



EDST8213

Science, Technology and Mathematics Specialisation

Session 2, In person-scheduled-infrequent, North Ryde 2023

Macquarie School of Education

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Disclaimer

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General Information

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By arrangement

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Credit points

10

Prerequisites

EDST8205 and EDST8211

Corequisites

Co-badged status

Unit description

This unit builds understanding of subject-based and interdisciplinary approaches to STEM education, and how STEM literacy can be developed through project, problem and scenario-based learning designs in primary classrooms. It takes a holistic perspective on the nature of STEM literacy, explores why developing it is important in terms of future learning (or 'soft' skill development) and practical and cognitive capabilities, and investigates its relationship with design thinking and the Design and Production strand of the K-6 Science and Technology syllabus. The unit will engage students in a range of practical tasks that develop understanding of the contribution of different knowledges applied to STEM-based innovations, products, services and systems in 'real world' contexts. It will also introduce different approaches to planning STEM, focusing on cross-curricula integrated models.

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: Evaluate the integrated nature of STEM teaching, learning and curriculum.

ULO2: Analyse the research foundations of the STEM thinking of students and STEM practice in primary schools.

ULO3: Articulate and implement pedagogical principles for planning learning that develops students' STEM capabilities with reference to educational research and practice.

ULO4: Critically reflect upon and research the efficacy of learning resources and pedagogical approaches to develop STEM capabilities.

ULO5: Demonstrate oral communication skills, listening skills, and teamwork skills appropriate to a range of professional educational purposes and audiences.

General Assessment Information

- Students should be aware of and apply the University policy on academic honesty (see: <https://policies.mq.edu.au/document/view.php?id=3>)
- Unless a Special Consideration (see: <https://students.mq.edu.au/study/assessment-exams/special-consideration>) request has been submitted and approved, a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a mark of, 0 (zero) will be awarded even if the assessment is submitted. Submission time for all written assessments is set at 11:55pm. A 1-hour grace period is provided to students who experience a technical issue. This late penalty will apply to non-timed sensitive assessment (incl essays, reports, posters, portfolios, journals, recordings etc).
- Late submission of time sensitive tasks (such as tests/exams, performance assessments/presentations, scheduled practical assessments/labs etc) will only be addressed by the unit convenor in a Special consideration application. Special Consideration outcome may result in a new question or topic.
- Please format assessments using 12-point font and 1.5 spacing.
- All assessments are submitted electronically. Turnitin plagiarism detection software is used to check all written assessments.
- Students can use Turnitin's Originality Report as a learning tool to improve their academic writing if this option is made available in the unit.

- Students should carefully check that they submit the correct file for an assessment as no re-submissions will be accepted after the due date and time, including instances where students upload an incorrect file in error.
- Word limits are strictly applied. Work above the word limit will not be marked.
- All assessments are marked using a clear marking scheme or a rubric.
- Marking of all assessments is moderated by the Unit Convenor.
- Applications for extensions must be made via AskMQ (<https://ask.mq.edu.au/>).
- It is not the responsibility of unit staff to contact students who have failed to submit assessments. If you have any missing items of assessment, it is your responsibility to make contact with the unit convenor.

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
<u>Collaborative interdisciplinary STEM investigations recorded in an ePortfolio.</u>	60%	No	23:55 28/09/2023
<u>Understanding the rationale for STEM education in schools</u>	40%	No	23:55 5/11/23

Collaborative interdisciplinary STEM investigations recorded in an ePortfolio.

Assessment Type ¹: Practice-based task

Indicative Time on Task ²: 50 hours

Due: **23:55 28/09/2023**

Weighting: **60%**

Conduct guided STEM projects in workshops and record in ePortfolio using stages of Design and Production process. Independent STEM project within specified theme conducted and recorded in ePortfolio. Concise unit of work developed based on this project.

On successful completion you will be able to:

- Evaluate the integrated nature of STEM teaching, learning and curriculum.
- Analyse the research foundations of the STEM thinking of students and STEM practice in primary schools.
- Articulate and implement pedagogical principles for planning learning that develops students' STEM capabilities with reference to educational research and practice.
- Critically reflect upon and research the efficacy of learning resources and pedagogical approaches to develop STEM capabilities.
- Demonstrate oral communication skills, listening skills, and teamwork skills appropriate to a range of professional educational purposes and audiences.

Understanding the rationale for STEM education in schools

Assessment Type ¹: Report

Indicative Time on Task ²: 35 hours

Due: **23:55 5/11/23**

Weighting: **40%**

Research and write a report (approx. 1500 words) summarising the key arguments and rationale supporting interdisciplinary STEM education in schools drawing on both the literature and your experience of STEM projects in the course. The report should communicate understanding of the relationship between interdisciplinary project and problem based approaches to STEM and development of 21st Century or future-focused skills, competencies and STEM discipline knowledge. The report draws implications from the research for teachers, particularly focusing on curriculum and learning designs and pedagogical approaches supportive of effective STEM teaching and learning in primary classrooms.

On successful completion you will be able to:

- Evaluate the integrated nature of STEM teaching, learning and curriculum.
- Analyse the research foundations of the STEM thinking of students and STEM practice in primary schools.
- Articulate and implement pedagogical principles for planning learning that develops

students' STEM capabilities with reference to educational research and practice.

- Critically reflect upon and research the efficacy of learning resources and pedagogical approaches to develop STEM capabilities.

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

iLearn

- This unit has a web support presence on 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 there, as will other relevant unit notices and materials, and the weekly learning modules. Various activities and materials for discussion and critical reflection are also included. Electronic links and suggested references will be included in the Resources section. Please check the iLearn unit site regularly.

Workshops and Online Learning Modules

- As this unit is offered in Infrequent Delivery mode only, dates for the Saturday workshops will be posted on iLearn. You must attend all workshops unless a Special Consideration request has been granted .

Structure

The unit comprises 4 X 4-hour (approx.) Saturday workshops, three lectures and online learning modules. The workshops are practical and form an integral component supporting learning in the unit. These are supplemented by online learning modules completed between the workshops. These help establish the theoretical and empirical base for activities completed in the workshops.

During the workshops and weekly modules, students are required to participate in practical group activities, whole class discussion, read relevant material in advance, and complete related tasks either as individuals or in pairs or small groups. Details of the weekly learning modules and other required tasks in preparation for the workshops, along with accompanying readings/ tasks, will be available on the unit iLearn site.

Access and technical assistance

Information for students about access to the online component of this unit is available at [ilearn.m](#)

q.edu.au/login/MQ/. 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 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.

Unit Schedule

EDST8213, Session 2, 2023

Weekly Schedule

Week	Workshop and online content
Week 1: Lecture 1 Workshop 1: 29 July	Lecture 1 revisits key ideas relating to the nature of contemporary STEM pedagogy. The workshop will guide us through the first STEM project using the structure of the Design and Production process from the S&T syllabus.
Week 2: Lecture 2 Workshop: 2 5 August	Lecture 2 deals with Design Thinking and how its principles and skills may be usefully applied to STEM projects. The second workshop scaffolds an engineering project.
Weeks 3 to MQ Recess	EDST8240: Practicum (no classes)
Recess	Assignment 1 due: Thursday 28 September @ 11.55 pm
Week 10: Lecture 3 Workshop 3: 14 October	Lecture 3 is about how science can be used to inspire interdisciplinary STEM projects. The third workshop provides another example of an engineering challenge with a STEM focus.

Week 11: Workshop 4: 21 October	The workshop will provide the fourth and final interdisciplinary STEM challenge. We will have time to consider the second assignment and review some of the literature on STEM pedagogy.
Week 13:	Assignment 2 due: Sunday 5 November @ 11.55 pm

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 an](#)

[d maths support](#), [academic skills development](#) and [wellbeing consultations](#).

Late Assessment Submission Penalty

Unless a Special Consideration request has been submitted and approved, **a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted**, up until the 7th day (including weekends). After the 7th day, a mark of '0' (zero) will be awarded even if the assessment is submitted. Submission time for all written assessments is set at 11.55pm. A 1-hour grace period is provided to students who experience a technical issue.

This late penalty will apply to non-timed sensitive assessment (incl essays, reports, posters, portfolios, journals, recordings etc). **Late submission of time sensitive tasks** (such as tests/exams, performance assessments/presentations, scheduled practical assessments/labs etc) **will only be addressed by the unit convenor in a Special consideration application. Special Consideration outcome may result in a new question or topic.**

School of Education Procedures

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

Attendance for Master of Teaching (Primary and Secondary) units

*Attendance at all synchronous activities, completion of non-synchronous formative/diagnostic class tasks and involvement in professional forums is **compulsory** as the Master of Teaching is a professional qualification. All students must meet the 80% attendance requirement.*

Activities completed during weekly tutorials or on campus days 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. Attendance at all tutorials or on campus days is expected and the roll will be taken.

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

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 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

- Information about the dates if the on-campus sessions can be found in the university timetable. <https://timetables.mq.edu.au/>
- The on-campus sessions 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 the on-campus sessions, 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.

All Students

The on-campus workshops on July 30, August 6, October 15 and October 22 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 the workshops, you should have completed online module requirements and read the prescribed readings. Where recommended, you should 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 lectures where specified.

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:

- Learning from research to build professional knowledge
- Resilience through practice in solving and developing solutions to ill structured problem

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](#)

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.

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 Advocacy](#) provides independent advice on MQ policies, procedures, and processes

Access to policies

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) (<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](#)
- [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.*)
- Students seeking more policy resources can visit the [Student Policy Gateway](https://student.s.mq.edu.au/support/study/student-policy-gateway) (<https://student.s.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 postgraduate 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) (<https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>).

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.

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:

- Developing your resilience in terms of appreciating the value of mistakes in the design-thinking process
- Engage with research-based practices in the design and production process in relation to understanding problems and the possible pathways to their solutions

Unit information based on version 2023.02 of the [Handbook](#)