



# ECHE2320

## Mathematical and Scientific Thinking in the Early Years

Session 2, Infrequent attendance, North Ryde 2021

*Macquarie School of Education*

### Contents

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<a href="#"><u>General Information</u></a>	3
<a href="#"><u>Learning Outcomes</u></a>	4
<a href="#"><u>General Assessment Information</u></a>	4
<a href="#"><u>Assessment Tasks</u></a>	7
<a href="#"><u>Delivery and Resources</u></a>	9
<a href="#"><u>Unit Schedule</u></a>	10
<a href="#"><u>Policies and Procedures</u></a>	11
<a href="#"><u>5Rs Framework</u></a>	13

#### **Disclaimer**

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#### **Session 2 Learning and Teaching Update**

The decision has been made to conduct study online for the remainder of Session 2 for all units WITHOUT mandatory on-campus learning activities. Exams for Session 2 will also be online where possible to do so.

This is due to the extension of the lockdown orders and to provide certainty around arrangements for the remainder of Session 2. We hope to return to campus beyond Session 2 as soon as it is safe and appropriate to do so.

Some classes/teaching activities cannot be moved online and must be taught on campus. You should already know if you are in one of these classes/teaching activities and your unit convenor will provide you with more information via iLearn. If you want to confirm, see the list of [units with mandatory on-campus classes/teaching activities](#).

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Visit the [MQ COVID-19 information page](#) for more detail.

## General Information

### Unit convenor and teaching staff

Convenor

Sarah Powell

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Contact via iLearn Dialogue

29WW Rm 268

By appointment

tutor

Carolyn Palmer

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Contact via email

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Catherine Jones

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Credit points

10

Prerequisites

ECH113 or ECHE1130 or (40cp at 1000 level or above) and admission to BTeach(ECS)

Corequisites

Co-badged status

Unit description

This unit explores mathematical and scientific thinking, teaching and learning in early childhood education (birth to five years). Key mathematical and scientific concepts and processes will be investigated and considered in terms of theory, research, pedagogical practice and play-based learning. Students will gain in-depth understandings of how mathematics and science underpin ways of acquiring and processing information about the world, now and in the future.

## Important Academic Dates

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

## Learning Outcomes

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

**ULO1:** Demonstrate a fundamental understanding of the major theoretical developments, central concepts, modes of enquiry, pedagogical practice and inclusion of relevant technologies in early childhood mathematics and science.

**ULO2:** Develop skills in designing, implementing and evaluating learning experience sequences using knowledge from the National Quality Frameworks and other curriculum requirements of the Education Act.

**ULO3:** Begin to evaluate mathematics and science learning resources in light of their experience as a teacher of young children.

**ULO4:** Demonstrate research-based knowledge of the models of pedagogy for teaching and assessing mathematics and science.

**ULO5:** Develop an understanding of different learning approaches to teaching and learning and the need for pedagogical approaches that are socially and culturally relevant, including use of technology.

## 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.

## Requesting a re-assessment 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:

- Please do not request a re-mark for a Failed assessment as they are all double-marked as a part of the moderation process.
- The outcome of a re-mark may be a higher/lower or unchanged grade.
- Grades are standards referenced and effort is NOT a criterion.

## 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](https://ask.mq.edu.au).

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Mathematical concepts and processes in storytelling</a>	50%	No	23.59 10/09/2021
<a href="#">Science in play-based learning</a>	50%	No	23.59 04/11/2021

### Mathematical concepts and processes in storytelling

Assessment Type <sup>1</sup>: Learning plan

Indicative Time on Task <sup>2</sup>: 29.5 hours

Due: **23.59 10/09/2021**

Weighting: **50%**

3000 words Students will be provided with a list of children's literature/ books which include mathematical themes, concepts and processes. Alternatively, the students can select their own book (but should check with the convenor). They must select two books- one suitable for birth to two years, and one suitable for three to five years of age. Students are required to identify the mathematical concepts and processes in each book. They must then plan a sequence of two or three experiences for each book. This should include reference to diverse learners/ culture or background. Also must link with the EYLF and may link with ES1 in the school curriculum Students should demonstrate knowledge of mathematical concepts and processes. They should also show that they can identify these in storybooks, and then extend on storytelling experience to create follow on experiences.

On successful completion you will be able to:

- Demonstrate a fundamental understanding of the major theoretical developments, central concepts, modes of enquiry, pedagogical practice and inclusion of relevant technologies in early childhood mathematics and science.
- Develop skills in designing, implementing and evaluating learning experience sequences using knowledge from the National Quality Frameworks and other curriculum requirements of the Education Act.
- Begin to evaluate mathematics and science learning 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.
- Develop an understanding of different learning approaches to teaching and learning and the need for pedagogical approaches that are socially and culturally relevant, including use of technology.

## Science in play-based learning

Assessment Type <sup>1</sup>: Learning plan

Indicative Time on Task <sup>2</sup>: 29.5 hours

Due: **23.59 04/11/2021**

Weighting: **50%**

3000 words Students will select a science concept/ topic to focus on and develop a series of experience and resources that can be explored through play-based learning with children in prior-to-school contexts. Science concepts and processes will be identified and explained with clear links to the EYLF. Learning experiences should include a focus on sustainability and indigenous perspectives.



On successful completion you will be able to:

- Demonstrate a fundamental understanding of the major theoretical developments, central concepts, modes of enquiry, pedagogical practice and inclusion of relevant technologies in early childhood mathematics and science.
- Develop skills in designing, implementing and evaluating learning experience sequences using knowledge from the National Quality Frameworks and other curriculum requirements of the Education Act.
- Begin to evaluate mathematics and science learning 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.
- Develop an understanding of different learning approaches to teaching and learning and the need for pedagogical approaches that are socially and culturally relevant, including use of technology.

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<sup>1</sup> 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 [Learning Skills Unit](#) for academic skills support.

<sup>2</sup> 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. (2018). *Mathematics in early childhood*. Oxford University Press.

Campbell, C., Jobling, W., & Howitt, C. (2018). *Science in early childhood*. Cambridge 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 are available in iLearn in advance of the weekly lecture.

### **Access and technical assistance**

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](http://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 of weekly lectures and tutorial content. In the tutorial students will 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 small group activities, whole class discussion, to read the weekly material in advance, and to complete brief tasks. The weekly program for the course with the accompanying readings/ preparation is available on the unit iLearn site.

## **Unit Schedule**

Please see iLearn for unit schedule and further details.

## 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](#)
- [Grade Appeal Policy](#)
- [Complaint Management 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](https://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## School of Education Procedures

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

### Attendance for undergraduate units

All Internal tutorials begin in Week 1 of Session.

Activities completed during tutorials 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 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

### **External Students**

- The tutorials are essential to student engagement and learning and attendance on all days is expected. Failure to attend or to have an approved Special Consideration may result in a Fail grade for the unit. Please see attendance requirements in this unit guide.
- Prior to tutorials, you should have read the prescribed readings and listened to the lectures. Summarise the main points and make a note of the key terms and definitions. Prepare any discussion questions of your own that you wish to share.
- Please make effective use of the online component of the unit and access iLearn regularly. Keep up to date with listening to the lectures on a weekly basis.

## 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](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [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 Enquiry Service

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

If you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@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/](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.

## 5Rs Framework

### 5Rs 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: Content and assessment builds students confidence through identifying personal attitudes towards maths and science and challenging pre-existing math and science identities (Assessments 1 and 2)..

Reflexive: Strong understanding of theory to underpin pedagogy. Understanding intergenerational maths anxiety and low maths self-efficacy to address own beliefs/ self-belief and to build positive dispositions in children. Building passion, interest and enthusiasm for maths and science and developing strategies for supporting that response/ disposition/ experience for children and families as well (Assessment 1 and 2)

Responsive: Understanding family perspectives on maths and science and creating teaching and learning content that creates connections between children, families, educators and teachers (Assessments 1 and 2)

Ready to Learn: Reinforcing the teacher's role as co-learner – learning alongside children on maths and science content (Assessments 1 and 2).

Research Engaged: Drawing on research publications and research undertaken with previous cohorts to explain maths identity (Assessments 1 and 2).