TOPS: Collaboration and Competition to stretch our most able programming novices
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Common beginnings …

… first year is problematic
– some students can
– some students can’t
… what do we do
– try to motivate them all?
– teach to the middle?
– extra support for strugglers?
– … what about our best?

TOP students
We all have top students
– obviously find work easy
– programmed before
– pick it up quickly
– lectures too simple and slow
– bored with mundane tasks
We all have strategies for our best students
– Ours include:
  • CSCS
  • Rocket scientists
  • Space Cadets
  • If you have some to share… let us know

The project
Teaching Over Performing Students
£3,000 Start Date November 1 2006

The project was proof of concept…
– intra-university programming competition
– collaborative problem setting
as a means of extending the most able students in programming classes
sharing current practice peer observations across universities

Existing competitions
The IBM student competition
http://www.developer.ibm.com/university/students/contests/
The ACM student research competition sponsored by Microsoft
http://www.acm.org/src/
The International Imagine Cup
http://imaginecup.com/
Topcoder collegiate challenge
http://www.topcoder.com/
BCS competition
http://www.bcs.org/uk/

How we did it …

strengths
– Motivate good students
– Are only for the best
– Look good on the CV

weaknesses
– Not linked to the curriculum
– Students don’t always want extra learning
– International competitions diverge from UK curriculum
Collaboration, peer observation

Plan, discuss
Share current practice
Obtain a 'sense of place'
- Meet find out
  - what we do
  - more about our
    students
  - problems we encounter
  - how we want to stretch
    our students

Our competition

- Based upon our curricula
  - Using only what we expect
    our students to know
  - Set a collaborative
    challenge
  - Be more immediate and
    relevant

Authentic pair programming
- Insight into curriculum
- Extend and motivate our
  top students
- ... Look good on the CV

Our challenges - organisation

- How many students?
  - Determined by funding
    ...and rail fares!
- What student tasks
  - Write code
  - Present their work
  - compliments
  - 6 with all four specialties
  - be interesting/relevant

Our challenges - sponsorship

- Sun Microsystems provided
  - Venue
  - Catering
  - Some prizes
- This fixed competition date
  - 14th March 2007

Involving the students ...

- Scenario
  - Something relevent to a group of students attending a
    tech conference in London
- Setting a challenge task
  - Each University Student team to set one task
  - Collaborative response is brief
  - Management in 1 hour by 2 students pair-programming
  - Uses their ideas – motivating
  - Prize for university team who set the best challenge
  - motivating
  - Challenges more likely to be suitable

Our challenges - what will the
students do

- Scenario
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    tech conference in London
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Choose the team

- Each institution chose its team in whatever way
  was appropriate to them
  - Team size
    - 8 students
    - 6 students going to London
    - some students participated who otherwise couldn’t
    - back-up in case anybody dropped out

Runners and Riders...

Durham
At the venue

The students' first taste of such an event
- Most students attended James Gosling’s keynote
- They had the opportunity to attend talks and browse stalls
- All properly registered with delegate badges

Competition was not hidden
- On the programme
- On direction boards
- Proper sign on the door
- Assigned a conference staff helper
- Sun allowed us to use their logo on certificates

The programme for the day

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1030-1045</td>
<td>Introduction</td>
</tr>
<tr>
<td>1045-1145</td>
<td>Challenge 1</td>
</tr>
<tr>
<td>1200-1300</td>
<td>Challenge 2</td>
</tr>
<tr>
<td>1300-1400</td>
<td>Lunch</td>
</tr>
<tr>
<td>1400-1500</td>
<td>Challenge 3</td>
</tr>
<tr>
<td>1500-1600</td>
<td>Judging</td>
</tr>
<tr>
<td>1600-1630</td>
<td>Prize giving</td>
</tr>
</tbody>
</table>

The day itself... Initial tension

Scoping the tasks

coding in pairs
Settling in the environment

Marking/logistics

The winning pair (left)

The winning challenge team

It's great - thank you for organizing it

It was really intense, but great fun

We've got a proper sign on the door like all the other rooms

Working together was great! Everyone worked amazingly well in teams

Thank You

Acknowledgement

The support of the UK HEA subject centre for information and computer sciences

Sponsorship from Sun Microsystems

Conclusions/reflections

Faculty

• Proof of concept
• Peer deliverance amongst universities
• Share current practice

Students

• Gain insight into the curriculum
• Extend and motivate programming activities
• Authentic time-constrained paired programming

Meeting students from other universities
/ Scheduling into regular academic slots
/ Keeping to budget

We intend to run this again
The students enjoyed it
The students benefited from it
More generous funding

Possible solutions

• Virtual component(s)
  - but face to face is preferred
• Simplify tasks
  - but aim to ensure the challenge idea
• Target different groups
• Additional sponsorship
  - PhD students
  - commercial
  - corporate

This year

• Additional sponsorship
  - Post graduate assistants for marking
• 4 students going to London

Thank You

Acknowledgement

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Questions?

References