

DEBATE PACK

Number CDP-0045, 22 March 2021

Science and Discovery Centres' support for education in science and careers in STEM subjects

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Summary

A Westminster Hall debate on the 'Science and Discovery Centres' support for education in science and careers in STEM subjects' has been scheduled for Wednesday 24 March 2021 from 2:30pm. The debate has been initiated by Dr Ben Spencer MP.

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1. Background

1.1 What is STEM?

STEM stands for science, technology, engineering, and mathematics. When used in an educational context, the term generally means the study of these subjects, either exclusively or in combination. It might also refer to the study of ICT, computing, or design and technology.

In employment, STEM refers to jobs requiring the application of science, technology, engineering and mathematics skills, or a qualification completed in a relevant subject, industry, or sector. It can also be used to refer to occupations related to medicine and health.

1.2 STEM in schools: impact of Coronavirus pandemic

School trips and participation in external events

Schools in England are currently fully open. However, the DfE currently advises against any educational trips and visits. This has been the position for much of the pandemic, although schools were able to resume domestic daytime visits at the beginning of the autumn term in 2020, subject to risk assessment.

The Department for Education has published guidance for out-of-school education providers.

Financial support for providers affected by pandemic restrictions on school trips

The Government set out the support available to science and discovery centres affected by the pandemic in response to an October 2020 parliamentary question:

Science and Discovery Centres in England have access to the unprecedented support the Government has announced for business and workers, to protect them against the current economic emergency. Many are also part of museum groups or are heritage sites. Museums and heritage organisations can access over £200 million of coronavirus support schemes from Arts Council England and the National Lottery Heritage Fund. Some centres may also be eligible for support from the £1.57 billion investment to protect cultural and heritage organisations announced by Government on 5 July.²

Also in October 2020, the UK Association for Science and Discovery Centres (UKASDC) co-ordinated an <u>open letter</u> to the Government, calling for £25 million of emergency financial support for the sector. The letter, signed by

Department for Education, <u>Actions for schools during the coronavirus outbreak</u>, 16 March 2021.

² PQ HL8714, 19 October 2020.

157 STEM professionals, said the sector was at "imminent risk". It continued:

As things stand today, 96% of Science and Discovery Centres say they cannot cover costs when they reopen as their capacities are reduced by up to 75% to enable social distancing [..]

We, like so many UK businesses, have benefited from the government's valued job retention scheme and reduced VAT. Many Science Centres have made significant staff redundancies and taken out loans. However, Science Centres are also charities, with science and environmental education and public engagement missions. Surely we want to protect this precious national asset to continue to engage young people with science for years to come, contributing to the future success of the UK.

It was deeply disappointing to learn that Science and Discovery Centres had been largely excluded from the remarkable government support being made available to other cultural organisations in similar dire straits. Science and Discovery Centres work to place science at the heart of our culture in the UK, and yet were largely excluded from the arts, heritage and culture rescue package of £1.57 billion. [...]³

A data sheet published alongside the letter states:

- Over 25 million people each year visit UK science centres and museums annually. Of these, more than half were women and girls.
- Around 8 million school-age children and adults annually visit "the Science and Discovery Centres that are excluded from applying for central government grants (those open to heritage, museums, theatres and the arts) and are at risk."⁴

1.3 STEM A-Level entries

On 13 August 2020, the Campaign for Science and Engineering, which represents over 115 scientific organisations, published an <u>analysis of 2020</u> A-level entries. It found that the core STEM subjects of biology, chemistry and physics saw a small drop in entries but still remain among the most popular subjects. Maths remained the most popular subject for students and saw an increase in the number of entries.

In England the proportion of A-level students entering any maths or science subject increased from 35% in 2015/16 to 46% in 2019/20. The proportion studying three or more of these subjects at A level went from 15% to 19% over the same period. There were increases in all individual subjects. Boys were more likely to study one or more maths or science subject; 55% did so in 2019/20 compared to 39% of girls. The only major science subject with more girls than boys is biology, although the entry rate for chemistry was only slightly lower for boys. Boys were around eight times as likely to study computing at A level than girls and more than four times as likely to study Physics. ⁵

³ UK Association for Science and Discovery Centres, <u>Open letter to Prime Minister</u>, <u>Chancellor and Secretary of State to ask for Resilience Funding for Science Centres</u>, October 2020.

⁴ UK Association for Science and Discovery Centres, <u>data sheet</u>, undated.

⁵ A level and other 16 to 18 results 2019/20, DfE

1.4 Further Education White Paper: Skills for Jobs

On 21 January 2021, the Government published a white paper setting out reforms to post-16 technical education and training: Skills for jobs: lifelong learning for opportunity and growth. It contained a number of proposals related to STEM, including the continuation of the roll-out of T Levels and the expansion of the Institutes of Technology programme. An overview of the white paper can be found in the Library briefing FE white paper: Skills for Jobs for Lifelong Learning for Opportunity and Growth, 28 January 2021.

T levels are qualifications based on employer-led standards that offer a technical alternative to A Levels for 16 to 19 year olds. Three T Levels in the Health and Science route will be available in 2021-22 (Health, Healthcare Science, Science). During the 2-year programme, students will develop the core knowledge and skills that are needed for entry to a range of science occupations. The library briefing T Levels: Reforms to Technical Education, 16 December 2019 gives an overview of T-Levels.

Institutes of Technology are collaborations between further education colleges, universities, and employers. Their objective is to deliver higherlevel technical education with a clear route to high-skilled employment focusing on STEM skills in areas like advanced manufacturing, infrastructure, digital, and life sciences. They aim to target disadvantaged groups in their local areas and increase the representation of women in STEM in order to help close skills gaps.

1.5 Skills shortages

On 24 October 2019, the Industrial Strategy Council published a research paper titled UK Skills Mismatch 2030. It noted that there will be "acute shortages of specialist skills in STEM and health services by 2030." The paper argues that these shortages are "likely to show up in terms of both knowledge (for example, mathematics) and workplace skills (for example, scientific research and development (R&D), and advanced IT skills)".7

A 2020 report published by the Confederation of British Industry demonstrates that "upskilling and retraining people to give them the skills they will need to succeed will cost an additional £130billion by 2030."8

In 2018, STEM Learning, which provides education and careers support across the UK, found that existing shortages in STEM skills are costing businesses £1.5 billion a year in recruitment, temporary staffing, inflated salaries, and additional training costs.

1.6 STEM in Higher Education

STEM subjects are recognised as having strategic importance in higher education (HE) for the economy and employers. The Office for Students distributes extra government funding to Higher Education Providers (HEPs) in England for the study of STEM subjects:

⁶ Industrial Strategy Council, UK Skills Mismatch 2030, 24 October 2019, p28.

⁷ Industrial Strategy Council, UK Skills Mismatch 2030, 24 October 2019, p29.

⁸ CBI, <u>Learning for Life: Funding a world-class adult education system</u>, October 2020, p8.

We provide institutions with funding for high-cost subjects. These are subjects where the tuition fee alone is not enough to meet the full costs of its delivery.

High-cost subjects include laboratory-based science, engineering and technology subjects. In addition, we have provided funding to help secure the provision of four very high-cost STEM subjects, chemistry, physics, chemical engineering, and mineral, metallurgy and materials engineering

Many HEPs offer summer schools and outreach programmes to give young people the experience of studying a STEM subject at university, including the <u>University of Cambridge</u>, <u>Imperial College London</u>, and the <u>University of Sheffield</u>.

1.7 Equity in STEM

On 23 June 2020, The All-Party Parliamentary Group (APPG) on Diversity and Inclusion in STEM published a report titled <u>Equity in STEM education</u>. It followed a 15-month inquiry on whether the education system and schools provide equal opportunities for students of all ages to learn STEM subjects in England. The report made six recommendations:

- A Minister responsible for addressing inequity within the education system
- STEM education that is more relevant to the lives of all young people
- Greater action to address teacher shortages in STEM subjects
- Full implementation of changes to careers support and guidance, as suggested by the Careers Strategy for England (2017)
- Steps to address the existing inequalities in provision of Double Award and Triple Science at GCSE
- A review of fundamental changes to STEM GCSEs which considers equity issues.

The APPG is currently undertaking an <u>inquiry</u> into equity in the UK STEM workforce. A final report will be published in summer 2021. Prior to the inquiry, the APPG published a <u>Data Analysis Brief</u> on the diversity of the STEM (including health) workforce as it stood in 2019. The key findings include:

- 18% of the UK workforce work in STEM occupations
- 65% of the STEM workforce are white men
- The STEM workforce has a lower share of female workers than the rest of the workforce (27% vs. 52%)
- The share of ethnic minority workers in STEM is on a par with the rest of the economy.

2. Parliamentary Material

2.1 Parliamentary Questions

Minerals: Higher Education

05 Mar 2021 | 160725

Asked by: Steve Double

To ask the Secretary of State for Education, what steps he is taking to improve the (a) availability and (b) quality of university courses related to the UK's industrial critical minerals needs.

Answering member: Michelle Donelan | Department: Department for **Education (DFE)**

It is one of the government's highest priorities and an important manifesto commitment to drive up quality and standards in higher education (HE), which is a fundamental part of our levelling up agenda. We owe it to all our students, wherever they are from, that at the very least they can expect a minimum standard of excellence that is going to lead to a qualification that will improve their future prospects and help them achieve their life goals.

In order to be registered with the English HE regulator, the Office for Students (OfS), HE providers in England are required to meet a minimum set of requirements. These are designed to ensure that all students receive a high-quality academic experience, students' interests are protected and that students' qualifications hold their value over time. Providers must deliver successful outcomes for all their students, which are recognised and valued by employers, and/or enable further study. The government welcomes the recent OfS consultation on regulating quality and standards in HE and expects the OfS to progress rapidly to ensure that a robust and enhanced quality regime will be operational as soon as possible.

The OfS provides funding to support high-cost science, technology, engineering, and mathematics (STEM) subjects, which will include high skilled jobs in the minerals industry. Further details can be found here: https://www.officeforstudents.org.uk/advice-and-guidance/skillsand-employment/supporting-stem-subjects/.

The Strategic Priorities Grant, formerly referred to as the HE Teaching Grant, will play an important role in supporting providers and students to develop the skills and knowledge needed locally, regionally, and nationally to support the economy. My right hon. Friend, the Secretary of State for Education, has asked the OfS to reform the Grant for the 2021-22 financial year, to ensure that more of taxpayers' money is spent on supporting HE provision which aligns with national priorities, such as healthcare, STEM and subjects meeting specific labour market needs.

The OfS will consult on these changes before final allocations for the 2021-22 financial year are confirmed.

We are also reforming higher technical education to make it more prestigious and popular so that it delivers the skills employers need. We will introduce high-quality, nationally recognised approved higher technical qualifications that meet employer needs, starting with the digital route from September 2022.

STEM Subjects: Further Education

10 Nov 2020 | 109394

Asked by: Colleen Fletcher

To ask the Secretary of State for Education, what estimate his Department has made of the number of students studying STEM-related courses in further education colleges in each of the last five years.

Answering member: Gillian Keegan | Department: DFE

Table 1 in the attached file provides the number of learning aims (i.e. courses, programmes, qualifications and units) taken in STEM-related sector subject areas in education and training provision for each academic year between 2014/15 and 2018/19 and covers all further education (FE) providers. In addition, Table 2 provides apprenticeship participation on STEM-related apprenticeships delivered at FE and tertiary colleges. Both tables include students of all ages for learning in England.

Figures for the full, final 2019/20 academic year are due to be published in our next 'Further Education and Skills' statistical release later this month. The exact publication date will be announced on gov.uk soon.

Science: Coronavirus

19 Oct 2020 | HL8714

Asked by: Lord Bradley

To ask Her Majesty's Government what additional resources they will make available to UK Science and Discovery Centres in the light of the COVID-19 pandemic.

Answering member: Lord Callanan | Department: Department for Business, Energy and Industrial Strategy (BEIS)

Science and Discovery Centres in England have access to the unprecedented support the Government has announced for business and workers, to protect them against the current economic emergency. Many are also part of museum groups or are heritage sites. Museums and heritage organisations can access over £200 million of coronavirus support schemes from Arts Council England and the National Lottery Heritage Fund. Some centres may also be eligible for support from the £1.57 billion investment to protect cultural and heritage organisations announced by Government on 5 July.

STEM Subjects: Higher Education

06 Oct 2020 | HL8391

Asked by: Lord Taylor of Warwick

To ask Her Majesty's Government what steps they are taking to increase the diversity of students taking STEM subjects at university.

Answering member: Lord Parkinson of Whitley Bay | Department: DFE

Studying science, technology, engineering, and mathematics (STEM) subjects has an economic benefit for individual students as well as society at large. Ensuring that anyone, regardless of their background, has the opportunity to pursue a career in these areas is a priority for this government.

We have undertaken a behaviourial insight trial of 11,000 pupils to gain a better understanding of why there is a low participation of female students in STEM subjects and to identify the best ways to redress this.

In mathematics, we have invested £76 million in the Teaching for Mastery programme. This programme aims to reach 11,000 schools across England by 2023 and equip all young people, regardless of their background, with the mathematical knowledge and skills they will need for employment, further study, and everyday life. This is further supported by our Advanced Maths Support programme, which aims to increase participation in the post-16 study of mathematics, with a specific focus on the participation of girls and disadvantaged pupils.

In science, we have committed funding to the Stimulating Physics Network to improve the teaching of science for all pupils. This includes a specific programme to improve gender balance. We have also developed the Isaac Physics online learning platform to improve GCSE and A level physics students' attainment, and to increase the numbers of students from disadvantaged backgrounds who choose to study physics at university.

In September 2020 we introduced T levels, new post-16 technical programmes which have been designed to give all young people a highquality route to skilled employment and higher technical training such as degree apprenticeships, including for key STEM-related subjects.

Universities and other higher education providers wishing to charge higher levels fees must have an access and participation plan agreed by the regulator, the Office for Students. Through these plans, universities set out how they will support students from disadvantaged backgrounds and under-represented groups to access and successfully participate in higher education.

We will continue to invest to in all stages of education to ensure that people with an interest in, and talent for, STEM courses are able to pursue them at university if they wish to do so.

Department for Digital, Culture, Media and Sport: Cybercrime and Digital **Technology**

17 Jul 2020 | 72907

Asked by: Chi Onwurah

To ask the Secretary of State for Digital, Culture, Media and Sport, how much funding his Department has allocated to (a) digital skills and (b) cyber skills; and to whom that funding has been allocated.

Answering member: Caroline Dinenage | Department for Digital, Culture, Media and Sport (DCMS)

Since 2018 the government, through DCMS, has provided £9.1 million of funding for digital skills. This has been allocated to:

- Degree conversion course programmes (£3.3 million) in data science and artificial intelligence with the office for students. Further funding is due in subsequent years for up to 1,000 scholarships to open up opportunities for people from diverse backgrounds.
- The Fast Track Digital Workforce Fund (£3 million), a digital skills pilot programme covering the Greater Manchester Combined Authority and Lancashire Local Enterprise Partnership (LEP) areas to boost digital skills training (including cyber security, software development and digital marketing).
- The Digital Skills Innovation Fund (£1.1 million) for LEPs and Combined Authorities for initiatives that aim to help women, disabled people, and residents in poorer wards get into digital roles or further training and The Digital Inclusion Innovation Fund (£400,000) to help older and disabled people acquire digital skills.
- Six Local Digital Skills Partnerships (£900,000) that bring together cross-sector regional and national partners to upskill the current workforce.
- The Grenfell Digital Skills programme (£300,000), which has been made available to the survivors and bereaved to learn digital skills.
- Code4000's Coding in Prisons programme (£100,000), supporting their expansion from HMP Humber and HMP Holme House, to other prison sites across the UK and funding support for graduates upon release in finding employment.

In addition to this DCMS has also funded research into digital skills.

Through the £1.9bn National Cyber Security Strategy, government has funded a range of initiatives to support the development of home-grown cyber security talent. This includes funding for the Cyber Discovery Schools Programme to inspire the next generation of cyber security talent and through the Cyber Skills Immediate Impact Fund to increase opportunities for individuals to retrain and upskill for a career in cyber security.

For national security reasons we are unable to detail individual funding by department or initiative.

Science: Finance

16 Jul 2020 | 45300

Asked by: Tommy Sheppard

To ask the Secretary of State for Digital, Culture, Media and Sport, what assessment he has made of the potential merits of the UK Association for Science and Discovery Centres' Proposal for an Emergency Resilience Fund for UK Science Centres; and if he will make a statement.

Answering member: Caroline Dinenage | Department: DCMS

Science and discovery centres around the country have an important role in educating, inspiring and entertaining visitors of all ages on what science is and the important discoveries over the centuries that have changed all our

Science centres in England have access to the unprecedented support the Government has announced for business and workers, to protect them against the current economic emergency. This includes the Job Retention Scheme, which science centres have benefited from, VAT payment deferrals, and £330bn worth of government backed and guaranteed loans to support businesses. The Chancellor has also announced a Bounce Back loan scheme to help small businesses access loans of up to £50,000, with a 100% government-backed guarantee for lenders. Additionally some of the members of the ASDC - specifically cultural institutions like museums - may be eligible to apply for support as part of the £1.57 billion investment announced earlier this month.

Science centres outside England may be eligible for further support from the devolved governments for example some centres in Scotland may eligible for additional support from the Scottish Government.

Science: Coronavirus

09 Jun 2020 | 54244

Asked by: Anneliese Dodds

To ask the Secretary of State for Digital, Culture, Media and Sport, with reference to the covid-19 outbreak, what plans his Department has to provide support for the independent science centres sector.

Answering member: Caroline Dinenage | Department: DCMS

We recognise that these are extremely difficult conditions for attractions such as independent science centres. These organisations educate and entertain visitors of all ages on what science is and the important discoveries over the centuries that have changed all our lives.

Businesses and workers in the independent science centres sector can access the Government's comprehensive economic support package. This includes the recently extended Coronavirus Job Retention Scheme, the Bounce Back Loan scheme, VAT payment deferrals for firms and £330bn worth of government backed and guaranteed loans to support businesses.

My Department has established a Cultural Renewal taskforce to prepare guidance to help our sector's businesses, including attractions, reopen safely. We will continue to engage with industry to assess how we can most effectively support the attractions sector through this crisis and beyond.

Productivity

16 Jan 2019 | HL12721

Asked by: Lord Taylor of Warwick

To ask Her Majesty's Government what steps they are taking to improve labour productivity in the UK.

Answering member: Lord Henley | Department: BEIS

Raising labour productivity is at the heart of the Government's Modern Industrial Strategy. The strategy aims to improve labour productivity by encouraging innovation, developing high quality jobs, supporting UK businesses and fostering growth in all parts of the UK.

A year into the Industrial Strategy we have made significant progress towards these goals, including:

- **Investing substantially in skills** We are designing a National Retraining Scheme to support adults impacted by automation, investing £406 in STEM and technical education for people of all ages as well as introducing new T levels to provide a technical alternative to A levels, in addition to our reforms to apprenticeships.
- The biggest increase in R&D funding ever we have committed an extra £7bn by 2023/24, including £2.7bn already allocated to innovative programmes supporting industry and researchers through the Industrial Strategy Challenge Fund.
- Record investment in infrastructure with £37bn committed through the National Productivity Investment Fund by 2023/24. This includes £2.45bn for Transforming Cities and £1bn in digital infrastructure.
- Publication of Nine Sector Deals, supporting billions in investment from the public and private sector and important sectoral reforms on issues such as technology diffusion and workforce diversity. A further three deals are being negotiated.
- Announcement of the first 'missions' under the Grand Challenges, aiming to galvanise action on ambitious and specific goals in AI & Data, Clean Growth, the Future of Mobility and Ageing Society. This includes a second clean growth mission to decarbonise industrial clusters.

3. Press Articles

3.1 News Articles

Government must urgently reconsider research budget cuts

FE News

16 March 2021

Universities warn over £1bn bill for staying in EU research programme

Financial Times

16 March 2021

UK set to miss R&D spending target after funding cuts, researchers warn

Financial Times

15 March 2021

Fighting the Gender Gap in UK Construction and Engineering

FE News

10 March 2021

Universities back launch of 'high-risk' research agency

University World News

20 February 2021

The Real Reason Female Engineers Are Still a Rarity

FE News

30 August 2020

Analysis of 2020 A-level entries

Campaign for Science and Engineering

13 August 2020

Teaching digital skills to young people is vital for future economic growth

FE News

16 August 2020

Skills shortage costing STEM sector £1.5bn

STEM Learning

17 May 2018

3.2 Press releases

UK to launch new research agency to support high risk, high reward science

Department for Business, Energy & Industrial Strategy

19 February 2021

Major overhaul of higher technical education announced

14 Number CDP-0045, 22 March 2021

Department for Education

14 July 2020

£400 million boost to regional R&D projects across the UK

Department for Business, Energy & Industrial Strategy

26 June 2020

4. Further Reading

4.1 Reports

All-Party Parliamentary Group on Diversity and Inclusion in STEM, The State of the Sector: Diversity and representation in STEM industries in the UK, November 2020

CBI, Learning for Life: Funding a world-class adult education system, October 2020

All-Party Parliamentary Group on Diversity and Inclusion in STEM, Inquiry: **Equity in STEM Education, June 2020**

Industrial Strategy Council, <u>UK Skills Mismatch 2030</u>, 24 October 2019

4.2 Library Papers

House of Commons Library, FE white paper: Skills for Jobs for Lifelong Learning for Opportunity and Growth, 28 January 2021

House of Commons Library, T Levels: Reforms to Technical Education, 16 December 2019

4.3 Websites

The Association for Science and Discovery Centres

Office for Students: Supporting STEM Subjects

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