

## Helping computer scientists learn the basics of programming through an interactive visual online environment

Dr Colin Higgins and Dr Ben Moss discuss their innovative work which involved visual representations of the impact of computer algorithms to help students learn troublesome concepts.



### What was the teaching and learning issue this work sought to address?

All undergraduate students must have a grounding in programming if they are to effectively progress to subsequent stages of their degree. However, first-year Computer Science undergraduates studying the core programming module find certain concepts difficult to learn. We wanted to help students

learn by providing a functional, interactive visual online environment where students can modify visual representations of the difficult algorithms and see the implications of their actions.

### What did you do?

This work was conducted in three phases. First, we analysed our existing course data to determine the most difficult concept priorities. We then customised an existing system (the Jeliot system) to integrate with the module requirements. We also developed the software wizard to enable practitioners to create instances of the

customized Jeliot system for specific code examples without requiring additional technical knowledge. The final stage was to develop an on-line lesson. This lesson addressed one of the problems found by analysis of our course data, using visual examples provided by the customised Jeliot system, and was developed using the software wizard.

### What were the learning and teaching outcomes?

The wizard has been used to visualise a range of examples to complement existing teaching resources. These visualisations have been embedded into a Web-based lesson on the subject of arrays, covering the basic and intermediate concepts. The code examples have been carefully chosen to demonstrate the key concepts of arrays, whilst fully exploiting the use of visualisation for greater impact. The demonstration has been integrated with the existing Web-based teaching materials for the module.

### Does this technology have a use in other disciplines?

Having developed a visualisation environment that could be integrated into existing teaching materials using the deployment wizard, what we have created is effectively the first of many such environments which could be used to teach a wide variety of programming concepts in Java, and thereafter a host of concepts in other programming languages.

*Article compiled by Dr Brett Bligh*