

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

Su White*, Janet Carter,
 Nick Efford, Stephan Jamieson,
 Tony Jenkins
*Learning Societies Lab, ECS
 The University of Southampton, UK
 IEEE FIE2007 Milwaukee

<http://www.lsl.ecs.soton.ac.uk/> saw@ecs.soton.ac.uk

Collaborate

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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?

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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

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The project

Teaching
 Over
 Performing
 Students

£3,000 Start Date November 1 2006

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The project

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

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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/erc/>

The International Imagine Cup
<http://imaginecup.com/>

Topcoder collegiate challenge
<http://www.topcoder.com/>

BCS competition
<http://www.bcs.org/>

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Existing competitions

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 curricula

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How we did it ...

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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

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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

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Our challenges - organisation

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

When?
What Sponsorship?
Which Venue?
What Prizes?

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Our challenges - sponsorship

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

London Tech Day

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Involving the students ...

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Our challenges – what will the students do

- Scenario
 - Something relevant 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 to brief
 - Manageable 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

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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

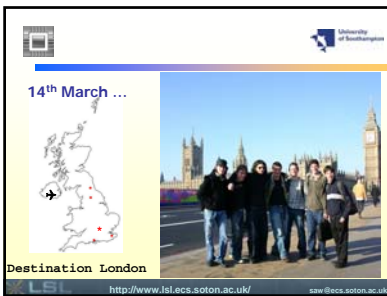
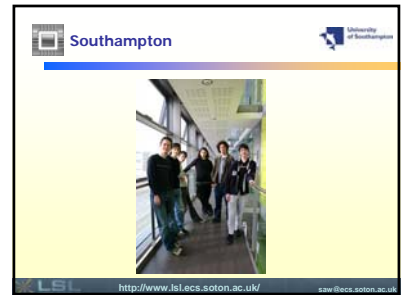
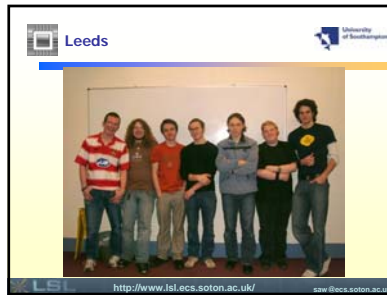
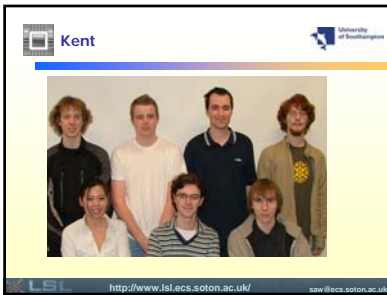
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Runners and Riders...

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Durham

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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

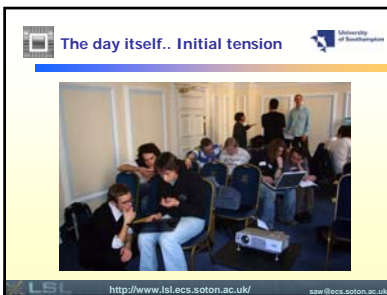
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The programme for the day

1030 – 1045	Introduction
1045 – 1145	Challenge 1
1200 – 1300	Challenge 2
1300 – 1400	Lunch
1400 – 1500	Challenge 3
1500 – 1600	Judging
1600 – 1630	Prize giving

Challenge	Team			
	Durham	Kent	Leeds	Soton
1	K	L	S	D
2	L	S	D	K
3	S	D	K	L

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Settling in the environment

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Marking/logistics

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The winning pair (left)

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The winning challenge team

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It's great - thank you for organizing it

It was really intense, but great fun

Making the challenge idea was easy, but the wording and the mark scheme weren't

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

I liked that we were supposed to work at our natural pace and that we had to think.

Working together was great. Everyone worked amazingly well in teams.

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Conclusions/reflections

Faculty <ul style="list-style-type: none"> • Proof of concept ✓ • Peer observe across universities ✓ • Share current practice ✓ 	<ul style="list-style-type: none"> • Meeting students from other universities ☹ • Scheduling into regular academic slots ☹ • Keeping to budget "100%!" • Workload on the competition day ☹
Students <ul style="list-style-type: none"> • Gain insight into the curriculum ✓ • Extend and motivate programming activities ✓ • authentic time-constrained paired-programming ✓ 	<p>transformative inspirational challenging fun</p>

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Reflections/conclusions

Possible solutions <ul style="list-style-type: none"> • Virtual component(s) <ul style="list-style-type: none"> - but face to face is preferred • Simplify tasks <ul style="list-style-type: none"> - But what about stretching the most able? • Target different groups • Additional sponsorship <ul style="list-style-type: none"> - Challenge retreat - Socialised learning - Presentations of work - Longer timescales ☹ - More cash for train companies! 	We intend to run this again <ul style="list-style-type: none"> - The students enjoyed it - The students benefited from it - More generous funding This year <ul style="list-style-type: none"> - Additional sponsorship - Post Graduate assistants for marking - Probably teams of 5 <ul style="list-style-type: none"> • 4 students going to London
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Thank You ☺

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Questions?

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references

- Carr, L. A., Davis, H. C. and White, S. A., "AnAAn - a Tool to Scaffold Learning About Programs", presented at the Fifth Annual Conference of LTSA/ACS, Uster, UK, 2004.
- Carter, J. and Boyle, R., "Teaching Delivery Issues: Lessons from Computer Science", vol. 1, 2002, pp. 77-89.
- Carter, J., English, J., Alia-Mujica, K., Dick, M., Foris, W., Fuller, L. and Sheard, J., "How Shall We Assess This?...", ACM SIGCSE Bulletin, vol. 35, pp. 107-123, 2003.
- Czegelski, C. and Hall, D., "What Makes a Good Programmer?," Commun. ACM, vol. 49, pp. 75-76, 2006.
- Davis, H. C., Carr, L. A., Cooke, E. C., and White, S. A., "Managing Diversity: Experiences Teaching Programming Principles", presented at the 2nd LTSA/ACS Annual Conference, London, 2001.
- Fincher, S., Barnes, D. J., Bibby, P., Bown, J., Bush, V., Campbell, P., Quinn, C., Jameson, S., Jenkins, T., Michael Jones, Dmitar Kazakov, Lancaster, T., Ratcliffe, M., Sassenberger, M., Shiner-Kennedy, D., Wagslat, C., White, L., and Whytey, C., "Some Good Ideas from the Disciplinary Comms", presented at the 7th Annual Conference of the Subject Centre for Information and Computer Science, Dublin, 2006.
- Kölling, M. and Barnes, D. J., "Enhancing Apprentice-Based Learning of Java," presented at thirty-fifth SIGCSE technical symposium on computer science education, 2004.

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