Towards a MOOC for Teaching Introductory Programming @ Griffith – a Case Study

Prepared by: Wayne Pullan
Presented by: Michael Blumenstein

School of ICT, Griffith University
Overview

• In 2012, a revised approach was taken to teaching introductory programming at Griffith’s Gold Coast campus and within some Queensland High schools.

• In addition to on-campus lectures and workshops, an on-line environment was introduced (JPL¹) which consisted of the three components listed on the following pages (Knowledge, Practical, Assessment). Used by over 1,500 students to date.

• Following on from the success of this approach (see later slide) the decision has been made to extend the course and make it fully on-line.

• Anyone will have access to the Knowledge and Practical components but only students enrolled at Griffith will have access to the Assessment component.

¹. Java Programming Laboratory
Knowledge Component

• Current Knowledge Component
  a. Interactive web pages for more content detail
  b. Practice on-line quizzes (On-line marking)

• Fully On-line Knowledge Component Extensions
  a. Topic specific, video mini-lectures (10 – 15 minutes) with slides available
  b. Interactive assistance (Collaborate)
Practical Component

- **Current Practical Component**
  a. Practice Environment: Lots of small, scaffolded targeted problems with automated testing
  b. Assistance: 10 minute videos of tutor solving a problem, remote assistance directly into students source files, Hints, Solutions
  c. Feedback: Automated testing, provided solutions

- **Fully On-line Knowledge Component Extensions**
  a. Practice Environment: automatic check of problem statement understanding before allowed to start coding
  b. Assistance: more 10 minute videos of tutor solving problems, Collaborate / Workshop (Videoed), video responses to students, extended solutions, On-Line Question Database
  c. Feedback: analysis of students solution, provided solutions when student successful
Assessment Component (GU students only)

- **Current Assessment Component**
  a. Multiple choice tests (25%)
  b. Randomised Assessed Labs (25%)
  c. Invigilated, final examination (50%)

- **Fully On-line Assessment Component Extensions**
  a. Randomised multiple choice tests (20%)
  b. Randomised multi-part assignment (20%)
  c. Invigilated, must attain more than 65%, final examination (60%)
### 2011 – 2014 SEC (5 point scale)


<table>
<thead>
<tr>
<th>Category</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>This course was well organised</td>
<td>3.8</td>
<td>4.2</td>
<td>4.3</td>
<td>4.6</td>
</tr>
<tr>
<td>The assessment was clear and fair</td>
<td>3.6</td>
<td>4.2</td>
<td>4.2</td>
<td>4.7</td>
</tr>
<tr>
<td>I received helpful feedback on my assessment work</td>
<td>3.3</td>
<td>3.9</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>This course engaged me in learning</td>
<td>3.7</td>
<td>4.2</td>
<td>4.0</td>
<td>4.3</td>
</tr>
<tr>
<td>The teaching (lecturers, tutors, online) was effective in helping me to learn</td>
<td>3.7</td>
<td>4.1</td>
<td>4.1</td>
<td>4.4</td>
</tr>
<tr>
<td>Overall I am satisfied with the quality of this course</td>
<td>3.6</td>
<td>4.0</td>
<td>4.2</td>
<td>4.5</td>
</tr>
</tbody>
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Practical Component Interfaces

- JPLIDE interface – selecting a problem
- JPLIDE handles Java, C++, C#, Python
- Students’ files saved centrally
• JPLIDE interface – successful test
Practical Component Interfaces

- webJPL interfaces to same problems
- webJPL handles Java, C++, C#, Python
- Access same students files as JPLIDE
For a 2014/1 class of around 170 1001ICT students at the GC:

1. JPLIDE Starts = 15,026
2. Total JPLIDE Commands = 415,242
3. Open JPL Template = 33,467, Compiles = 196,469, Failed Tests = 58,271, Passed Tests = 31,989
4. Total JPLIDE Dev. Commands = 334,431 (80.54%)
5. Off-campus activity is 70.00% of total activity
As problems become harder, students command input slows down
# 2012 - 2014 Student Numbers

<table>
<thead>
<tr>
<th>Year</th>
<th>Griffith Students</th>
<th>High School Students</th>
<th>Overseas University</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>380</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>2013</td>
<td>400</td>
<td>60</td>
<td>80</td>
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<tr>
<td>2014</td>
<td>420</td>
<td>120</td>
<td>90</td>
</tr>
</tbody>
</table>

To date, JPL has been restricted to on-campus courses so limited to formally enrolled students.
Future plans and opportunities

• To fully open up the current JPL-driven course (1001ICT)

• Integration of high school students with the greater University student community
  ◦ Plugging the JPL into an engagement platform

• Collaboration opportunity: “MOOC on MOOCS”
  ◦ Can be pursued more broadly through ACDICT members