

Science Extension

**A student's guide to the Scientific Research Report and
Scientific Research Portfolio**

© 2018 NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales.

The NESA website holds the ONLY official and up-to-date versions of these documents available on the internet. ANY other copies of these documents, or parts of these documents, that may be found elsewhere on the internet might not be current and are NOT authorised. You CANNOT rely on copies from any other source.

The documents on this website contain material prepared by NESA for and on behalf of the Crown in right of the State of New South Wales. The material is protected by Crown copyright.

All rights reserved. No part of the Material may be reproduced in Australia or in any other country by any process, electronic or otherwise, in any material form, or transmitted to any other person or stored electronically in any form without the prior written permission of NESA, except as permitted by the *Copyright Act 1968*.

When you access the material you agree:

- to use the material for information purposes only
- to reproduce a single copy for personal bona fide study use only and not to reproduce any major extract or the entire material without the prior permission of NESA.
- to acknowledge that the material is provided by NESA.
- to include this copyright notice in any copy made
- not to modify the material or any part of the material without the express prior written permission of NESA.

The material may contain third-party copyright materials such as photos, diagrams, quotations, cartoons and artworks. These materials are protected by Australian and international copyright laws and may not be reproduced or transmitted in any format without the copyright owner's specific permission. Unauthorised reproduction, transmission or commercial use of such copyright materials may result in prosecution.

NESA has made all reasonable attempts to locate owners of third-party copyright material and invites anyone from whom permission has not been sought to contact the Copyright Officer.

Phone: (02) 9367 8289

Fax: (02) 9279 1482

Email: mila.buraga@nesa.nsw.edu.au

Published by
NSW Education Standards Authority
GPO Box 5300
Sydney NSW 2001 Australia

educationstandards.nsw.edu.au

DSSP – 28165
D2017/105317

Contents

Context.....	4
What is a Scientific Research Report?	4
What is a Scientific Research Portfolio?	4
Requirements for the Scientific Research Report and Scientific Research Portfolio	5
How to start a Scientific Research Project	5
Choosing an area of interest	5
One method to formulate a research question.....	5
Mentors/Assistance	6
Finding a mentor or outside assistance	6
Choosing a mentor or engaging outside assistance.....	6
Contacting a prospective mentor or assistant	6
The Scientific Research Portfolio	7
What makes an effective portfolio?	7
Organisation of the Scientific Research Portfolio	7
Creating an effective portfolio.....	7
The relationship between the Scientific Research Portfolio and Scientific Research Report	8
Writing the Scientific Research Report.....	8
Frequently Asked Questions	9
How will the Scientific Research Project be resourced?	9
How will the Scientific Research Portfolio and Scientific Research Report be assessed?9	
How much information can I include from the work of others?.....	9
Can I use my depth study for the Scientific Research Project in Extension Science?	9
Science Extension Declaration Form.....	10

Context

Students with a passion for science explore the development of the scientific process over time by undertaking high-level authentic scientific research. Students will communicate their findings and propose further scientific research through a Scientific Research Report (Report) and a Scientific Research Portfolio (Portfolio).

What is a Scientific Research Report?

(Excerpt from the syllabus)

A scientific research report or paper (approximately 2500–3000 words) has a formal structure. Regardless of the scientific discipline the report is prepared in a way that it can be clearly interpreted by academics or other scientists. The order in which the sections of a report appear are, however, not necessarily in the order they are written. For example, the abstract appears at the beginning but is written last, once the scientific research findings have been determined.

What is a Scientific Research Portfolio?

(Excerpt from the syllabus)

The Scientific Research Portfolio supports and guides the development of the Scientific Research Report. It provides a record of the processes and documents the information gathered, the analysis of data and the development of the report.

The portfolio is an active, working, purpose-built set of documents that facilitates organisation and ensures that students reflect on their work and maintain information and records of their actions and findings. It is used to evidence students' original work and maintain records of teacher feedback, comments and observations. The portfolio also provides evidence for the acknowledgement of secondary-sourced information used and clarifies the scientific research methodology, leading to a logical evidence-based Scientific Research Report. The portfolio may be maintained in digital format.

The following information is provided to assist students in identifying the key structural elements of the portfolio. Each element may be revisited a number of times and the order of engagement with each element may vary.

Requirements for the Scientific Research Report and Scientific Research Portfolio

The time allocated to completing the Report and Portfolio may be a combination of class time and your own time. Your teacher may allocate class time for work on your Portfolio items, application of skills or completing sections of the Report.

- There are no specific hours allocated for the production of the Report or Portfolio.
- Contributions made by your teacher, mentor or any other person must be documented in the student log and appropriate acknowledgement made through the use of referencing within the Report.
- The Report should adhere to the guidelines presented in the Science Extension syllabus.
- The Report and Portfolio produced in this course may be an extension of, but must not overlap with or duplicate, any depth study completed in Year 11 or Year 12 Biology, Chemistry, Earth and Environmental Science, Investigating Science or Physics.
- The Report and Portfolio is best developed concurrently with the study of Modules 1 to 4 of the Science Extension syllabus.
- The application of skills learned throughout the course should be clearly demonstrated in your Report and Portfolio.

How to start a Scientific Research Project

Choosing an area of interest

- Choose a scientific topic or area of interest as the Report will take significant time and effort to complete.
- You may not need to produce new research and generate original data to complete your project but your work may provide a new or alternate perspective to existing research or data. The area chosen should have sufficient and readily accessible data including, where appropriate, large data sets to examine.
- To produce meaningful work the topic should be specific and narrow. Choosing too broad an area of study will make it difficult to formulate hypotheses or to draw meaningful conclusions.

One method to formulate a research question

- Choose a science discipline and broad area of interest, eg Biology.
- Narrow your focus through wide reading of peer-reviewed literature or reliable articles, eg Immunology – Cancer – T-Cells.
- Search to see if there are research papers and data sets available within your narrowed area before formulating a question.

Example research questions:

- What subsets of T-cells are found in BRCA1 positive mutation breast cancers compared with BRCA1 negative, HER2/neu positive breast cancers?
- Which is the most appropriate alternative energy source to replace non-renewable energy sources in your area?
- Explore appropriate ways to data mine and manage large data sets in astrophysics.
- Examine the longevity of sunscreen effectiveness in the presence of varying concentrations of pool chlorine.

Mentors/Assistance

Finding a mentor or outside assistance

Ensuring student wellbeing and safety is a requirement for all government and non-government schools. Your school has policies and guidelines to ensure that all students are safe. You will need to adhere to the school policies and processes if an outside mentor is to be engaged. Your teacher can assist you with this. You must inform your teacher of any communication with non-school personnel that relates to this course.

You must follow all policy and guidelines required by your school. This includes not approaching potential mentors or seeking external assistance until you have been given explicit permission from your teacher or school.

It is not a course requirement to have a mentor and you may choose to work independently or with a mentor for only a part of the project.

Choosing a mentor or engaging outside assistance

It is essential for the mentor or assistant to have specific experience in your chosen interest area.

A mentor may be:

- a science professional who has experience in research
- a contact or friend who has knowledge of the relevant area
- an academic professional at an educational institution, eg TAFE, university, school
- a professional person working in an area of science, eg zookeeper, astronaut, school teacher.

The chosen mentor or outside assistant:

- should be willing and have time to speak to you or correspond with you on a regular basis
- may offer critical feedback, and provide professional advice related your Project
- may assist with guiding you to relevant resources
- must not complete the Project for you. This includes proofreading or correcting drafts. They may, however, help you with specific key terminology and ideas
- should not be directly responsible for marking/assessing the Report
- must not be part of the exam development process in that current year.

Contacting a prospective mentor or assistant

You must follow the policy and guidelines set out by your school.

In addition:

- Prior to any contact, you should provide your teacher or school representative with the relevant details of your potential mentor or assistant.
- The teacher or school representative should make first contact with the mentor to ensure that the person meets the school policy/policies regarding child protection.
- Ideally, all written correspondence between you and a mentor should be copied to your teacher.
- All direct contact should conform to the school policy/policies regarding child protection.

The Scientific Research Portfolio

What makes an effective portfolio?

A portfolio is an effective way to tell the story of the research process, progression, learning, and challenges. While it forms part of the assessment, it is also an effective assessment for learning tool. Ideally, the Portfolio should:

- demonstrate the growth and development of the investigation
- showcase the student's work
- document process for school-based assessment.

The Portfolio has been divided into three sections as detailed in the Science Extension syllabus. Lists of example elements that may form part of the sections have been included.

Organisation of the Scientific Research Portfolio

The way in which the Portfolio is maintained will be a school-based decision. NESA does not mandate any specific requirements outside those documented in the Science Extension syllabus and Assessment and Reporting documents.

It is a requirement of the course that you, the student, are the author of your own Portfolio.

The Portfolio may be constructed using:

- online file-sharing software or platforms
- a portable electronic file storage device
- hard copy of portfolio elements
- a combination of the above
- any other format.

NESA requires that a signed *Science Extension Declaration Form* (attached) be provided with each Scientific Research Report to ensure that the submission is wholly the work of the student. Further detail can be found in [Assessment and Reporting in Science Extension Stage 6](#). A well-planned organisation of the Scientific Research Portfolio is essential as it is the proof of authorship and may form the basis for school-based assessment appeals. A detailed and regularly monitored process log should be included, especially when your work is completed away from school.

Creating an effective portfolio

- Follow the guidelines set out by your teacher.
- Be creative and individual while following your teacher's guidelines.
- Ensure that you keep up to date and work regularly on the Portfolio items.
- Create a backup for your portfolio. Your teacher may request all students store their portfolios in a particular manner but you may choose to back up or have your draft in a different format.
- Provide responses to feedback from your teacher to demonstrate your learning.
- It is recommended that you store your portfolio in a private manner to prevent public access. Follow school policies and guidelines.
- Think about which portfolio elements you can use for future employment or research pursuits. You may like to keep an additional portfolio with these elements only.

The relationship between the Scientific Research Portfolio and Scientific Research Report

The Portfolio is essential to prove authorship of the Report. Receiving assistance and collaboration is part of the research process. This assistance must be referenced as you would any other resource. You may acknowledge how this assistance has led to a greater understanding of your topic or the development of your research.

The Portfolio is a tool for you, your teacher or other readers to understand the philosophy, rationale, and aim of your research project and is comparable to a laboratory book.

The Portfolio also enables a peer review process particularly in the case where you may be required to substantiate a new discovery.

Writing the Scientific Research Report

The requirements for the Scientific Research Report are clearly listed in the [Stage 6 Science Extension Syllabus](#). The requirements for the assessment of the Report and Portfolio are found in [Assessment and Reporting in Science Extension Stage 6](#).

The Report is a result of your own work and must adhere to the principles and practices of good scholarship, as identified in the [HSC: All My Own Work](#) course. All scientific research must be sensitive to community expectations in relation to the question being interrogated. You must adhere to ethical practices in the collection and analysis of data and the communication of results.

Frequently Asked Questions

How will the Scientific Research Project be resourced?

The development of the Report and Portfolio relies on your creativity, curiosity and imagination. You may use any school-approved resources. You are not required to buy expensive resources nor is the school responsible for individual specialist items that you may need. The choice of resources provided by the school is a school-based decision.

How will the Scientific Research Portfolio and Scientific Research Report be assessed?

Your school will provide information for your school-based assessment. The Report will be marked by the teacher and must be assessed as a complete piece of work. Sample assessment schedules, assessment tasks and marking criteria can be found on the NESA website.

How much information can I include from the work of others?

You must complete the online course [HSC: All My Own Work](#). Citing the work of others should follow standard academic guidelines. Schools have their own policies in dealing with issues of plagiarism and the completion of the Report and Portfolio should follow the same rules that your school has in place. There are online software programs that can be used to identify plagiarism.

Can I use my depth study for the Scientific Research Project in Extension Science?

You may take inspiration from the depth study/studies you have completed or are completing in a 2 Unit Science course. However, the course requirements and outcomes for Science Extension are different from the 2 Unit Science courses. As a student studying Science Extension, you are expected to extend your scientific research and Working Scientifically skills to a higher level than those required for the 2 Unit Courses. Additionally, projects developed for assessment in one subject are not to be used either in full or in part for assessment in any other subject ([Assessment, Certification, Examination \(ACE\), 8013](#)).

**Science Extension – Scientific Research
Report and Scientific Research Portfolio
Declaration and Certification Form**

This form contains information to be read by students, teachers and the Head Teacher/Head of Department. It is to be retained by the school in accordance with the school's assessment policy.

Student: _____ Student number: _____

Scientific Research Report title:

Supervising Teacher: _____

Supervising Teacher please note: The teacher and student declarations regarding the originality of the student's work and its supervision are included on this form. Please ensure that your students have read the declaration to which they are attesting when they sign the form. Your declaration attesting to the completion of students' work in accordance with the rules appears below. Please read the declaration prior to signing below the student's signature.

Supervising Teacher's Declaration: I declare that I have supervised the planning, development, content and presentation of this Scientific Research Report and Scientific Research Portfolio and I confirm that it is essentially the student's own work, except for limited material, if any, drawn from acknowledged sources. The Scientific Research Portfolio is a correct record of the student's planning and progress throughout the development of the Scientific Research Report.

NB. If any student's work is unable to be certified, a statement from the school providing the reasons for non-certification should be attached to this form. This statement must be signed by the student. If the student wishes, they should be given the opportunity to make written comments.

Students please note: You must read and understand the following declaration prior to signing below. Your signature shows your agreement with the declaration.

Student Declaration: I declare that the planning, development, content and presentation of this Scientific Research Report and Scientific Research Portfolio is essentially my own work (except for limited material, if any, drawn from acknowledged sources) and has not been copied from any other person's work. I understand that a false declaration may jeopardise my HSC results.

Signature of student

Date

Signature of Supervising Teacher

Date

Signature of Head Teacher/Head of Department

Date

