

ACER Portfolio Project

TEACHING FIELD: Secondary Science
LEVEL: Highly Accomplished

ENTRY 2: Conducting a whole-class discussion in science

The ACER Portfolio Project focuses on the research and practical challenges involved in developing valid and feasible methods by which teachers can demonstrate how they meet the Australian Professional Standards for Teachers at the highly accomplished level. Entry 2 is one of four portfolio entries for secondary science teachers.

ENTRY 2: Conducting a whole-class discussion in science

Introduction

Highly accomplished science teachers are able to facilitate whole-class discussions insightfully, skilfully and in a collaborative and safe learning environment. Such discussions engage students productively and clearly contribute to their achieving identified learning goals that are aligned to the science curriculum and their needs.

Highly accomplished science teachers know their students well and the factors that influence their learning in science and their participation in class discussion. They can demonstrate strategies used to create safe, constructive discussion environments where students can question, respond, communicate and develop ideas and understanding. Highly accomplished teachers understand the dynamic and productive nature of a whole-class discussion and are able to negotiate and adhere to guidelines to ensure students can respectfully exchange ideas with one another.

Highly accomplished science teachers can integrate the three Content Area Strands of the Australian Curriculum to identify and incorporate meaningful connections during whole-class discussions. They are able to use multi-modal resources to engage students' in discussion about the relevance of science to the life of individuals, society, the environment and our economic wellbeing. Highly accomplished science teachers can demonstrate strategies that equitably support and develop students' confidence to participate in whole-class discussions. They are able to identify and explain the context and purpose of the ideas being communicated in ways that enable students to interpret their own and others' ideas.

Highly accomplished science teachers demonstrate the ability to anticipate and diagnose hurdles to learning during whole-class discussions and promptly respond to maximise the students' gain in knowledge, understanding and communication skills. Highly accomplished teachers demonstrate the ability to provide constructive feedback so students can identify learning-gains and reflect on their learning. They also gather feedback from their students to evaluate and analyse their own teaching practice.

Highly accomplished science teachers engage in purposeful professional learning to keep their science and pedagogical knowledge current. They identify and use authoritative findings from the literature to support their classroom practice, and can demonstrate the use of contemporary science understanding and pedagogy to facilitate whole-class discussions.

Overview of the portfolio entry

In this portfolio entry you will demonstrate how you:

- Incorporate whole-class discussion into a planned sequence of learning activities
- Use effective discussion strategies to establish and maintain a respectful and productive learning environment
- Engage students in sustained and productive whole-class discussions of a major concept or idea in science
- Probe students' current understanding
- Promote and expand students' current knowledge and ability to communicate their ideas
- Integrate the three Content Area Strands of the Australian Curriculum into whole-class discussions
- Promote students' ability to identify and relate the importance of science to individuals and society
- Provide feedback that promotes students' understanding of scientific ideas and communication skills.

You will provide evidence by means of:

- A **film recording** of 15-20 minutes duration demonstrating how you engage students in effective whole-class discussion and which provides evidence of the points above.
- **Artefacts** used to (a) locate the film segment in the planned teaching/learning sequence, and (b) used to monitor, guide and support students in the discussion.
- A **written commentary** that (a) describes the context of your teaching, (b) explains the reason/s for selecting the particular segment recorded for the film, (c) an analysis of the teaching strategies used in the whole-class discussion, (d) reflects on the learning outcomes as demonstrated by the changes in students and its implications for your practice.

Note: this entry should not duplicate the same teaching/learning sequence or be based on the same class as the other science portfolio entries.

Entry design

This entry is designed to enable you to provide evidence of how you meet standards for highly accomplished teachers in your current teaching context. Your entry will demonstrate your knowledge of science and its processes and your ability to establish and sustain a whole-class discussion in which students develop their science knowledge and engage in those processes.

The entry is referenced to:

- The Australian Professional Standards for Teachers (AITSL) at the Highly Accomplished career stage.
<http://www.aitsl.edu.au/australian-professional-standards-for-teachers/standards/career-stage/highly-accomplished>

- Australian Curriculum: Science (AC:S)
<http://www.australiancurriculum.edu.au/science/rationale>
- Research on best practice for teaching and learning science that informed your practice in relation to this entry

Australian Professional Standards for Teachers, Australian Institute for Teaching and School Leadership (AITSL), Relevant to Entry 3

This entry requires you to provide evidence of your accomplishment relevant to the following *Australian Professional Standards for Teaching* at the Highly Accomplished career stage:

Standard 1: Know students and how they learn

Standard 2: Know the content and how to teach it

Standard 3: Plan for and implement effective teaching and learning

Standard 4: Create and maintain supportive and safe learning environments

Standard 5: Assess, provide feedback and report on student learning

Standard 6: Engage in professional learning

An emphasis for this entry is on Standards 1, 2, 3 and 4 although your entry will also provide evidence in relation to Standards 5 and 6.

Australian Curriculum: Science

The overall **aims** and **content structure** of the science curriculum are clearly articulated. <http://www.australiancurriculum.edu.au/science/aims> and <http://www.australiancurriculum.edu.au/science/content-structure>

The science content for this particular entry is described in the Australian Curriculum: Science (AC:S), relevant to the year or phase of learning of your students. <http://www.australiancurriculum.edu.au/science/curriculum/f-10?layout=1>

The three strands of the science curriculum are interrelated and are expected to be taught and learnt in an integrated way. This entry will demonstrate how your teaching contributes to developing students scientific literacy skills through integrating the three strands: *Science Understanding*, *Science as Human Endeavour* and *Science Inquiry Skills*

<http://www.australiancurriculum.edu.au/science/content-structure>.

Note: *Individual jurisdictions may have mandated variants of the AC:S. If so, the relevant curriculum documentation should be referenced*

This entry does not prescribe **how** you will teach scientific literacy and communication skills, or the kind of opportunities you provide within the teaching/learning sequence and whole-class discussion; it is matter for your professional judgment given the circumstances of your teaching and the particular requirements of your students.

<http://www.australiancurriculum.edu.au/science/implications-for-teaching-assessment-and-reporting>

Research on effective teaching practice in science

There is a considerable body of research into best practice for teaching and learning science. You will draw on and reference this research, explain how it

has informed your approach to teaching and learning in science, and relate it to the opportunities you provided to enable **your** students to build their knowledge of the relevance of science and their scientific literacy skills.

[see Supporting information]

Requirements for Entry 2: Conducting a whole-class discussion in science

The **film**, **artefacts** and **written commentary** together provide evidence of how you have met the requirements of this portfolio entry.

The class you select and the teaching/learning sequence should be different from those featured in your other portfolio entries.

Film recording (continuous and uninterrupted 15-20min)

It is important that the class you select and the segment of class discussion you choose provides you with the opportunity to demonstrate your professional knowledge and practice to best advantage. The film should provide evidence of how you interact with your students, maintain a positive learning environment, encourage all students to initiate ideas, build on those ideas and develop their scientific literacy.

Guidance is provided in the *Supporting information*.

Artefacts

The artefacts you select must support this particular entry. Guidance on selection is provided in the *Supporting information*. [\[link\]](#)

Requirements for assembling, formatting, digitising and submission of items are provided.... [\[link\]](#)

Written commentary

Your written commentary will assist assessors in making judgements about your accomplishment in relation to this entry. Your written commentary will consist of 6 components as follows:

1. School context

In this section you will outline the characteristics of the school and the wider community that provides an overall context for your teaching and learning environment, including:

- 1.1 Type of school, its location (rural/remote/urban), jurisdiction, level (e.g. primary, secondary, F-12); single/multi-campus, co-ed/single sex boys/girls
- 1.2 Total school enrolment, year levels, number and size of classes
- 1.3 Mandated curriculum requirements. **Note:** your school/jurisdiction may mandate a variant of the Australian Curriculum. Please give relevant details if this is the case.
- 1.4 Demographic composition and characteristics of the school and wider community, for example: cultural, ethnic and socio-economic backgrounds, diversity of language, integration of students with disabilities or special needs.

2. Teaching context

In this section you will describe the characteristics of the class you are teaching; the resources available to you and other factors that might influence teaching and learning of these students at this time.

- 2.1 Identify the year level, age range and number of students in the class?

- 2.2 Describe the nature of the space/facilities in which you teach science to this class?
- 2.3 Identify the features of school programming that might affect your teaching of this class?
- 2.4 Identify resources that are present or absent that affect the science teaching and learning of this class?
- 2.5 What are the characteristics of the class you are teaching that influenced the way you designed the teaching and learning sequence featured in your entry?

3. Research on effective teaching practice in science

In this section you will select and reference two to four authoritative research studies in the field of science teaching and learning that have influenced the way you teach scientific literacy skills. Make specific reference to why and how you have applied the research findings in this field to the learning opportunities you have provided your students in the context of this entry.

- 3.1 Explain how and to what extent your prior knowledge/understanding of educational research findings affected or informed your approach to teaching for this entry.

References should be:

- correctly cited and referenced
- related to teaching practice or knowledge of students
- clearly linked to how teaching practice has been kept current
- clearly linked to teaching practice in relation to facilitating whole-class discussion to developing students' scientific literacy and communication skills.

4. Planning

In this section you describe the plan for the overall teaching/learning sequence, of which the class discussion forms a part. This will include a description of the purpose, focus and context of the planned whole-class discussion featured in the film segment for this entry. Where appropriate, refer to specific artefacts you are submitting to support your entry.

- 4.1 In your planning, what were the overall goals for the sequence of teaching and learning in which the discussion shown in the film was a part? Why were these goals appropriate and important for your students?
- 4.2 In your planning of the teaching/learning sequence, describe how you made meaningful connections between the relevant content descriptions for *Science as Human Endeavour*, *Science Understanding* and *Science Inquiry Skills* strands (or their variants)?
- 4.3 Describe the challenges inherent in the specific aspects of *Scientific Literacy and Communication* that you addressed by teaching your students through the whole-class discussion?
- 4.4 Outline the activities the students previously engaged in that led to the whole-class discussion and interactions shown in the film?
- 4.5 What was/were the intention(s) of the discussion that you facilitated? In what way was this evidenced in the film segment?

- 4.6 Describe and explain the particular challenges presented by the class you have chosen for this entry?

5. Analysis

In this section you will analyse your teaching practice and the students' development of scientific literacy and communication skills. The prime source of evidence for your analysis will be the film segment, supported by your artefacts. In your analysis you will explain:

- 5.1 Why you chose this particular segment of the film to submit?
- 5.2 What specific interactions between you and your students provide evidence of the strategies you employed to (a) facilitate the discussion, (b) monitor/gauge student progress, and (c) guide students' developing particular aspects of scientific literacy and communication skills? (Use the timer to indicate where these interactions occur)
- 5.3 What features of the learning environment enabled the students to actively participate in the discussion?
- 5.4 What sections of the video demonstrate gains in learning achieved by the students? (Refer to specific students. E.g. the boy with red hair)

6. Reflection and evaluation

In this section you will reflect on and evaluate your teaching practice in the light of the APST standards and the extent to which your students achieved the goals of the teaching/learning sequence described in this entry. Making specific reference to the film, to the artefacts and to your analysis of the teaching/learning sequence above, reflect on:

- 6.1 Intended and unintended outcomes of the discussion and how they will inform your future teaching of this class and, in particular, how you conduct future classroom discussions with this and other classes.
- 6.2 How your knowledge of particular students influenced the teaching strategies you used and how successful these were in engaging them productively in the discussion?
- 6.3 How the features of the learning environment affected the extent of student participation?
- 6.3 How effectively you monitored students' level of understanding, given what you have seen in the film segment?
- 6.4 How the discussion helped students to develop their scientific literacy and communication skills?
- 6.6 The influence that science education research had on your teaching?

How will the entry be assessed?

Your entry will be confidential, anonymous and will be assessed by trained peers using the Evaluation Guide [link]. Assessment of the quality of your teaching will be based on the evidence provided in the film **segment**, the **written commentary** and the supporting **artefacts**. They will demonstrate how you have enabled students to develop scientific literacy

and communication skills relevant to the intentions of the particular discussion and the longer term learning goals of the teaching-learning sequence.

Assessment Guide

An entry that meets the highly accomplished level provides clear evidence that the teacher has planned and implemented a purposeful, coherent and cohesive sequence of learning activities in which a whole-class discussion was facilitated to assist students to develop scientific literacy and communication skills.

Entry 2 Secondary Science: Conducting a whole class discussion in science

Summary of requirements

Components of the portfolio entry	Limits*	
Film	15-20 min	Continuous and uninterrupted (may be part of a more extensive film). Contains evidence of teacher practice and student participation.
Artefacts	8 pages	Materials created or selected by the teacher to support the teaching and learning practices viewed in the film segment
Written commentary <i>Describes, analyses and evaluates a whole-class discussion as part of a unit of work in which you have developed student' science literacy and communication skills.</i>		
School context	1p Not assessed	Describes the characteristics of the school and wider community that provide the context for your teaching.
Teaching context	1p Not assessed	Describes the characteristics of students in your class and how they influence your approach to teaching in the context of this entry..
Research on effective teaching practice in science	Reference 2-4 articles 1 page	Demonstrates how educational research has informed your practice generally and, in particular, your approach to developing students' scientific literacy and communication skills.
Planning	3 pages	Describes the plan for the overall teaching/learning sequence of which the class discussion forms a part Describes the intention of the particular discussion featured in the film segment.
Analysis	3-4 pages	Points to and analyses evidence in the film segment that student are engaged in a purposeful discussion of a major idea or ideas in science and developing their
Reflection and evaluation	2 pages	Provides a review the unit of work as a whole, and the film segment in particular, discussing the extent to which it was successful in achieving your goals and its implications for future teaching of inquiry skills.

Total page length should not exceed 12 pages. When completed, each of these components will be uploaded to a website. Guidelines for uploading will be provided later.

Supporting information: guidance for preparing your portfolio entry

How to demonstrate practice to best advantage

Both the class itself and the film segment you choose to submit should provide you with the opportunity to demonstrate your professional knowledge and practice to best advantage.

The film, written commentary and supporting artefacts will constitute the primary evidence. They will demonstrate how you have enabled these students to make gains in developing their scientific literacy and communication skills relevant to the intentions of the whole-class discussion and the longer term learning goals of the teaching-learning sequence.

Selection of the class

It is suggested that the class you select has some experience in being involved in whole-class discussion, though it is not essential.

Selection of the focus or topic for discussion

It is important that you select a topic for discussion that:

- Enables you to provide evidence of employing strategies that assist students to develop aspects of their scientific literacy or communication skills in meaningful contexts
- Provides the opportunity for you to demonstrate the strategies you use to maintain students' engagement in the discussion, rather than using a transmission style delivery such as a lecture
- Is substantial enough to make meaningful connections between the three strands of the Australian Curriculum (AC:S or mandated variant)
- Is substantial enough to develop as a coherent argument during the period of the discussion and is demonstrably a part of the teaching/learning sequence.

'Whole-class discussion' in the context of this entry might be a whole or part of a lesson, or of longer term group or collaborative activities that draw the class together for a particular purpose.

'Scientific literacy' in the context of this entry, incorporates but is not limited to, the following description:

'the ability to use scientific knowledge, understanding, and inquiry skills to identify questions, acquire new knowledge, explain science phenomena, solve problems and draw evidence-based conclusions in making sense of the world, and to recognise how understandings of the nature, development, use and influence of science help us make responsible decisions and shape our interpretations of information'.

Australian Curriculum: Science

<http://www.australiancurriculum.edu.au/Glossary?a=S&t=scientific+literacy>

Selection of artefacts

The artefacts you select should be relevant to and support this particular entry. They should not replicate what is evident in the film. It is recommended you review the requirements for the Written Commentary as these will help guide the choices you make about what type of artefacts to submit in support of your entry.

Making the film

Detailed information about making your film can be found in the general guidelines for preparing your portfolio [Link to be inserted]

If you and your students are unfamiliar with the process of being recorded on film it is worthwhile recording a number of sessions/lessons that contain, if possible, whole-class discussions. Students who do not have permission to be filmed must be unidentifiable, have their image made unidentifiable or be excluded from the class.

The film could be filmed by a colleague, or a student who is not an active participant in the class or you could set the camera up on a tripod and leave it running. The film may have close-up and panned segments of the class, so it is recommended that the person filming has been instructed or has expertise in capturing the elements of the class dynamics.

If you record a discussion that is lengthier than the 15-20 minutes uninterrupted footage (required for this entry) it enables you to make a judicious selection of the segment for submission. The film segment must include evidence of how you facilitate the whole-class discussion purposefully, manage the class environment, and show how students participated actively.

In your analysis of the filmed interactions you have selected, it is recommended that the interactions are identified (or referenced) by the number of minutes into the film segment they occur. This enables the assessors to accurately relate the written analysis to the event in the film.

Ensure that during the filming students are addressed by their first name or remain anonymous. They can be identified by a distinguishing feature (e.g. clothing) or numbered from the left/right or top/bottom of the picture plane.

Permissions

Prior to filming your class discussions, you will need to obtain permission from parents or carers for all students who appear in the film. Standard permission forms will be provided on the ACER website that you can send to parents. When signed, you should keep copies of the forms on file. Details about permissions can be found in the general guidelines for preparing your portfolio [Link to be inserted]

Selection of Research findings

For this entry you are expected to source and reference authoritative research that has influenced your science teaching. A comprehensive literature review or analysis is not expected, but you will need to explain of how your professional reading has informed your teaching practice and how students learn. It should demonstrate how knowledge from literature about science and science teaching has enabled you to keep your teaching practice current.

The reading should be cited in your writing and referenced appropriately. This will enable assessors to identify what has influenced and informed your teaching practice in relation to facilitating whole-class discussion and developing students' scientific literacy and communication skills.