Investigation of student engagement with programming in TU100

The impact of using a graphical programming environment?

Helen Jefferis, Soraya Kouadri & Elaine Thomas
Computing & Communication Department
Agenda

• Motivation
• Project's aims
• Methodology
• Our findings
• Summary & future work
Motivation

• There is a strong need for the teaching of introductory programming at level 1 in the Computing and IT degree programme.

• The majority of new OU students will not have experienced the new National Curriculum.

• Previous teaching of programming at level 1 (M150) involved a text-based programming, JavaScript.
  – Over half of students avoided answering the question on programming in the EMA.

• TU100 ‘My digital life’ uses a graphical programming environment Sense based on Scratch.
Project's aim

• The aim of this eSTEeM project is to investigate the impact of using a graphical programming environment on student engagement with programming.

– It will seek to address the fundamental question as to whether the visual programming environment actually engages novice programmers or not in ‘TU100’.
Methodology

- Identification of the Sense programming questions in each TMA and in the EMA.
- Identification and collection of data related to the numbers or students who completed these questions and their overall performance.
- Analysis of textual comments in a selection of SEaM surveys of TU100 relating to students’ experience of programming.
## Comparison of OES Scores

<table>
<thead>
<tr>
<th>Presentation</th>
<th>No. of Students</th>
<th>OES</th>
<th>Sense</th>
<th>Rest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>Median</td>
<td>Mean</td>
</tr>
<tr>
<td>13J</td>
<td>1340</td>
<td>70.66</td>
<td>74.40</td>
<td>71.32</td>
</tr>
<tr>
<td>14B</td>
<td>801</td>
<td>69.62</td>
<td>74.19</td>
<td>69.64</td>
</tr>
<tr>
<td>14J</td>
<td>1343</td>
<td>73.63</td>
<td>78.80</td>
<td>85.00</td>
</tr>
<tr>
<td>15B</td>
<td>767</td>
<td>73.19</td>
<td>78.00</td>
<td>84.10</td>
</tr>
<tr>
<td>15J</td>
<td>1234</td>
<td>70.03</td>
<td>74.80</td>
<td>75.14</td>
</tr>
<tr>
<td>16B</td>
<td>674</td>
<td>70.28</td>
<td>74.80</td>
<td>73.26</td>
</tr>
</tbody>
</table>
Comparison of OES Scores

Comparison of OES Average Scores with Sense and non-programming components

- Average %
- Number of students

Presentation:
- 13J
- 14B
- 14J
- 15B
- 15J
- 16B

Legend:
- OES Mean
- Sense Mean
- Rest Mean
- Number Students
Correlation between Sense and Non-programming scores.

<table>
<thead>
<tr>
<th>Presentation</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>13J</td>
<td>.569</td>
</tr>
<tr>
<td>14B</td>
<td>.602</td>
</tr>
<tr>
<td>14J</td>
<td>.522</td>
</tr>
<tr>
<td>15B</td>
<td>.512</td>
</tr>
<tr>
<td>15J</td>
<td>.551</td>
</tr>
<tr>
<td>16B</td>
<td>.555</td>
</tr>
</tbody>
</table>

(In all cases $p = 0.00$)

$n=6,159$
Are Students passing without passing Sense?

<7.5% (460 out of 6,159 students) failed Sense and passed OES
Summary & Future Work

• Summary
  – More students have engaged with the programming element than on previous modules.
  – There is a strong correlation between the scores that students achieved in the programming and non-programming elements of the EMA.
  – There is little or no difference in the performance of students in the programming elements and the non-programming elements.

• Future Work
  – Analysis of SEaM surveys’ textual comments relating to students’ experience of programming.
  – Investigation of whether there is improved students engagement with programming comparing to M150