Teaching "Computers & Society" To Disinterested CS Students

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Abstract: Recently courses on computers & ethics or computers & society have been given more prominence within the computer science curriculum. The author teaches one such course and the challenges faced in teaching it are discussed. Some of these problems are general in nature while others are more particular to the country, education system and institution in question. In particular the soft interdisciplinary nature of such a course does not sit easily in a specialised professional degree. The broad contents of the course will be outlined along with the (IT based) teaching techniques used in course delivery.

Overview

Of late there has been a concerted move within the computer science community to have courses on computers & ethics or computers & society given more prominence within the computer science curriculum [4]. The author teaches one such course, on "Computers & Society", to 1st year undergraduate students on a Computer Science degree in a European university. The challenges faced in teaching the course are discussed. Some of these problems are general in nature while others are more particular to the country, education system and institution in question. In particular the soft interdisciplinary nature of such a course does not sit easily in a specialised professional degree. The broad contents of the course will be outlined along with the (IT based) teaching techniques used in course delivery.

Background

The education model in Ireland is similar to that of the UK, but with a number of significant differences. At the end of second level, 17-18 years of age, all students take a national examination - the Leaving Certificate. This is similar to the A Levels in the UK but with students taking 6 or 7 subjects. Entry to university is highly competitive[1] and is based solely on the results of the Leaving Certificate examination.

At 3rd level the tendency is for universities to provide specialised professional degrees. In the author's institution, for example, the B.A. in Computer Science is a 4 year degree

[1] The number of applicants for the Computer Science degree in question typically exceeds the number of places available by a factor of 4.

covering mathematics, software and hardware and there is no facility for taking subjects outside of these areas.

The Computers & Society course discussed here is given as part of the first year of the degree just mentioned. The objectives are to encourage students to take a broad look at the relationship between (information) technology and society and to equip them with some skills in studying a soft subject area such as this. Giving the students experience of teamwork and improving their communication skills, and their ability to construct a reasoned argument, are also key objectives.

Challenges - General

As reported by Jewett in [2], Schulze in [6] and others, there are a number of significant challenges faced in teaching Computers & Society type courses. The most obvious is that by its very nature the course is interdisciplinary but quite often finishes up being taught by a computer science professional with no formal background in ethics or social issues and technology. The second major problem is that such a subject is not well suited to the traditional lecture format.

Challenges - Local

Within the author's institution the problems listed previously are further compounded upon by the fact that the subject has traditionally not been taken seriously by students, and in some cases fellow staff, who tend to regard it as a token subject. (Students typically view themselves as entering in the degree to hack code not write essays about privacy, while some staff would be quite happy to have the subject dropped from the curriculum.) Furthermore it counts for a small component of the overall workload for the year, one contact hour per week, and was not examined by an end of year written examination. The class size is not small, 70 or so students, thus ruling out a tutorial or discussion type approach to teaching. Finally while there is an ever expanding literature in the area the vast majority of it, in English at least, is from a North American background and thus lacks a certain direct relevance to the immediate lives of the students.

All in all, teaching Computers & Society to a large disinterested class of 1st year CS students is quite a challenging problem. So after a number of failed attempts with tinkering with the course the author embarked upon a major three pronged assault involving changing the syllabus, the teaching techniques and the assessment procedures.

The Syllabus

The syllabus[2], as currently taught, is somewhat different than that recommended by the ACM [4]. Rather than focusing upon ethics it draws heavily from ideas in the social sciences. In particular it examines the idea of technological determinism and alternative views on the relationship between technology and society [5]. The main sources of reading material covered in the course are [3], [5] and [7]. Where possible, examples are drawn from the local context.

[2] Previous technologies and social change; the development of IT; what is a social issue; IT predictions; logical arguments, technical writing and presentation techniques; a brief history of computing; technological determinism and alternative models; the "Information Society".

Pedagogical and Assessment Techniques

In order to get the students to fully engage with the material presented in lectures, in the prescribed reading material, and in the overall process a number of different pedagogical and assessment techniques are used, some of which are based upon techniques described in [1]&[5].

The single lecture per week is run in as interactive a fashion as possible but the large class size prevents too much discussion taking place. In order to give the course stature within the student population an end of year written examination was introduced. This is far from being an ideal assessment technique but was crucial for the credibility of the course.

A course web site contains not just the course description and links to on-line resources but also samples of selected pieces of work done by students each year. Thus the efforts of previous students are available as a reference point for current students. Inclusion of one's work on the web site also generates a certain amount of internal competition within the class.

During the year students engage in two different types of exercise, writing papers and giving presentations in class. The paper writing is a relatively straightforward exercise. A major paper is submitted in each of the 3 terms and this is returned to the students with some comments. The papers are assessed based upon content, breath of reading in the area and depth of understanding of the material. Marks are also awarded for the coherency of the arguments presented and the proper use of bibliographies and citations. Sample papers are placed on the course web page. While the quality of student's papers has improved this aspect of the course does need further work. Ideally the lecturer should sit down with each student and go through their papers with them but this is not feasible so alternative strategies are being investigated.

Group presentations are the corner stones of the course and are the activity which generates the best learning experiences. The class is divided into 4 groups, of 15-20 students each, and during the year each group must give a series of presentations in the form of in class debates[3]. The debates are organised on a league system with a prize for the overall winning group.

There are number of features of this approach which have proved to be very useful.

- The presentations for the debates must be prepared as a group activity thus requiring the students to work co-operatively.

- The debates are judged not by the course lecturer but by 3 other academic staff: one from the Computer Science department and two others from different areas in the university. This requires the students to pitch their presentations at a level which is not technology focused, which is not something that comes naturally to CS students. The 3 adjudicators give very useful feedback to the students on what worked in their presentations and what areas need more improvement.

[3] The topics debated have included "IT the workers friend", "Technology is but an improved means to an unimproved end", "The EU should let commercial forces alone power the information super highway".

- The presentations are given using PowerPoint and displayed using a data projector. Students get a certain buzz out of using a data projector but more importantly having to prepare bullet points for the slide show helps them to focus and structure their arguments. All presentations are placed on the course web page.

- When tried initially it was found that the presentations were of a very variable quality. Currently each group is required to give a dry run of their presentation to the course lecturer a few days before the formal debate. This has proved to be a very beneficial learning experience, although it does requires scheduling an hour with each group outside of their normal lectures and finding a free room!

Assessment of group projects is always problematic, how does one prevent some students free loading on the work of others? The solution adopted is to set-up a simple e-mail distribution list for each group. Students are awarded a mark based upon the overall performance of the group AND their own visible contribution to the preparation.

Summary/Outcome

The approach just described appears to be paying dividends. Students are engaged with the course and it is seen as a subject to be taken seriously to the extent that the end of year examination has been dropped and the course is now assessed purely by continuous assessment. The quality of the work produced by the average student in the class has improved. This is a reflection of the seriousness with which they take it but also that some of the techniques described above are working.

References

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