ECH 430

Teaching and Learning Science and Technology

S2 Day 2016

Institute of Early Childhood

Contents

General Information

Unit convenor and teaching staff
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Credit points
3

Prerequisites
ECH335

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 & communication and products & services.
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

Name	Weighting	Due
Weekly Discussion Posts	35%	Weekly
Science Fair Presentation	30%	29/30 September
Planning for Science Learning	35%	Nov 4

Weekly Discussion Posts

Due: **Weekly**
Weighting: **35%**

After reviewing the set weekly readings, on-line resources & provocations (provided via iLearn), students are required to reflect on these discussion points / questions posted online and respond. Students should contribute a short response (approximately 300 words) to their allocated weekly forum on iLearn.

Students also are required to reflect on others postings and write a response. Students should move beyond summarising the papers to outlining a position and contributing to the discussion. Students may choose to agree, disagree or extend a discussion, they may also add to the discussion by attaching or adding additional readings, resources, web pages and the like.

On successful completion you will be able to:

- Develop further understanding of the major theoretical and research directions and current resources in science education.
- Demonstrate knowledge of scientific concepts, processes and resources related to the made environment in the contexts of physical phenomena, information & communication and products & services.

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

Due: **29/30 September**
Weighting: **30%**

In this context a science fair consists of an inquiry question, an experiment and presentation of findings. Here students are required to develop a topic of inquiry, conduct an experiment (or series of experiments) and present their findings for peers in a 'science fair'.

Students will:

1. Identify a focus question (for science learning that you have not covered in a previous unit)
2. Develop and conduct an experiment (demonstrating appropriate lines of scientific inquiry) to generate findings
3. Analyse their data

Present their work (showing evidence of the experiment) in class to peers. This presentation will be 5 minutes long and may include multimedia (eg VideoScribe, video, Educreations, ShowMe, Powerpoint etc) or a poster display.

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 & communication and products & services.
- Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the science classroom.
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Planning for Science Learning

Due: **Nov 4**
Weighting: **35%**

Scope and Sequence documents are commonly used in schools to ensure that all curriculum content is addressed over the grades and stages. These documents outline focus areas and content strands and ensure that students who complete their schooling in one school do not cover the same topics or units repeatedly. In this assignment groups of students will be randomly presented with a topic and age group from a scope and sequence document, they will then use this topic and age group to design a unit of work and virtual resource kit for science learning. This task includes a group component (17marks) and an individual component (18 marks).

Students will select a small group to work in for this assignment (of approximately 3 people). Then, drawing on your experience of effective and engaging science learning pedagogies students (ie hands on learning) will work collaboratively to plan a unit of work and virtual resource kit that could be used over the period of one term (that is 10 weeks, with a session of 1 hour per week or equivalent hours). NOTE you may include an excursion or incursion this would count as one lesson, but should be detailed as a lesson plan.

In designing and presenting their unit of work students should present a virtual resource kit including images and details of all components of their unit of work, including but not limited digital resources for work with the children, scientific background information and lesson plans. The group virtual resource kit must contain information and images of all required materials including background and plans. Students should plan to work as a group as well as independently and should allocate adequate time to format and compile their unit of work and resources.

Students may choose the online technology that they create their digital resource kit with but it is suggested that a blog, website or google docs could be utilised. It is assumed that students would research the digital tool and make an informed decision about which platform meets their needs. A range of digital tools will be presented in tutorials and at on campus. You might like to look at sites such as Yola, Wix, Google sites, Edublogs, Weebly. This list is by no means comprehensive and the choice of platform you use is entirely your own, you must also consider costs as you make this decision.

Students will submit this work through turnitin in two parts

PART 1 – group work. This is a one page submission with the group members names, the work they contributed, the URL and a QRcode to their website.

PART 2 – individual plans. This is PDF copy of the lesson plans you developed.

On successful completion you will be able to:

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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 & communication and products & services.
- 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.
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Delivery and Resources

ECH 430 will involve a one-hour online lecture (or a collection of shorter recordings not totalling more than 55 minutes) and one two-hour tutorial in each teaching week. These lectures will be delivered via iLearn.

The timetable for internal classes can be found on the University web site at: http://www.timetables.mq.edu.au

As this unit has reduced tutorials attendance at all classes is compulsory for satisfactory completion of the unit. Documentation (such as a doctor's certificate) should be provided to explain absences.

The week's lectures will be available via ILearn for all students. Some lectures are "regular" lectures; others are shorter and may cover a collection of key ideas, an interview or be shorter lectures by experts in the field.

Both **Internal and External students** can access lectures as well as any tutorial notes via ILearn.

Compulsory On-Campus Session for ECH 430 External Students

There are two **compulsory** On-Campus Sessions for ECH 430 external students. Failure to attend all or part of the sessions will result in automatic exclusion from the unit. The On-Campus sessions will be held on the **26th and 27th of September 9.00am-5.00pm.**

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 available via iLearn.

Unit Schedule

Week	Week beginning	Topic Area	Lecture and Tutorial Activities
1	1/8/16	Unit introduction, assignments Science curriculum and change	Lecture only No tutorials (First weekly post opened on Monday for submission in week 2)
2	8/8/16	ICT Technology – multi- media, interactive tools (QR codes and Aurasma) and Professional learning networks	Lecture and Tutorials * Weekly posting due before Monday @ midnight*
3	15/8/16	Science – Rich investigations and Electricity	Lecture and Tutorials * Weekly posting due before Monday @ midnight*
4	22/8/16	Science – Informal learning opportunities and Magnetism	Lecture and Tutorials * Weekly posting due before Monday @ midnight*
5	29/8/16	No classes for ECHP424 professional experience *no weekly postings	
6	5/9/16		
7	12/9/16		
	19/9/16	Mid Semester Break	
	26/9/16	Mid Semester Break	External On Campus Day 26/9/2016 and 27/9/2016 External Assignment Two due in class (day 2)
8	3/10/16	Science Education in Aboriginal and Torres Strait Islander Communities multi-media and interactive tools	Lecture only Individual presentations in tutorials * Weekly posting due before Monday @ midnight* * Internal Assignment Two due in class
9	10/10/16	Science – linking KLAs and science and Simple Machines & Kitchen Chemistry	Lecture and Tutorials * Weekly posting due before Monday @ midnight*

10	17/10/16	Developing Content knowledge & Meeting the needs of diverse learners (part a)	No Classes to facilitate group work * Weekly posting due before Monday @ midnight*
11	24/10/16	Meeting the needs of diverse learners (part b)	Lecture only No Classes to facilitate group work * Weekly posting due before Monday @ midnight*
12	31/10/16	Group Presentations	No lectures Group presentations in tutorials * Assignment Three due 4/11/2016
13	7/11/16	Unit Reflections	No Classes (Final post for assessment 1 due before before Monday 7th @ midnight)

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

New Assessment Policy in effect from Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy_2016.html. For more information visit http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/

Assessment Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/grading/policy.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the Learning and Teaching Category of 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/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 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

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

- Science Fair Presentation
- Planning for Science Learning

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.

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

- Weekly Discussion Posts
- Science Fair Presentation
- Planning for Science Learning

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 & communication and products & services.
- Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the science classroom.
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Assessment tasks

- Weekly Discussion Posts
- Science Fair Presentation
- Planning for Science Learning

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

- Weekly Discussion Posts
- Science Fair Presentation
- Planning for Science Learning

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

- Weekly Discussion Posts
- Science Fair Presentation
- Planning for Science Learning

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 & communication and products & services.
- 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

- Weekly Discussion Posts
- Science Fair Presentation
- Planning for Science Learning

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

- Planning for Science Learning

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

- Planning for Science Learning