ECH 232

Teaching and Learning Mathematics, Science and Technology 1

S1 Day 2018

Department of Educational Studies

Contents

General Information

Unit convenor and teaching staff
Coordinator
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Credit points
3

Prerequisites
ECH113 or ((12cp at 100 level or above) and admission to BTeach(ECS))

Corequisites

Co-badged status

Unit description
This unit explores the theory and practice of mathematics, science and technology for young children. Mathematics, science and technology are presented as ways of acquiring and processing information about the world. Students gain an understanding of developmental stages in young children's learning of mathematics and science. Teaching and assessment strategies relevant for planning and implementing developmental programs are examined.

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:

Demonstrate a fundamental understanding of the major theoretical developments in

early childhood mathematics, science and technology education;
Develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act;
Demonstrate relevant knowledge of the central concepts, modes of enquiry and structure in the discipline of mathematics and science & technology
Begin to evaluate mathematics, science and technology resources in light of their experience as a teacher of young children;
Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology
Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning;
Explore, adapt and shape understandings and skills and demonstrate safe, responsible and legal use of ICT in planning and teaching.

General Assessment Information

All assessments in this unit involved online tasks and online submission.

Assessment Tasks

Name	Weighting	Hurdle	Due
Observation and Planning	35%	No	3/4/2018
Planning for Science	45%	No	6/6/2018
Quiz	20%	No	8/6/2018

Observation and Planning

Due: **3/4/2018**
Weighting: **35%**

Students will watch a video (in ilearn) of a young child being assessed in mathematics - following a structured assessment compatible with DET's requirements. Students will reflect on this kind of assessment for young children, design and propose follow up experiences to support children's mathematical learning and write a brief report for parents.

This assignment will be submitted early on in the session - after all groups have completed at least the first Maths tutorial/first on campus day.

More details of the assessment task will be available via the full unit outline on iLearn.

On successful completion you will be able to:

- Demonstrate a fundamental understanding of the major theoretical developments in early childhood mathematics, science and technology education;
- Begin to evaluate mathematics, science and technology resources in light of their experience as a teacher of young children;
- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology

Planning for Science

Due: **6/6/2018**
Weighting: **45%**

Students will p**lan a mini-unit of work for science**. They will have to organise three sequential experiences for teaching science ('Living world' or 'Earth and Space') for young children (3-8 years old) following the EYLF or the NSW curriculum for science (a pre-structured proforma will be provided). They will also need to design an interactive Information kiosk or e-book using familiar software (such as power point; prezi; keynote; movie maker, google sites etc) relevant to their chosen topic/experiences.

Students will present their kiosk in the final (third) technology tutorial. After their presentation they will submit the l**esson plans/information kiosk (screenshots) and a short reflection** on their presentation/information kiosk.

More details of the assessment task will be available via the full unit outline on iLearn.

On successful completion you will be able to:

- Demonstrate a fundamental understanding of the major theoretical developments in early childhood mathematics, science and technology education;
- Develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act;
- Demonstrate relevant knowledge of the central concepts, modes of enquiry and structure in the discipline of mathematics and science & technology
- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology
- Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning;
- Explore, adapt and shape understandings and skills and demonstrate safe, responsible

and legal use of ICT in planning and teaching.

Quiz

Due: **8/6/2018**
Weighting: **20%**

Students will reply to 20 multiple choice questions covering the three modules (Maths, Science, Technology). Each week, depending on the module they have to do, students will have a short online quiz (5 multiple choice questions - unmarked) to help them practice before the large quiz at the end of the session.

Details of the assessment tasks will be available via the full unit outline on iLearn.

On successful completion you will be able to:

- Demonstrate a fundamental understanding of the major theoretical developments in early childhood mathematics, science and technology education;
- Develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act;
- Demonstrate relevant knowledge of the central concepts, modes of enquiry and structure in the discipline of mathematics and science & technology
- Begin to evaluate mathematics, science and technology resources in light of their experience as a teacher of young children;
- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology
- Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning;
- Explore, adapt and shape understandings and skills and demonstrate safe, responsible and legal use of ICT in planning and teaching.

Delivery and Resources

CLASSES

Three face to face classed run simultaneously for this unit (maths, science and technology). Students rotate each week. The sequence in which students complete these modules will depend on their tutorial time.

Each module/topic has an online lecture, readings, online tasks and face-to-face tutorials. The lecture or collection of shorter lectures (not totalling more than one hour) will be available online as a video or through Echo. Following this, students will complete a 2 hour tutorial each week (or

equivalent compulsory on campus days for external students).

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

Completion of all modules is a requirement for satisfactory completion of the unit. Documentation (such as a doctor's certificate) should be provided to explain absences.

Compulsory On-Campus Session for ECH232 External Students

There are two compulsory On-Campus Sessions for ECH 232 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 Saturday 17th of March and Saturday the 5th of May (9.00am - 5.00 pm)** Please make arrangements to attend for the full day each day. Further details will be sent out early in the semester.

Department of Educational Studies (EC) Relevant Documents

The information in this *Unit Guide* must be read in conjunction with the following documents available for download from iLearn:

- *Academic Honesty Handbook*
- *Unit Readings, Assessments & Study Guide*

Department of Educational Studies Electronic Communication

During semester time, staff may contact students using the following ways:

- *Dialogue* function on iLearn
- Official *MQ Student Email* Address

It is the student's responsibility to check all electronic communication on a regular weekly basis.

Department of Educational Studies (EC) Unit Expectations

- In order to be eligible for a passing grade, students must meet the following attendance requirements:
    - Internal Students: Participate in at least 80% of all tutorials – punctuality is expected. Consistent lateness or absence will jeopardise a passing grade
    - External Students: Participate in all on-campus sessions – punctuality is expected.
- Students are required to contribute to all online and tutorials tasks
- 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
- All assessment tasks must be submitted

Withdrawing from this UG Unit

If you are considering withdrawing from this unit, please seek academic advice by writing to iec@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.

Department of Educational Studies (EC) 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 for submission.
- It is the onus of the student to ensure that all assessments are successfully submitted through Turnitin.
- Faculty assignment cover sheets are NOT required for this unit.

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.

When preparing your assignments, it is essential that:

- Students must retain a copy of all assignments before submission, and retain the copy until your final grade for the subject has been received;

- Marks will be deducted if you submit your assessment late (refer to the 'late assessments' section below for more details);
- Unless there are exceptional circumstances, no assessment will be accepted after the date that the assessment has been returned to other students.
- If an assessment is considered to be below passing standard, another staff member on the unit will provide a second opinion. No failed assessment may be re-submitted.

Final Submissions

- Students are responsible for checking that their submission has been successful and has been submitted by the due date and time.
- Late submissions due to last minute technical difficulties will incur a lateness penalty.

Assignment extensions and late penalties

The New Special Consideration Policy

The Disruption to Studies (DTS) process has been replaced by a new Special Consideration policy which took effect from Session 3 (4th December 2017).

See:

https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration

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, and currently available at:

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.

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.

- Please notify the unit coordinator of your intention to request an extension (via Dialogue in iLearn), however, an extension will only be granted on receipt of the completed form submitted through ask.mq.edu.au, plus documentation.
- Emails are not appropriate means of extension requests.
- It is essential that you plan ahead and organise your study time effectively. Poor time management is not grounds for an extension

Department of Educational Studies (EC) Academic Honesty Guidelines:

All assignments should cite and provide full bibliographical details of all material that you have used to inform or support your ideas. Early Childhood, students are required to use the American Psychological Association (APA) referencing procedures. Full details about how to cite and reference correctly can be found in **Perrin (2015)** and in the **Academic Honesty Handbook**.

The following guide can be purchased from the Co-op Bookshop. This is a required text:

Perrin, R. (2015). Pocket guide to APA style (5th ed.). Stamford, CT: Cengage Learning.

Units with Quiz Assessments

Online quizzes are an individual assessment task and **MUST BE COMPLETED by each student individually**. Similarities in responses between students will be checked and investigated for possible collusion. Please see the Academic Honesty Handbook for more information. CHANGE OF DATES/EXTENSION FOR THIS TASK IS NOT POSSIBLE.

Unit Schedule

TWO REQUIRED TEXTBOOKS

1) Fleer, M. (2016) *Science for children*. GB: Cambridge University Press.

2) Yelland, N. (2014). *Early Mathematical explorations*. GB: Cambridge University Press.

UNIT SCHEDULE 2018

(Please follow the schedule vertically after finding your tutorial group)

Tutorial day = **MONDAY** **WEEK-DATE**		**Tutorial Group A** 12 pm **Tutorial Group D** 2 pm **External students** **(follow this column vertically).**	**Tutorial Group B** 12 pm **Tutorial Group E** 2 pm	**Tutorial Group C** 12 pm **Tutorial Group F** 2 pm
1	**26/2**	Mathematics 1 (Kelly* X5B 041)	Science 1 (Anne* X5B 045)	Technology 1 (Maria* X5B 140)
2	**5/3**	Technology 1 (Maria X5B 140)	Mathematics 1 (Kelly X5B 041)	Science 1 (Anne X5B 045)
3	**12/3**	Science 1 (Anne X5B 045)	Technology 1 (Maria X5B 140)	Mathematics 1 (Kelly X5B 041)
EXTERNAL STUDENTS: SATURDAY 17/3 FIRST On Campus Day				
4	**19/3**	Mathematics 2 (Kelly X5B 041)	Science 2 (Anne X5B 045)	Technology 2 (Maria X5B 140)
5	**26/3**	Technology 2 (Maria X5B 140)	Mathematics 2 (Kelly X5B 041)	Science 2 (Anne X5B 045)
Tuesday 3/4 **Assignment 1: Observation, assessment and planning for mathematics learning**				
6	**9/4**	Science 2 (Anne X5B 045)	Technology 2 (Maria X5B 140)	Mathematics 2 (Kelly X5B041)
MID SESSION BREAK **(16/4/ - 23/4)**				
7	**30/4**	PRAC – NO CLASSES		
EXTERNAL STUDENTS: SATURDAY 5/5 SECOND On Campus Day				
8	**7/5**	PRAC – NO CLASSES		
9	**14/5**	PRAC – NO CLASSES		

10	**21/5**	Mathematics 3 (Kelly X5B 041)	Science 3 (Anne X5B 045)	Technology 3 (Maria X5B 140)
11	**28/5**	Technology 3 (Maria X5B 140)	Mathematics 3 (Kelly X5B041)	Science 3 (Anne X5B 045)
13	**4/6**	Science 3 (Anne X5B 045)	Technology 3 (Maria X5B 140)	Mathematics 3 (Kelly X5B 041)

Wednesday 6/6

ASSIGNMENT 2: Planning for Science and Technology Learning

FRIDAY 8/6

ASSIGNMENT 3: Revision Quiz - ONLINE TASK (DATE/TIME CANNOT CHANGE).

*Please note that tutors may vary.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.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 (https://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 (https://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 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 outcomes

- Develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act;
- Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning;

Assessment tasks

- Planning for Science
- Quiz

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 outcomes

- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology
- Explore, adapt and shape understandings and skills and demonstrate safe, responsible and legal use of ICT in planning and teaching.

Assessment tasks

- Observation and Planning
- Planning for Science
- Quiz

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 outcomes

- Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning;
- Explore, adapt and shape understandings and skills and demonstrate safe, responsible and legal use of ICT in planning and teaching.

Assessment tasks

- Planning for Science
- Quiz

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

- Demonstrate a fundamental understanding of the major theoretical developments in early childhood mathematics, science and technology education;
- Develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act;
- Demonstrate relevant knowledge of the central concepts, modes of enquiry and structure in the discipline of mathematics and science & technology
- Begin to evaluate mathematics, science and technology resources in light of their experience as a teacher of young children;
- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology

Assessment tasks

- Observation and Planning
- Planning for Science
- Quiz

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

- Develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act;
- Begin to evaluate mathematics, science and technology resources in light of their experience as a teacher of young children;
- Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning;
- Explore, adapt and shape understandings and skills and demonstrate safe, responsible and legal use of ICT in planning and teaching.

Assessment tasks

- Observation and Planning
- Planning for Science
- Quiz

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 the models of pedagogy for teaching and assessing mathematics and science & technology
- Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in

mathematics and science learning;

Assessment tasks

- Observation and Planning
- Planning for Science
- Quiz

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

- Develop skills in designing, implementing and evaluating lesson sequences using knowledge of the NSW Curriculum Framework, NSW syllabuses and other curriculum requirements of the Education Act;
- Demonstrate relevant knowledge of the central concepts, modes of enquiry and structure in the discipline of mathematics and science & technology
- Begin to evaluate mathematics, science and technology resources in light of their experience as a teacher of young children;
- Develop skills in integrating information and communication technologies (ICT) within effective teaching and learning strategies to expand opportunities for students in mathematics and science learning;

Assessment tasks

- Observation and Planning
- Planning for Science
- Quiz

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 outcomes

- Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science & technology
- Explore, adapt and shape understandings and skills and demonstrate safe, responsible and legal use of ICT in planning and teaching.

Assessment tasks

- Observation and Planning
- Planning for Science
- Quiz

Changes from Previous Offering

1) THIS YEAR STUDENTS HAVE TO BUY TWO TEXTBOOKS, one for Maths and one for Science.

The two required texts are:

a) Yelland, N. (2014). Early Mathematical Explorations. GB: Cambridge University Press.

b) Fleer, M. (2016) *Science for children*. GB: Cambridge University Press.

2) This year students won't do any visits to the early childhood centres.