



ECHE8270

Learning Through Mathematics, Science and Technology in Early Childhood Settings

Session 2, Online-flexible 2022

Macquarie School of Education

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General Information

Unit convenor and teaching staff

Convenor, Lecturer, Tutor

Laurinda Lomas

laurinda.lomas@mq.edu.au

Contact via email

Rm 272, 29 Wally's Walk

By appointment

Credit points

10

Prerequisites

[Admission to (MTeach(0-5) or GradCertEChild) and (ECED600 or ECHE6000)] or [admission to MEChild or MEd or MEdLead or MIndigenousEd or MSpecEd or GradCertEdS]

Corequisites

Co-badged status

Unit description

This unit explores theories of learning in mathematics, science and technology for young children (birth to five years). Students will examine the specialist role of play and conceptual development in a range of early childhood settings. Current issues in research and practice will be investigated through independent study. Students acquire autonomy and expert knowledge of pedagogy and content for mathematics, science and technology as they design and evaluate learning experiences for young children.

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:

ULO1: Demonstrate a fundamental understanding of the major theoretical developments in early childhood mathematics, science and technology education.

ULO2: Examine the role of play in children's mathematics, science and technology in early learning settings.

ULO3: Evaluate a number of mathematics, science and technology resources.

ULO4: Engage in the multi-faceted task of early childhood curriculum design with an emphasis on mathematics, science and technology.

ULO5: Locate and synthesise a wide range of contemporary research literature relating to mathematics, science and technology in early learning.

General Assessment Information

Assessment Presentation and 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 responsibility 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,
- Students are responsible for checking that their submission has been successful and has been submitted by the due date and time.

Assignment extensions and late penalties

- In general, there should be no need for extensions except through illness or misadventure that would be categorised as serious and unavoidable disruption according to the University definition of same, see: <https://students.mq.edu.au/study/my-study-program/special-consideration>
- Applications for extensions must be made via AskMQ according to the Special Consideration policy. 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.
- Late submissions: Unless a Special Consideration request has been submitted and approved, (a) a penalty for lateness will apply - 10/100 marks of credit (10% of the total assessment weighting) will be deducted per day for assignments submitted after the due date – and (b) no assignment will be accepted seven days (incl. weekends) after the original submission deadline. No late submissions will be accepted for timed assessment - e.g. quizzes, online tests. A zero result for the assignment will be recorded after the late submission period has ended if no task has been received.
- 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.
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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.

Descriptive Criteria for awarding grades in the unit

In order to meet the unit outcomes and successfully pass this unit, students must make a genuine attempt at all assessment tasks. Where any submitted assessment task is considered

to be unsatisfactory in this regard, the highest possible final grade that can be awarded for the unit will be 45.

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.

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

Withdrawing from this unit

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

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](#).

Assessment Tasks

Name	Weighting	Hurdle	Due
Assessment Task 1: Develop a mind map from a provocation and design learning experiences.	50%	No	26/9/22 at 23:55
Assessment Task 2: Literature and resource review	50%	No	14/11/22 at 23:55

Assessment Task 1: Develop a mind map from a provocation and design learning experiences.

Assessment Type [1](#): Programming Task

Indicative Time on Task [2](#): 29.5 hours

Due: **26/9/22 at 23:55**

Weighting: **50%**

Develop a mind map from a provocation and design learning experiences based on Mathematical and Scientific concepts and processes (2500 words).

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.
- Examine the role of play in children's mathematics, science and technology in early learning settings.
- Engage in the multi-faceted task of early childhood curriculum design with an emphasis on mathematics, science and technology.
- Locate and synthesise a wide range of contemporary research literature relating to mathematics, science and technology in early learning.

Assessment Task 2: Literature and resource review

Assessment Type [1](#): Literature review

Indicative Time on Task [2](#): 29.5 hours

Due: **14/11/22 at 23:55**

Weighting: **50%**

Literature review of contemporary research informing a review of technological resources that can support mathematical and scientific thinking and learning in young children (2500 words).

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.
- Examine the role of play in children's mathematics, science and technology in early learning settings.
- Evaluate a number of mathematics, science and technology resources.
- Engage in the multi-faceted task of early childhood curriculum design with an emphasis on mathematics, science and technology.
- Locate and synthesise a wide range of contemporary research literature relating to mathematics, science and technology in early learning.

¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

Required and recommended texts

MacDonald, A. (2015). *Investigating mathematics, science and technology in early childhood*. South Melbourne: Oxford University Press.

Information about the unit iLearn site

This unit has a full web presence through iLearn.

Students will need regular access to a computer and the Internet to complete this unit.

Weekly access to iLearn is compulsory for all students. Important assessment information will be posted here, as will other relevant unit notices and materials, including a reading template and guide to lecture note taking to assist your studies.

Various activities and materials for discussion and critical reflection are included and external students especially are encouraged to use this web component. Electronic links and suggested

references will be included in the Resources section. Please check the iLearn unit regularly.

Weekly lectures are available on the web through the ECHO360 lecture component. You must listen to all lectures. PowerPoint slides will be available.

Information for students about access to the online component of this unit is available at <https://ilearn.mq.edu.au/login/index.php>. You will need to enter your student username and password.

Please do NOT contact the Unit Convenor regarding iLearn technical help.

No extensions will be given for any technical issues. Allow enough time for your submissions.

Assistance is available from IT Helpdesk ph: 1800 67 4357, or log a request at help.mq.edu.au. OneHelp is the online IT support service for both students and staff.

This unit requires students to use several ICT and software skills:

- Internet access: The iLearn site contains materials for this unit; it is also required for the online submission of all Assessment Tasks, and for the use of Turnitin submission for ALL tasks.
- Word processing, visual representations, and document formatting: You are required to use an appropriate form of software to present your assignments.
- Uploading of assessment tasks to iLearn.

Structure

The unit comprises weekly lectures, readings and tutorial tasks. Students will be encouraged to discuss issues and questions arising from the lectures and prescribed readings. They are expected to base their arguments/discussions on evidence from published research and other relevant material. There will be a supporting website for the unit providing additional readings, links and materials. Lectures will also be available through Echo in iLearn from the following website link: <http://ilearn.mq.edu.au>

Students are required to participate in activities and discussion, to read the weekly material in advance, and to complete brief tasks relating to the tutorial workbook content. The weekly program for the course with the accompanying readings/ preparation is available on the following pages or on the unit iLearn site.

Unit Schedule

Please see iLearn for the unit schedule

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). 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](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

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

To find other policies relating to Teaching and Learning, visit [Policy Central](https://policies.mq.edu.au) (<https://policies.mq.edu.au>) and use the [search tool](#).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/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

Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

School of Education Procedures

In addition, the following policies and procedures of the School of Education are applicable in this unit.

Fitness to Practice

Fitness to Practice Academic Senate has approved the development of a Fitness to Practice (FTP) procedure to provide further clarity to students enrolled in practical, clinical and professional programs who have not met the requirements of the General Coursework Rules. It establishes how the University will manage the progression of students enrolled in practical, clinical or professional (PCP) programs or units listed on Schedule 3 of the Academic

Progression Policy, with embedded placements and/or registration, accreditation or other mandated requirements.

The Procedure is governed by General Coursework Rules, and the Academic Progression Policy and is supported by the Inherent Requirements Framework. It provides the process to identify, notify, intervene, support, monitor and exclude when required, those students who are not meeting the FTP requirements of their program. FTP is the demonstration of professional competence, acceptable professional behaviour, freedom from impairment and compliance with program specific requirements needed for a student to practice properly and safely throughout their practical, clinical or professional program. Students must ensure they meet Inherent Requirements before enrolling in their program; that they have the physical, cognitive, communication and behavioural capacity to complete the program. Students with a disability or chronic health condition may have reasonable adjustments made. Students must also demonstrate that they are fit to practice and demonstrate the capabilities and professional behaviours required of that profession.

Attendance for undergraduate units

See the university timetable for information about when classes begin in this unit. <https://timetables.mq.edu.au/>

Activities completed during weekly tutorials (internal) or on campus days (external) 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 all tutorials or on campus days (OCD) 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 to 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.

Student Support

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

The Writing Centre

The [Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)

Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

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.

5R Framework

The 5Rs Framework, developed by the School of Education at Macquarie University, is embedded throughout your teacher education course.

Your use of the 5Rs Framework will help you develop the capabilities that will make your teaching career sustainable and fulfilling.

In this unit, you will learn using the 5Rs framework in the following important ways:

Resilient :

- Understanding and identifying personal attitudes towards maths, science and technology
- Challenging pre-existing maths and science identities
- Building conceptual and procedural understandings to bolster confidence
- Building on stronger understandings of theory and pedagogy to support content knowledge (Assessments 1 & 2).
- Awareness of role as co-learner and co-investigator with children (Assessments 1 & 2).

Reflexive:

- Strong understanding of theory to underpin pedagogy
- Understanding intergenerational maths anxiety and low maths self-efficacy to address beliefs/ self-belief and to build positive dispositions in children
- Understanding family perspectives on maths and science and creating teaching and learning content that generates connections between children, families, educators and teachers Assessments 1 & 2)
- Understanding broader implications of technology and how this influences teaching and learning decision (Assessment 2)

Responsive:

- Recalling our own learning experiences and reflecting on what makes a good teacher/ what pedagogical practices they found negative
- Building passion, interest and enthusiasm for maths and science and developing strategies for supporting that response/ disposition/ experience for children and families
- Recognising how children's interest in technology and multimedia are important as an impetus for curriculum planning/ implementation (in both digital and non-digital play) (Assessments 1 & 2)

Ready to learn:

- Reinforcing the teacher's role as co-learner – learning alongside children on maths and science content
- Understanding technology as tool for teaching and learning (Assessments 1 & 2)

Research Engaged:

- Drawing on research to explain maths identity and anxiety (Assessments 1 & 2)