UNIVERSITY OF
LINCOLN

Measuring the Impact of an On-line Maths Support System

Michael Gallimore

Background

- Ever-increasing gap between secondary and university level mathematics.
- More diverse cohorts.
- Students are less prepared for shift in levels meaning transition is more difficult.
- Ultimately leads to poor retention, low success rates and lack of engagement.
- Means required to aid this transition through a mathematics support programme particularly in STEM subjects.

Traditional Approaches to Support

1) DIAGNOSTIC TESTING ON ENTRY

- Content often not thought through and has no real purpose
- Not used to inform future learning
- Uses threshold type approach

2) **ONGOING SUPPORT**

- Often very informal and relies on students understanding their weaknesses
- Not tailored to individual needs

Initial Off-line System

Support is Two-fold

Initial Support Requirements

- Identified through intelligent diagnostic testing & in-line with course needs.
- Initial support offered through timetabled sessions.

Sustained Support Requirements

- Identified throughout taught material using AFL techniques.
- ILP's used to track student progress.

Impact of Off-line System

Student Category	Average Diagnostic Score	Average Exam Score	Average Value-Added
1 – Not identified as needing support	85%	71.4%	-13.6%
2 – Identified and made use of support	50.3%	76.9%	26.6%
3 – Identified but did not make use of support	50.7%	40%	-10.7%

On-line System -Project Background

- **On-line Diagnostics**
- Traditional AFL techniques not sustainable as student numbers grow.
- On-line tests administered at entry and after each taught topic.
- Questions levelled in-line with Bloom's taxonomy and degree classifications – allows self assessment.
- ILP's updated automatically throughout and support offered via on-line resources, timetabled sessions and student mentoring system.

On-line System -Project Background

- **Student Mentoring**

- Student mentoring recognised as a method of improving success and retention.
- ‘Student Expert’ system designed to promote subject specific mentoring.
- Harnesses the knowledge of gifted and talented students.
- Promotes support between first and second year students.
- Encourages cross-institutional support.

Welcome, Michael

Admin Functions

- View / Edit Staff
- View / Edit Students
- View / Edit Modules
- View / Edit Awards
- Question Store
- View / Edit Pages
- Exams
- Experts
- Site Admin

Your Modules

- EGR1002M - Engineering Science And Mathematics (1)
- EGR1003M - Engineering Science And Mathematics (2)

Exams Available to Start

Module	Exam Title	Valid From	Valid To	Time Limit	Support Allowed	Actions
EGR1002M	Maths Diagnostic Test Welcome Week	Wednesday 19th of September 2012 12:00:00 AM			No	Start Exam
EGR1003M	Tutorial 5 - Complex Numbers	Monday 28th of January 2013 12:00:00 AM			Yes	Start Exam

Exams Started

Module	Exam Title	Valid From	Valid To	Time Limit	Support Allowed	Actions
EGR1002M	Tutorial 2 - Differentiation (Simple, Rules, Parametric, Implicit)	Monday 22nd of October 2012 12:00:00 AM	Thursday 1st of January 1970 12:00:00 AM		Yes	View Exam
EGR1002M	Tutorial 6 - Integration by Substitution, Applications	Monday 14th of January 2013 12:00:00 AM	Thursday 1st of January 1970 12:00:00 AM		Yes	View Exam
EGR1002M	Tutorial 8 - Second Order LCC ODE's	Thursday 14th of March 2013	Thursday 1st of January 1970		Yes	View

Topic: Matrices - Gaussian Elimination

Request Status: Closed

Student Expert

I can't seem to put this augmented matrix into row echelon form:

1 4 -2 8
-1 2 -6 6

5 7 -5 6

This is the furtherest i've got:

1 4 -2 8
0 7 -6 15

5 0 1 -9

3:33am on Saturday 17th November 2012
9 Months, 3 Weeks, 3 Days, 3 Minutes ago

Student Expert

Hi

Had another look and this is the solution. Not quite sure how you got your matrix, but this is how I'd do it.

First step add row 1 to row 2

Gives

1 4 -2 8
0 6 -8 14
5 7 -5 6

Then multiply row 1 by 5 and subtract from row 3

Gives

1 4 -2 8
0 6 -8 14
0 -13 5 -34

Now need to get rid of that -13, so multiply row 2 by 13/6, then ADD to row 3.

Gives
1 4 -2 8
0 6 -8 14
0 0 -37/3 -11/3

this gives z= 11/37 and you can find y and x from there. Any more problems, get in touch.

Impact of On-line System

- **Teaching Delivery**

- Allows ‘live’ monitoring of students during tutorial sessions.
- Immediate feedback to students, 100% automated.
- Allows early intervention, even during tutorial sessions.
- Delivery can be tailored to address common issues/misconceptions.
- Allows focused revision prior to examinations

Student A	Student A	25% • Differential Equations - Second Order LCC Homo - 33% • Differential Equations - Second Order LCC Non-Homo - 33% • Differential Equations - * Mass Spring Damper - 0%	View
Student A	Student A	25% • Differential Equations - Second Order LCC Homo - 67% • Differential Equations - Second Order LCC Non-Homo - 0% • Differential Equations - * Mass Spring Damper - 0%	View
Student A	Student A	75% • Differential Equations - Second Order LCC Homo - 100% • Differential Equations - Second Order LCC Non-Homo - 67% • Differential Equations - * Mass Spring Damper - 50%	View
Student A	Student A	100% • Differential Equations - Second Order LCC Homo - 100% • Differential Equations - Second Order LCC Non-Homo - 100% • Differential Equations - * Mass Spring Damper - 100%	View

Impact of On-line System

- **Achievement**

- Allows self-assessment and measurable progression, increasing engagement.
- Engages students who fail to make use of timetabled support.
- 100% achievement in first year maths modules.
- Value added increased for support students due to engagement of all students in support process.
- Value added of other first year modules increased by 10%.

Impact of On-line System

Student Category	Average Diagnostic Score	Average Exam Score	Average Value-Added
1 – Not identified as needing support	85%	71.4%	-13.6%
2 – Identified and made use of support	50.3%	76.9%	26.6%
3 – Identified but did not make use of support	50.7%	40%	-10.7%

Student Category	Average Diagnostic Score	Average Exam Score	Average Value-Added
1 – Not identified as needing support	89.2%	76.2%	-13%
2 – Identified and made use of timetabled support	55.1%	75.8%	20.7%
3 – Identified but did not make use of timetabled support	54.6%	68.7%	14.1%

UNIVERSITY OF
LINCOLN

THANK YOU

Michael Gallimore
mgallimore@lincoln.ac.uk