HOUSE OF COMMONS

Science and Technology Committee

Oral evidence: Diversity in STEM, HC 903

Wednesday 23 February 2022

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Watch the meeting

Members present: Greg Clark (Chair); Katherine Fletcher; Rebecca Long Bailey; Carol Monaghan; Graham Stringer; Zarah Sultana.

Questions 1 - 103

Witnesses

I: Professor Jeremy Sanders CBE FRS, Chair, Diversity Committee, Royal Society; and Clare Viney, Chief Executive Officer, Careers Research and Advisory Centre/Vitae.

II: Katherine Mathieson, Chief Executive, British Science Association; and Dr Anna Zecharia, Development Board Member, Equality, Diversity and Inclusion in Science and Health.

III: Dr Jake Anders, Deputy Director, UCL Centre for Education Policy and Equalising Opportunities; and Dr Rebecca Montacute, Senior Research and Policy Manager, Sutton Trust.

Examination of witnesses

Witnesses: Professor Sanders and Clare Viney.

Q1 **Chair:** The Committee is now in session. Today, the Science and Technology Committee begins a new inquiry into diversity in STEM; that is to say, science, technology, engineering and maths. We will look at what the current situation is in terms of the diversity of the workforce and participants in the various disciplines that comprise the Committee's remit, and the causes of and solutions to some of the under-representation of groups that we will discuss today and in the course of the inquiry.

To begin our first session, I am very pleased to welcome our first two witnesses. They are Professor Jeremy Sanders, who is chair of the Royal Society's diversity committee, and Clare Viney, who is the chief executive of the Careers Research and Advisory Centre. Thank you very much for starting our inquiry today.

Professor Sanders, can you summarise the conclusions and reflections that have resulted from the study by the Royal Society group that you chair?

Professor Sanders: The Royal Society is committed to increasing diversity in STEM. The under-representation of a variety of groups means not only a loss of opportunity and a waste of talent for them, but a loss of opportunity for society as a whole. The Royal Society created a diversity committee in 2015. Its initial focus was mostly around gender. More recently, it has expanded its interest to ethnicity, disability, socioeconomic deprivation and sexuality.

There are two sub-groups. One looks particularly at the under-representation of ethnic minorities in STEM. The other is around scientists with disabilities. So far, we have commissioned reports from Jisc and CRAC.

Q2 **Chair:** What is Jisc, Professor Sanders?

Professor Sanders: Jisc is a body that analyses all the data that comes from HESA, the Higher Education Statistics Agency. The aim is to give us a baseline understanding of what is happening around under-representation and where we are seeing the loss. If we look at ethnic minorities, we see a loss of ethnic minority individuals at every stage through education and career.

Q3 **Chair:** The dimensions that you mentioned were gender, ethnicity, disability, sexuality and socioeconomic background. Can you give the Committee a gloss on each of them? Is representation from groups in those areas a problem in science consistently across the board or does it vary? Perhaps starting with gender, what is your headline?

Professor Sanders: We have made a lot of progress on gender. If we look at the last two or three years and the highest level of science and

technology—elections to the Royal Society—last year just over 30% of new fellows of the Royal Society were female. There has been a steady increase over the last few years. There is still quite a long way to go, but there is real progress there.

If we look at ethnic minorities, progress is much slower and patchier. In particular, there is a lack of black representation. Quite a few black students now go to university, but the attrition rate at each stage—becoming a PhD student, becoming a postdoc, getting an academic position and being promoted—is much higher in the black community than in those with an Asian background, for example. We really do not understand the details of why that is. We have commissioned further research from Jisc and have commissioned a report to try to understand what the causes of that attrition are. We hope to publish those reports later this year.

Q4 **Chair:** Can I follow up on that, given that this is the Committee's first oral hearing in this inquiry? On ethnicity, I take it from what you have said that we need to go below the headline label of "an ethnic minority group" and look at the experience of particular ethnic groups. Am I inferring correctly from what you have said?

Professor Sanders: Absolutely. Looking simply at the headline numbers is not straightforward. If we look at student numbers, essentially the statistics that we have are for home students—those living in the UK. If we look at the workforce, we find that the ethnic mix is different, because we have a large number of immigrants, particularly Asian males, in the workforce. That skews the statistics.

Q5 **Chair:** That is very helpful. We have talked about gender and ethnicity. My colleague Graham Stringer has some questions for Clare Viney, but can you give us the starting headline on disability?

Professor Sanders: Once again it is very complicated, because many people with disabilities are reluctant, for a variety of reasons, to declare them, and it is not always obvious what a disability is. In the older workforce, only a very tiny proportion self-identify as having a disability. Mostly, those will be physical disabilities. If we look at the student body, we find that a large number declare that they have a disability. Increasingly, that is around neurodiversity, mental rather than physical matters.

Q6 **Chair:** Again, it is necessary to go beyond the term "disability" and to look at the particular types of disability that might have an impact. I will finish my questioning to Professor Sanders and then invite Clare to come in on this. Briefly, can you give us your starting steer on sexuality and the socioeconomic aspects?

Professor Sanders: We are not doing a great deal of work on sexuality at the moment, but there is certainly some evidence that in some environments and institutions the LGBT community feel that they are

held back. It is very patchy and depends very much on the environment people are in.

When it comes to socioeconomic deprivation, the work in recent decades on widening participation has made a big difference to attendance at universities, but there is still a long way to go in that area. Certainly, the Royal Society has projects that are aimed at reaching potential students from deprived areas to bring them into the STEM world.

Q7 **Chair:** You have already stimulated interest on the part of my colleague Carol Monaghan, and Clare Viney wants to add something before we go to Graham. Before we do, for people watching the session but who are not familiar with the role of the Royal Society as our leading science academy, can you say a bit about which part of the science and technology landscape you are talking about? When you make these reflections, are you talking about industry or academic science?

Professor Sanders: Many fellows of the Royal Society are from academia. That is something the Royal Society is looking at, because we want to have a more diverse fellowship. That means more diverse in the sense of their scientific and technological careers, if you like, as well as more diversity of the kinds we have been discussing. The work that the society does is not in any way restricted to academia. We want to have as much influence as we can in the industrial world and so on.

Chair: Thank you.

Q8 **Carol Monaghan:** I have a quick question. You mentioned socioeconomic diversity. I would be interested to hear how you are gathering that data.

Professor Sanders: I will have to come back to you on the details of that. Jisc is analysing the HESA data for us, to give us that kind of information.

Q9 **Chair:** Clare Viney, do you want to add something to what Jeremy Sanders has said?

Clare Viney: The Committee might find it useful to have some of the numbers to back up the statement that Professor Sanders made. One in 40 at professoriate level discloses a disability. It is one in four at student level. There are lots of things. It depends on what questions you ask and who is asking them. If you are a professor, it may be your employer who is asking you. If you are an undergraduate student, you may be looking to get more support with mental health challenges, particularly over the last few years. We are seeing a real explosion of disclosure. There are some interesting things to do with that. It is quite complicated, as Professor Sanders acknowledged.

Chair: Thank you. Graham Stringer has some questions.

Q10 **Graham Stringer:** I want to follow up on the questions on disability. There are obviously real physical problems in a laboratory. Do you have

any examples of good practice where there have been physical changes in a laboratory that would make it easier for somebody in a wheelchair, for instance, to use? Are there cases of adaptation in that way?

Professor Sanders: I am certainly aware of that. To draw on my experience as a university teacher, there are certainly cases where we have adapted laboratories, and are aware of other universities that have done so, to make it possible for people to work in labs. Clearly, it is sometimes difficult, but it is possible, with a will, to open doors to some extent at least.

Q11 **Graham Stringer:** Can you give us a specific example that we could use to illustrate the issue in our report when we finally write it?

Professor Sanders: I am not sure that I can give you a precise example from a specific department. I have certainly heard of places where you can lower the height of a laboratory bench and so on. You can have auditory read-out of a titration, for example, if someone cannot see. These kinds of adjustments need to be made pretty much on an individual basis. They are bespoke.

Q12 **Graham Stringer:** They will be expensive and difficult. You are a chemist. If you were to adjust fume cupboards—if such things still exist in laboratories, and I assume they do—

Professor Sanders: They do indeed.

Graham Stringer: —adjusting them would be expensive and difficult.

Professor Sanders: Yes, but you can do it.

Q13 **Graham Stringer:** Again, do you have an example?

Professor Sanders: With a will, you can do it. We certainly have made adjustments in my department for individuals. I cannot provide you with precise details right now.

Q14 **Graham Stringer:** I will move on to Clare if I may. Are there difficulties with the information and datasets that we have to examine what is actually happening in this area? If there are, can you explain what they are?

Clare Viney: It depends on what question you are trying to ask and answer, and on understanding how you compare like for like. For example, ethnic minority data for early-career researchers appears on the surface to be heading in the right direction, but, as Professor Sanders mentioned, male Asian scientists are, essentially, responsible for that increase. If you look at UK-domiciled black scientists, for example, 8% of undergraduates are black scientists. By the time you get to the professoriate, it is 0.4%; there are 25 black STEM scientists in the UK, out of 6,500-plus, which is pretty shocking.

Q15 **Graham Stringer:** Can you say that again? How many are there?

Clare Viney: There are 25 black professors, in STEM alone. It is about 160 across all disciplines. The attainment gap is pretty shocking for the UK-domiciled. Inward migration often skews the data and the information we are looking at. It is really important that you understand what question you are trying to answer so that you can compare the data properly. It is a bit like whack-a-mole. You might try to address one particular aspect, but you need to be careful and clear about what you are trying to achieve and the impact. We need to understand who is coming into STEM, the progression and transitions that are happening throughout their careers, and when and where they are leaving.

Q16 **Graham Stringer:** Is it all self-definition? Physically, how do you collect the information?

Clare Viney: Professor Sanders mentioned the Higher Education Statistics Agency, which is world leading in the way we collect data about our academic staff. Beyond academia, it is much harder to understand the picture. BEIS is trying to do some work around the R&D workforce. Is it STEM or is it R&D? That is one massive question. It could take a session to unpack that in itself.

You mentioned datasets. We have a good example, which is not completely perfect, in LEO, the longitudinal education outcomes data. We have joined the tax records—HMRC data—with our student data, so we are able to see progression from undergraduate level. Surveys are great and give you a feel for or an understanding of what is going on, but joining datasets is really the way to understand what is going on longer term.

Q17 **Graham Stringer:** Do you have anything to add, Professor Sanders?

Professor Sanders: Yes. Clare referred to the difficulty of classification. The Royal Society is working with the University of Warwick to try to develop a better set of standard occupational classification codes—SOC codes. At the moment, there is no agreement even on how we define the STEM workforce. If we had a good set of SOC codes that could be agreed by all the relevant bodies, including Government, it would be much easier to count. We would know how many people we could agree are working in STEM and what sorts of jobs they are doing. We just do not have good data outside academia at the moment.

Q18 **Graham Stringer:** Can I ask what I think is a difficult question? Are there incentives to self-declare disabilities to give you an advantage academically, either in time in exams or in support in the laboratory? Is there any evidence of cheating in those areas?

Clare Viney: I may not be the best person to answer that. It may be a question for some of the witnesses you will see in later sessions. I have not come across anything to substantiate that.

There is a counter to that. We have talked about socioeconomic background. The widening participation investment and work that we

have done in the UK, which has made so much more access to university for so many, has some great examples of how we have brought people in. What happens when they get to university is that they do not want to be labelled. They do not self-identify. It actually becomes quite difficult. I mentioned the difference between datasets and surveys. Who asked the question and how it is going to be used can really affect how people answer the questions.

Q19 **Graham Stringer:** Professor Sanders, I did a chemistry degree two years after you did. I looked up the figures on my course and graduation. We started off with about 15% young women. For whatever reason, a higher percentage of women on the course graduated, so there was a different percentage. Is that your experience? Do the latest figures show similar trends?

Professor Sanders: In my institution, we do not see a decrease in the participation of women between a first degree and a PhD. There is no attenuation at that point, and there is not much attenuation between a PhD and postdoctoral research positions. The big drop-off comes with independent fellowships and academic positions. That is where the leaky pipeline really leaks. That is where we see a major attenuation and the loss of women in the scientific workforce.

Q20 **Graham Stringer:** Thanks. My last couple of questions are for Clare. I understand that BEIS is developing a workforce survey. Can you tell the Committee a bit about that and how it will help?

Clare Viney: Yes. It is a biannual survey. It will be conducted by Ipsos MORI and I think it will be a really useful tool, but, as I mentioned, it is not connecting datasets. It is a survey. It is on R&D. Again, there is the issue of the definition of STEM and R&D. Professor Sanders mentioned the SOC codes. Locking some of these things down and making sure that you are measuring like for like and not looking at bananas and kumquats is really important.

The survey is a real step in the right direction. Making sure that it is meaningful across Government would be really helpful. It is being driven by BEIS, but, as we know, STEM affects most areas of Government and society. We could try to make the survey more useful by making it useful for things like looking at ethnicity culture. There will be some culture questions in the survey. Benchmarking is really useful. That investment is great. Can we do more? Can it be more sustained? Yes.

Q21 **Graham Stringer:** Do the problems that you have outlined with getting decent stats and information out make measuring success difficult? Can you say how, and how that could be overcome?

Clare Viney: It makes measuring success and impact difficult because you are not always comparing like-for-like situations. We are investing a lot of money—over £1 billion—in STEM outreach, but we cannot always say how effective that has been. There are a lot of interventions that are

extremely well meaning and, obviously, impactful in a small way, but how do we look at it systemically?

One of the things that we proposed in our submission was a what works well-type approach, where we could share good practice, toolkits, evidence, tools and ways of working. There is a really good example from widening participation. Transforming access and student outcomes—TASO—has been invested in by OfS and is doing a similar sort of thing in the widening participation agenda. We are investing a huge amount of money in that area.

Q22 **Graham Stringer:** This really is the last question. How does intersectionality affect under-representation? It must make things even more difficult to measure.

Clare Viney: Yes. One of the challenges is that you have many moving parts. As I said, you have to be absolutely crystal clear about what question you are asking.

Q23 **Chair:** Can you describe what intersectionality is?

Clare Viney: Yes. I mentioned the UK domiciled. For example, at undergraduate level the data you are looking at is for UK-domiciled students. When we get to postgraduate level and beyond and to staff, it is for all nationalities. The nationalities can skew it. The Asian male scientists are skewing the data. Inward migration is masking the fact that, although we are making some gains with UK female scientists—so there is a move—overall it looks like there is a drop. It is quite a complex situation because of that intersectionality. Again, the male Asian scientists make the statistic for BAME—black, Asian and minority ethnic—scientists, which is aggregated, look better. The reality is that under the bonnet there are some things happening that we need to look at more carefully.

Q24 **Chair:** Thank you. Before I go to Rebecca Long Bailey, can I return to the striking statistic that you mentioned of 25 black STEM professors? Did you say that that was for male professors or for professors of both sexes?

Clare Viney: Male.

Q25 **Chair:** Obviously, that is a shockingly small number. Do you have any sense of whether that low number is an increase on what it was, or has it shrunk over recent years?

Clare Viney: It has increased. We were commissioned by the Royal Society to look at the pool of BAME postdocs eligible for its fellowships and, according to the statistics, there are currently zero black postdocs in the UK. This is not getting any better.

Q26 **Chair:** Could you pause there? You said that—

Clare Viney: There are zero in physics.

Q27 **Chair:** In physics, there are no black male postdoctoral researchers.

Clare Viney: When we looked at the HESA statistics that are collected by the Government, there were zero.

Q28 **Chair:** Out of a universe of how many? How many physics postdocs are there?

Clare Viney: There are 50,000 postdocs in total. It could be a couple of thousand.

Professor Sanders: If there are 50,000 in total, a small number of thousands will be in physics.

Q29 **Chair:** A small number of thousands, and, according to the statistics you are familiar with, there is not a single black postdoctoral researcher in physics.

Clare Viney: In chemistry—I am also a fellow chemist, Graham—it is two, so it gets rounded down to zero. We are spending a lot of effort and time as a community, and we are all very passionate about diversity and inclusion in STEM, but something is not right. There is something not quite right about the progression for UK-domiciled black scientists. As I said, the Royal Society is looking at it, but it needs to be collective action.

Professor Sanders: Can I amplify that?

Chair: Of course, Professor.

Professor Sanders: One project that the Royal Society supports is called Destination STEMM. In collaboration with the Windsor Fellowship, we mentor promising black students in London who are interested in STEM subjects. We match them with a research fellow, who is funded by the Royal Society anyway, and mentor them through their A-level period. This has only been going for a couple of years, so it will be at least six or seven years before that cohort of students gets the opportunity to be postdocs. Then it will be another 10 or 15 years before they get the opportunity to be professors.

It is a relatively small-scale project. At the moment, it is a dozen students a year. If in the early days it looks like it is going to be a useful way of encouraging black students to study and work in STEM subjects, we can try to expand the scale of it. One of the questions is how you take these small-scale projects and scale them up to make a real impact.

Chair: Indeed. These are important things to consider right at the beginning of our inquiry. For those who may be inclined to think that the problem of having 25 black male professors in STEM is a kind of legacy, because of problems promoting people in the past, the figure that you have just given for the number of postdocs shows that it cannot be regarded as that. It is a current problem.

Q30 **Rebecca Long Bailey:** Thank you both for speaking to us today. Ms Viney, are there any groups among whom notable progress has been made in increasing representation?

Clare Viney: I mentioned that there have been huge efforts on women in STEM. Graham asked a question about percentages. When it comes to female chemists, girls and women outperform boys and men in education, but something happens when they go into industry.

This morning, we have focused very much on higher education and education, but there are some things going on in industry, too, around how women progress through the career stages in R&D beyond academia. Many businesses and companies—multinationals and SMEs—are very worried about that and are investing in talent programmes to develop women in STEM. Again, it is collective. There are lots of things going on. Are they connected?

Where we have made targeted interventions, we can see progress. It is sometimes difficult to measure that progress. What is challenging is that it needs to be sustained investment. It is a decade of action. It is a longer-term aspiration. We have things such as people and culture and levelling up. We have lots of policy agendas. How do we bring some of those things together to make sure that this is a sustained, long-term focus and investment?

Q31 **Rebecca Long Bailey:** Which targeted interventions have been the most effective, in your view?

Clare Viney: At academic level, there have been good examples of funding and grants to help tackle the attrition that Professor Sanders mentioned, especially fellowships to support women on career breaks part-time. I have not even mentioned some of the intersectionality around part-time versus full-time. As soon as you start digging, it throws up all sorts of different things. We have made great strides in widening participation and gender. How do we look at other areas? Those other areas also deserve to have that spotlight shone on them.

Q32 **Rebecca Long Bailey:** Thank you. Professor Sanders, can you update us on your efforts to develop a widely agreed methodology for defining the STEM workforce?

Professor Sanders: All I can tell you is that the Royal Society has commissioned the University of Warwick to do the work. I do not have any updates on how far they have got or when they will come to a conclusion.

Q33 **Rebecca Long Bailey:** Okay. More broadly, although you cannot divulge details, could you tell the Committee why it is so important to have this methodology and what the benefits of it will be?

Professor Sanders: You are asking about diversity in STEM. I should say that I prefer the word "inclusion" rather than "diversity", because "diversity" seems to me to accentuate difference.

We are asking good questions, but you cannot answer them without knowing whether we can deem the individual to be working in a STEM

world or whether they are administrators and you do not count that as STEM. If they are doing administration of some kind in a STEM environment, where do you draw the line? You cannot answer the questions without having good data.

Rebecca Long Bailey: Thank you.

Q34 **Carol Monaghan:** This question probably applies to both of you. We have talked about diversity in STEM. Maybe we should say inclusion; I like that. I have some figures here, which I think are quite useful. This is for Scotland, but I imagine it is quite similar across the rest of the UK. If I look at pupils taking, for example, higher human biology, 69% are girls; 53% of chemistry pupils and 47% of maths pupils are girls. At that point things look okay, but when we look at physics, it is 27%, and in computing science it is 17%. Are those numbers the same once we enter the workforce and academia, or does it get worse? Maybe Clare could start.

Clare Viney: It gets worse. At each transition, there is attrition and drop-off for many reasons, and it is not the same; it is different by discipline.

Q35 **Carol Monaghan:** To take the 69% for human biology, when we get to postdoc level how many females are working in biological sciences?

Clare Viney: In biological sciences, it still holds up pretty well. That is the challenge. If you look at STEM, the totality is relatively good. If you then look at physics and you drill down, it becomes worse. About 20% of undergraduates take physics. It is a pyramid. With biological sciences, you start with a large number, and you continue with a largeish number, so that attrition is not quite so stark.

Q36 **Carol Monaghan:** I suppose traditionally—I do not like that word, but I was a physics teacher—girls would have gone to biological sciences and fewer would have gone to physical sciences. What we are hearing from people working in biological sciences is that the same issues apply; they are still struggling to get professorships, they are still struggling to manage the work/life balance, and there is still drop-off. Can we apply what is happening in physics to what is happening in biological sciences as well?

Clare Viney: Eighty per cent. of postgraduate researchers aspire to an academic career, yet we know that only 10% to 15% will achieve a meaningful academic career. My charity has been working in this space since 1968. It is not a new problem. There are many reasons. I mentioned that there are 50,000 postdocs. The Government's investment in research in universities has a biomedical bubble. There are huge numbers of postdocs. There are some socioeconomic dimensions to that. Many of those postdocs are on short-term contracts. In higher education, about 70% of contracts are short term. It is not the same in other sectors. The system is complex. Between the diversity and inclusion

culture, the door is being opened, which is diversity, but they are not feeling included when they are there.

Q37 **Carol Monaghan:** The issues that are clear in physics and engineering-type subjects apply in biological sciences as well.

Clare Viney: Probably to a lesser degree. We can get you the exact stats.

Professor Sanders: Exactly. The attrition in physics is very obvious because you start out with relatively few women. If you halve them and then quarter them, it is very obvious. In biology, because you start off with more than 50% women, the attrition still leaves you with a substantial number of senior women. Students looking ahead at the careers of the people who teach them will see more women in a biological environment than they will in a physics or a mathematics one.

Q38 **Carol Monaghan:** Thank you for that. Clare, to come back to you, last July the Government published their R&D people and culture strategy. Looking at it, there are lots of words like "encourage", "support", "develop" and "evaluate". To me, these are all a bit woolly. Have we been using the carrot too long? Do we need to start using the stick?

Clare Viney: My community is very excited by the prospect of focusing on the people; the researchers, not just the research. It is essentially workforce planning. If we want to be a science superflower—I meant superpower, although we can be a superflower as well—

Carol Monaghan: Biological sciences again.

Clare Viney: If we want to be a science superpower, we need people. We need bright, intelligent, smart people. Those people are in the UK already, but we also need inward migration and talent development. My worry is whether there will be new money or whether there will be consolidation of budgets. Protecting the science and the R&D budget is really important if we have these big aspirations and the 2.4%. I appreciate that the fiscal climate is very difficult at the moment. For example, applications to medicine are up 25%. How do we capitalise on the brilliant narrative, the part that STEM has played, in the pandemic and in the response, not just here in the UK but globally?

Q39 **Carol Monaghan:** Should there be targets for inclusion for females and for people from a black and minority ethnic community?

Clare Viney: Positive action—I know the Royal Society has some views on this—is much more prevalent in the US. Has it made a difference? It has in some places. There is some evidence to suggest that it helps move the dial more quickly, but the culture piece is really important.

Q40 **Carol Monaghan:** Professor Sanders.

Professor Sanders: The 30% Club, which Helena Morrissey started about 10 years ago, aiming to get 30% of women into boardrooms, has

been very successful. When I was pro-vice-chancellor at Cambridge, I took Cambridge into the 30% Club as the first university in this country to do that.

Q41 **Carol Monaghan:** How did you do that?

Professor Sanders: How did I do that? I talked to the vice-chancellor and I talked to Helena.

Q42 **Carol Monaghan:** It would be good to hear about that. You were proactive in ensuring that it happened, but it must have been more than just talking to people.

Professor Sanders: I am not sure how to answer that question. The university has a council. You put a proposal to it. The idea was that the 30% Club was a set of people and a set of institutions or companies that were keen to change things, and I wanted to be a part of that change process, to go to meetings, meet people and so on. The university agreed that we should do that, and other universities followed. I am no longer involved in that, so I do not know how it has progressed.

Over the last few years, we have acquired a very good set of national policies around equality and family leave, for example. It is one thing to have a policy that family leave for a year can be shared between two partners. It is another thing to have a culture in a company or in a university that encourages men to take a fair share of parental leave. That is a cultural thing rather than a legislative thing. We are seeing slow progress in younger men taking six months or more paternity leave and sharing childcare. That kind of cultural shift is making a difference within the legislative framework that is really helpful.

Q43 **Carol Monaghan:** Thank you. I have a final question to Clare. Could you tell us a bit about how the growing use of narrative CVs will make a difference?

Clare Viney: We have talked a little bit about the attainment or awarding gap. Narrative CVs think about how you demonstrate potential. UKRI is championing the use of them. The Royal Society started the résumé for researchers work, which Dame Ottoline Leyser has taken forward at UKRI. It has real potential to be quite revolutionary in focusing more on the potential of those researchers and levelling out the playing field.

However, if the reviewers and the system do not change, all of that good will potentially be undone, and we do not yet have the evidence to know whether it is working or not. It is a really exciting and positive step forward. It is about how we monitor, track and evaluate what effect it might have on the system. Many other funders are also looking at the use of narrative CVs. They have been used in other sectors. For example, in accountancy, a 2:1 degree is not really a good benchmark for potential for being a good accountant, so that has been removed by the big four. Actually, a degree, full stop, has been removed by some accountancy

firms. We can look to other sectors to think about the balance between excellence and the backward look that you get on a CV versus potential and the forward look.

Carol Monaghan: Thank you.

Q44 **Chair:** To pick up on the exchange you had with Carol on the 30% Club at the University of Cambridge, Professor Sanders, what does that 30% apply to? Is it heads of house? Is it heads of colleges? Is it the professors in the university?

Professor Sanders: It was senior positions. It was not well defined. Probably 30% or more of heads of houses in Cambridge are women now.

Q45 **Graham Stringer:** Are any countries approaching this problem more effectively than we are, and have we learnt from them? I am not sure who the question is to—either or both.

Professor Sanders: We come back to the difficulty of definition of statistics. Every country looks at these things in a different way and defines things differently. The National Academy of Sciences in the States is more worried right now that most of its members come from the east coast and the west coast and not so much from the middle. It is really difficult to compare one country with another. Career paths are so different and statistics are gathered so differently.

Clare Viney: I mentioned previously that HESA, the Higher Education Statistics Agency, is pretty good. There is always room for improvement, but it gives us a really good picture at the academic staff/early career researcher level. There are different things in the US. Europe is trying to look at a data observatory.

The short answer, Graham, is no, but the long answer is that I am sure there are things that would be applicable to the UK system. First, we need to understand what question we are trying to ask, and then what data we need to collect and gather. The utopia is joining sets. The Government have access to lots of fantastic datasets, such as tax records. Joining up all of those different parts across government would make things a lot easier.

Q46 **Graham Stringer:** There is much more good will and commitment in this area than there certainly was when I went to university a long time ago. Why isn't more progress being made?

Clare Viney: It is a great question. My personal take would be that there are lots of well-meaning interventions, done with good intentions, that perhaps are not as effective and impactful as they could be. There is a lot of activity, but not necessarily a cohesive approach.

Professor Sanders: Many institutions and many people working in institutions are inherently reluctant to change.

Q47 **Graham Stringer:** You think it is inertia.

Professor Sanders: Yes.

Q48 **Graham Stringer:** You can make a comment on this or not. There is one extraordinary example where girls have been attracted to physics, and that is the University of Manchester because of the extraordinary influence of Professor Brian Cox. It seems to me that one can expend a lot of angst and intellectual firepower, but having a sexy professor gets more people to apply for those subjects than any other action. Would either of you like to comment on that?

Professor Sanders: I would not like to comment on the sexy professor. As Clare said early on, what really matters is people. There is no doubt that inspirational figures, who do not necessarily have to be public figures, in a company or in a university can make a big difference to attract the next generation.

Clare Viney: Teachers are a massive part of that. Carol asked the question as an ex-physics teacher. Teachers are a big part of that, and the curriculum. I am sure that will come out in other parts of your inquiry.

Graham Stringer: Thanks very much. It has been very interesting. I am sorry that I have to go in a minute.

Q49 **Chair:** Finally, to go back to the figure that you introduced the Committee to about the number of black male professors in STEM, do you have the equivalent number for black women in STEM?

Clare Viney: We can get you that.

Q50 **Chair:** You don't have it.

Clare Viney: No, not in my notes today, sorry.

Q51 **Carol Monaghan:** What about just female professors?

Chair: And indeed female professors.

Clare Viney: Yes, we can get you that.

Chair: There is a lot of information that we would like to follow up on. I thank both witnesses for kicking off our inquiry. We have covered a lot of ground. We have begun to get into some issues that we will go into much more deeply in the next few sessions.

Examination of witnesses

Witnesses: Katherine Mathieson and Dr Zecharia.

Q52 **Chair:** I now ask our next pair of witnesses to join us at the table. I am very pleased to welcome them. Katherine Mathieson is the chief executive of the British Science Association. My understanding is that she is shortly to be director of the Royal Institution—this spring, I am told. Hopefully, the spring is not too far away. Anna Zecharia is director of

policy at the British Pharmacological Society and development board member for Equality, Diversity and Inclusion in Science and Health. Thank you both very much indeed for appearing today.

Perhaps I could start with a question to Katherine Mathieson to reflect on the discussion we had in the previous session and to advise the Committee. Are there any interventions or any policy directions that have been taken in recent years that seem to be, in your view, having a positive impact?

Katherine Mathieson: Thank you for the invitation to be here this morning, and thank you for such an interesting question. We are here this morning as the British Science Association but also in our role as secretariat for the all-party parliamentary group on diversity and inclusion in STEM.

The nature and the extent of the under-representation is systemic; it is present at all levels and, therefore, it has been very challenging for a single policy or single intervention to cut through and make a significant difference. The discussion with the earlier witnesses showed the dramatic under-representation at all levels, from early education through later education through academia into industry.

There was a little bit of discussion around a leaky pipeline metaphor—attrition at each stage. I see the appeal of that metaphor and it can be useful, but it suggests that the people responsible for the attrition are the people who are leaking out at each stage, and that they do not find science or STEM sufficiently interesting, appealing or worth while, and they leak out of the pipeline. If we look at it as a system in which the barriers are higher for less privileged groups in society, and each time there is a decision point we see the effects of those barriers more clearly for some groups than others, that frames it as a societal-wide issue. Rather than saying a single institution or a single discipline can solve it, we see it more as a societal-wide systemic problem that needs a systemic approach and a systemic solution.

Graham asked a very good question about why we have not made more progress despite a great deal of well-intentioned work. We have seen the limits of what good intentions can do for us in this space. We need to consider an emphasis not only on representation but on inclusion—not just how many people are in a particular setting but their experience in that setting. Are they doing great work? Is their voice being heard? Are they fully embedded in that particular higher education or industrial setting? We heard some really interesting stats about higher education and academia, and that will continue. I think you will hear more this morning as well.

It is worth thinking about STEM businesses and industry, and where there are signs of good intentions and awareness of the issue but a sense that co-ordinated, Government-backed action is needed. The submission from the Royal Academy of Engineering to the Committee's inquiry said that

60% of the UK's engineers are in SMEs, and SMEs are broadly excluded for a lot of the initiatives on EDI—equity, diversity and inclusion—in STEM. SMEs are a key part of the equation. They often lack tailored resources to carry out EDI work, and struggle to find the capacity, so they are a key part of the Committee's consideration. Even larger employers struggle. The focus is often on recruitment rather than on culture and inclusion, and there is a lack of evidence broadly about what is working. There is often a focus on single characteristics rather than intersectionality, as was covered earlier.

We should not only be thinking about the role of STEM in a workforce and career setting. STEM has importance to all of us beyond our careers. People's relationship with science affects how they make everyday decisions, such as on vaccines, and it affects how they participate or do not participate in wider societal discussions of science, such as net zero. We have seen, as a result of the pandemic, a rise in public trust in science, and aspirations among young people to go into science-based careers, particularly medical ones, have risen, so there is a real opportunity. Existing STEM engagement work, we know, tends to cluster around universities and urban centres. It is important that that work carries on, but it means that there are large areas of the United Kingdom where there is little in the way of science centres, science festivals, outreach activities and community engagement.

Q53 **Chair:** Thank you. There is a lot there for us to delve into in the inquiry. As we commence this inquiry, one of the things we are conscious of is that the terrain is so broad and the initiatives that have been taken are so numerous that we can end up endorsing and promoting worthy micro-initiatives to tackle different things and different aspects, whereas some of the figures that were deployed in the previous session, especially the striking figure on the number of postdocs in physics, show that we need something more than incremental. Do you have a sense, knowing the science sector as well as you do, that there is recognition of that on the part of the community? Are people up for confronting, frankly, the lack of adequate progress?

Katherine Mathieson: My personal view is that, yes, there is recognition that the issue is significant, persistent and needs a co-ordinated approach. There is perhaps a sense that we do not know what that would look like yet, so it is easy to commit to something when we do not know quite what its scale would imply.

Q54 **Chair:** Thank you. Dr Zecharia.

Dr Zecharia: Thank you. I absolutely agree that there is appetite. That is what makes the opportunity of this inquiry quite exciting. Speaking on behalf of EDIS, which represents almost 30 organisations in the sector, and other significant organisations and funders like UKRI and Wellcome, they are speaking in the terms that Katherine started setting out, which is framing this at scale at the societal level. Getting the framing right will help unleash appetite and it will help us look at parts of the problem and

solutions that might otherwise look like they are not connected. We must get across the fact that STEM is part of society; it is not immune from societal forces and is entrenched in inequalities. These things play out in our institutions, processes and systems, and they inform who gets to succeed. Who you are has a bearing on how successful you are.

The sector is starting to talk in those terms, and it is starting to say that you have to do both; you have to look at the fact that, where there is under-representation right now, we absolutely should be looking at methods to encourage, support and bring people in, but if we stop at the point where we are trying to bring people into environments, workplaces and education systems that were not designed with them in mind, we are never going to really solve the problem. We have to say, "Hang on a minute, is there something about our institutions and our culture that is keeping people out?"

It is Katherine's point about the leaky pipeline metaphor and why it is not helpful. It is not that people are leaking out; it is because the system they are in does not work for them. A sense of belonging is required, and a sense of different people working in different ways. By bringing that assumption of what we think is normal right to the surface, making it clear, and saying that we are making a choice about what we say is normal, we can start to challenge and we can start to say at a systems level that we can take a systems solution and a systems approach.

That is why, through EDIS and through the British Pharmacological Society, we would frame this in social justice terms—the social part being that it is a societal issue and needs a systems-level solution, and the justice part being about fairness and recognising that who you are impacts on your chances of success. If we can do that and have these sorts of conversations through this inquiry, we can start making those connections from the education system, the workplace, and the culture that we support and endorse, and we can start looking at them holistically. That is where, with an otherwise potentially overwhelming challenge, you can start making some progress, because you can look at it in the round.

Chair: Thank you very much indeed.

Q55 **Carol Monaghan:** Katherine, your written submission says that "in many cases, it is best for historically marginalised and excluded groups to decide how to structure, develop and execute their engagement with STEM for themselves, rather than have initiatives imposed on them." How do we incentivise such initiatives coming from within those groups themselves?

Katherine Mathieson: I think that is right. We can take some inspiration from the disability activists slogan "Nothing about us without us." It is critical that diversity and inclusion work is properly recognised and rewarded, and not seen as an extra that you do as well as being a professional scientist or engineer. The British Science Association is an

independent charity working for science to be seen as more relevant, representative and connected to society. The work we are doing is often with locally led community groups for things like British Science Week.

They tell us that there is a lack of confidence sometimes about their own entitlement to participate in STEM, that STEM is seen as something done by other people somewhere else, that you have to have a lot of qualifications and be super-brainy, and that it is very hard and "Why would it be relevant to my life?" The work that we do is about supporting them to rediscover their own science identity, their own entitlement to STEM, and the relevance of STEM in their everyday lives. That means that the funding and the support we provide needs to be flexible and responsive.

Rather than designing a scheme where everyone can apply for this amount of money to do this activity or use our activity, it is much more about supporting the leaders on the ground to develop what is right for their communities and their audiences. It is harder work because it requires us as an institution, and our partners as organisations, to step back from deciding the best way forward, and it is more expensive to deliver because of the flexibility. What it develops in the people we have worked with over recent years for things like British Science Week community grants is a sense of empowerment and confidence that enables them to go forward and develop their own science programming with their communities and audiences.

Q56 **Carol Monaghan:** When you say it is more expensive, that is quite interesting because when I was at school, which was a long time ago, initiatives were being used, but they did not really shift the numbers. In 40 years, we have not had any huge increase in the number of girls particularly going into physics and engineering-type careers. Although it is more expensive, have you seen any results that show it is actually going to have longer-term value?

Katherine Mathieson: The work on science capital by the ASPIRES team is very helpful because it shows us just how early young people's attitudes to science and STEM are shaped. Most children aged 10 that they studied in that long-term cohort study said that they found science interesting and it was worth while for society, and that their parents thought it was important that they studied science, but they did not want to be a scientist, aged 10. That is before we even get into secondary schooling and specialist subject teaching and all that sort of thing. The children in the study are showing us that they are absorbing the wider societal attitudes towards science and STEM that are around us all, and they are picking them up and reflecting them.

Aspirations for STEM careers are not the only desirable impact of good STEM engagement at school. We want young people to feel a positive, lifelong relationship with science that will lead them to make informed decisions in their everyday lives going forward. It is not only about whether they choose STEM A-levels and STEM universities. There are a

lot of different routes they can take, and STEM can form part of all those routes. We want them to absorb an ability to use the skills they develop through science education in a much wider range of settings.

Our experience at the British Science Association with the CREST awards programme suggests that it is about giving young people the opportunity to tailor their STEM activities to something that is relevant to their own lives. CREST awards enable young people to do a science and engineering research project on a topic that they shape or choose. You cannot really say, "I can't be a scientist," if you already have just been a scientist doing the project on which music is the best to revise to, or whatever your research topic has been.

Q57 **Carol Monaghan:** One of the first things I used to do with my new first-year classes—age 12 secondary school and first experience of science in a science lab, usually—was to ask them to draw a picture of a scientist. Usually, there was a white coat, a beard, glasses and mad hair. It was an Einstein figure when I was standing there as a female scientist in front of them. What role do the media have in starting to tackle inclusion? I like the word "inclusion" from the last panel.

Katherine Mathieson: I agree. I like the word "inclusion". The media reflect society more than shape it. The media often reflect our stereotypes as scientists unless there is deliberate work done to circumvent that. We and several other partners are running a Smashing Stereotypes campaign for British Science Week this year to try to subvert some of the very common stereotypes about scientists being of a particular gender or ethnicity.

Q58 **Carol Monaghan:** Could you share some of those resources with the Committee because I think we would like to see some of them?

Katherine Mathieson: I will.

Q59 **Carol Monaghan:** I want to ask Anna some questions as well, but I have a final question for you, Katherine. We have heard already in the previous panel that, often when we are looking at particularly women in STEM, we look at women working in a STEM environment rather than in a STEM role. How do we make sure that we are not capturing women doing administration-type work in a STEM environment, and it is actually people working in STEM roles?

Katherine Mathieson: That is a really interesting question. What counts as a STEM job? Does it count if you are doing administration in a STEM organisation, or not? Does it count if you are doing a STEM job that requires STEM skills like coding in a creative industry's organisation? You could make the argument both ways. Dame Ottoline Leyser at UKRI would argue for a more inclusive and broader definition that the contribution of the person you see on reception when you walk in the door is just as valuable to the output of the UK's research sector as the people doing the stuff in the labs, whatever that is.

Q60 **Carol Monaghan:** Do you want to contribute to that, Anna?

Dr Zecharia: The Academy of Medical Sciences has a nice concept called team science, which is the idea that reshaping and re-contracting our relationship with who ultimately delivers research outcomes is a really important part of that. The idea that everybody who is involved in the research endeavour has a role to play in the final outcome is really important, and that will have knock-on effects on how we recognise those people within the research system as well.

I have a quick comment on the media point. When we look at that from the STEM perspective, we have a certain angle on it. It is also important to say, keeping with the societal theme, that there are issues with who is in the writing room and who is behind the camera. The British Film Institute is doing some brilliant work trying to improve inclusion and diversity representation within the creative industries, because it is the people who tell the stories that determine which stories get told and how you then tell more and different stories. It is about us acting in partnership with other parts of society as well.

Q61 **Carol Monaghan:** Thank you. Can I ask about your submission? You talked about a social justice approach to addressing the lack of diversity in STEM. Can you define that, and why do you think it is a useful approach?

Dr Zecharia: As I said at the beginning, the framing is really important. I am sure that over the course of this inquiry you are going to hear lots of different dimensions of the challenge. We have already heard about the transition from mid-career to professorship. We are starting to hear some of the issues in education and access in the first place. We have already heard that there is no single reason and there is no single solution, but having holistic framing is really important.

For us, the social justice framework splits into three parts. The social bit is that STEM is part of society and recognising that who you are has a bearing on your chances of success does not exist in a STEM bubble—it exists in the context of society and within our institutions. You need to look at that at a societal and at a systems level. We could talk about who has responsibility for that.

The justice angle, for me, is about really recognising inequality and entrenched inequalities, and that that is not fair, and that putting a determination for fairness at the heart of what we are doing is really important. There are lots of good output reasons why you might want to increase inclusion and diversity within STEM, and we can talk about that as well, but it is the right thing to do. Equality is enshrined in our legal frameworks.

The other dimension is that STEM is a driver of social justice in terms of social mobility and widening research outcomes. We know that who gets to do the inventing has a bearing on what gets invented. Diversity within

the research system leads to diversity of research questions and, ultimately, research outcomes that have benefit for the whole of society. We know that there is a disconnect between need and potentially what research is getting done as well. An obvious example is women's health.

Carol Monaghan: Thank you.

Q62 **Katherine Fletcher:** Hello, ladies. This is really fascinating. We had a really interesting visit as part of the Science and Technology Committee to Carol's hometown of Glasgow the other week and met some very interesting and very diverse students. One of the things that came up in conversation is that I am part of the leaky pipeline. I was offered a research post in STEM, but it came with a price tag that was not accessible to me, so it was a practical reason why I went off and did my nerdery as a hobby as opposed to a profession.

I want to pursue questions in two areas. How can we improve the pull factors that mean that 21-year-old me in the future does not just think, "That's expensive and it's not for me," and how can we address some of the practical challenges that are leading people astray? Dr Zecharia, let's start with the obvious. Why is it important, and why should somebody who is not a grey-bearded, white-coated scientist want to research in STEM?

Dr Zecharia: You could also flip that to say, "Why should only that particular type of person be expected or eligible to do STEM?" To build on what I was saying before—Katherine also talked about it—in the sense that STEM is part of our society, it has reach into all of our society and all of our lives, and much of it is publicly funded, and, therefore, there is a duty to serve the whole of the population.

We know that investing in STEM is good for productivity, creativity, problem solving and innovation, so why would we restrict ourselves to a tiny, tiny proportion of society? Just from a logical basis, you would not want to restrict your talent pool. Secondly, I absolutely agree with the framing of the levelling-up paper, which says talent is distributed equally and opportunity is not. If we are only looking in a small section, we are doing ourselves a disservice.

Q63 **Katherine Fletcher:** I agree. It is almost the sales pitch. What is the sales pitch to come? Katherine, spelt completely correctly—

Katherine Mathieson: Absolutely.

Katherine Fletcher: —what is the sales pitch for diversity? What is the pull factor that we can create?

Katherine Mathieson: It is really interesting listening to your own story, Katherine. I would suggest that you did not leak out of the pipeline. You are here on this Committee arguably doing more to shape the future of UK science—

Katherine Fletcher: Don't be nice to me, I'll get an—

Katherine Mathieson: You are doing more than a research career might have done. From what you said, it sounded like the pull factors were working just fine, and there was a very practical barrier that affected you more than some of your peers. That is the kind of challenge that we would like to see Government action on. Some of the barriers are very practical. They are about income, family background and community expectations. They are about where people live and what kinds of careers and lives people aspire to. They are practical things that a co-ordinated effort could help to address.

Q64 **Katherine Fletcher:** Would it be possible to make some suggestions? Sorry, Rebecca, I am in danger of getting into your questions. I apologise if I do. I will return to you, Katherine, but, Dr Zecharia, one of your key areas for action is to "improve consistency in the design, implementation and monitoring of Equality, Diversity and Inclusion (EDI) interventions." I confess as a bit of a practical woman that that sounds a little bit fluffy. Could you make it granular and practical? What barriers is it going through? What would you do to achieve it?

Dr Zecharia: This area of action fits under research on research, which is a research discipline in and of itself. We have talked about inconsistency in how you design a study, how you evaluate it and how you then scale it. There are issues with how you collect data, which measures, and what your real evaluation measures are. It would be putting some money into research on research on EDI—equality, diversity and inclusion—initiatives and reaching some recommendations about good practice and design, good practice and evaluation measures, and making that available and disseminated across the sector for people who are taking it up. There might be pots of money available on a grant basis.

Q65 **Katherine Fletcher:** Could you give us a for instance of what one of those pieces of research might be and what it would be for?

Dr Zecharia: Yes. Some of this has been done, so maybe it is helpful to draw on what might happen next for some of these things. Katherine mentioned the ASPIRES project, which was a largely observational, longitudinal study to try to get to the issues when you look at students progressing across an X-year period—I think it was from ages 10 to 19—and what are the factors that determine. That is one kind of study that helps you get quantitative and qualitative data. Often in STEM we are not as good at bringing in the qualitative data, to be able to describe what is happening in a very structured way. That study has been impactful in leading on to recommendations for what you might do when you understand the problem.

The idea of science capital and drawing it out through that ASPIRES study and making that evidence based has now led to interventions that respond to the problem directly. The things that we know are happening in the STEM enrichment outreach suffer from a similar problem. Although some of the data is there, maybe you have to pick and draw it from different sources. We know that starting early works. We know that

sustained, long-term interventions work, not just one-off things with the intention of people liking STEM.

You need to focus on engagement with STEM rather than just making it nice and likeable. Some of that research has been done, but it has not been done in a structured way. It is about having agreement, when you are funding an initiative, that your evaluation measure is not just about liking STEM; what it does in terms of engagement, aspiration and then career progression might be one way of framing a good design for an intervention or testing an intervention. Does that make sense?

Q66 **Katherine Fletcher:** Little, if I am honest. Forgive me, I am just not that sophisticated a creature. Are we going to put 10 role models out? Are we going to establish pots of funding that help people who don't have any money? Without totally overdoing my colleague's questions, what can we do practically to make sure that it is promoted properly and that it can be implemented and achieved? Katherine, please.

Katherine Mathieson: Can I check that I understand the question? If we were doing research into this, what research areas would we go down?

Katherine Fletcher: Ultimately, outputs. We all agree diversity is important, without prejudicing the Committee. I am trying to establish what we can actually do. Do we need research on it, or do we just need to skip the research thing and go to something practical? Sorry.

Dr Zecharia: It is not research on the problem. Maybe that is important when we are talking about data as well. We need good data so that we can track whether we are making progress. When you are putting an intervention in place, there are some examples like the CREST award projects that are very well based in evidence. The next stage for those is how you scale that, whereas across different parts of the system you might want to invest in pilots, for example.

You might want to say, "We think we understand what the problem is here. We are going to put out a small-scale version of a particular pilot, whether it is in engagement, or whether it is changing the way you advertise for your posts." You might then make sure that you have the design clear, so that when you get to the end you know what you have found and you can track whether you have had any impact.

The research at that level is not about diagnosing the problem; it is about being clear that the things you invest in are having the impact that you want and are building the evidence base for the investment that it will take to scale them, because we want to make sure that we are focusing limited resources on things that are going to work. There are examples already of things that work, and Katherine is very well placed to speak to many of them.

Katherine Mathieson: I agree with that, absolutely. We have an increasing evidence base around what works in supporting particular

groups in communities and schools. The all-party parliamentary group on diversity and inclusion in STEM looked at this as well and looked at what can be done. They recommended a diversity decade of action to co-ordinate work across Government, industry and academia. They also suggested a what works approach, which one of the earlier witnesses, Clare Viney, mentioned. That would be STEM leaders from organisations across public, private and voluntary sectors working together, almost in an employers coalition, to address structural inequities, focusing on whole sector involvement rather than piecemeal initiatives, using examples from EDIS and other settings.

My colleague Abby and I arranged some roundtables to look at this recommendation in a bit more detail. Employers from industry were very positive about it, about the need for more learning and more sharing of resources. As we discussed earlier, SMEs particularly are struggling to find the capacity to do good work in this area because there are so many other demands on their time. There would need to be an emphasis on sharing learning, particularly with organisations that are classified as SMEs.

There is a need for more evidence on intersectionality and the impact of particular change interventions. It is not research on the scale of the under-representation because we have already heard that there is quite a lot of that, but often what the APPG found was that most of the data being submitted was focused on single characteristics, on single interventions, so there is something about a broader, richer picture.

There is a need for greater professional development on EDI change across the whole STEM sector and ensuring that inclusion and diversity work is really built into the strategies of organisations in the infrastructure sector. We suggest that it is time for a bold vision by Government to put the need for a diverse and equitable STEM sector at the heart of our ambition to be a science superpower—a very high-level ambition-setting goal.

Katherine Fletcher: Okay. I am very conscious of time. I will just say that one of the PhD physics students we met had watched "Hidden Figures" in Kenya and was currently rocking the University of Strathclyde and satellites, so it is starting to change. Thank you.

Q67 **Chair:** To build on Katherine's point, my concern about this is that research on research and a plethora of pilots and well-meaning initiatives could have the successor Committee to this in 10 years' time taking much the same evidence. A report that we wrote would no doubt be worthy, but it might not have made a change. When you commission things like some of the initiatives that we have been talking about, and they are commissioned by one set of Ministers and one set of Members of Parliament, if it is their successors who pick them up, because they did not commission them, they do not relate to them in quite the same way. I feel a sense of foreboding about that type of approach.

In some areas we have been determined, as a country and as a society, to make a difference—on net zero for example, we passed a very bold piece of legislation. We did not submit it to endless years of pilots and consultation; we set a requirement on ourselves. Do you think that, in this space, given the abysmal progress, frankly, at least in parts of the sector that we have already heard about this morning, it is time to blow the whistle on the kind of well-meaning approaches that have been taken to date?

Dr Zecharia: Absolutely. It is brilliant to hear you say that because that was one of our recommendations on the pilots in research on research. It is a continuum. There are some things we know that we should be co-ordinating on right now, scaling right now, and making bold commitments on right now. Where there is lack of consolidation and lack of scaling on things that we know work because we have the evidence, we should be doing them. That is what I hope comes out of the evidence that you are hearing for this report.

There is then a tail of areas like intersectionality and others at the very end where we know things but we need better data and more research. As we understand problems, we might start identifying things that we need to do some research on. It is a "yes and." It is about looking at the continuum. Let's not not act until we know absolutely everything. Let's be bold and act now and fund and co-ordinate across areas like science capital-led education and making a shared vision on research culture in the way we move away from short-term contracts, because we know that is a real issue in terms of who stays. As a research community, let's make sure that when we look for new interventions we run them properly and we fund understanding them properly so that they can move up the next stage of the pipeline and get scaled.

Q68 **Rebecca Long Bailey:** To follow on from those points, we have a Queen's Speech expected in the relatively near future. To what extent might legislation assist in increasing diversity in STEM? Do we need, on the point made earlier, a stick now rather than a carrot? Dr Zecharia first.

Dr Zecharia: It is really important to look closely at this. I am going to preface everything I say by saying that I am not a legal expert, and it might be helpful for the Committee to speak to a legal expert.

There are a few schools of thought around the Equality Act 2010 and whether it is or is not fit for purpose. It is over a decade old, and there are parts of the sector calling for the enforcement of section 14 in terms of dual discrimination and whether the scope of protected characteristics is broad enough. For example, including socioeconomic status and paternity is some of the discussion that is happening. Another school of thought is that the legislation is there and there is evidence that judges are interpreting it within case law, so looking at whether it is fit for purpose should be a priority given the fact that there is an opportunity in the not too distant future, but with the intention of making sure that any

form of discrimination, direct or indirect, and how it is then implemented is couched properly through the legislation.

There is something else the Government could do on the legislation front. Some things in law are not being used to their fullest extent or being implemented as they should. By that, I mean specifically positive action and the public sector equality duty. There might be a stick there to make sure that people are held accountable for doing equality impact assessments, so that we can start breaking the cycle of making decisions based on not taking the full range of people into account.

Q69 **Rebecca Long Bailey:** Ms Mathieson.

Katherine Mathieson: The net-zero analogy that Greg used is a really powerful one because it shows that on that topic as well we can make individual actions and we can work with organisations to take actions, but that will not get us where we want to be. The big picture is where organisations like this can create change.

In terms of legislation, I would suggest a workforce information Bill. That would increase mandatory pay gap reporting across multiple protected characteristics and to smaller organisations. That would help us understand how broader societal trends are affecting organisations across a range of sectors and geographies.

In the Equality Act, we could suggest extending the scope of the protected characteristics to include socioeconomic background, paternity and shared parental leave, and update some of the language in that Act on gender reassignment. It could go further and provide legal recognition for non-binary people, a ban on gender conversion therapy, and extend redundancy protections to people returning from maternity, adoption or shared parental leave. I hope those suggestions are helpful.

Q70 **Rebecca Long Bailey:** Yes, that is very helpful. Do you think that it would be helpful to set up a new body to monitor progress and to enforce, essentially, some of those provisions?

Katherine Mathieson: My view, personally, is that it would be extremely helpful because it would provide visibility as well as accountability and clarity in what is often seen to be a very complex area.

Q71 **Rebecca Long Bailey:** Dr Zecharia, do you want to add anything?

Dr Zecharia: It would be helpful, as long as it is done in the context of broader sector accountability and co-ordination and recognising that we are working with a complex sector, and different sorts of organisations will have different ways of making that progress; not on its own, but, yes, if it has the right oversight of implementation of legislation and monitoring diversity data—things that need to be happening at a system level—while recognising other forms of accountability. To use EDIS as an example, that is a membership organisation where we hold each other to account, and we recognise the importance of local high-level buy-in to

strategy and it is a space for shared learning. Both of those things are important in making progress.

Rebecca Long Bailey: Thank you very much.

Chair: Thank you very much indeed, Rebecca, and thank you to our two witnesses for their evidence in this panel.

Examination of witnesses

Witnesses: Dr Anders and Dr Montacute.

Q72 **Chair:** I now ask our final panel for this morning to join us at the table. I am pleased to welcome them. Dr Rebecca Montacute is the senior research and policy manager at the Sutton Trust, which is the charitable foundation that specialises in social mobility, with a particular interest in education. Dr Jake Anders is deputy director of the Centre for Education Policy and Equalising Opportunities at University College London. Thank you very much indeed for joining us this morning to give evidence.

Perhaps I could start with a question to Dr Montacute. Would it be correct to say that the education system is the origin of some of the problems we have been talking about in the lack of diversity and inclusion in STEM? How important is school-level education?

Dr Montacute: We know from the work of the Sutton Trust and others that inequality by socioeconomic background starts very early. Even before young children start at school there are disparities. Those disparities grow through their time in the education system. That continues through each stage. For instance, if we are looking at schools, there are questions around access to careers guidance from an early age and making sure that young people know that these careers are options for them. During their time in school there are questions about things like access to teachers and whether or not they are able to have specialised teachers in science; what their access is to that; whether they can do certain subjects, for instance access to things like physics at A-level.

There is the actual attainment gap going through school at each stage and the fact that children who are, say, on free school meals are less likely to get the attainment necessary to go to university. There are gaps in access to university obviously, and access to postgraduate study as well.

That said, it is definitely not all of the gap. There are also issues in who goes into the actual workplace and their progression within it. For instance, we have just had a report out today looking at access to engineering specifically by socioeconomic background. There are issues with access to the profession to start, but also access as people progress through it. Those from higher and managerial backgrounds are more likely to end up progressing to some of the top roles in engineering.

I forgot to say thank you very much for inviting me.

Q73 **Chair:** It is very good to have you here. Education is important, but you cannot leave it like that; it is not just about access but continuing progress. We have had some discussion about the importance and relevance of role models in attracting people to careers in STEM. Would you say something about what your research says about that in educational settings? How important are role models to attract and encourage people?

Dr Montacute: When we look at things like careers guidance, we know that having interactions when you are at school with people in different roles in the workplace is really important, making sure that you can see people doing those jobs and understanding what the role entails. We know through that and work on access to university that young people tend to say that seeing people similar to themselves when they are doing that kind of access work tends to make it appear more achievable and something that someone like them could go on to do. It is important that there is wide diversity among people doing that kind of outreach work.

Q74 **Chair:** If you think that is important, can you think of any specific actions that could be taken to make a real difference?

Dr Montacute: One thing we have seen in the report on engineering is that the perception of engineering helps it in lots of regards to be more socioeconomically diverse than a lot of other similar professions. We think that part of that is that historical thought about engineering is that it tends to be a bit of a working-class occupation and one that might be more accessible. We think that a lot of other sectors could improve their diversity by doing more to try to have the people in their sector they have already managed to bring in from more diverse backgrounds going out to do access work. They could celebrate where they have managed to bring people in and try to demystify a little bit the people already working in that field, and that there are some people, if not enough, from similar backgrounds to the wider population.

Q75 **Katherine Fletcher:** Thanks for your time. We appreciate you coming. Referring to one of your previous comments, I am struck by the idea that engineering is somehow working-class. Could you expand a little bit on what you mean, to allow me to understand where you are going with that? I helped to build a couple of the motorways in and around Manchester as a summer job. One chap of south-east Asian heritage used to run away when senior management turned up; otherwise, he would never have got any engineering done because he was being wheeled out as the example. I will not name him because he does not know I am talking about him on the record. Could you talk about that to make sure that we do not naff off a subset of the population? You know what I am getting at.

Dr Montacute: I definitely agree that on diversity there is always the issue that already a small number of people from that kind of background end up having to do all of the work and the heavy lifting. From the work we have done looking at diversity in wider firms, it is important that

senior management, no matter who they are, see issues like socioeconomic diversity as core for them to work on and take as being extremely important. They should be doing a lot of that work as well. That said, it is about balancing that against the need to make sure that you can have people seeing themselves where possible, and that you can do it where it is possible.

Q76 **Katherine Fletcher:** Is some of the lack of diversity in STEM coming from inequalities in STEM education, or would you say that it is primarily the role model question that the Chair asked?

Dr Montacute: A lot of it is in education. It will be different in each part of STEM. For instance, a few months ago through the Department for Education we did a piece of work, together with the Institute for Fiscal Studies, that linked up data from schools, through the national pupil database, about where people went to university, what courses they did and their outcomes later on.

It really differs between different bits of STEM in terms of who gets in and what the outcomes are. For instance, pharmacology is extremely good for social mobility in having good access and who gets into the course. Quite a few people from lower socioeconomic backgrounds do that course at university. The people who do it also have good outcomes in the workplace, whereas for things like maths and medicine far fewer go into it at university. It is much worse for access, so that is a real problem, but those who do will do really well when they go into the workplace. It is quite good in terms of overall social mobility for those reasons, even if they are not getting into maths and medicine. It depends on the exact bit of STEM you are talking about.

Q77 **Katherine Fletcher:** That is a great point. I was going off on a different tangent. There could be a perception that because we are teaching joint science qualifications in school it means there is a barrier for people being able to engage in a purer science route. Is that something that comes out? Is it the actual change in the qualifications or the optionality of the qualifications shutting down pathways too early?

Dr Montacute: Do you mean the difference between doing double and triple science?

Q78 **Katherine Fletcher:** Yes. I did them individually, but I am ancient.

Dr Montacute: I think I am right in saying that you can still do triple science at school, but one of the barriers is that access to it differs a lot by deprivation level and area of the country. For instance, people in schools around London and the south-east are much more likely to have access to triple science than people elsewhere, and less deprived schools are more likely to offer triple science. If you have had the opportunity to access less science in your time at GCSE, there is less chance that something picks up your interest; you have a bit less background going into A-level. I certainly see that acting as a barrier to young people seeing STEM as an option for them.

Q79 **Katherine Fletcher:** Do you think it is frowned upon within STEM research and STEM careers if you have double science only as a dual award and you have not specialised at an early age? Do you have any evidence about that?

Dr Montacute: We do not have any direct evidence on that. As a slight aside, I only did double science and I have a PhD in neuroscience, so it is definitely not a complete barrier; you can still do it, but if you have that lower base you might struggle a bit more when you are doing it at A-level. Maybe you have not covered some of the concepts someone else has. I certainly think that we should be giving as many kids as possible access to it. The problem is the difference in access at the core; the issue is that better-off kids are much more likely to have access to triple science.

Katherine Fletcher: Very fair.

Dr Anders: There is some evidence that looks at where people have done double or triple science at GCSE and the outcomes. As you say, it is not a determinant, but it is a predictor; it makes a difference to people's chances of making it on to more academic tracks that might help them to get into STEM at later stages.

Katherine Fletcher: Fair enough. Thank you.

Q80 **Carol Monaghan:** Dr Anders, we have received quite a lot of evidence that the UK needs to address the shortage of STEM-qualified teachers. How are we going to address that?

Dr Anders: It is a very difficult question. Part of the problem is a broader shortage of teachers and recruitment challenges in teaching more broadly. The solutions have to start from that wider section, but it is particularly acute in the context of STEM subjects. Part of the reason is that the outside options and what they can do as an alternative career are stronger. Where there have been programmes that have tried to address that, with phased bursaries and things like that, they help with retention while they are going on, but they do not seem to have a longer-term continuing impact, which makes them a very expensive way of trying to do it, because it means you cannot just use them to attract people and hope they will want to keep doing it. You have to keep pushing people into doing it.

An important angle is that there is much less of a problem of a shortage of those teachers in schools with a higher SES intake. They are able to recruit such teachers, as it is easier for them to recruit other teachers, so in my view a lot of this comes to the wider point about teacher recruitment and retention, as well as thinking of it in those specific terms. The financial things are important, but there are also the non-financial pull-and-push factors for people in deciding whether they want to teach more generally.

Q81 **Carol Monaghan:** If we are looking at the numbers of young people

deciding to choose STEM subjects at school and beyond, does a qualified teacher in that STEM subject make a difference, as opposed to somebody who has retrained?

Dr Anders: I am not aware of a study that draws that specific conclusion. Linking up the data to answer that question is quite a challenging thing to do. I can write to the Committee if I become aware of something.

Q82 **Carol Monaghan:** Dr Montacute, do you have any information on that?

Dr Montacute: Not specifically on their likelihood of going on to do STEM, but we know that those with subject expertise are strongly linked to how effective they are as teachers in that specific subject, which will then feed into the attainment of young people. That in and of itself feeds into how likely they are to be able to go on in terms of their attainment.

Q83 **Carol Monaghan:** Are there any countries that the UK should look to in learning lessons from STEM education?

Dr Montacute: One of the issues that we as an organisation have consistently highlighted is that a lot of other countries have much stronger roots through apprenticeships as a dual option. Apprenticeships can also be an important route into STEM careers and professions. Looking again at engineering as an example, that is a potential way for lots of people to go into that field, which can be better suited to some young people. There are lots of other countries—for example, Germany and Switzerland—where they have much stronger apprenticeship systems and it is a more realistic option for young people to go into. That is a good one for us to look to in terms of improvements.

Q84 **Carol Monaghan:** Considering apprenticeships for a second, and looking at countries like Germany, are they doing better on inclusion with their apprenticeships? Some studies show that only about 8% of apprenticeships in the engineering and energy fields are undertaken by girls and young women.

Dr Montacute: That is a good question. I am not sure. In general, when something is in smaller numbers in terms of opportunities, at least for socioeconomic background it tends to be those with better ability to seek them out and manage to access them. With degree and higher-level apprenticeships, we found that in the UK there are not very many available, so it tends to be quite hard to get into them. I imagine that greater numbers of opportunities could help in lots of ways in diversity, but I do not know specific numbers on that.

Dr Anders: Some of the high status degree and higher-level apprenticeship-type qualifications are certainly more socioeconomically selective. I do not think they are always what people think of when they talk about apprenticeships, but expanding and maintaining the quality of those in order that they maintain the prestige they have started to build up is important.

Carol Monaghan: Thank you.

Q85 **Zarah Sultana:** Dr Anders, other than it being the right thing to do to be representative of the population, what are the benefits to society of combatting the structural inequalities we are talking about and having greater access to science, education and careers advice for young people to pursue a career in STEM?

Dr Anders: Other than saying it is the right thing to do, which is first and foremost an important point and I do not want to suggest I am ignoring that, we heard briefly from an earlier panel that a lot of things get overlooked in the process of scientific inquiry. To take one particular aspect, if diverse voices are not in the room, they are not setting the research questions and not noticing the things that are important to serve all of our communities—for example, in science and technology development.

Some of the problems we have seen of AI being less likely to recognise people from ethnic minority backgrounds, for example, would have been much less likely to be a problem if there had been a more diverse community in the room when those things were happening. There is some kind of organisational research as well that suggests that the productivity of teams is helped by having a more diverse mix of people in all sorts of different ways. For me, those are crucial instrumental reasons for wanting to increase diversity in this way.

Q86 **Zarah Sultana:** I want to touch on a question asked by Rebecca in a previous panel. There have been so many reports. There have been two Royal Society reports that touch on racial and gender inequalities in STEM. There is also a Sutton Trust report. People know that there is a problem; this is not something new. What is the issue? Why is it taking so long to address some of these representation issues in STEM? Will it take a legal obligation, for example in the form of quotas? I am trying to understand what stops people doing something about this.

Dr Anders: It takes a long time, as people have said. There are lots of points on this and I will probably make more. So much of it is embedded so early in the education system. It is there before school; it is there in choices. Therefore, trying to fix it late is hard. The net-zero analogy is apposite in that way as well. It is not something we can change rapidly; we have to change it at structural level in order that more people want to go into these careers and jobs.

At the moment, there are some people who want to do these things and things have got in the way which mean they do not want to. Some people do not realise that they want to do these things because they never saw them as options, and it would not be right for us to say, "You're going to have to go into STEM now anyway." We have to accept that it is not something we can fix quickly, but that is not an excuse for not trying to push it forward at a good pace and making sure that we track progress.

There is a balance between saying every so often, "This is a big problem. Why is nothing happening about it?", and saying, "We have to fix it in two years." We need to make sure that we see incremental progress and have the data available to track that, which is a big challenge. We can see that quite well in the education sector, but we see it way less well beyond that sector.

Q87 **Zarah Sultana:** How would you measure and define greater social mobility within STEM education, academia and industry?

Dr Anders: One important thing is that it needs to be multidimensional in the sense that it needs to take into account gender, ethnicity and socioeconomic status, and it needs to take into account the intersection of those. The patterning across those groups at the moment is already not clear. There are fewer women in STEM occupations, but the combination of certain gender and ethnic minority groups means that there are more women from a particular ethnic minority group than men. It is a complex picture, but that is what we have to try to do. I realise that is an annoying answer.

Q88 **Zarah Sultana:** I understand in the sense that in the BAME picture, for example, you really have to look at the specifics because people from black backgrounds in particular are very under-represented, but for Asian groups the data is different. I agree that you need to look at it in a granular way. Dr Montacute, do you want to add anything?

Dr Montacute: On the general issue of diversity and why it is taking so long and whether we will be back here in 10 years, STEM has not always taken socioeconomic diversity specifically as seriously as some of the others—for instance, gender, which has had a longer-running focus on it. We found that in engineering it was quite difficult to get firms even to take part in the research because they were thinking, "Our focus is on gender and we need to think about gender." I echo Jake's point that you cannot do these things in isolation; you need to look at them together. I think that STEM is slowly catching up on socioeconomic diversity and seeing it as something that should be considered very important.

Q89 **Zarah Sultana:** You mentioned free school meals as an indicator of looking at social mobility. Do you still think that is a good indicator to use? I am thinking of growing levels of poverty, people not being able to access the benefits system or register for free school meals and the kids who get lost in the system. In 2022, are free school meals still the right measure at the very beginning to look at social mobility going forward?

Dr Montacute: That is a really interesting question. One of the reasons researchers tend to use it so much is its availability in datasets, but we know that things like persistent disadvantage tend to have even worse outcomes. Things like who has been eligible for free school meals over a longer period of time can be quite a good and effective way to look at that.

One big issue we tend to have is following through schools into university and then into the workplace, because the measures do not always perfectly track together. One thing we were able to do in the work with the IFS that I mentioned was to link up who was eligible at school for FSM and then what happened to them at university, which can be quite challenging to do.

In the workplace, we do not recommend primarily using free school meals because they have not been in place for everybody who is in the workplace at the moment. It can be quite difficult for people to remember. In the workplace we tend to focus on parental occupation as the one thing that organisations should ask of their staff. People tend to be able to remember what kind of job their parents did when they were about 14. That gives us information about both the likely level of income in that household and wider questions around social capital and so on. That tends to be what we focus on in the workplace.

Dr Anders: On the free school meals point, a really big challenge is that it captures the bottom of the distribution, and that's it. There is a huge group of the population above it, but it focuses us on that distinction and means that quite often we ignore other important distinctions further up the distribution.

Q90 **Zarah Sultana:** Is there any research or data on the impact of the tripling of tuition fees back in 2012 and how that might have changed people's ideas about whether or not to go into STEM? What is the impact of an increasingly more expensive higher education system on people from lower socioeconomic backgrounds pursuing those careers?

Dr Anders: I do not know about STEM specifically. The reforms that brought in the higher tuition fees, because of the greater package of loans and grants made available at the same time, tended to be supportive of the aspiration to go to university rather than detrimental. There was more than one reform in there at the same time. I am afraid I do not know about that particularly for the STEM point.

Dr Montacute: My worry would probably be more about the impact fees can have on access to postgraduate study, because there is not the same kind of package of wider support. We did a bit of work on that last year. While the loans introduced a few years ago for masters have had a really good impact on access, at the same time the fees that universities are charging have gone up quite considerably. In England, the amount of money given is not enough to cover both fees and maintenance at the majority of institutions. Wales has a much better and more comprehensive package than England. I would say that making sure that access to postgrad is reformed and that the barriers there are removed would be important.

Q91 **Zarah Sultana:** When you are looking at postgraduate education, is work being done on the impact of precarious short-term contracts within academia and the impact that has on disadvantaged or under-

represented groups?

Dr Montacute: We have not looked at that specifically and I am not sure there is direct evidence on how it would impact socioeconomic disadvantage. I can definitely imagine from work we have done on things like unpaid internships that not having financial security will have more impact on people from backgrounds where they do not have money backing them up to be able to take that chance. Anything that can increase security for those people is likely to help with access.

Q92 **Katherine Fletcher:** I want to be a little bit challenging. This is not directed at our two witnesses at all. I am very appreciative of your time. Throughout the whole of this session, I have been listening to shocking fact after shocking fact. I am galvanised and ready to run out the door and do everything that this office allows me to do to solve the problem, but I cannot get my to-do list together. Do you see what I mean? I hear that there are different ways to measure the data and different proposals, as we heard from the previous panel. What is a girl like me to do to get my to-do list to help start to solve this problem?

Dr Montacute: If I were to give you an immediate to-do list now, my top things would be that, first, for the whole education system there should be more focus on the early years, making sure that more of the practitioners there have the qualifications they need in English and maths. There should be reform of the 30-hour policy at the moment. Some of the lowest income children cannot access 30 hours of early education for three and four-year-olds. I would change that and make it universal for all three and four-year-olds.

In schools, I would look at teacher recruitment and retention specifically for STEM subjects, making sure that disadvantaged communities have access to good-quality, specifically qualified STEM teachers. For access to university I would look at some of the courses with the worst access rates, for example medicine, and what you can do. It will differ with each course. With medicine there are issues like access to work experience and the need to widen that, so I cannot give you specifics. It is a matter of looking at the worst-access courses and what you can do. Reform postgrads so that you give people proper support and allow everyone to access it. In the workplace itself, have people monitoring socioeconomic background so that you can see where the challenges are and start to look at ways to address that. Hopefully, that is helpful as a start.

Q93 **Katherine Fletcher:** There are two macro elements in there: increase the size of the pool to pick from, and help the people who are very nearly there with specific and targeted support in STEM. Dr Anders, would you like to add anything?

Dr Anders: I was hoping that Becky might forget one of those. I endorse all of them. Could I say something about information, advice and guidance on those points as well? That is something that gets held up a lot and it is important.

The evidence is that it works only when you are pushing at an open door, in the sense that the person just needs to be made aware of these things but there are not structural barriers in front of them that mean it is harder for them to take that course of action. For example, with triple science, it is all very well if that is what you want to do, but if your school does not offer it, that does not help. If you want to apply to a STEM course at university that requires you to do some extra tests or something like that, you need more than just advice; you need someone to help support you through some of those processes, because individuals from more advantaged backgrounds will be getting that support, and where that support is different is important.

Q94 **Katherine Fletcher:** Thank you. Both of you are commenting on opening the door wider and hoping that the pull will go through. Perhaps later on in the inquiry we can look at what we can do to pull up. I am not a total believer in, "Build it and they will come," but that was very clear and totally answers my question, which is helpful.

Dr Anders: One other point that occurs to me is that our education system is quite an unforgiving one, in the sense that, once you are off track from a way you were interested in going, it is quite hard to get back on it. If you have chosen the "wrong" subjects at GCSE, it is pretty hard to get back there at a later stage. An education system that was more forgiving of that would make a big difference to some of these sorts of issues.

Q95 **Katherine Fletcher:** You mean things like T-levels, for example; a practical way. I presume that as they are so new there is not a published route for where you would effectively step out, do a T-level and then go back into academia.

Dr Anders: I do not know enough about how they're going to work in practice.

Q96 **Katherine Fletcher:** They are very new, but I think they are addressing the point that you are not just doing GCSEs, A-levels, undergrad, masters and postgrad. We need to create another route if you have a STEM mindset. If you have a biological mindset and you did not pick biology at 13 then you're right, you're out.

Dr Anders: If they can provide that route that is to be welcomed.

Katherine Fletcher: I appreciate that. Sorry, Rebecca.

Chair: Thank you, Katherine. Finally, Rebecca Long Bailey.

Q97 **Rebecca Long Bailey:** Finally, have you seen evidence of a cross-cutting Government strategy to address questions of social mobility, skills and education, and what do you think of it?

Dr Anders: A potentially welcome development is the move of the Social Mobility Commission into the Cabinet Office. That has the potential to frame those issues as bigger and more cross-cutting. I do not think we

have seen enough about whether that is what is happening, and that is what is developing as a result, for me to say that it worked and that means that there is a cross-government strategy.

I would be a bit sceptical of the idea that there is a strong enough animating mission on these issues that brings people together across Departments to solve them. In particular, the structural separation between the education system and the issues we have talked about after education is always a challenge.

Q98 **Rebecca Long Bailey:** Dr Montacute?

Dr Montacute: I broadly agree with that. Some bits of Government policy are promising and could help with some of the issues we have talked about. In the levelling-up White Paper, things like having education investment areas and retention payments for teachers linked to those areas could be helpful in tackling some of the teacher retention problems, with all of the caveats and issues Jake pointed out in what happens over the longer term to keep people in that field.

That said, I am not sure that with a lot of these things there is an overarching strategy to tackle them. Careers advice and guidance is a good example. The national strategy has lapsed and has not been replaced, and there is not one that goes across multiple Departments to make sure they are working together coherently so that all the various bits of the careers guidance system join up together. A lot more could be done to make sure that some good individual parts are being joined up properly and are working as a coherent strategy.

Q99 **Rebecca Long Bailey:** My final question is very wide reaching. In an economy that is becoming increasingly more focused on STEM, what would be the consequences of letting structural inequalities and similar challenges, such as the need to increase social mobility and equip children with the skills they need to pursue STEM careers, go unaddressed? You can cover everything from the impact on the STEM sector generally to the impact on wider society and what you see as the wider economic impact, or the exacerbation of regional inequalities in particular.

Dr Anders: As you say, it is a sector that continues to expand and grow. There will be challenges in getting the skills that are needed if the diversity of the pool is not widened; it just gets harder and harder. If those are the jobs that end up being more highly valued and so on, and have some great economic benefits, and you are left outside the tent, that will be divisive within society potentially.

Q100 **Rebecca Long Bailey:** Dr Montacute?

Dr Montacute: I broadly agree with that. The really big challenge is that it will have an economic impact if you are not getting all the talent that needs to get into the room. If in your company you never employ the person who invents the thing that becomes your major product, or if in

your research lab you never bring in the person who gets the important breakthrough that means you can start treating something you would not otherwise have treated, it has a human and economic impact. Making sure that those people have the chance to get into those rooms is important.

Regionally, if you are not allowing people in all regions of the UK to make the best of their talent and to be able to make that economic contribution, that also has impacts on those regions and is not conducive to levelling up either. I agree there is an economic and regional impact in not doing so.

Rebecca Long Bailey: Thank you very much.

Q101 **Chair:** Reforms to the higher education funding system are expected imminently and some of those are germane to our inquiry, particularly foundation courses for access to degrees. In your view and experience, has the foundation course model proved itself, or given that you could put the same money into access courses, for example, and probably involve more people, is that a better use of it? Do you have any perspective on that?

Dr Montacute: We have not done a huge amount of work on that, but we looked into it a little bit a few years ago, so I can give my partially informed perspective, hopefully, from that work.

Some foundation courses seem to be of fairly low quality, whereas some are doing good work to bring people in and make sure that they are bringing about access. In general, our preferred approach would be to make use of contextualised offers to university, so that you take into account the contextual background of somebody when making an offer and put in place additional support during the time they are at university to help them, if there are places where they need extra support. Money-wise, that is likely to be a better use of money. It is more targeted. You can do it alongside their first year. You do not have to support them maintenance-wise for an additional year, and it is better for young people to be able to feel they are continuing through the education system.

Q102 **Chair:** Thank you. That is very helpful. Dr Anders, do you want to comment?

Dr Anders: I agree with all of that, although I would come back to a point I made earlier about the unforgiving nature of the education system. To the extent that they can provide useful routes for people who think they need that preparation—they have gone down a different route; they do not want to go straight into the first year and, perhaps with additional support, they would welcome a foundation year as a way to bring them into the higher education track—I think they have a strong potential.

Q103 **Chair:** Are access courses less well geared to correcting the unforgiving aspect of the system that you mentioned, or can access courses do that

as well as foundation courses?

Dr Anders: They can potentially. It comes back partly to the point Becky made about the variable nature of some of these things. I do not know the evidence well enough to distinguish that point.

Chair: That concludes this morning's evidence. We have got our inquiry off to a flying start, with some very useful specific facts to understand the problems we are dealing with, as well as some suggestions for directions and solutions.

I am very grateful to all of our witnesses this morning, in particular Dr Anders and Dr Montacute, the last panel. Thank you very much indeed. That concludes this meeting of the Committee.