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

<table>
<thead>
<tr>
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<tbody>
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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.
Student Expert

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

\[
\begin{align*}
1 & \quad -2 & \quad 8 \\
-1 & \quad 2 & \quad -6 & \quad 6 \\
5 & \quad 7 & \quad -6 & \quad 6
\end{align*}
\]

This is the furthest I've got:

\[
\begin{align*}
1 & \quad -2 & \quad 8 \\
0 & \quad 7 & \quad -6 & \quad 15 \\
5 & \quad 0 & \quad 1 & \quad -9
\end{align*}
\]

3:33am on Saturday 17th November 2012
9 Months, 3 Weeks, 3 Days, 3 Minutes ago
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
<table>
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<th>Student A</th>
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<th>View</th>
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<tr>
<td></td>
<td></td>
<td>• Differential Equations - Second Order LCC Homo - 33%</td>
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<td>• Differential Equations - Second Order LCC Non-Homo - 33%</td>
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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%.
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<td>55.1%</td>
<td>75.8%</td>
<td>20.7%</td>
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<td>54.6%</td>
<td>68.7%</td>
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THANK YOU

Michael Gallimore
mgallimore@lincoln.ac.uk