

Dear Mike,

I thought about what could be done usefully to compare the Italian and British Universities systems, but it's a daunting task. But I can't help noticing how many of your colleagues have worked at British and US universities and probably, between yourselves, you have enough insight.

But there are important themes. The following is somewhat digressive and I hope some of you might have the patience to read it to the end.

Each country has its traditions and natural advantages which just cannot be ignored. For Britain it has always been the English Language, its position as an island and an acceptance that real talent appears from the strangest places. Even in the middle ages, the networks of the Church ensured that talented students came to Oxford and Cambridge from the villages of England. Against this, notions of class and the split between private and state education still biases opportunity to the wealthier. But in all my years in British Universities, no new development could be understood without an understanding of the often ancient driving forces which shape British society. So also is it for Italy.

The other acquired advantage of Britain is its scientific tradition, a gift of Italy. The scientific renaissance should have occurred in southern Europe. The genius of the age was Galileo. But his suppression by the Church resulted in Newton finding the vital threads in Kepler's raw data and much else besides. It could have been a different story. But Britain's tradition is a scientific one and the application of science was often better done by France, Germany and Italy. My alma mater Imperial College arose from the realisation of how far Britain had fallen behind in technical education in the mid 19th century and the efforts of Prince Albert, a German. For me, as an undergraduate, Newton and Hamilton were dominant figures but when I moved on to elasticity and plasticity theory it was Castigliano, Betti, Poison, Euler, von Mises, Tresca, Mushkhelishvili, Rabotnov, Katchanov, Prager, Drucker and Koiter and, of course, Giulio Maier, who I first met in Providence. The dominant figure in plasticity in the UK was Rodney Hill, who has recently died. He was drafted into the subject during the war and his relations with the rest of the subject were notoriously unfriendly. I always suspected he really saw himself as a physicist and mathematician first.

In the broader range of my subject, if I think of really important developments, these must include finite elements and other numerical methods and constitutive modelling. Of all the names I associate with these subjects I cannot think of many Italians. But when I think of my experience of Italian students who have come to work with me, their basic grounding in theoretical techniques is very good indeed. Good young Italians are attracted to our subject. Why don't you have greater prominence? Or am I just out of touch?

Ultimately the strength of a University system comes down to the experience of the student. They will become the dominant figures in 20 years time. The attitudes and values of the society that nurture them and those with whom they work closely will mould them and the generation to follow. In the UK in applied science it's always a bit of a battle as our physics colleagues regard engineering applications of science as something they could quite easily do

themselves - if only they had the time. It's not the real thing. Things have improved since a senior science colleague told me, when a member of the main board of the major research funding council that, in his view, engineering research in the UK was not very good but the council should fund it to keep it going. You should not have such difficulties. But do you? What would be your answer to my unfriendly physicist?

Because, at the end of the day, how do you justify what you do? What is the dialogue that takes place over which type of research should be funded and for how long? What should you teach? Is it appropriate to work alone or should you be working in groups, across universities? Which gives the best experience for the young research worker? Are some of you just happy to carry on trying to say the last word about a subject where the focus of attention has already moved elsewhere? How is true originality recognised or is it just numbers of papers? At an early stage in my career I was warned against spending my whole career expanding my PhD thesis. For most research students the best advice is to go and work with someone doing something entirely different. Does the fact that so many of you seem to stay in the University of the City of your birth have an effect on this? In the UK we usually break with our home city or town when we first go to University and rarely return. Many years ago I asked an eminent Italian academic why he was so interested in the subject of his paper as I just couldn't understand the motivation. It was as if he had never previously been asked that question and I didn't get an answer. It's very frequently asked in the UK.

Where originality is concerned, the UK attitude is unequivocal. My PhD supervisor liked to tell the story of a conversation he had overheard between G. I. Taylor and a senior colleague. Taylor was the man who showed that plastic flow in metals can be caused by dislocations, before they were observable. The colleague wanted G.I. to meet his research student who, he claimed, had said absolutely the last word on his thesis topic. Taylor politely replied that he would be delighted to meet the student but he had to say that he was only interested in those who say the first word, not the last. Would such a conversation take place in Italy? Alternatively what would be the equivalent conversation be, remembered by a student fifty years later? How do you judge originality and how do you encourage it?

All this is about the day to day conversation, discussion and decision making processes which effect, above all, the student. This is contained in all your individual hands. This is where the action is. So much discussion can be about salaries, facilities and power broking, the obsession of the middle-aged, which of course, can be as important, but not always. I have the impression from the cut of your suits and the cars you drive that Italian academics have actually done rather well in recent years. Perhaps you should begin to think of yourselves as the generation who blew it all and turn your undivided attention to all those young people whose lives you are danger of having messed up? Or is this just too Anglo Saxon a way of thinking about things?

And finally, I am conscious that today, February 7th, is the bi-centenary of the birth of Charles Dickens, England's second greatest writer after Shakespeare. The Minister for Culture has given each Minister in the Government a copy of a Dickens novel most

appropriate to their problems. The Prime Minister will receive two; *Great Expectations* and *Hard Times*. Perhaps I'll send you the same.

Dickens had little education. His father sent him to a shoe blacking factory at the age of ten and he could well have been numbered amongst the millions who disappear from history. But, at some point in his young life he realised he had the ability to express the burning rage about the world he saw around him. He injected into the unwilling minds of us all for the last 180 years the notion that our lot can be shaped by the economic and social circumstances that have been created for us and by us. I first read *Oliver Twist* at the age of ten and had already been frightened witless by the opening scene of David Lean's film of *Great Expectations* at the age of seven. A flower from Dickens's grave was in our family bible, placed there by an ancestor. It is still impossible to ignore him as his grotesques are still everywhere to see. The Murdres of this world are not just a product of a 19th Century economy and Departments of Circumlocution spring up as quickly as they are closed down. There are still opportunities to be grasped, life is still full of luck and misfortune and, whatever the circumstances of our lives, we can raise above it by strength of character.

Shakespeare, similarly, came from a humble background, but at least had some sort of education at Stratford Grammar School, a small country town grammar school not unlike my own. My own school, King Henry VIII Grammar School in Abergavenny, Monmouthshire, had, as its motto "Ut Prosim" – so that we may be of service. This is a sufficiently vague motto but certainly implying that there was more to life than just getting on. In recent years they have changed it, disappointingly, to a phrase I've already forgotten but it was something like "Onwards and Upward" – the favourite phrase used in a popular radio gardening program. But I don't disparage my school because the Mathematics master introduced me to Euclid and my English master showed me the relationship between history and literature.

Little is known about Shakespeare apart from a few formal records. We know where he lived as a child as his father was taken to court for leaving a pile of horse manure outside his house. He appears in the student list of the grammar school and, at the end of his life his final will exists, where he left his second best bed to his wife. This paucity of information has led to an old theory, retold again in a recent film, that he was an aristocrat writing under an assumed name. But his work has the mark of a child inspired, most probably by his teachers who encouraged him to go to London and try his luck.

But both Dickens and Shakespeare were advantaged and given their opportunity by two things – the English Language and the circumstances of the day. For Dickens it was the growth of a form of journalism where weekly newspapers included a serial story, rather like the television soap operas of today, avidly read by an increasingly affluent and educated middle class. From first writing short amusing pieces he moved on to his novels written in monthly episodes, sometimes with little idea in Dickens's mind where the story would lead. This provided the structure and funds which kept him writing. For Shakespeare it was the theatre during the reign of Elizabeth I which required new plays, reflecting the circumstances of the day, to be available on demand, with little censorship. If Dickens had died in the Blacking Factory or Shakespeare had died from disease from his father's carelessness with

manure, others would have written but certainly not as well. The literary forms were created by others to satisfy the needs of the time; we were lucky that, within the strong literary tradition of the English language, two geniuses emerged. So what are your natural advantages and opportunities of your age? Who will emerge from your Universities in 20 years time to light up the world.?

Italy has great traditions and it is not for me to understand the world in which you live, but, often, it is the less obvious that is most important.

Mike, you can put this on the web only under the condition that you and your colleagues give me the answer to my questions.

Kindest regards

Alan