Students Learning Software Programming: Innovative Strategies for Learning and Assessment

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Agenda

- Context
- Current Issues
- Pedagogy
- Case Study
- Learning and Assessment Strategies
  - (Where is Teaching?)
- Results
Context

- Students demand engaging approaches
- Employers demand soft skills
- Traditional education
  - Is boring
  - Fails to deliver good soft skills
  - Mediocre levels of achievement
- Very rapid change in software products
  - High stress levels
Addressing the Issues

- Need for
  - Enthusiastic students
  - Total engagement
  - Excellence in achievement
  - Outstanding soft skills for
    - Employment
    - Life-long learning
Pedagogic Philosophies

- Academic as
  - “Domain Expert”
    - Knows it all
    - Teaches domain facts, theories, software details
  or
  - “Learning-to-Learn Expert”
    - Guides and mentors the learning process
    - “Teaches” how to learn, questions, where to find answers
Case Study Modules

- **Introduction to Data Analysis**
  - 1st year – Learn SAS® and how to analyse data

- **Emerging IT Product Development**
  - 3rd year – Using new software products to find insights
Case Study Approach

“Education is not filling (leaky) buckets but lighting fires (of enthusiasm)” (Plutarch, modified)

Guided Learning

- No formal software teaching
- Provide access to software, manuals, training materials, CBT tests
- Provide big challenges
- Students as co-producers

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Traditional Approach

- Lectures
  - Describe syntax and grammar
  - Use cases
  - Worked examples

- Workshops and Tutorials
  - Lots of Exercises
  - Tutor as problem solver, often with answers

- Assessments
  - Single defined task
  - Demonstrations / Code inspections, etc.
New Approach

- **Lectures**
  - Outline of capabilities and purpose of software
  - Student presentations of their learning

- **Workshops**
  - Explore and learn the language capabilities
  - Apply new knowledge
  - Learn and use sources of language “how to do”
  - More questions, very few answers

- **Assessment**
  - Big challenge
  - Presentations of critical reflection and insights
Introduction to Data Analysis (1)

- Learn SAS from “20 Chapters” course materials
- Research capabilities of SAS functionality
  - Student presentations of research
- Data Analysis challenge
  - Find open source data
  - Identify interesting / valuable questions
  - Develop valuable insights
Introduction to Data Analysis (2)

- Technical Competence – 4xCBT (40%)
- Technical Communication research presentation (20%)
- Application of knowledge – (30%) data analysis challenge and presentation
- Contribution to class – (10%)
Overall pass at first attempt = 68%
1st and 2:1 = 63% (1st 37%)
Overall Average mark 55.6%
Total Cohort 19 students
The 6 who did not pass each failed to submit at least one element of the portfolio.
Emerging IT Product Developments (1)

- Learn IBM Bluemix and Watson Analytics
  - IBM staff present Tutorials
- Data Analytics challenge
  - Find open source data
  - Identify interesting / valuable questions
  - Develop valuable insights
Emerging IT Product Developments (2)

- Research based Article (40%)
  - A critical evaluation of the topic “Big Data Analytics and the Internet of Things: Technology and Data Integration to develop Smart Insights”

- Reflective critical evaluation of the challenge (60%)
  - Requirements, development, implementation and insights
Emerging IT Product Developments (3)

- Results being consolidated

- Article (40%)
  - 75% Good grade (2:1 and 1st)
  - 58% First class
  - 68.4% average
Student Reflections

- “Your approach to teaching is nothing short of refreshing; not only is it inspiring but also encourages creativity and novel thinking (an important aspect of education that I often find is overlooked)”

- “This approach to teaching enables me to easily become motivated, but what’s more, I now feel like I am making a genuine impact in the field”
The assignments that Richard sets are very broad with room for interpretation. The broadness of the question allows students to make the assignment their own; taking the topic and running with it.”

“Something that I value a lot is that finding novel ideas for our assignments is constantly encouraged”

“This leads to a grand spectrum of findings, with the best assignments getting the opportunity to be published”
Student Reflections

- Richard reviews and gives us formative feedback on our assignments allowing us to improve not only our assignments but also our understanding of the topic at hand.