

# RSS NEWS

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## On thinking and learning

**Stephen Senn** argues that viewing university students as 'customers' can be dangerous

'I went to lectures by Fred Hoyle and Herman Bondi and a wonderful Russian called Besicovitch, an expert on almost-periodic functions...If you wanted to learn Hardy, which is what he was supposed to be lecturing on, you had to read the book in your spare time because most of his [Besicovitch's] examples were taken from his current research. I don't think this was a bad thing.'

This is John Nelder speaking of his Cambridge days (Senn, *Statistical Science*, 2003) and the book to which he is referring is *A Course of Pure Mathematics* by GH Hardy. It is only one example plucked not at all at random



Julian Le Grand giving the Beveridge Lecture  
– see report on page 14.

and John Nelder was very far from being an average student, yet I wonder whether any student of mathematics or statistics, or for that matter any educational expert, university administrator or politician these days, could be found to defend as acceptable an approach to education that appears to place this degree of responsibility on the student.

However, I personally agree with John Nelder that hearing someone lecture on their own research, whilst being expected to read, learn and digest in one's spare time some possibly quite different material in order to pass a largely orthogonal set of exams, is not necessarily a bad thing. And certainly what I do feel is that if Besicovitch was taking a less than ideal approach to teaching Hardy, the opposite, that of regarding all interaction with students as being a preparation for their exams, which is what I sometimes fear we are drifting towards, in the long run does students no favours at all.

The folk saying is that when the policemen look young to you, you know you are growing old. Perhaps the fact that I am disappointed by certain attitudes these days is a sign that I am finally in my dotage. All that now remains is for me to complain about the incorrect use of 'quartile' when the correct word would be 'quarter' and that people no longer know how to use statistical tables.

I want to make it quite clear, however, that I am not complaining about the mental ability of students these days, nor even about their education at school. These may or may not be what they were but this is not relevant directly to the argument, and I, unlike John Nelder, was a very average student and am in no position to cast stones. It is not lack of ability I am complaining about but lack of intellectual independence and responsibility. And in any case, I believe it is not the students alone who are to blame; it is partly, at least, the educational institutions.

Furthermore, to the extent that my unease is due to student attitudes, these attitudes are not those of the majority. Many students I encounter

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continue to have an awareness of their responsibility for their own education and will go on to make fine statisticians. It is rather that there is a significant minority that lacks this sense of responsibility. Probably this minority has always existed. The difference now is that their attitudes are regarded by some segments of society as reasonable and we ourselves as academics are not immune. I take a recent case where a university was being sued by a student for failing to prevent his plagiarism as a straw in the wind.

Let me give some examples of the erosion of self-reliance. Nowadays students have extensive printed notes to cover the course. This is in itself, I believe, a good thing or at least it is potentially a good thing. In mathematics and statistics note-taking can involve much copying, and this is a time-consuming but unexciting and un-stimulating activity that can interfere with the business of actually understanding the material. Having notes provided frees the student to concentrate on the lecture. However, increasingly I find that my lectures are being assessed according to the degree to which they conform to the notes. I, who regard my lectures as a pleasant and illuminating variation on a theme, am having to learn from (some of) my students that they are received as distracting noise.

The joke goes that when three students were asked to memorise the telephone directory the mathematician said 'Why?', the lawyer said 'How long have I got?' and the medical student said 'Will the yellow pages also be in the exam?', but these days I find that 'Will this be in the exam?' is a common question regarding almost anything I do, whatever the class. This is backed up by an ever-increasing demand for specimen exam questions and model answers. I had always refused to provide students with the latter, arguing that they were for communication between examiners, not with students, but now they are available to all.

When I was a student you were expected to read books. It was through reading such books that you came to realise that a topic was not defined by its notation since the same subject could be presented in initially mysteriously different ways by different authors.

I can even remember the day I discovered by comparing two books that there was no universal agreement as to how the sample variance was defined. One author divided the corrected sum of squares by  $n$  and another by  $(n-1)$ . (I prefer the latter convention but there are contrary arguments in favour of the former.) These differences led to apparently different formulae for the  $t$ -statistic, which were, in fact, identical. At the time this struck me as being both unhelpful and something of a scandal, but in retrospect it was just part of my education. After all, the form of the  $t$ -statistic we use today is that promoted by Fisher, which in any case is not the same as that used by 'Student'. Realising what are essential differences and what are not is part of your education.

Since I opened by quoting Nelder on Hardy,



Stephen Senn

let me quote Hardy himself, from his brilliant eulogy to mathematics as a creative discipline, *A Mathematician's Apology*.

'I hate 'teaching' and have had to do very little teaching, such teaching as I have done having been almost entirely supervision of research; I love lecturing and have lectured a great deal to extremely able classes.' (p149)

I am sure that to many academics and many readers of *RSS NEWS* this remark will be perfectly intelligible but I wonder how many of the bureaucrats who now run our universities could make any sense of such a statement.

This is not to denigrate teaching. Teaching school children is a difficult task, crucially important to the well-being of our society and disgracefully undervalued by it. But, 'when I was a child I spoke as a child I understood as a child I thought as a child; but when I became a man I put away childish things.' It is an irony of our society today that, whilst simultaneously increasing the degree of autonomy we allow young adults in the social sphere, we place less and less responsibility on them for their own education.

It seems to be increasingly the case, for example, that students bring their parents along for interview at the university. If you do not find this extraordinary, ask yourself whether you think their parents should accompany them to the voting booths also and supervise the marking of their ballots? University has become an extension of school. In fact we are moving towards a society in which students must be allowed to address their

lecturers by first name, because they are 'adults', but their lecturers will have to be vetted because they are in contact with 'children'.

Part of the problem, I think, is that we are now encouraged to think of students as 'customers'. However, the current students on any degree course are not the only customers for that degree. Universities are accrediting institutions. They are thus maintainers of standards. The customers of any university also include all past and future graduates. Consider how different the response would be if you asked students if it should be made easier to get an upper second or first but then explained that any reforms would only be instituted to benefit future generations once the respondents had graduated. In fact, Nobel prize-winning economist Clive Granger has suggested that we should not be judging courses on feedback from students but from employers (*Empirical Modelling in Economics*, CUP, 1999).

Although I have some sympathy with this, I think it goes too far. If Nelder led me to Hardy, Hardy leads me to AE Housman. In *A Mathematician's Apology*, Hardy refers to Housman's famous lecture at Cambridge in 1933 *The Name and Nature of Poetry* and the outrage that he personally felt, as a passionate advocate of creativity, at Housman's assertion that ability as a literary critic was more 'charily bestowed' than the gift of poetry. Well, criticism is an important part of statistics and I have some sympathy with Housman's view that it is not necessarily easy, whether applied to literature or to science.

However, there is one thing on which Housman and Hardy would have agreed entirely: the value of a university education is not justified in terms of its potential practical application. Compare Hardy's, 'I have never done anything useful' with Housman in his *Introductory Lecture* (1892) at University College London: 'The partisans of Science define the aim of learning to be utility. I do not mean that any eminent man of science commits himself to this opinion: some of them have publicly and scornfully repudiated it, and all of them, I imagine, reject it in their hearts.'

As it turns out neither Hardy nor Housman was right in his claims for lack of utility. Hardy did not foresee the application of his work in cryptography and Housman, who could hardly have been expected to predict the development of global positioning systems, referred to astronomy as a 'squeezed orange' as regards its utility to the art of navigation. However, they were surely right in maintaining that the predictable potential application of a university subject is not what constitutes its value.

Of course, I believe, as I am sure do many readers of *RSS NEWS*, that statistics is a subject with considerable application and of great practical importance to society. However, I also believe that it is an intellectually stimulating subject of great beauty and some philosophical depth that attempts to provide (with some diffi-

culty and not entirely successfully) a bridge between mathematics and empirical science. This is also what I want my students to feel. There is a danger for our subject if we stress only its utility. In claiming utility we are incomparably better placed than the medievalists and yet I feel there are many reasons why we should show solidarity with them against a previous Education Secretary who took them to task for their lack of relevance.

So I would like to finish my senile grumble by taking some positions that many will no doubt find outrageous but which I believe have some value. However, as befits a statistician, my mind is not closed on the subject and I invite readers of *RSS NEWS* to tell me that I am wrong.

◆ It is no more appropriate to tailor a course to the desires of the student than it is to modify the driving test according to the wishes of learner drivers. (In fact what applies to the latter applies *a fortiori* to the former.) Nobody applying for a job would be proud to claim 'my degree is particularly prestigious because the university has spent years adapting its requirements in the light of student suggestions'. The very value of a degree depends on the independence of its content and standards from the students who take it. University education is like mountaineering. If you could make the Eiger North Wall shorter, less steep and built of firmer rock and with larger handholds, then climbing it would no longer have the same point.

◆ The course does not exist as a preparation for the examination. The examination is a means of assessing understanding of the course.

◆ The student must accept responsibility for his or her own education. Knowledge is to be won from the resources available: staff, books, notes, lectures. It is not a commodity that the academic staff are charged with forcing the students to absorb.

◆ Content is of primary importance. Ways and means of delivering that content are not unimportant but they are secondary.

◆ If failure is impossible, passing is meaningless.

◆ There are no important educational objectives that 'learning objectives' help one attain. An appropriate learning objective for a course is either so trivial as to be superfluous once the content of the course is explained or it interferes with the exploration of that content, which is what education is about.

◆ Statistics is a critical subject that requires critical thinking. A statistician is someone who can not only solve but also formulate problems he or she has not seen before and accept responsibility for the solution offered.

◆ The only justification for a professional cadre of university administrators is the freeing of scholars to practice scholarship, the practice of which is the business of universities. (I include allowing students to benefit from and participate in scholarship as being part of scholarship.) ■

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## MARVIN ZELEN LEADERSHIP AWARD

The department of biostatistics at the Harvard School of Public Health has named Scott L Zeger as the recipient of the 2007 Marvin Zelen leadership award in statistical science. The award recognises an individual in government, industry, or academia, who by virtue of their outstanding leadership has greatly influenced the theory and practice of statistical science.

Nominations for next year's award, to be given in June, should be sent to the Marvin Zelen Leadership Award Committee, Department of Biostatistics, Harvard School of Public Health, 655 Huntington Avenue, Boston, MA 02115, USA.

Nominations should include a letter describing the contributions of the candidate, specifically highlighting the criteria for the award, and a curriculum vitae.

They should be received by 15 December.