

Science in Practice 2019 v1.0

Sample assessment instrument

November 2018

Investigation — Environmental study

Information for teachers

This sample has been compiled by the QCAA to help and support teachers in planning and developing assessment instruments for individual school settings.

Schools develop internal assessments for each Applied subject, based on the learning and assessment described in the approved study plan.

Purpose of the investigation

This technique assesses investigative practices and the outcomes of applying these practices. Investigation includes locating and using information beyond students' own knowledge and the data they have been given. In Science in Practice, investigations involve research and follow the methods of scientific inquiry. They provide opportunity for assessment to be authentic and set in contexts similar to those that might be encountered by scientists.

Further information about the specifications for this assessment technique can be found in the Assessment techniques section of the Science in Practice syllabus.

Assessment dimensions

This assessment instrument is used to determine student achievement in the following dimensions:

- Knowing and understanding
- Analysing and applying
- Planning and evaluating.

In Science in Practice, all objectives from each dimension must be assessed in an investigation.

Subject	Science in Practice
Technique	Investigation — Environmental study
Unit number and module number and name	Unit: 3 Module: 6. Environmental study

Conditions	Units 3–4
Written	600–1000 words
Further information	
Duration (including class time)	6 weeks, including 5 hours of fieldwork
Individual/group	Data will be collected in groups and the scientific report will be completed individually.
Resources available	<p>Access to:</p> <ul style="list-style-type: none"> • internet and computers • water quality testing kits • macroinvertebrate collection and identification equipment, e.g. scoop nets, ice containers, small paint brushes, macroinvertebrate identification keys. <p>Resources also may include catchment study guides from:</p> <ul style="list-style-type: none"> • local authorities, e.g. Gold Coast City Council • local environmental education centres, e.g. Numinbah Environmental Education Centre.
Context	
<p>Human interactions with our environment can have significant impacts on the Earth and a profound effect on present and future generations. In this module you have learnt about the impact humans have on water resources, focused on water quality and accessibility. You have been introduced to the biological and physicochemical indicators of water quality and gained experience in testing water quality in the laboratory. You will now apply these skills to assess the health of a local stream at different points throughout its catchment.</p>	
Task	
<p>Investigate the health of a stream in the Nerang River catchment by performing various biological and physicochemical tests at different points. Analyse the results and discoveries, and the conditions surrounding them. Write an individual scientific report providing conclusions on the stream's overall health and recommendations for future management of the Nerang River catchment.</p>	

To complete this task:

In groups, create an investigation plan to safely collect water quality and stream health data. The plan should:

- identify and record notes on the safety factors that need to be considered for the task (including environmental and equipment/chemical factors)
- identify at least two different freshwater sites to sample in the Nerang River catchment, with each site containing both riffle and edgewater habitats
 - one upstream of Hinze Dam
 - one downstream of Hinze Dam
- allow for
 - the performance of macroinvertebrate sampling and recording of findings
 - the undertaking of a habitat assessment (using a habitat assessment data sheet from your local authority or education centre)
 - testing and recording of various physical and chemical parameters, including temperature, pH, salinity/conductivity, turbidity, nitrates, phosphates and dissolved oxygen
 - recording of times of day, date, weather conditions and other relevant details, e.g. land use type, housing density, presence of human impact.

Conduct your investigation, ensuring that each group member has access to all of the collected data for their scientific report.

Individually, prepare a scientific report that:

- describes and explains the factors that affect water quality in catchments, particularly for the Nerang River
- describes and explains the choice of tests and techniques used to collect the data
- displays findings in suitable tables and uses graphs to compare relevant data
- analyses the data to identify patterns, similarities and differences within a site and between the different sites tested
- evaluates the plan and subsequent results in terms of the reliability and validity of data collected
- draws conclusions regarding the health of the stream and makes justified recommendations for future management of the Nerang River catchment.

Checkpoints

- Term [X] Week [X]/[Date]: Discuss investigation plans as a group with teacher
- Term [X] Week [X]/[X]: Submit group raw results summary to teacher
- Term [X] Week [X]/[X]: Complete draft scientific report
- [Due date]: Submit final scientific report

Authentication strategies

Your teacher will use ways to check that the work you are assessed on is your own work.

- Your teacher will observe you completing work in class.
- Take part in interviews or consultations with your teacher as you develop your response.
- Submit a draft and respond to teacher feedback.
- Check you have not plagiarised any material, e.g. by using plagiarism-detection software or other school processes.
- Acknowledge all sources used.
- Your teacher will compare the responses of students who have worked together in groups.

Instrument-specific standards matrix

	Standard A	Standard B	Standard C	Standard D	Standard E
Knowing and understanding	<p>The student work has the following characteristics:</p> <ul style="list-style-type: none"> comprehensive description and explanation of scientific facts, concepts and phenomena in a range of situations including some that are unfamiliar coherent description and explanation of scientific skills, techniques, methods and risks. 	<p>The student work has the following characteristics:</p> <ul style="list-style-type: none"> detailed description and explanation of scientific facts, concepts and phenomena in familiar situations detailed description and explanation of scientific skills, techniques, methods and risks. 	<p>The student work has the following characteristics:</p> <ul style="list-style-type: none"> description and explanation of scientific facts, concepts and phenomena in familiar situations description and explanation of scientific skills, techniques, methods and risks. 	<p>The student work has the following characteristics:</p> <ul style="list-style-type: none"> description of simple scientific facts, concepts and phenomena description of scientific skills, techniques, methods and risks. 	<p>The student work has the following characteristics:</p> <ul style="list-style-type: none"> statements about simple scientific facts and phenomena statements about simple scientific skills, techniques, methods and risks.
	Analysing and applying	<p>The student work has the following characteristics:</p> <ul style="list-style-type: none"> comprehensive analysis of data, information, situations and relationships application of scientific knowledge, understanding and skills to generate justified solutions in a range of situations including some that are unfamiliar clear and coherent communication using scientific terminology, diagrams, conventions and symbols. 	<p>The student work has the following characteristics:</p> <ul style="list-style-type: none"> detailed analysis of data, information, situations and relationships application of scientific knowledge, understanding and skills to generate informed solutions in familiar situations effective communication using scientific terminology, diagrams, conventions and symbols. 	<p>The student work has the following characteristics:</p> <ul style="list-style-type: none"> analysis of data, information, situations and relationships application of scientific knowledge, understanding and skills to generate solutions in familiar situations communication using scientific terminology, diagrams, conventions and symbols. 	<p>The student work has the following characteristics:</p> <ul style="list-style-type: none"> description of data, information, situations and relationships partial application of simple scientific knowledge, understanding and skills basic communication using aspects of scientific terminology, diagrams, conventions and symbols.

	Standard A	Standard B	Standard C	Standard D	Standard E
Planning and evaluating	The student work has the following characteristics:	The student work has the following characteristics:	The student work has the following characteristics:	The student work has the following characteristics:	The student work has the following characteristics:
	<ul style="list-style-type: none"> considered planning of scientific activities and investigations systematic evaluation of the reliability and validity of plans and procedures, and data and information valid conclusions, decisions and recommendations justified with scientific evidence. 	<ul style="list-style-type: none"> effective planning of scientific activities and investigations detailed evaluation of the reliability and validity of plans and procedures, and data and information informed conclusions, decisions and recommendations linked to scientific evidence. 	<ul style="list-style-type: none"> planning of scientific activities and investigations evaluation of the reliability and validity of plans and procedures, and data and information conclusions, decisions and recommendations using scientific evidence. 	<ul style="list-style-type: none"> planning of aspects of scientific activities and investigations statements about the reliability and validity of simple plans and procedures, and data and information conclusions, decisions and recommendations. 	<ul style="list-style-type: none"> statements about aspects of scientific activities and investigations statements about aspects of reliability and validity statements of personal opinion.