What counts as numeracy preparation in enabling programs

Results of a national audit

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Project context

- **AALL-funded**: A national stocktake of numeracy provision in enabling courses in Australian Higher Education (HE)
  - **Desktop audit** – publicly available info
  - **Telephone interviews** – 26 participants, from 27 enabling programs across 23 institutions
- **Enabling programs:**
  - Cost-free
  - Alternative pathway to HE
  - Largely students fall into the 6 equity groups
  - Preparation, induction and support for HE
  - No national curriculum framework

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Questions

- How is numeracy **positioned** within enabling programs?
- What is considered to be **‘core’ numeracy content** for academic preparation?
- What **connections** exist (if at all) with undergraduate discipline areas?
- Is academic numeracy considered to be **part of ‘academic literacies’** by enabling practitioners?

Background: maths and numeracy

- **Slippage: mathematics and numeracy**
  - Interchangeable
  - In contrast
- **Academic numeracy:**
  - The teaching, learning and application of ‘necessary maths’ for professional and / or disciplinary contexts in ways that are contextual, adaptive and developmental, and which foreground issues of students’ mathematical competence, critical awareness and confidence.

Background: Academic Literacies

- **Conceptual frame:** Academic Literacies (Lea & Street, 1998)
  - Sociocultural practices that are deeply embedded within contexts and constituted by / constitutive of particular disciplinary epistemologies and values
  - Historically situated & embedded in institutional systems
  - Reflective of institutional power

Background: numeracy as social practice

- Four-part understanding of numeracy (Baker, 1995):
  - Content
  - Context
  - Culture
  - Ideology
- Challenges mainstream view:
  - Numeracy as singular and prescriptive

Content	Context	Culture	Ideology
Autonomous	Events	Values	Ideological
Activities	Purposes	Beliefs	Relationships
Techniques	Appropriacy	Epistemologies	Power
Skills			Legitimacy

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How is numeracy positioned in enabling programs?

- **Numeracy or mathematics as core/compulsory:** 72% of programs
    - Compulsory unit
    - Core in disciplinary stream
    - Embedded in whole program (no individual units)
- **Embedded in other units:** sciences ('natural')
- **Academic writing & critical thinking units**

> Numeracy pops up everywhere, even if you're writing because if you're reading an article that has a table in it then that's numeracy.

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‘Core’ numeracy content

Category	Number of participants
Arithmetic	17
Number	16
Algebra	14
Statistics	14
Language	11
Thinking	7
Geometry	4

Interpreting data in academic research contexts formed an important part of what participants considered to be academic numeracy

Connections with undergrad

- Mostly informal relationships
  - Sessional staff working across enabling and undergrad
  - Identifying student needs
  - Opportunities for progression
- Some formal relationships
  - Communities of Practice
  - Curriculum redev initiatives
  - Quality assurance measures
    - Eg, academic boards, exam approvals processes

> Most of the tutors that we have also teach in undergraduate degrees and … I also work with undergraduate lecturers … so I kind of feel like I have a good idea of what is required for them.

Academic numeracy: positions, perceptions & definitions

- What does ‘academic numeracy’ mean to you?
- 14 discourses identified and organised around Baker’s (1995) model of numeracy, understood as a continuum.
  - Content
  - Context
  - Culture
  - Ideology
- Enabling educators are aware of the contextual, cultural and political power of academic numeracy

Discourse	# of participants	Baker's (1995) model of numeracy
Understand, communicate, apply concepts	10	Context-Culture
Dependent on academic level	7	Culture-Ideology
Discipline-specific//dependant	5	Culture-Ideology
Competency in skills	5	Content
'Maths-lite'	4	Content
Logical thinking	3	Culture
Identification & application of patterns	2	Content
Interpretation of graphs/tables	2	Context-Culture
Confidence	2	Culture
Fluency	2	Culture
Socio-political	2	Ideology
Attach meaning to symbols	1	Content
Number sense	1	Content-Culture
Reason and argument	1	Context

Academic numeracy: positions, perceptions & definitions

So to understand mathematical concepts or understand numbers in a conceptual way, so being able to apply that to particular disciplines or what might have been called real life situations.

Degrees of ability and levels and the skills that are needed in certain areas, and that's where we hopefully are developing courses that provide students with basic and foundational knowledge before they move on to their degree.

Academic numeracy: positions, perceptions & definitions

- Is numeracy part of academic literacies?
- 23 out of 26 agreed that it was

> Academic writing, you need to be able to do a lot of simple numerical estimations and computations so that you can back up your own argument, for example.

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Discourse	# of participants	Baker's (1995) model of numeracy
Numeracy as essential for HE	5	Context-Culture
Numeracy as specific & essential to particular disciplines	4	Context-Culture
Numeracy as maths lite	4	Content
Numeracy as tacit/ everyday/ invisible	3	Content
Numeracy as maths vocabulary	1	Content-Context
Numeracy as a skill	1	Content
Numeracy as intertwined with assumptions re aptitude	1	Content
Numeracy as logic	1	Content
Numeracy as applied logic	1	Context

Discussion: diversity and consensus

- Enabling education: diverse, complex and context-dependent/ locally responsive
- Relative consensus
  - Arthimetic
  - Number
  - Algebra
  - Statistics
- Numeracy and literacy: symbiotic
  - Critical, holistic model of meaning making in academic preparation
- Yet spectrum of understandings from ‘maths lite’ and tacit/everyday to academic/ discipline-specific
- Impacting teaching, learning and assessment practices

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Enabling Typology

Numeracy/ mathematics courses	Numeracy diagnostic / Readiness Test + Description	Numeracy support	LBOTE numeracy support
• Introductory Mathematics • Intermediate Mathematics • Extension Mathematics	No, but self-assessment tool available to students to help them choose which mathematics course to enrol in.	Individual support available from lecturing staff. Drop-in tutorial sessions. Students can also access centralised numeracy support. PASS sessions. Student-run maths clinic in Mathematics Faculty.	No, however, students can access individual support with English Language Support Teacher.

Description: Introductory Mathematics, Intermediate Mathematics and Extension Mathematics are offered as electives in the Open Foundation program. Students may choose two disciplinary-based electives, but may not choose more than one mathematics course to make up their program. Introductory Mathematics is also offered as part of the Open Foundation Online program.

Course	Topic	Assesment Types	How Graded	Textbook
Introductory Mathematics	Numeracy; Algebra; Linear functions; Graphing; Probability; Statistics	In-class quizzes; In-class test; Exam	Graded mark	Yes
Intermediate Mathematics	Numeracy; Algebra; Linear & non-linear functions; Graphing; Exponential & logarithmic theory; Probability; Statistics	Quizzes; Class test; Exam	Graded mark	No
Extension Mathematics	Number systems; Basic algebra; Simultaneous & quadratic equations; Functions & graphs; Sequences & series; Trigonometry; Differential & integral calculus	Essay; Weekly assignments; Weekly quizzes; Exam	Graded mark	No

http://enablingeducators.org/enablingtypology

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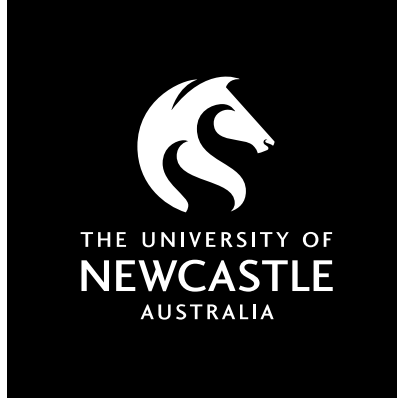
References

Baker, D. (1995). Numeracy as a Social Practice: Implications for concerns about numeracy in schools, *The Proceedings of the Political Dimensions of Mathematical Education Conference*, July 95, University of Bergen, Bergen.

Lea, M. & Street, B. (1998). Student writing in higher education: An academic literacies approach, *Studies in Higher Education*, 23 (2): 157-172.



thank you