Resilient future mathematics education for students on technical degree programmes

QAA Scotland Enhancement Conference 2022

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Edinburgh Napier UNIVERSITY

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Overview

- Background and context
- What we did
- Findings
- Recommendations and conclusions
Shall report findings of a small case study at Edinburgh Napier University broadly about

- teaching mathematics in an online/blended capacity
- for students on technical degree programmes

Project arose as a consequence of the Coronavirus pandemic, and took place over the 2020/21 academic year

Part of the QAA resilient learning communities enhancement theme within Edinburgh Napier University — internal written report available if interested
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  1. improve our online delivery by enhancing our own practice, and learn how to better foster resilience in learners studying mathematics on technical programmes in an online or blended capacity;

  2. make potential recommendations for future blended or online-only degree programmes

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(b) to explore with our continuing students their experiences of the switch of teaching and learning from face-to-face, to blended, and then to online-only delivery.

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Key disciplinary challenge

- Mathematics is a written subject — “we do it by writing it”
- The subject requires detailed derivations and explanations of techniques, followed by examples, explored collaboratively by the lecturer and the class
- Students must then work through exercises themselves
- Both “master and apprentice” approach and iterative in nature
- Note here the distinction between writing calculations out in real time, and showing a pre-prepared slide containing calculations
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- For these reasons, prior to 2020, we expect that most mathematics teaching and learning took place face-to-face across the HE sector.

- Indeed, academic staff at Napier were not trained or experienced in teaching in a blended or online-only manner.

- Also, we expect that students had not studied mathematics in this way before.
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  (....class start working on tutorial sheet.....)

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- In Trimester 2 (Spring 2021) all students had teaching via VLE only

- Teaching comprises
  - Lectures
  - Tutorial sessions, supported by peer tutors
  - Computer labs, although these were not possible in 2020/21

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- Groups organised along two the strands (transition to HE and continuing students)

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  - How had the students gotten on?
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- Of funds for at most 32 students, we recruited only six

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Question 2
• In Trimester 1 we had a combination of face-to-face classes and online classes
• We tried to have as much face-to-face teaching as possible given the constraints on rooms, class sizes, timetabling etc
• In trimester 2 we have been allowed no face-to-face classes

Have you preferred face to face teaching or the online classes? Does this depend on the lecturer or subject material?

Question 3
• When teaching mathematics to engineering and computer science students there are usually four types of timetabled activities
  • Lecture
  • Tutorial
  • Computer lab
  • Workshop/drop in session (MathsPlus at Napier)

Which of these do you think work well when delivered online, and which do not, and why? If you decided your future timetable, how would you schedule each of the above activities?

Question 4
• Technology plays an important role in facilitating teaching and learning

Which technologies have worked well for delivering maths or technical subjects online, and which have not? Do you feel you have had the correct IT equipment to engage with classes? Is there additional or different IT equipment which would help?

Question 5
• And finally

What have we missed or overlooked? Do you have any comments or reflections on your experiences over the past academic year which these questions have not addressed?
Feedback from Focus Groups — 1

Summary of comments from two first-year students

- Delivering the modules online had broadly worked well
- Face-to-face teaching preferred — but recordings valued
- Having a second screen was more important than having their own writing tablet
- Discussion about using cameras in class — much wider issue
- Students would have looked at materials in advance of arriving at university
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Our own reflections

As a group of (five) academics, we also reflected on teaching and learning in the 2020/21 academic year

- Broadly agreed with student views
- Having correct equipment is essential, also for peer tutors
- Lectures (large classes, not so interactive) and individual meetings work well-enough online
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This relies on students creating a suitable document for upload — a single (ideally pdf) document of their work, which requires practice.

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- We are aware of issues of academic integrity in online assessments — particularly with calculation-based (mathematical) subjects

- We are not sure how widespread — although anecdotally quite problematic

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- Peer tutors (teaching assistants) need the correct equipment as well.
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- There is some interest on having pre-course maths material made available for first-year modules — typical issue of how to get students advanced access.
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Programme recommendations

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- Mathematics support should primarily be held face-to-face
- Some students indicated that online maths support would be welcome
- Consider raising student awareness of importance of participating in online classes, meaning asking questions, turning cameras on, using the chat, and so on
- Be aware of students caught in “hybrid degrees” — varying assessment patterns
- Dual degrees (face-to-face and online) increases resources required for delivery
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Further conclusions

- The students who engaged with the focus groups gave helpful insights.

- However, encouraging students to participate in these sorts of teaching and learning enhancement activities, even with incentives, can be challenging.

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Two potential answers

▶ As educators — being better-prepared for potential future shocks to UK HE, such as another pandemic

▶ For students — helping them get the most out of online teaching and learning, particularly mathematics and technical subjects, so that they stay engaged, and ultimately have a better student experience and degree outcome
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