



ECH 430

Teaching and Learning Science and Technology

S2 External 2019

Department of Educational Studies

Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	3
<u>General Assessment Information</u>	3
<u>Assessment Tasks</u>	8
<u>Delivery and Resources</u>	10
<u>Policies and Procedures</u>	10
<u>Graduate Capabilities</u>	12

Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

General Information

Unit convenor and teaching staff

Convenor and Lecturer

Anne Forbes

anne.forbes@mq.edu.au

Contact via Via iLearn

29 Wally's Walk, Room 240

Tutor

John Johnstone

john.johnstone@mq.edu.au

Contact via Via iLearn

Owain Matthews

owain.matthews@mq.edu.au

Credit points

3

Prerequisites

ECH335 or ECHE234

Corequisites

Co-badged status

Unit description

This unit builds on the knowledge gained in previous units, further developing student's knowledge of the principles and practices of teaching and learning science and technology. Students explore a range of strategies for assessing children's scientific understandings, and use knowledge of curricula, resources and teaching strategies to design and implement lesson sequences to enhance the growth of children's scientific thinking. Students examine information and communication technology as a tool for learning and explore issues related to the use of technology in the classroom. The integration of science and technology into other learning areas and differentiating curriculums to meet the diverse needs of learners are also addressed.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

Develop further understanding of the major theoretical and research directions and current resources in science education.

Design lesson sequences and units of work that enhance the growth of children's scientific thinking, reflects current issues in research and integrates other curriculum areas.

Demonstrate knowledge of scientific concepts, processes and resources related to the made environment in the contexts of physical phenomena, information, and products.

Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the science classroom.

Demonstrate effective science teaching and learning strategies for meeting the needs of indigenous students.

Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

General Assessment Information

ATTENDANCE FOR UNDERGRADUATE UNITS

There will be 10 online lectures - 1 per week beginning in Week 1 of Session 2 (week beginning Monday July 29).

Activities completed during on campus days (September 23 and 24) are essential for building the core knowledge and/or skills required to demonstrate the learning outcomes of this unit [and to meet the AITSL Graduate Teacher Standards and/or ACECQA requirements]. Attendance at both on campus days is expected and the roll will be taken.

Students are required to attend the tutorial in which they are enrolled. Any changes to tutorial enrolments must be completed officially through e-student. Please do not contact the unit convenor requesting a change.

Unit Expectations

- Students are expected to read weekly readings before completing tasks and attending tutorials
- Students are expected to listen/attend weekly lectures before completing tasks and attending tutorials

Note: It is not the responsibility of unit staff to contact students who have failed to submit assignments. If you have any missing items of assessment, it is your responsibility to make

contact with the unit convenor.

ELECTRONIC COMMUNICATION

It is the student's responsibility to check all electronic communication on a regular weekly basis. Communication may occur via:

- Official MQ Student Email Address
- The Dialogue function on iLearn
- Other iLearn communication functions

GENERAL ASSESSMENT INFORMATION

Assignment extensions and late penalties

Applications for extensions must be made via AskMQ at <https://ask.mq.edu.au> as a Special Consideration request before the submission date. Students who experience a disruption to their studies through ill-health or misadventure are able to apply for this request. Extensions can only be granted if they meet the Special Considerations policy and are submitted via <https://ask.mq.edu.au/>. This will ensure consistency in the consideration of such requests is maintained.

In general, there should be no need for extensions except through illness or misadventure that would be categorised as unavoidable disruption according to the University definition of same, see: <https://students.mq.edu.au/study/my-study-program/special-consideration>

Late submissions without extension will receive a penalty of 5% reduction of the total possible mark for each day late (including weekends and public holidays). You are reminded that submitting even just 1 day late could be the difference between passing and failing a unit. Late penalties are applied by unit convenors or their delegates after tasks are assessed. For example: a task worth 50%, the 5% late penalty would therefore be a grade reduction of 2.5 marks per day. e.g. 5% of 50 = 2.5. 2 days late = 5 mark deduction.

No assessable work will be accepted after the return/release of marked work on the same topic. If a student is still permitted to submit on the basis of unavoidable disruption, an alternative topic may be set.

Students should keep an electronic file of all assessments. Claims regarding "lost" assessments cannot be made if the file cannot be produced. It is also advisable to keep an electronic file of all drafts and the final submission on a USB untouched/unopened after submission. This can be used to demonstrate easily that the assessment has not been amended after the submission date.

Requesting a remark of an assignment

If you have evidence that your task has been incorrectly assessed against the grade descriptors you can request a re-mark. To request a re-mark you need to contact the unit convenor within 7 days of the date of return of the assignment and provide a detailed assessment of your script against the task criteria. Evidence from your assignment must be provided to support your judgements.

Note: Failed assessments can not be re-submitted as they are all double-marked as a part of the

moderation process.

Please note: The outcome of a re-mark may be a higher/lower or unchanged grade. Grades are standards referenced and effort is NOT a criterion.

Assessment Presentation & Submission Guidelines

Please follow these guidelines when you submit each assignment:

- Allow a left and right-hand margin of at least 2cm in all assignments.
- Please type all assignments using 12-point font and 1.5 spacing.
- All assessments must be submitted through Turnitin in .doc or .pdf format
- It is the onus of the student to ensure that all assessments are successfully submitted through Turnitin.
- Faculty assignment cover sheets are NOT required.

Draft Submissions & Turnitin Originality Reports

- Students may use Turnitin's Originality Report as a learning tool to improve their academic writing if this option is made available in the unit.
- Students are strongly encouraged to upload a draft copy of each assessment to Turnitin at least one week prior to the due date to obtain an Originality Report.
- The Originality Report provides students with a similarity index that may indicate if plagiarism has occurred. Students will be able to make amendments to their drafts prior to their final submission on the due date.
- Generally, one Originality Report is generated every 24 hours up to the due date.

Please note:

- Students should regularly save a copy of all assignments before submission,
- Unless there are exceptional circumstances, no assessment will be accepted after the date that the assessment has been returned to other students.
- Students are responsible for checking that their submission has been successful and has been submitted by the due date and time.

University policy on grading

Criteria for awarding grades for assessment tasks

Assignments will be awarded grades ranging from HD to F according to guidelines set out in the University's Grading Policy. The following descriptive criteria are included for your information.

Note: If you fail a unit with a professional experience component the fail grade will be on your transcript irrespective of the timing of when the placement takes place.

Criteria for awarding grades in the unit

Students will be awarded grades ranging from HD to F according to guidelines set out in the policy: <https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/assessment-in-effect-from-session-2-2016>

The following generic grade descriptors provide university-wide standards for awarding final grades.

Grade	Descriptor
HD (High Distinction)	Provides consistent evidence of deep and critical understanding in relation to the learning outcomes. There is substantial originality and insight in identifying, generating and communicating competing arguments, perspectives or problem solving approaches; critical evaluation of problems, their solutions and their implications; creativity in application as appropriate to the discipline.
D (Distinction)	Provides evidence of integration and evaluation of critical ideas, principles and theories, distinctive insight and ability in applying relevant skills and concepts in relation to learning outcomes. There is demonstration of frequent originality in defining and analysing issues or problems and providing solutions; and the use of means of communication appropriate to the discipline and the audience.
Cr (Credit)	Provides evidence of learning that goes beyond replication of content knowledge or skills relevant to the learning outcomes. There is demonstration of substantial understanding of fundamental concepts in the field of study and the ability to apply these concepts in a variety of contexts; convincing argumentation with appropriate coherent justification; communication of ideas fluently and clearly in terms of the conventions of the discipline.
P (Pass).	Provides sufficient evidence of the achievement of learning outcomes. There is demonstration of understanding and application of fundamental concepts of the field of study; routine argumentation with acceptable justification; communication of information and ideas adequately in terms of the conventions of the discipline. The learning attainment is considered satisfactory or adequate or competent or capable in relation to the specified outcomes.
F (Fail)	Does not provide evidence of attainment of learning outcomes. There is missing or partial or superficial or faulty understanding and application of the fundamental concepts in the field of study; missing, undeveloped, inappropriate or confusing argumentation; incomplete, confusing or lacking communication of ideas in ways that give little attention to the conventions of the discipline.

PROCEDURES and POLICIES

Withdrawing from this UG Unit

If you are considering withdrawing from this unit, please seek academic advice by writing to <https://ask.mq.edu.au> before doing so as this unit may be a co-requisite or prerequisite for units in the following semesters and may impact on your progression through the degree.

Withdrawing from this PG Unit

If you are considering withdrawing from this unit, please seek academic advice by writing to <https://ask.mq.edu.au> before doing so as this unit may be a co-requisite or prerequisite for units in the following semesters and may impact on your progression through the degree.

Other important policies

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the policies listed in this/the Unit Guide with regard to Learning and

Teaching.

For this Unit, students must also be aware of the following specific requirements:

- Students must meet the mandatory requirements to undertake placements as specified in this/ the Unit Guide. These may include both University requirements and mandatory requirements specified by the accrediting authority such as the Working with Children check.
- Macquarie University operates under a 'Fit to Sit' model as specified in the University's [Special Consideration Policy](#). For this Unit, this means that, when undertaking a placement, a student is declaring that they are fit to do so. It is the responsibility of the student to determine whether they are fit to undertake a placement. Therefore, if a student is feeling unfit to undertake a placement, they should not do so.
- If a Student is identified by the Unit Convenor as being 'At Risk', the [Department's 'At Risk' procedure](#) will be activated and they will not be able to withdraw themselves from this Unit.
- The timing of placements can vary. For placements early in the Session, Fail grades may be approved by the University prior to the end of Session for students who do not meet the placement expectations of the Unit.

Other policies that relate to Learning and Teaching (see Policy central):

Academic Honesty Policy

Assessment Policy

Grade Appeal Policy

Complaint Management Procedure for Students and Members of the Public

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in iLearn, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit ask.mq.edu.au.

Student support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)

- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

Student enquiry service

For all student enquiries, visit Student Connect at ask.mq.edu.au

Equity support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

IT help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Assessment Tasks

Name	Weighting	Hurdle	Due
Rationale for a Unit of Work	40%	No	2/10/19
Unit of Work	60%	No	4/11/19

Rationale for a Unit of Work

Due: **2/10/19**

Weighting: **40%**

Produce a plan for a Unit of Work which uses sustainability as a context for learning K-6 Science and Technology concepts.

1. Using academic writing **produce a rationale** for a unit of work which justifies the following inclusions:
 - Specific local sustainability issue
 - Problem-based learning using the 5E approach
 - How and where there will be a focus on the NSW S&T syllabus skill outcomes of Working Scientifically (WS) and Design and Production (DP)
 - How and where there will be a focus on identified NSW S&T syllabus knowledge outcomes (select from Earth & Space, Living World, Material World, Physical World)
 - Expected alternative conceptions related to the NSW S&T syllabus knowledge

outcomes

- How different learners' needs will be addressed through the design of the unit
- How and where assessment of student learning will occur and specific evidence that you will be looking for
- Digital resource selection justification
 - To develop students' science conceptual knowledge related to a sustainability context
 - To develop students' ability to share and communicate their learning from the topic

2. **Provide evidence of your development** as a knowledge sharer and communicator through participation in the online iLearn forum.

See iLearn for assessment details.

On successful completion you will be able to:

- Develop further understanding of the major theoretical and research directions and current resources in science education.
- Design lesson sequences and units of work that enhance the growth of children's scientific thinking, reflects current issues in research and integrates other curriculum areas.
- Demonstrate knowledge of scientific concepts, processes and resources related to the made environment in the contexts of physical phenomena, information, and products.
- Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Unit of Work

Due: **4/11/19**

Weighting: **60%**

Using feedback from AT1, design and produce a complete unit of work to engage and inform primary school students with online and offline activities related to concepts in the K-6 Science and Technology syllabus around a local sustainability issue. This assignment differs from AT1 through its focus on the details of what students will actually do in the ten lessons of sixty minute (10 x 1hour) duration using the 5E approach. Include clear evidence of the following in your completed unit of work:

Strategies that enable a range of students with different needs to:

- engage with and sustain their attention on solving a specific (identified) local

sustainability issue

- develop their skills of Working Scientifically and Design and Production through hands-on activities
- use selected digital resources to develop their science conceptual knowledge and their ability to share and communicate their learning from the topic
- demonstrate their learning of science and technology concepts throughout the unit

See iLearn for assessment details.

On successful completion you will be able to:

- Design lesson sequences and units of work that enhance the growth of children's scientific thinking, reflects current issues in research and integrates other curriculum areas.
- Demonstrate knowledge of scientific concepts, processes and resources related to the made environment in the contexts of physical phenomena, information, and products.
- Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the science classroom.
- Demonstrate effective science teaching and learning strategies for meeting the needs of indigenous students.
- Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Delivery and Resources

For external students ECH 430 will involve a one-hour online lecture (or a collection of shorter recordings not totalling more than 55 minutes) and attendance at the **two compulsory on campus days on September 23 and 24 2019. Activities on each day run from 9:00am-5:00pm with breaks from 11:00-11:30am and 1:30-2:00pm.** Failure to attend all or part of the sessions will result in automatic exclusion from the unit.

Each week's lectures will be available via iLearn for all students and will be available from at least 9:00pm on the preceding Sunday evening.

Resources

This unit requires students to access online journals and research materials through the Macquarie University Library website. There are no set texts for this unit. Weekly readings are detailed on iLearn.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (<https://staff.mq.edu.au/policycentral/>)

mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Undergraduate students seeking more policy resources can visit the [Student Policy Gateway](http://students.mq.edu.au/support/study/student-policy-gateway) (<http://students.mq.edu.au/support/study/student-policy-gateway>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/study/getting-started/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)

- [Ask a Learning Adviser](#)

Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcome

- Design lesson sequences and units of work that enhance the growth of children's scientific thinking, reflects current issues in research and integrates other curriculum areas.

Assessment tasks

- Rationale for a Unit of Work
- Unit of Work

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcome

- Develop further understanding of the major theoretical and research directions and current resources in science education.

Assessment task

- Rationale for a Unit of Work

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcome

- Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Assessment tasks

- Rationale for a Unit of Work
- Unit of Work

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Develop further understanding of the major theoretical and research directions and current resources in science education.
- Design lesson sequences and units of work that enhance the growth of children's scientific thinking, reflects current issues in research and integrates other curriculum areas.

- Demonstrate knowledge of scientific concepts, processes and resources related to the made environment in the contexts of physical phenomena, information, and products.
- Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the science classroom.
- Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Assessment tasks

- Rationale for a Unit of Work
- Unit of Work

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Design lesson sequences and units of work that enhance the growth of children's scientific thinking, reflects current issues in research and integrates other curriculum areas.
- Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Assessment tasks

- Rationale for a Unit of Work
- Unit of Work

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the science classroom.
- Demonstrate effective science teaching and learning strategies for meeting the needs of indigenous students.
- Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Assessment tasks

- Rationale for a Unit of Work
- Unit of Work

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Design lesson sequences and units of work that enhance the growth of children's scientific thinking, reflects current issues in research and integrates other curriculum areas.
- Demonstrate knowledge of scientific concepts, processes and resources related to the made environment in the contexts of physical phenomena, information, and products.
- Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Assessment tasks

- Rationale for a Unit of Work
- Unit of Work

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with

knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcome

- Demonstrate effective science teaching and learning strategies for meeting the needs of indigenous students.

Assessment task

- Unit of Work

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcome

- Demonstrate effective science teaching and learning strategies for meeting the needs of indigenous students.

Assessment task

- Unit of Work