The challenges of teaching a computer science capstone team project to a large cohort of undergraduate students

Advance HE Teaching and Learning Conference 2019

Tom Prickett PhD
Alan Godfrey BEng, PhD, MBA
Overview

Background

Question
  Poll Everywhere participation - #fun!

Experiences
  Life at CIS – 6 topics

Possible solutions

Future work and conclusions

Q&A
  Poll Everywhere results
What is a Capstone Project?

During a Capstone Project
“students teams develop software for external customers, solving real-world problems”

(Vanhanen J, Lehtinen T and Lassenius C (2012))

Approach?

One Project?

Or

Many Projects?
(Clark N (2005))
Context

Policy Context - Shadbolt Review
(Shadbolt N (2016))

Literature Context - Computer Science and ‘Live Projects’

“It is well understood and has been well documented that there is much to gain by using live projects, those that serve a real client with a real problem to solve, in the computer science classroom” (Chase J.D et al (2007), page 469)

Challenges: solicitation; scoping; specialisation; consistency; Increased time, organizational and pedagogical demands (Chase J.D et al (2015))

Northumbria Context
• Regional economic inactivity in North East of England 25% (Office National Statistics (2019))
• Loyalty to the region (Government Office for Science (2016))
• Placement Uptake 25-35%.
Why are we doing this?

Students:

- Choice
- Career development
  - Work readiness
  - An element for their career portfolio
  - Enhanced “soft” skills
- Creativity (Knobelsdorf M (2008))
- Opportunity to evaluate the ‘environmental’ aspects of a significant project
- Appreciation of accomplishments

Staff:

- Opportunity to work with third parties
- Divergent Assessment
  (Bradley S(2016))
The module - What could possibly go wrong!

- The module
  - Team Project and Professionalism - Level 6 / final year / 20 credits / semester long / January-May
- The Assessment
  - Development and evaluation of a software product and its potential commercial exploitation
- The programmes
  - BSc (Hons) Computer Science - 180 students / BSc (Hons) Applied Computing - 20 students
- Differing specialisms
- Prerequisite knowledge
- Teams of (about) 5 students complete a self selected development project
- Large teaching team
Before we begin...

What effective practices have/would you apply to conduct large scale, self-defined, multi-modal, team projects?

Responses to https://pollev.com/tomprickett158
Or text TOMPRICKETT158 to 07480 781235 to join and then another text with your response.
Experiences

Solicitation of ‘Live’ projects

Scoping

Choice of project (specialisation 1)

Choice of context (specialisation 2)

Consistency of academics

Consistency of Process - Executing the projects (technical, non-technical, organisation etc.)
Solicitation of Live projects

- Finding projects

- Intellectual property (IP) and other critical issues

Solicitation
- Types of ‘Live’ Projects
- Sources of projects

Project Disclaimer agreed with the Legal office

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Scoping

Common expectations
  Of Students
  Of Projects
  Of Supervision

Equity of assessment (differing projects)

- Student Expectations:
  - Learning agreement
- Project expectations:
  - Formative and Summative Approval of project
- Supervision expectations
- Equity of assessment
  - Types of prototype
    - Proof of concept
    - Commercially demonstrable

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Student choice (Specialisation 1)

Choice of supervisor

Choice of project

- Module team with a diverse range of expertise
- Strategic students?
- 80% of students indicated they were excited by their project choice

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Choice of context (Specialisation 2)

The product
The processes
Professional, Legal, Ethical and Social issues
HCI matters
Cybersecurity

Evaluation contextualised to an area of interest
Evaluate:
- the prototype
- the prototypes future exploitation

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Consistency 1 – Consistency of Academics

Large multi-disciplinary (within department) team

Consistent supervision

Consistent marking

• Diverse ideas, projects and applications
• Extensive module documentation
• Team meeting and discussion
• Marking:
  • Blackboard Rubrics to reduce low level differences
  • Considerable peer marking and moderation

“Paul and I are gearing up to team-teach another course.”

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Consistency 2 – Consistency of Process - Executing the projects

Project management
Team working
Support processes (version control, integration, testing etc.)
Rewarding students differing skill sets

- Prerequisite modules
- Individual tasks
  - Team leader
  - A Decomcracy?
- GitHub and other tools
- Collaborative learning

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Future Work

• Work in progress
• Student Feedback
• Harvesting projects
• Commercial exploitation?
• Encouraging students to be more adventurous in project selection?
• Is Capstone the right approach?
  
  Should we be considering Internships?
  (Wright K(2010))

Summary

• Context
• Experiences
• Possible Solutions
• Future work
• Poll Everywhere results

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Thank you

And (hopefully) the results are in...

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References


