Resilient future mathematics education for students on technical degree programmes

QAA Scotland Enhancement Conference 2022

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Overview

- Background and context
- What we did
- Findings
- Recommendations and conclusions

Outline

- 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

Aims

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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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  (a) to explore resilience with (then) current **first-year** or **direct entry** students in the context of transition to HE, and;
  (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
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- In Trimester 2 (Spring 2021) all students had teaching via VLE only
- Teaching comprises
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- We proposed a series of focus groups with first- and second-year engineering students
- 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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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?

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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?

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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?

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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?

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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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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
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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
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- Many practical courses cannot be run online only
- 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

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
- More work is needed to persuade students to engage in online classes
- Mathematics for non-specialist students can be taught online if needed
  - Lectures are the easiest to replicate, and worked well
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- How do these findings relate back to resilient learning communities?
- 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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