ECH 431
Teaching and Learning Mathematics
S1 External 2013

Institute of Early Childhood

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General Information

Unit convenor and teaching staff
Unit Convenor
Kate Highfield
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Contact via kate.highfield@mq.edu.au

Credit points
3

Prerequisites
ECH335 or admission to GDipAdvStEc

Corequisites

Co-badged status

Unit description
This unit builds on the knowledge gained in previous units, further developing student's knowledge of the principles and practices of teaching and learning mathematics. Students explore a range of strategies for assessing children's mathematical understandings, and design and implement lesson sequences to enhance the growth of children's mathematical thinking. The integration of technology with mathematics and with other key learning areas, including differentiating curriculum to meet the diverse needs of learners, is also addressed.

Important Academic Dates
Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

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

Develop further understanding of the major theoretical and research directions and current issues in mathematics education.
Design lesson sequences that enhance the growth of children’s mathematical thinking, reflect current issues in research and integrate other curriculum areas.
Demonstrate knowledge of mathematical concepts and processes in the areas of data, measurement and working mathematically.
Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the mathematics
classroom.
Demonstrate effective mathematics teaching and learning strategies for meeting the needs of indigenous students.
Demonstrate a capacity to use appropriate software for student profiling and reporting, lesson preparation and general administrative tasks.
Develop an awareness of the range of application and adaptive technologies available to support students with special needs.

Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
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<tbody>
<tr>
<td>Assessment One</td>
<td>25%</td>
<td>weekly</td>
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<tr>
<td>Assessment Two</td>
<td>40%</td>
<td>Week 6 and 7 Tutorials</td>
</tr>
<tr>
<td>Assessment Three</td>
<td>35%</td>
<td>June 3rd</td>
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</table>

Assessment One
Due: **weekly**
Weighting: **25%**
Each week students are required to read the key readings and engage with lecture and posting content. Students then reflect on this and respond to an online provocation.

On successful completion you will be able to:
- Develop further understanding of the major theoretical and research directions and current issues in mathematics education.
- Design lesson sequences that enhance the growth of children’s mathematical thinking, reflect current issues in research and integrate other curriculum areas.
- Demonstrate effective mathematics teaching and learning strategies for meeting the needs of indigenous students.
- Demonstrate a capacity to use appropriate software for student profiling and reporting, lesson preparation and general administrative tasks.
- Develop an awareness of the range of application and adaptive technologies available to support students with special needs.

Assessment Two
Due: **Week 6 and 7 Tutorials**
Weighting: **40%**
Students work in a pair to develop a brochure outlining key activities connecting quality children’s literature and mathematics. Students then present this work in class tutorials.

A complete description of this task is available in the unit outline presented through iLearn.

On successful completion you will be able to:

- Develop further understanding of the major theoretical and research directions and current issues in mathematics education.
- Demonstrate knowledge of mathematical concepts and processes in the areas of data, measurement and working mathematically.
- Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the mathematics classroom.
- Demonstrate effective mathematics teaching and learning strategies for meeting the needs of indigenous students.

Assessment Three

Due: June 3rd
Weighting: 35%

Students choose one of the two options:

OPTION 1: develop five parent guides, each identifying key barriers to mathematics learning and suggesting resources and technologies to support engagement.

OPTION 2: develop a multimedia artifact critically evaluating and demonstrating the use of a technology (chosen from a recommended list) in mathematics learning.

A complete description of this task is available in the unit outline presented through iLearn.

On successful completion you will be able to:

- Develop further understanding of the major theoretical and research directions and current issues in mathematics education.
- Design lesson sequences that enhance the growth of children’s mathematical thinking, reflect current issues in research and integrate other curriculum areas.
- Demonstrate knowledge of mathematical concepts and processes in the areas of data, measurement and working mathematically.
- Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the mathematics classroom.
- Demonstrate effective mathematics teaching and learning strategies for meeting the
needs of indigenous students.
- Demonstrate a capacity to use appropriate software for student profiling and reporting, lesson preparation and general administrative tasks.
- Develop an awareness of the range of application and adaptive technologies available to support students with special needs.

## Delivery and Resources

### Technology used and required

This unit requires students to use a range of technologies. These include technologies provided within class (such as interactive whiteboards, iPads, calculators and laptops) and technologies for personal use. Students should be confident users of iLearn, echo and basic academic tools (such as word, web & library resources, SMARTnotebook and powerpoint). Students will be supported in use of these tools as needed and should contact the unit convener where assistance is required.

### Lecture and Tutorial times

ECH 431 will involve a one hour online lecture or equivalent shorter lectures not totalling more than 50 minutes. Students will also complete a two hour tutorial each week OR the external equivalent. The timetable for internal classes can be found on the University web site at: [http://www.timetables.mq.edu.au](http://www.timetables.mq.edu.au).

In addition students should consult the unit outline on iLearn as some weeks are allocated for independent study and group work. Tutorial and lecture attendance is not compulsory in these weeks.

### iLearn

This unit uses an iLearn site to distribute the formal unit outline, weekly tutorial topics, summary notes and lectures. This site is also used to distribute resources, facilitate discussions and enable a community of learners. Further information and access to iLearn is available through [https://ilearn.mq.edu.au](https://ilearn.mq.edu.au).

### Other material, additional resources and reading lists

This unit uses journal articles and e-reserve resources and reading lists are presented in the formal unit outline on iLearn ([https://ilearn.mq.edu.au](https://ilearn.mq.edu.au)).

### Changes since the last offering of this unit.

This unit has minor changes (to readings, sequence and assessment tasks) since its last offering in 2012.
Learning and Teaching Activities

Lectures
This unit engages students in lectures covering research and theory in Science and Technology education.

Online discussions
This unit engages students in online discussions addressing research and issues in relation to the learning of Science and Technology.

Tutorial Workshops
This unit engages students in tutorial workshops covering practical tasks in Science and Technology. Students will also present their learning for peer feedback throughout semester. External students will complete tutorials at two compulsory on-campus days. Some tutorial tasks will also be completed online.

Assessment tasks and presentations
This unit engages students in a range of Assessment tasks where peer feedback is provided. These will enable reflection and revision of work over semester.

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

- Special Consideration Policy http://www.mq.edu.au/policy/docs/special_consideration/policy.html

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

Student Support
Macquarie University provides a range of Academic Student Support Services. Details of these services can be accessed at: http://students.mq.edu.au/support/

UniWISE provides:
- Online learning resources and academic skills workshops http://www.students.mq.edu.au/support/learning_skills/
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.

Details of these services can be accessed at http://www.student.mq.edu.au/ses/.

IT Help

If you wish to receive IT help, we would be glad to assist you at http://informatics.mq.edu.au/help/.

When using the university's IT, you must adhere to the Acceptable Use Policy. The policy applies to all who connect to the MQ network including students and it outlines what can be done.

Graduate Capabilities

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcome

- Develop further understanding of the major theoretical and research directions and current issues in mathematics education.

Assessment tasks

- Assessment One
- Assessment Two
- Assessment Three

Learning and teaching activities

- This unit engages students in lectures covering research and theory in Science and Technology education
- This unit engages students in online discussions addressing research and issues in
Commitment to Continuous Learning
Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

**Learning outcome**

- Develop an awareness of the range of application and adaptive technologies available to support students with special needs.

**Assessment tasks**

- Assessment One
- Assessment Three

**Learning and teaching activities**

- This unit engages students in lectures covering research and theory in Science and Technology education
- This unit engages students in online discussions addressing research and issues in relation to the learning of Science and Technology
- This unit engages students in tutorial workshops covering practical tasks in Science and Technology. Students will also present their learning for peer feedback throughout semester. External students will complete tutorials at two compulsory on campus days. Some tutorial tasks will also be completed online.
- This unit engages students in a range of Assessment tasks where peer feedback is provided. These will enable reflection and revision of work over semester

**Discipline Specific Knowledge and Skills**
Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.
This graduate capability is supported by:

Learning outcomes

- Develop further understanding of the major theoretical and research directions and current issues in mathematics education.
- Design lesson sequences that enhance the growth of children’s mathematical thinking, reflect current issues in research and integrate other curriculum areas.
- Demonstrate knowledge of mathematical concepts and processes in the areas of data, measurement and working mathematically.
- Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the mathematics classroom.

Assessment tasks

- Assessment One
- Assessment Two

Learning and teaching activities

- This unit engages students in lectures covering research and theory in Science and Technology education
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- This unit engages students in a range of Assessment tasks where peer feedback is provided. These will enable reflection and revision of work over semester

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Design lesson sequences that enhance the growth of children’s mathematical thinking,
reflect current issues in research and integrate other curriculum areas.

• Demonstrate a capacity to use appropriate software for student profiling and reporting, lesson preparation and general administrative tasks.

Assessment tasks

• Assessment One
• Assessment Two
• Assessment Three

Learning and teaching activities

• This unit engages students in lectures covering research and theory in Science and Technology education
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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 outcome

• Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the mathematics classroom.

Assessment tasks

• Assessment One
• Assessment Two
• Assessment Three
Learning and teaching activities

• This unit engages students in lectures covering research and theory in Science and Technology education
• This unit engages students in online discussions addressing research and issues in relation to the learning of Science and Technology
• This unit engages students in a range of Assessment tasks where peer feedback is provided. These will enable reflection and revision of work over semester

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

• Design lesson sequences that enhance the growth of children’s mathematical thinking, reflect current issues in research and integrate other curriculum areas.
• Develop an awareness of the range of application and adaptive technologies available to support students with special needs.

Assessment tasks

• Assessment One
• Assessment Two
• Assessment Three

Learning and teaching activities

• This unit engages students in a range of Assessment tasks where peer feedback is provided. These will enable reflection and revision of work over semester

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

• Design lesson sequences that enhance the growth of children’s mathematical thinking,
reflect current issues in research and integrate other curriculum areas.

- Demonstrate knowledge of mathematical concepts and processes in the areas of data, measurement and working mathematically.
- Demonstrate a capacity to use appropriate software for student profiling and reporting, lesson preparation and general administrative tasks.
- Develop an awareness of the range of application and adaptive technologies available to support students with special needs.

**Assessment tasks**

- Assessment One
- Assessment Two
- Assessment Three

**Learning and teaching activities**

- This unit engages students in online discussions addressing research and issues in relation to the learning of Science and Technology
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- This unit engages students in a range of Assessment tasks where peer feedback is provided. These will enable reflection and revision of work over semester

**Engaged and Ethical Local and Global citizens**

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

**Learning outcome**

- Demonstrate effective mathematics teaching and learning strategies for meeting the needs of indigenous students.

**Assessment task**

- Assessment One
Learning and teaching activity

• This unit engages students in lectures covering research and theory in Science and Technology education
• This unit engages students in online discussions addressing research and issues in relation to the learning of Science and Technology
• This unit engages students in a range of Assessment tasks where peer feedback is provided. These will enable reflection and revision of work over semester

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcome

• Demonstrate effective mathematics teaching and learning strategies for meeting the needs of indigenous students.

Assessment task

• Assessment One

Learning and teaching activity

• This unit engages students in lectures covering research and theory in Science and Technology education
• This unit engages students in online discussions addressing research and issues in relation to the learning of Science and Technology
• This unit engages students in a range of Assessment tasks where peer feedback is provided. These will enable reflection and revision of work over semester