QARC Review of Undergraduate Teaching of Computing.
Imperial College London
13 June 2008

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We were invited to frame our responses in terms of six questions. I have attempted to do so, and have included an "additional comments" section to capture things that I couldn't quite fit into responses to those questions. I have also included some suggestions with respect to some of these questions. Most of these comments came up during our discussion on the 13th, and indeed I understand that many of these are already being addressed – but I include them here for completeness.

1. Are the educational objectives of the programmes appropriate and are they achieved?

I believe so. The focus is on intellectual, personal and practical skills development. Also on building a base, a capability and a motivation for continued learning and discovery in the very dynamic world of computing.

Suggestions:
It's hard to assess this in one day – especially when you are talking mainly to current students, rather than to graduates that have now moved on. I would encourage more effort in the area of alumni relations as this would help the department assess their success with respect to this objective. It would of course also have other benefits.

2. Are the learning outcomes appropriate to the educational objectives and are they achieved?

I believe so. To achieve the objectives, the department places particular emphasis on grounding the students in fundamental principles of computing with the first two years dedicated to this purpose. There is a strong emphasis on material that builds problem solving skills.

Subsequent years include an internship for 6 months, which contributes substantially to achieving educational objectives.

The department is working to ensure the emphasis is less on assessment and more on learning. In one case a decision was made to not count the weekly assessment marks for a small group programming course. Instead, the students learnt that the exercises were essential preparation for doing well on the final exam. It's not clear to me though that the students have quite the same view of this as a success. They are all focused on achieving the highest marks they can get.

One student we spoke with came into the programme with no programming experience at all. Nevertheless he has been able to progress well, and does not feel at all disadvantaged. He cited the choice of Haskell as a first programming language as

especially appropriate, as this was also new for many of the more skilled first year students.

We spent some time talking about "softer skills". I noted that IBM has lost several candidates from Imperial recently because they did not do well on the assessment exercise that IBM employed (it was some kind of team-based activity, I believe). In my view this is IBM's loss, but perhaps this happens with other companies as well. One of my colleagues on the panel agreed that this has happened with their university and another industrial partner as well.

Suggestions:
The Joint Maths/Computing (JMC) programme does not presently have an internship option and the JMC students expressed a strong desire for one. We learnt that there are plans for a 4 month internship.

On "soft skills", I suggest the Department engage with its industrial partners (those same companies providing internship positions) to understand this better. It may be that the companies can help directly – e.g., can they share with Imperial their assessment practices? Can they help the students explicitly develop some of these skills during their internships? I expect the industry partners would be keen to help.

3. Do the curricula allow the learning outcomes to be achieved? What are the strengths and weaknesses?

Yes.

We discussed programming languages and the approach taken by the department to introduce numerous languages at different stages in the programme. This seems to work very well. It is vital that students be exposed to different ways of thinking and expressing their ideas, and this is an excellent way to ensure this happens. A weakness of some programmes is their near-total dependence on Java; this is not the case here.

One student suggested a need for more flexibility in allowing students to take courses in Engineering. While it appears that some cross-disciplinary arrangements have been made (e.g., with Business School), it is very difficult for students to participate in the Engineering curriculum.

Strengths are the overall structure of the MEng programme, and the intensity and breadth of the first two years. Also the substantial focus on mathematical foundations is a great strength.

Weaknesses may be in areas such as "softer skills" (see above), business process engineering (which was viewed by some faculty as more of a business skill – but I disagree). Also I saw nothing on the curriculum covering Security and Privacy – a subtle area with very few experts, but experiencing intensely growing demand.

Suggestions:
Explore the wider value of, and mechanisms for, opening up 3rd/4th year courses to Engineering (and perhaps other areas too).

Note possible weaknesses identified above.

4. Are the students adequately supported by the learning resources, study skills help, personal tutoring etc? What are the strengths and weaknesses?

Yes.

The students we met with were all very positive. All came across as extremely highly motivated and pragmatic. They know they're in a special place, and they have high expectations for the future. They feel very well supported.

There are many strengths:
All students have a tutor; in addition there is a substantial tutorial and counselling infrastructure. One observation made at the College level was that the overseas students, although more susceptible to crime and other pressures, do not make use of the counselling services.

The staff-student ratio appears to be excellent and allows staff to sustain a relatively low teaching load (I believe 27 hrs a year?).

The use of the Undergraduate Assistants to help with tutorials appears to be a success. Both students and teachers cite similar qualities - in particular, the closeness in age between the assistants and the students.

There is also a buddy system programme, and this is widely viewed as very helpful.

Perhaps some minor weaknesses:
Physical resources were reported by students as a problem sometimes. While there are lots of computers, often they are not working. There are only 3 printers for 400 students; frequently they jam and 2 of the 3 are not working.

Suggestions:
Existing mechanisms (joint staff/student committee meetings) for student feedback are viewed as effective. So – you are doing something right there.

5. Are the procedures for maintaining and enhancing the quality of provision and the academic standards effective? What are the strengths and weaknesses?

Yes, they seem to be. However, we noted that this meeting was taking place immediately following the recent BCS/IET accreditation meeting at which many of the same questions were raised and addressed.

One student observed that in the past there was an experience with very weak lectures. In spite of indicating this on SOLE, the same lecturer with the same weaknesses returned the following year.

Suggestion:

Consider combining these two reviews. The preparation appears to be the same for each. Perhaps by introducing one or two additional participants you can satisfy both the QARC and BCS/IET criteria.

Ensure that the experience with SOLE above is an anomaly. I expect it is, as it was noted in our discussion that no lecturers have been given poor marks in recent SOLE results.

6. Additional Comments

1. Members of the faculty are concerned that the introduction of a College engineering aptitude test will unsettle the balance in the department. It's unclear whether it would drive student applications up or down. There is a worry that the test could reduce the numbers of students from state schools; the Department today takes 86% (?) of its students from state schools.
2. Many comments were received from the students on the relationship between the JMC and the straight Computing degree programmes. In general, the JMC students felt a little left out. Some illustrations:
    a. The lack of an internship programme (see above)
    b. The lack of communication across departments, and the experience that the Computing students will learn of things that the JMC students should also – but didn't.
    c. Timetabling across Computing and JMC is not well coordinated. Clashes occur. (But – they do get fixed).
    d. Exams sometimes happen after lectures have resumed.
    e. ID cards don't initially provide access to all areas required by JMC students. (It gets fixed – but is reflective of feeling left out.)
    f. The Maths Department is not as modern as the Computing Department. Little material is online; work is handed in on paper.
3. I asked the faculty to identify weaknesses in the Undergraduate programme. This brought a sustained silence –and perhaps this isn't too surprising. The programme is successful. However, I had hoped to see some introspection, some yearning for continued improvement. One comment made was that if there were anything, we'd already be working on it! While I don't see this as terribly serious – especially given that the department does have processes and a focus on improving standards and delivery – it's more evidence of an attitude that could be an issue in the future.
4. We asked the students why they chose Imperial College. For some it was viewed a great honour to be at Imperial; the fact that it is hard to get it made it desirable as well. London is an important attraction for some. The most important reason – and the degree of the students' focus on this was fascinating – was the value of an Imperial College degree in securing employment.
5. The students like their 2 hour lunch. Further, Wednesday afternoons (ostensibly for sport) is an essential break in their very full week.