

# Is physics just for the rich?

**Aaron Iftikhar** says that better teaching can prevent physics from being a subject mainly for the well off

Universities are places of self-expression, the ultimate venues to pursue knowledge and develop yourself as a person. Further study is supposed to broaden your horizons, offering opportunities you would not otherwise get. Universities, like much of the education system, are also expected to be places of equality. Yet is this really true – or are such institutions merely breeding grounds for the fortunate few?

The data would suggest that the rich are well served. A 2012 study by the Institute of Physics (IOP), which publishes *Physics World*, found that 77.8% of all physics students have parents in the top three socioeconomic groups (SEGs). Less than a quarter of students (22.6%) have parents from the lowest four groups. According to the UK's Office of National Statistics (ONS), of the total working population between the ages of 45 and 54, some 40.6% were in the lowest four SEGs, while 48.8% were in the top three. Assuming most parents of university students are in this age bracket, there is a clear discrepancy between the IOP and the ONS statistics.

An even greater concern is that undergraduate physics programmes are performing worse than biomedical and engineering programmes. The IOP study found that biomedical science programmes included 33% of students from the four lowest SEGs, while engineering boasted 36.1%. The difference with physics is curious – why are students from economically disadvantaged backgrounds more likely to study engineering than physics?

One argument could be that students from relatively disadvantaged backgrounds put extra onus on taking subjects that will offer more money or better job stability rather than studying a subject (such as physics) simply because they enjoy it or are interested in it. After all, a graduate with an engineering degree has a more clearly defined career path than one with a physics degree, so perhaps these students choose a subject that they feel will give them the best chance of lifting themselves out of their current SEG.

However, the average starting salaries for physics and engineering graduates in the UK are similar. So either students aren't aware of this fact and opt for engineering



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because they think it's better paid or something else is at work. As other "academic" degrees such as maths and chemistry also have a similar proportion of students from lower SEGs to physics, the problem must be more fundamental – and lies in how physics is taught in primary and secondary schools.

## The next Einstein

Often the biggest obstacle to overcome when attracting students from poorer backgrounds into physics is to ensure they had positive experiences of learning it in the past. Previous experiences dictate future choices. As one of the 3550 full-time UK-domiciled students currently studying physics at university, I come from a background where my parents fit within the four lowest SEGs. I was also a student from a secondary school where just 40% of 16-year-olds pass their GCSE exams (and with more "poor" school inspection reports than pupils).

I believe no level of intervention after secondary school will undo years of substandard teaching and learning. If a student has a bad experience of physics at school they are extremely unlikely to want to read it at university. I chose to study physics partly because of my college physics teacher. I did not have a burning passion for physics, but I really enjoyed his lessons. They were not contrived – no hydrogen-filled balloons or burning jelly babies. He was just a great teacher teaching in that way that makes you forget the mundanity of measuring the acceleration of a mass on a spring.

To get students from economically disadvantaged backgrounds to study physics at university we must improve their experiences at school or college. That means ensuring schools are adequately equipped, having enough good teachers and offering

good learning environments from an early stage. Unfortunately, only some areas of the UK meet these goals.

A UK schools inspection report in 2013/14 looked at the achievement of the poorest pupils in different parts of the country in terms of the percentage who achieve five A\*–C grades at GCSE. The top 10 places included London suburbs such as Chelsea, while the worst 10 included towns such as Barnsley in northern England. Poor kids in Chelsea are, in principle, no more or less academically able than poor kids in Barnsley, so why do 47.6% of the former get five GCSEs at A\*–C whereas the figure in Barnsley is just 28.7%? Why can't the policies and initiatives that appear to be working in Chelsea be applied to Barnsley too? It is this type of blatant inequality that mars our education system.

In one introductory class in my first year of university, the lecturer quipped that maybe the next Einstein was in the room. At that point everyone felt a tiny bit smug, only to struggle doing a Taylor expansion the following week, quickly realizing they are not that Einstein. For me it is a sobering thought that maybe that Einstein is in school right now. Let us hope their parents are rich – if not they will have to play the roulette that is our education system. They could, like me, get lucky and encounter a teacher who motivates and inspires them. Or they will be failed, like so many before.



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