



ATSE
STELR
PROJECT

Investigating Science

Depth Study

Years 11 and 12

STELR Sustainable House Kit

Teacher Guide

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1. How to use the ATSE Investigating Science Depth Study booklet

This student booklet has been designed as a template to log the progress of all aspects of a Depth Study using the ATSE Sustainable Housing Kit (SHK), so can be used as a single depth study in Year 11 and Year 12.

This booklet has been developed using the *Working Scientifically* section of the Investigating Science curriculum as a guide. Therefore, by completing each of the five parts of the booklet, students can achieve all the Skills Section of the curriculum within a single Depth Study. The marking matrix provided with the Depth Study booklet maps directly to the Working Scientifically outcomes.

2. What is a Depth Study

A depth study is any type of investigation or activity that is an extension of the syllabus, so it must be inspired by and therefore linked to one of the Knowledge and Understanding outcomes in the Yr11/12 syllabus.

Examples of a Depth Study

A depth study may be, but is not limited to:

- a practical investigation or series of practical investigations and/or a secondary-sourced investigation or series of secondary-sourced investigations
- presentations, research assignments or fieldwork reports
- the extension of concepts found within the course, either qualitatively and/or quantitatively.

Requirements for a Depth Study

This booklet has been designed to address all the necessary components of the Depth Study while as an original inquiry investigation is undertaken. The following requirements are addressed:

- a minimum of 15 hours of in-class time
- Working Scientifically outcomes of Questioning and Predicting and Communicating must be addressed
- a minimum of two additional Working Scientifically skills outcomes
- development of at least one Knowledge and Understanding outcome.

Knowledge and Understanding Outcome

A Year 11 Depth Study using the ATSE Sustainable House Kit explicitly extends the ideas in Module 3 – Scientific Models. Inquiry questions from this module, as well as from Module 1 – Observations, and Module 2 – Inferences and Generalisations have been adapted and used throughout this booklet.

A Year 12 Depth Study using the ATSE Sustainable House Kit works well to extend the ideas in Module 7 – Fact or Fallacy? Inquiry questions from this module, as well as from Module 5 – Science Investigation, Module 6 – Technology, and Module 8 – Science and Society have been adapted and used throughout this booklet.

Note: Examples and Requirements for a Depth Study above were adapted from NESAs Investigating Science Stage 6 Syllabus. For a complete understanding of a depth study and its requirements please go to the NESAs Investigating Science Webpage. At the time of publication this webpage can be found by clicking on the following link <http://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/stage-6-science/investigating-science-2017>

3. Outline of the Depth Study Booklet by Section

Section	Activity	Features of Depth Study
1. Inquiry questioning	Analysis of secondary source data and information to generate an inquiry research question that aims to improve knowledge and understanding about sustainable housing.	<ul style="list-style-type: none"> • Data Analysis from a variety of sources
2. Hypothesize and predict	Application of thinking in Section 1 to develop a hypothesis and make a prediction. Plan an investigation to respond to the aim and test the hypothesis.	<ul style="list-style-type: none"> • Practical Investigations – design an experiment • Secondary-sourced investigations – develop an evidence-based argument • Data Analysis
3. Build and test a model sustainable house	Construction of a sustainable house to gather data relevant to the research question. Primary investigation using this model.	<ul style="list-style-type: none"> • Practical Investigation – conduct an experiment to test a claim and/or device • Create – design, invent, build a working model
4. Analysis of experimental results	Examination and interpretation of collected data for trends, limitations, relevance, accuracy, reliability and validity. Findings are analysed alongside secondary sources and future trends, and are used to construct new arguments and propose further questions.	<ul style="list-style-type: none"> • Data Analysis - construction and analysis of graphs/tables
5. Communicate findings	Create a presentation for an audience to communicate research results and their relevance.	<ul style="list-style-type: none"> • Primary and secondary-sourced investigations – create a presentation

4. Useful ATSE Resources

Prior to commencing their Depth Study it is recommended that all students complete one or more of the activities in the Investigating Science Introduction to the Sustainable Housing Kit [add in reference to where this can be found i.e. at the beginning of a larger booklet or a separate booklet]

The ATSE Sustainable Housing Kit supports the Depth Study by providing:

4.1 Equipment

- Sustainable House Kit – House cubes and roof; panels of various material for insulation, heating entry of light; and lamps; dual temperature logger; cables and plugs
- Memory stick with supporting information in the form of word documents, videos, and PowerPoint presentations (see b, c and d below)

4.2 Written documents

- Investigating Science Introduction to the Sustainable Housing
- Sustainable House designs background information
- ATSE sustainable house data
- Solar Logic Energy Efficient Housing Design
- Sustainable house model kit user guide
- Sustainable housing Fact File
- Cool homes e-book

4.3 Videos

- CSR House Design and Energy
- Illawarra Flame House
- Sustainable House Kit
- Sustainable House Logger
- Sustainable cities
- Passive solar design principals

4.4 Power Point Presentations

- Sustainable housing equipment
- Sample: Double glazing investigation

5. Curriculum Links

5.1 Cross Curricular Priorities

The ATSE Investigating Science Depth Study booklet as a whole directly supports the *Sustainability* Cross Cultural Priority

5.2 General Capabilities

The following General Capabilities are addressed directly: Literacy and Numeracy, ICT, Personal and Social Capabilities, Critical and Creative Thinking

5.3 Other areas identified as important for all students

Work and Enterprise

5.4 Working Scientifically, Values and Attitudes

Section	Syllabus Outcomes Addressed
<p>1. Inquiry questioning</p>	<p>Skills/Working Scientifically</p> <ul style="list-style-type: none"> • Questioning and predicting INS11/12-1* • Processing data and information INS11/12-4 • Analysing data and information INS11/12-5 <p>Values and Attitudes</p> <ul style="list-style-type: none"> • develop positive, informed values and attitudes towards science • recognise the importance and relevance of science in their lives
<p>2. Hypothesize and predict</p>	<p>Working Scientifically</p> <ul style="list-style-type: none"> • Questioning and predicting INS11/12-1* • Processing data and information INS11/12-4 <p>Values and Attitudes</p> <ul style="list-style-type: none"> • develop positive, informed values and attitudes towards science • recognise the importance and relevance of science in their lives
<p>3. Build and test a model sustainable house</p>	<p>Working Scientifically</p> <ul style="list-style-type: none"> • Planning investigations INS11/12-2 • Conducting investigations INS11/12-3 • Problem solving INS11/12-6 <p>Values and Attitudes</p> <ul style="list-style-type: none"> • develop an appreciation of the influence of imagination and creativity in scientific research
<p>4. Analysis of experimental results</p>	<p>Working Scientifically</p> <ul style="list-style-type: none"> • Questioning and predicting INS11/12-1* • Processing data and information INS11/12-4 • Analysing data and information INS11/12-5 • Problem solving INS11/12-6 <p>Values and Attitudes</p> <ul style="list-style-type: none"> • develop positive, informed values and attitudes towards science • recognise the importance and relevance of science in their lives • recognise the influence of economic, political and societal impacts on the development of scientific knowledge • develop an appreciation of the influence of imagination and creativity in scientific research.
<p>5. Communicate findings</p>	<p>Working Scientifically</p> <ul style="list-style-type: none"> • Communicating NS11/12-7* <p>Values and Attitudes</p> <ul style="list-style-type: none"> • develop positive, informed values and attitudes towards science • recognise the importance and relevance of science in their lives • recognise the influence of economic, political and societal impacts on the development of scientific knowledge • develop an appreciation of the influence of imagination and creativity in scientific research.

*compulsory aspect of depth study

5.5 Knowledge and Understanding

Year 11 Investigating Science

Knowledge and Understanding Curriculum Map

Curriculum Outcome	ATSE SH kit	
	Introductory Activities (activity #)	Depth study (section)
Module 1: Cause and Effect - Observing		
INS11-1 develops and evaluates questions and hypotheses for scientific investigation	2, 3, 5	All of 1, 2.2, 2.6
INS11-3 conducts investigations to collect valid and reliable primary and secondary data and information	2, 3, 4, 5, 7, 8	2.5, 2.5, 3.2, 3.3, All of 5
INS11-4 selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media	4	3.3, 4.3
INS11-8 identifies that the collection of primary and secondary data initiates scientific investigations	9	All of 1, 4.7
Module 2: Cause and Effect – Inferences and Generalisations		
INS11-1 develops and evaluates questions and hypotheses for scientific investigation	2, 3, 5	All of 1, 2.2, 2.6
INS11-2 designs and evaluates investigations in order to obtain primary and secondary data and information	5	1.1, 2.1, 2.3, 2.5, 2.7, 2.8, 3.1
INS11-4 selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media	4	3.3, 4.3
INS11-9 examines the use of inferences and generalisations in scientific investigations	9	4.1
Module 3: Scientific Models		
INS11-2 designs and evaluates investigations in order to obtain primary and secondary data and information	5	1.1, 2.1, 2.3, 2.5, 2.7, 2.8, 3.1
INS11-3 conducts investigations to collect valid and reliable primary and secondary data and information	2, 3, 4, 5, 7, 8	2.5, 2.5, 3.2, 3.3, All of 5
INS11-4 selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media	4	3.3, 4.3
INS11-10 develops, and engages with, modelling as an aid in predicting and simplifying scientific objects and processes	2, 3, 4, 5, 7, 8	2.5, 3.1, 4.4, 4.5
Module 4: Theories and Laws		
INS11-5 analyses and evaluates primary and secondary data and information	3, 4, 7, 8	4.1, 4.2
INS11-6 solves scientific problems using primary and secondary data, critical thinking skills and scientific processes	3, 4, 5, 6, 7, 8, 9	4.6, 4.7
INS11-7 communicates scientific understanding using suitable language and terminology for a specific audience or purpose	1 to 9	All of 5
INS11-11 describes and assesses how scientific explanations, laws and theories have developed		

*Year 12 Investigating Science
Knowledge and Understanding Curriculum Map*

Curriculum Outcome	ATSE SH kit	
	Introductory Activities (activity #)	Depth study (section)
Module 5: Scientific Investigations		
INS12-1 develops and evaluates questions and hypotheses for scientific investigation	2, 3, 5	All of 1, 2.2, 2.6
INS12-2 designs and evaluates investigations in order to obtain primary and secondary data and information	5	1.1, 2.1, 2.3, 2.5, 2.7, 2.8, 3.1
INS12-3 conducts investigations to collect valid and reliable primary and secondary data and information	2, 3, 4, 5, 7, 8	2.5, 2.5, 3.2, 3.3, All of 5
INS12-12 develops and evaluates the process of undertaking scientific investigations	4, 7, 8	Whole booklet is one example
Module 6: Technologies		
INS12-1 develops and evaluates questions and hypotheses for scientific investigation	2, 3, 5	All of 1, 2.2, 2.6
INS12-2 designs and evaluates investigations in order to obtain primary and secondary data and information	5	1.1, 2.1, 2.3, 2.5, 2.7, 2.8, 3.1
INS12-4 selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media	4	3.3, 4.3
INS12-13 describes and explains how science drives the development of technologies	9	4.5
Module 7: Fact or Fallacy?		
INS12-4 selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media	4	3.3, 4.3
INS12-5 analyses and evaluates primary and secondary data and information	3, 4, 7, 8	4.1, 4.2, 4.4
INS12-6 solves scientific problems using primary and secondary data, critical thinking skills and scientific processes	3, 4, 5, 6, 7, 8, 9	4.5, 4.6
INS12-7 communicates scientific understanding using suitable language and terminology for a specific audience or purpose	1 to 9	All of 5
INS12-14 uses evidence-based analysis in a scientific investigation to support or refute a hypothesis	4	4.1, 4.2, 4.3, 4.4
Module 8: Science and Society		
INS12-5 analyses and evaluates primary and secondary data and information	3, 4, 7, 8	4.1, 4.2, 4.4
INS12-6 solves scientific problems using primary and secondary data, critical thinking skills and scientific processes	3, 4, 5, 6, 7, 8, 9	4.5, 4.6
INS12-7 communicates scientific understanding using suitable language and terminology for a specific audience or purpose	1 to 9	All of 5
INS12-15 evaluates the implications of ethical, social, economic and political influences on science	9	4.4