaluation and metacognition.

At primary level, the **STS Class Project section**, for example, aligns closely with all of the progression points for progressing towards Level 4 Thinking Processes. This makes the Class Project an ideal learning and assessment vehicle for this domain and its three dimensions.

At secondary level, **Experimental Research** is well suited to this domain and its progression points for levels 5 and 6. Other STS sections could also easily be implemented in ways that incorporate key aspects of the thinking process domain.

Physical, Personal and Social Learning: Project development in **all sections and divisions of STS** involves managing personal learning. Students can be encouraged to work in teams to develop their project ideas, and to report and reflect on their individual or group projects prior to submitting them for judging. At primary level the Class Project (Lower Primary and Primary divisions) requires working in teams and building social relationships.

Information and communications technology (ICT): Involve your students in making a **Computer Program** or computer simulation; other students may prefer to enter the **Videos** section, presenting their work on a DVD.

These are just some examples of the explicit links between the Science Talent Search approach to learning and teaching and the VELS strands, domains, dimensions and progressions points. A quick look through the standards and progression points for all strands will reveal many more links and possibilities for embarking on Science Talent Search projects whilst fulfilling VELS requirements.

Assessment

You can integrate all forms of assessment into the STS project development and judging process. At public Judging Day all students receive constructive feedback, which includes suggestions for improvement. This feedback can be used as part of your formative assessment strategy. It can also help students with their self-assessment and identifying what they still need to learn.

Implications for teaching and learning

Science Talent Search creates an opportunity for students to take responsibility for their own learning: they can choose and design their own projects and investigations, direct their own learning and adjust their learning in line with self reflection and peer review. The competition provides opportunities for formative and summative assessment as well as self and peer assessment. Students can work individually or in groups of two. Their work is displayed and discussed publicly, providing opportunities to gain feedback from the wider community as well as public recognition of their efforts and talents. Projects involve science knowledge and understanding, based on real life, everyday science concepts and issues. Students are encouraged to draw on skills from other disciplines such as language, visual arts, computer programming and technology; and project work requires written, verbal and visual communication.

And remember, each year with STS you have a ready-made set of project requirements and assessment guidelines prepared for you ready for implementation; you also get set topics for Creative Writing and Experimental Research. You have opportunities for internal and external assessment, internal and external display of project work, and peer interaction for both you and your students at judging day and at the Exhibition and Presentation day.

Strategies for incorporating STS into VELs and whole school/science curriculum

Below are just a few ideas that work in other schools. You need to choose what will work best for your own circumstances.

- Make STS a compulsory part of the science curriculum, either at a year level or across year levels.
- Incorporate STS into a cross-curriculum unit.
- An individual teacher could do an STS project with their science class.
- Do STS as part of a science club or enrichment class.
- Do STS as a focus for an open evening or family science evening.

Science clubs and enrichment classes work well in primary schools or in schools which have a culture of self-motivated, extra-curricular learning. However, in large schools, it can be difficult to keep track of a mix of students, especially if attendance at sessions is voluntary.

Doing an STS project in any context will address learning focus statements from all 3 strands; both dimensions of Science in the Discipline-based Learning strand, and also dimensions from all the domains of Interdisciplinary Learning and the Personal Learning domain from Physical, Personal and Social Learning. Furthermore, if it is incorporated into a cross-curriculum unit, other Discipline-based Learning domains will also be included.

Choosing a topic

Although STS publishes a different theme each year, it is not compulsory to follow the theme in eight of the ten sections of the competition, allowing a variety of approaches to be used in choosing topics.

In most cases, the theme can be related to a particular learning focus in the science knowledge and understanding dimension. If an STS project is a compulsory part of the curriculum, then the Science Co-ordinator could involve the whole KLA in the planning to select relevant topics to study early in the year so that an STS project can be completed on time. Choosing an area of study related to the theme will also suit teachers who wish to limit students to just a few sections. For example you could choose Creative Writing or Posters as these two sections have set topics. However, if the topics or units planned for early in the year do not suit the STS theme, a variety of presentation styles is available in the other sections.

Rather than relating a project to some particular aspect of science knowledge, an STS project is also ideal for assessing the learning progression points of the Science at Work dimension. In this case, students would be encouraged to use an open-ended approach in an investigation of their own choice.

Getting started

- Choose one or two sections that you think are manageable OR leave it open to student interest.
- Either set aside one period per week OR set aside a block of time for students to work on a project.
- Run an internal STS competition and choose the best projects to enter into the competition OR allow all students to enter if they want to.
- Set the project in Term 1. Have the projects finished early in Term 2 so entries can be selected. Revisions can be made before judging in August.

For a teacher who has not entered student projects in STS before, it's best to keep it simple:

- Concentrate on one or two sections only
- Run the competition with students you teach for the whole year
- Use a structured topic which is integrated with the curriculum rather than open-ended research.

When you are more familiar with the STS guidelines, the sky is the limit! Give your students choices and they will amaze you with their creativity and scientific insights, while you are busily matching student progress with the VELs learning progression points.