London South Bank University

Module Guide

Developing Mathematical Thinking

EDU_4_DMT

School of Law and Social Sciences

Level 4

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1. MODULE DETAILS

Module Title:	Developing Mathematics
Module Level:	Level 4
Module Reference Number:	EDU_4_DMT
Credit Value:	20
Student Study Hours:	200
Contact Hours:	36 hours
Private Study Hours:	162
Pre-requisite Learning (If applicable):	None
Co-requisite Modules (If applicable):	None
Course(s):	BA (Hons) Education Studies
Year and Semester	Year 1 Semester 2
Module Coordinator:	Helen Thomas
MC Contact Details (Tel, Email, Room)	thomash8@lsbu.ac.uk Room V303 Ext 8071
Teaching Team & Contact Details (If applicable):	N/A
Subject Area:	Mathematics
Summary of Assessment Method:	Mathematics Investigation with Log Book
External Examiner appointed for module:	Fiona Shelton and Alison McLauchlin

2. SHORT DESCRIPTION

This module introduces students to key concepts and issues in the development of mathematical subject knowledge. By examining attitudes towards mathematics and the processes within problem solving, the module seeks to provide students with both theoretical and mathematical ideas that will underpin future studies. Themes such as calculations, number sense, and investigations are all addressed within the module.

3. AIMS OF THE MODULE

The module aims to provide students with the opportunity to:

- explore the meaning and nature of mathematics education
- develop knowledge and understanding of mathematical thinking and the problem solving processes
- build new mathematical knowledge through problem solving and solve problems that arise in mathematics and in other contexts
- apply and adapt a variety of appropriate strategies to solve problems

4. LEARNING OUTCOMES

4.1 Knowledge and Understanding

Demonstrate an understanding of key issues within the teaching and learning of mathematics

4.2 Intellectual Skills

Critically compare and contrast approaches to the teaching of mathematics

4.3 Practical Skills

Develop strategies to solve problems in mathematics

4.4 Transferable Skills

Understand how to communicate professionally with other adults in a school environment
Develop supportive and productive conversations with individual learners.

5. ASSESSMENT OF THE MODULE

Formative assessment

- Portfolio identifying subject knowledge and reading
- Peer assessment of portfolio
- Personal Reflection

Summative assessment

Choose an investigation at your own level – keep a logbook identifying the processes you have used as you work on your investigation. Write a 750-word summary, which reflects on your investigation with links to reading.

Assessment Hand in date – 9th May 2019

Criteria	Fail 0 – 30%	Fail 30-39%	Pass/Third Class 40-49%	Lower Second 50-59%	Upper Second 60--69%	First 70 – 80%	First 80 +
Use of standard English and academic referencing conventions.	Very poor written English: grammatical errors, errors in paragraphing and sentence structure and punctuation. Very Limited/incorrect use of referencing conventions.	Poor written English: grammatical errors, errors in paragraphing and sentence structure and punctuation. Limited/ incorrect use of referencing conventions.	Acceptable written English, acceptable grammatical errors, evidence of correct use of referencing conventions, with some errors/inconsistencies .	Sound quality and consistent application of written English and referencing conventions but with minor errors or omissions	Well written in an appropriate academic style. Handles written and referencing conventions correctly, confidently and effectively throughout with few errors or omissions.	Very well expressed in an appropriate academic style. Handles written and referencing conventions correctly, confidently and effectively throughout with very minor errors or omissions. Well-polished and accurate.	Very well expressed in an appropriate academic style. Handles written and referencing conventions correctly, confidently and effectively throughout with very minor errors or omissions. Well-polished and accurate. Written with flair and originality.
Ability to structure assignment coherently and develop sustained reasoned argument.	Little or no structure. Incoherent, inconsistent and fragmented or argument.	Weak structure with some inconsistency in argument and sometimes lacking cohesion.	Satisfactory structure with minor inconsistency in argument and cohesion.	Good structure, with effective argument, consistently and coherently carried across the assignment.	A very good/strong structure that enables the argument to be expressed with confidence.	An excellent strong and consistent structure that enables a well-focussed argument to be expressed with confidence and originality.	An outstanding strong and consistent structure that enables a well-focussed argument to be expressed with confidence, flair and originality.
Informed reading of, and reference to, pertinent literature in the given field.	Little or no evidence of use of literature. Descriptive and anecdotal	Limited range, depth or use of literature. Descriptive and lacking reflective discussion of ideas presented.	A satisfactory range of literature is referred to in order to support ideas. Some evidence of reflective discussion of ideas presented	Good and consistent use of literature throughout assignment. Good evidence of reflective discussion of ideas presented.	Ideas supported by wide range and depth of literature through the assignment. Very good evidence of reflective discussion of ideas presented.	An excellent range and depth of literature, critically and reflectively discussed.	An outstanding range and depth of literature, critically and reflectively discussed, with original insight.
Content and range of	Little or no relevant knowledge included.	Significant gaps in knowledge and/or	Evidence of some knowledge of topic	Demonstrates a sound factual and/or	Demonstrates a good factual and/or	Demonstrates a detailed, systematic	Demonstrates a detailed, systematic,

knowledge of using mathematics through problem solving		misuse of terminology/ statistical/factual information.	and use of appropriate terminology/ statistics/facts. May contain some errors and/or omissions.	conceptual knowledge base and uses appropriate terminology/ statistics/facts.	conceptual knowledge base and uses appropriate terminology/ statistics/facts.	knowledge base and uses appropriate terminology/statistics/ facts.	in-depth, theoretically informed knowledge base, with some appreciation of the provisional nature of knowledge.
Communication and presentation (visual)	Communication and presentation is disorganised and/or incoherent and/or medium is non-visual and/or shows no understanding of the discipline. Many and/or major errors; formatting incorrect.	Communication is unstructured and unfocused and/or in a format inappropriate to the discipline. Presented in a disorganised manner. Many errors; formatting in places incorrect.	Communication is generally clear but limited evidence of discipline's academic style. Visual aspect and/or structure of presentation is adequate but limited. Some systematic errors in presentation and evidence of inattentive proof-reading.	Communication is generally effective and shows awareness of the discipline's academic style. Presentation has a generally sound structure and visual tools are used effectively. A number of errors; formatting acceptable.	Communication is effective and in a format appropriate to the discipline. Presentation is clear and has some visual impact. Not many errors; formatting for the most part correct.	Good communication in a format appropriate to the discipline. Presentation is clear and has strong visual impact. Formatting correct.	Effective communication that demonstrates a strong understanding of the discipline. Message is presented clearly and imaginatively with strong visual impact.

6. FEEDBACK

Feedback will normally be given to students 20 working days after the final submission of an assignment and will be available electronically

7. INTRODUCTION TO STUDYING THE MODULE

7.1 Overview of the Main Content

The teaching sessions are designed to offer a range of activities to help students to develop their understanding of how children learn. The sessions are interactive and all members are expected to contribute to discussions and reflect on practice. The module is designed to help students to clarify links between what they see and experience in school with current educational theories.

7.2 Overview of Types of Classes

12 learning and teaching sessions consist of a mixture of lectures, seminars and workshops, these include small group discussion and a variety of formative activities.
In addition there will be a museum visit and the opportunity to work with a group of children in school.

7.3 Importance of Student Self-Managed Learning Time

Student responsibility in the learning and development process will be emphasised. Students are required to undertake directed self-study and prepare solutions/discussions to questions relative to various topic areas. Students will be encouraged to identify for themselves particular problems of difficulty and to use seminar discussions, where appropriate, for the resolution of these.
Students must regularly access the Moodle site for this module. They should download the class/lecture material from the Moodle site.

7.4 Employability

Nearly all employment requires employee to have mathematical skills and understanding. This module contributes to developing the student's skills in using and applying mathematics through investigation and problem solving.

8. THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT (INDICATIVE)

WEEK	TOPIC
1	Attitudes towards mathematics
2	Problem solving processes
3	Models and images
4	Developing number Sense
5	Mathematics and pattern in number
6	Calculators as a tool for learning
7	Mathematics trails
8	Self Study – Identify your chosen investigation for your summative assessment
9	Mathematical thinking through investigations
10	Mathematical thinking through a cross curricular approach

9. STUDENT EVALUATION

Student evaluations of this module during 2017_18 were generally very positive. Formative feedback will be collected during the course, including from Course Board, and end of module evaluations will be used to shape and improve the module for 2019 -20.

10. LEARNING RESOURCES

You can access your online reading list through your Moodle site. Alternatively, you can reach it directly at http://readinglists.lsbu.ac.uk then search by the module name or module code (EDU_4_DMT) to find your reading list. The list will show you the library availability, as well as link you directly through to electronic material (if available).

You will find that anything that is on your core-reading list will be stocked in the library, as well as much of the background reading. As the library is not able to provide a copy of every book for each student, you are able to place reservations on books when all copies are out on loan. The core reference section holds a single reference copy of everything that is on a core reading list so there should always be a copy available for you to see in the library.

10.1 Core Materials

Boaler, J. (2015) *The elephant in the classroom: Helping children learn and Love Maths*. United Kingdom: Souvenir Press.
Turner, S., McCullouch, J. and McCulloch, J. (2004) *Making connections in primary mathematics: A practical guide*. London: David Fulton Publishers.

10.2 Optional materials

Anghileri, J. (2001) *Principles and practices in arithmetic teaching: Innovative approaches for the primary classroom*. United Kingdom: Open University Press.
Anghileri, J. (2006) *Teaching number sense*. 2nd edn. London: Continuum International Publishing Group.
Bartlett, S. and Burton, D. M. (2007) *Introduction to education studies*. 2nd edn. Los Angeles: Sage Publications.
Briggs, M. and Davis, S. (2014) *Creative teaching: Mathematics in the primary classroom*. 2nd edn. United Kingdom: Routledge.
Burton, L. (1984) *Thinking things through: Problem solving in mathematics*. 4th edn. Oxford: Prentice Hall (a Pearson Education company).
Leslie, D. and Mendick, H. (eds.) (2013) *Debates in mathematics education*. London: Routledge.
Lilburn, P., Rawson, P. and Lilburn (1996) *Real life mathematics investigation book 1*. Melbourne: OUP Australia and New Zealand.
Mathematics literacy: Gr 10: Answer guide (2011) South Africa: Allcopy Publishers.
Morgan, C. (1998) *Writing mathematically: The discourse of 'investigation'.* Bristol, PA: Routledge Falmer.
Mottershead, L. (1992) *Investigations in mathematics*. Hemel Hempstead, Herts: Simon & Schuster Education.
Pound, L. and Lee, T. (2015) *Teaching mathematics creatively*. London: Taylor & Francis.
Royal, B. (2010) *The little blue reasoning book: 50 powerful principles for clear and effective thinking (3rd edition)*. Calgary: Maven Publishing.
Schliemann, A. D. and Carraher, D. W. (1993) *Street mathematics and school mathematics*. Edited by Terezinha Nunes. New York, NY, USA: Cambridge University Press.
Skelton, C. and Francis, B. (2003) *Boys and girls in the primary classroom*. Maidenhead: Open University Press.
Thompson, I. (2003) *Enhancing primary mathematics teaching*. Maidenhead: McGraw-Hill International (UK).
Thompson, I. (2008) *Teaching and learning early number*. 2nd edn. Maidenhead, England: Open University Press.
Thompson, I. (2010) *Issues in teaching numeracy in primary schools*. 2nd edn. Maidenhead: Open University Press.

10.3 Other learning materials

NRICH enriching mathematics
A useful site which provides teacher development and maths activities
http://nrich.maths.org/frontpage

TES Connect – website with useful teaching resources and investigations
http://www.tes.co.uk/teaching-resource/Maths-Investigations-3005645/

Primary resources – website with a wide range of resources and activities
http://www.primaryresources.co.uk/maths/mathsD3.htm