Identifying and helping Junior Science students at risk

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Background

• The transition from school to a more independent mode of learning at university is often difficult
• Science Faculty attempts to smooth the change via the Transition Workshop – ‘jump start’ the formation of peer groups,....
• The Schools, Faculty, University all offer further resources but large cohorts of students in first year Bio, Chem, Maths and Physics make personal mentoring of students difficult.
• Assessment usually starts within weeks of the first lecture and ~15 weeks after commencing University they have completed first semester, leaving little time for the new student to adapt.

The Project

• This project seeks to identify students ‘at risk’ of failing early in their Junior Science units and help them succeed.
• Failing is now more of a problem with semester-length units rather than year-long courses - affects progression especially in named degrees.
• PCON disappearing
• Workload outside Uni may put more people more at risk of failing
• Science Faculty Teaching Development Grant was obtained to identify and study students ‘at risk’ and develop a pilot program of academic and non-academic support for them, coordinated across Physics, Maths, Chemistry and Biology.

The Plan

• Study how well past students at risk are identified by early assessment tasks. Determine the extent to which they are at risk in more than one discipline.
• Identify and contact students at risk.
• Conduct focus group interviews to determine why these students are performing poorly and what can be done to help them.
• Develop materials to help students at risk.
• Implement a pilot program of academic and non-academic support for these students.
• Evaluate the success of the project.

Other projects

• Economics and Business (Michael Jackson, Michele Mowbray-d’Arbela/Jenny Beatson)
  • interested in students who fail one semester
  • driven by ‘show cause’ requirements
  • starting an on-line Discussion Forum within the University
  • What has arisen today….?

In the literature
e.g. selection from Uniserve FYE bibliography

• Cox – initial assessment of a range of knowledge and skills to assess “probable preparedness”
• McKenzie & Schweitzer – study of 197 students showed previous academic performance best predictor of uni performance – also other factors – identifying factors can improve targeting of interventions and support services for students at risk.
• Quinn et al. - pilot mentoring program employing a science/education specialist found at risk students just as motivated as others but a relatively low numbers of self-referering students
• Wagner et al. – specially developed pre-semester assessments were best predictor - further demographic information added little
• William et al. – student ‘self-reports’ for various purposes including identification of students at risk.
• Rodda – what is and is not important for failure in CS1 – attendance and time spent on revision in not? Self assessment of their situation may be best.

Also

• Rodda – what is and is not important for failure in CS1 – attendance and time spent on revision in not? Self assessment of their situation may be best.
How big is the problem?

<table>
<thead>
<tr>
<th>Failures</th>
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<tr>
<td>Biology</td>
<td>168 of 1108</td>
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<tr>
<td>Chemistry</td>
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<tr>
<td>Maths</td>
<td>217 of 2332 (Science only)</td>
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<tr>
<td>Physics</td>
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<td>1 subject</td>
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<td>2 subjects</td>
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<td>3 subjects</td>
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<td>4 subjects</td>
<td>8</td>
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<td>Total</td>
<td>615</td>
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Assessment and Resources

e.g. Chemistry

- Mid-semester assessment
  - MCQ quizzes held in tutorials (~20 min) in weeks 3, 6, 9 & 12.
  - Continuous assessment in the lab plus lab test.

Resources

- On-line ‘Self-help problems’ with full worked answers
- Comprehensive set of on-line learning modules (ChemCAL) covering the content of the course
- Important resources highlighted in the header of weekly assignments
- Duty tutor available for consultation 4 days/week and by e-mail
- First Year enquiry office

Assessment used

Mid-semester assessment marks plotted v. final mark and exam mark

Biology

- Weekly lab quiz - first 5 averaged

Chemistry

- MCQ quizzes held in tutorials - first 2 summed

Mathematics

- 2 tutorial quizzes and 2 marked assignments - all used

Physics

- Progressive and Skills tests summed

Results

- A correlation between assessments and final exams was evident in most plots, but many students who performed well in assessments went on to fail, and vice versa.

Analysis of results for Physical Science 1001

- Scatter plots showing correlation between assessments and final exams.

Analysis of results for Physical Science 1001 (Physics)

- Scatter plots showing correlation between assessments and final exams.
Results

• Correlation was similar for students who had failed the course before and those who were attempting it for the first time, and was similar in all four subjects.
• Chemistry students who failed >1 subject were compared to those who failed Chemistry only - not distinguished by assessment marks.
• Any selection of students based on a mark in mid-semester assessment seems certain to:
  • catch many who will pass anyway, and
  • fail to pick many who will fail.

Discussion

• is assessment misaligned with the exam? (certainly no for some - e.g. Physics Progressive Test)
• is the exam well aligned to the unit outcomes?
• is student attitude ‘misaligned’? Quinn ref. suggests that ‘at risk’ students are just as motivated as others.
• Is there a significant difference in the way students approach assessment and final examination?
• how do students respond to mid-semester assessment result? – work harder or slacken off?
• Is self-selection the best way? Ref’s and other experience suggest perhaps yes if they will volunteer. We can only help them if they choose to turn up to help sessions or use resources provided – which would be more likely if self-selected?

What to do with them anyway?

• We planned to interview but have not so far since we haven’t identified a group.
• We can’t cope with too many - any identification of at risk students needs to be done using a quantitative approach because of the numbers involved (e.g. ~1000 in semester 1 Physics).
• What is practical in an on-going way?
  • Science and Economics and Business have both used letters to at risk students (who have already failed in semester 1) – produced few useful responses.
  • Feedback suggests that students favour remedial tutorials - will they turn up?
  • more extensive use of WebCT Discussion pages – with the benefit of forming self-help networks among the students.
  • further on-line problem solving practice tailored to this group of students.
  • a mix of these is likely to be the best way to engage students and match their individual learning needs.

What to do with them anyway?

• The departments involved all have a raft of learning resources to support different modes of study and the University also possess support services (learning centre, maths learning centre, counselling, time management courses)
  • another TDG project encouraging all students to use the resources
• To a significant degree we must help the students make maximum use of these resources already available.
• Is advice about these resources and how to use them is sufficient to get a student ‘back on track’.