Level 3 Qualifications in Applied Sciences and Engineering

Removing funding from qualifications in applied sciences and engineering at level 3 will close off opportunities to young people to enter the research and innovation workforce.

Summary

The UK has an ambition to become a science superpower, with research and innovation a key part of its agenda to 'build back better', and core to the nation's Grand Challenges. There are nearly 1.5 million professionals working in research and technical roles in the UK[1] but we need many more. We will not have the required workforce in place without additional action.[2] Closing down STEM education pathways will compound this problem.

Our organisations are opposed to the proposed removal of funding from applied qualifications in STEM at level 3. We are concerned that the proposal will limit the opportunity for many students to study STEM subjects at level 3, reducing the progression of learners into higher education, higher apprenticeships and technical training, and the workplace. We are concerned that this will disproportionately affect those from underrepresented groups, worsening equity, diversity and inclusion in our sectors and losing talent from these groups.

We advocate for a system that encourages increased numbers to gain the knowledge and skills they require to further UK research and innovation, with the aim that the future landscape at level 3 continues to support and cater to students from all backgrounds. This briefing sets out the main arguments in our combined positions, and the evidence we have used to arrive at these positions.

Key messages

1. Our organisations support the Department for Education's aims for a qualifications landscape that is easy to navigate, in which qualifications are understood and have a purpose, and in which the development of technical skills and progression to technical occupations are valued and supported. In principle, we welcome the introduction of T Levels as a progression route directly into specialised STEM occupations, and wish to see them succeed.
2. Evidence[3] demonstrates that applied qualifications such as BTECs are highly valued qualifications by post-16 learners at level 3, HE and employers. Around 60,000 students complete such qualifications annually in science and engineering, and many progress to successful outcomes. We doubt this number of students would follow other available routes in sciences if qualifications in applied sciences were to disappear. Neither A-levels nor T Levels will be fully accessible to, nor meet all of the aims or needs of, this many students.

[1] 2018/19 figures ONS, Labour Force Survey data from 2018/19 (SOC codes 211, 212, 215, 311, 312, 321, 355 and 613), https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/adhocs/10922detailedoccupationsbyindustrygeographicanddemographicvariablesbiannually2011to2018

[2] The Research and Technical Workforce in the UK. Royal Society (2021). https://royalsociety.org/topics-policy/publications/2021/research-and-technical-workforce-uk/

[3] Education and learning for the modern world: CBI/Pearson Education and Skills Survey report (2019) https://www.cbi.org.uk/media/3841/12546_tess_2019.pdf

3. A-levels in the sciences have high barriers to entry. Applied sciences and engineering qualifications currently offer a progression route to students whose GCSE attainment does not meet the requirements frequently set to enter A-levels. Further, some students may not have the GCSE qualifications required to satisfy entry requirements to T Levels, normally including at least grade 4 in GCSE Mathematics and English, leaving them without an option to study STEM at level 3, and likely leading them to a different study area.
4. Some students may be less inclined to choose A-levels due to their perception of being too academic, or to select T Levels due to their narrow focus on specific occupations, reducing overall take-up. T Levels are unproven, and it is not clear how widely they will be available. The industry placement requirement could limit the number of places available to students in absolute terms, and access will be poor in some regions. Applied sciences qualifications are the alternative popular, flexible and accessible option that supports numerous progression opportunities.
5. We are therefore concerned that removing qualifications in the applied sciences and engineering would lead to students being either systematically prevented from studying these subjects due to lack of provision, or their self-selecting away to other subject areas, adding to the STEM skills gap. We fear this could be the case for the majority of the *ca*. 60,000 currently completing STEM applied qualifications annually.
6. Given the characteristics of the students who typically study applied routes, this outcome would disproportionately affect students from disadvantaged backgrounds and potentially other underrepresented groups.

We therefore ask for **reconsideration of the removal of funding from applied sciences and engineering qualifications at level 3**, if the only remaining classroom-based options are A-levels and T Levels. We ask for proper evaluation of the potential impacts on STEM subjects, and that T Levels be given time to embed, so that their success in supporting progression can be assessed, before any other qualifications are de-funded.

Qualifications in applied science support successful and flexible progression

- Every year, around 25,000 students complete applied classroom-based qualifactions in the sciences, and over 35,000 do in engineering;[4] the majority study BTEC qualifications.
- Applied sciences qualifications offer foundations across a range of science content, like A-levels, but have more of a practical focus. Aside from the progression to degree-level education, qualifications in applied sciences can support progression directly into the workplace, or to study at levels 4 or 5. They can also lead to an apprenticeship, or be studied in the context of an apprenticeship.
- Data supplied to our organisations by Pearson (right) show that around 14,000 students progressed from BTEC Applied Science to university in 2017. Around 5,750 of these had studied an Extended Diploma, a course which is the equivalent of 3 A-levels. The majority of these students entered degrees in subjects related to health, science and engineering.

BTEC Applied Science students progressing to selected degree subjects in 2017

- *Biology: 898 (590 from Extended Diploma)*
- *Engineering: 686 (336 from Extended Diploma)*
- *Chemistry: 307 (199 from Extended Diploma)*
- *Physics: 67 (41 from Extended Diploma)*

Many more progress to subjects allied to medicine and to other valuable areas in the life sciences.

Proportions of university students holding a BTEC qualification in 2015/16[5]

- *Biological sciences: ~28%*
- *Subjects allied to medicine: ~27%*
- *Engineering & technology: ~19%*
- *Physical sciences: ~8%*

[4] Data retrieved from the Ofqual Analytics Vocational and Technical Qualifications Landscape tool: https://analytics.ofqual.gov.uk/apps/VTQ/VTQLandscape/

[5] Social Market Foundation (2018) 'Vocation, Vocation, Vocation' https://www.smf.co.uk/wp-content/uploads/2018/01/SMF-Vocation-Vocation-Vocation.pdf; using data from HEFCE

- Evidence shows that level 3 BTEC students have good longitudinal outcomes. When students' characteristics are taken into account, earnings differentials for degree study are similar for the BTEC and A-level routes, suggesting long-term outcomes are equivilent.[6]
- Future progression opportunities from T Levels are not yet certain. There is an expectation in Government that they will provide progression to university as well as to the workplace. However, while T Levels have been included in the UCAS tariff, it is not yet clear that universities are willing to admit students with a T Level to their sciences and engineering degree courses. T Levels may therefore offer less flexibility in progression, and be less attractive to those students who do not want to commit at 16 to a specific technical occupation.

Alternatives may not be accessible or attractive for students choosing an applied science route, creating a provision gap

Barriers to A-level

- A-levels, especially in the sciences, are not a realistic option for many students who currently take qualifications in applied sciences. Education providers frequently require at least grade 6 in science GCSEs to begin science A-levels. DfE transition matrices[7] show that students on alternative routes frequently have lower GCSE grades. Indeed, within the matrix, the average GCSE grades on entry to BTEC Extended Diploma in Applied Science is substantially below that of entrants to A-level sciences. Applied sciences qualifications provide a progression opportunity that would otherwise be closed.

Level 3 qualification (full-time)	No. of records in 2019 Transition tables	% of students with an average GCSE grade <5	% of students with average GCSE grade ≥5
OCR Technical Extended Diploma Health Studies	293	78%	22%
BTEC Extended Diploma Applied Science	1,725	75%	25%
A level Biology	58,394	7%	93%
A level Chemistry	49,549	5%	95%
A level Physics	32,636	7%	93%

- The most common attainment for A-level science students with an average GCSE score below 5 is grade E, with substantial numbers failing. Students awarded grades E and U in science A-levels are unlikely to progress directly to higher levels of study. This is the rationale for schools and colleges accepting few students with lower GCSE scores onto science A-levels.

[6] Centre for Vocational Educational Research (2019) 'BTECs, higher education and labour market outcomes using the Longitudinal Education Outcome (LEO) dataset' https://cver.lse.ac.uk/textonly/cver/pubs/cverdp024.pdf

[7] Department for Education (2020) 'Transition matrices 16-18: 2019' https://www.gov.uk/government/publications/16-to-18-level-3-value-added-ready-reckoner

Barriers to T Levels

- **Entry requirements**: We do not yet know what access will be available to T Levels. Formally there are no entry requirements, however in practice students may need grade 4 in GCSE Mathematics and English, which some students will not have, leaving them without an option to study STEM at level 3, and likely leading them to a different study area.
- **Regional access**: We are doubtful whether the T Levels will be able to accommodate similar numbers as the existing appied science routes. We expect that the requirement to complete an industry placement – a valuable experience in an occupationally relevant qualification – will limit how many places can be offered, certainly in the short term as the qualification becomes embedded. Due to regional distribution of relevant employers, the Science T Level may never be available in all parts of the country. It would be inequitable not to have a progression route in the sciences that is accessible to all learners with the capability to study at level 3.
- **Narrowness**: While we hope the Science T Level will succeed as a development route for skilled technicians, we further note that not all students will aspire to a specific outcome, or know yet what particular route they want to take. Faced with no alternative option, they would likely self-select out of studying sciences.

Therefore, we predict that removing applied sciences qualifications will create a provision gap that will reduce the number of students studying on STEM pathways at level 3 and beyond.

This gap will disproportionately impact students from disadvantaged backgrounds

- Students who progress to higher education from a BTEC are more likely to have come from disadvantaged backgrounds.[8]
- The Department for Education's equalities impact annex to the recent consultation identifies that the groups most likely to be impacted by the proposals in the consultations are students who receive free school meals, students from the most disadvantaged backgrounds (using IDACI), students with SEND, students from Asian and black ethnic backgrounds, and male students.
- The existence of attainment gaps at GCSE correlated to socio-economic advantage is well documented.[9] It is therefore clear to see how barriers to accessing A-levels in the absence of applied sciences qualifications would disproportionately affect students from the least advantaged backgrounds.
- Our organisations have existing and ongoing concerns about the accessibility of progression routes in our subject areas, with certain groups of students disproportionately prevented or discouraged from studying sciences.[10] The removal of applied sciences qualifications would exacerbate this problem.

[8] Centre for Vocational Educational Research (2019) 'BTECs, higher education and labour market outcomes using the Longitudinal Education Outcome (LEO) dataset' https://cver.lse.ac.uk/textonly/cver/pubs/cverdp024.pdf

[9] Review of SES and Science Learning in Formal Educational Settings (2017) https://royalsociety.org/~/media/policy/topics/education-skills/education-research/evidence-review-eef-royalsociety-22-09-2017.pdf?la=en-GB

[10] See the outcomes of the ASPIRES research project: https://www.ucl.ac.uk/ioe/departments-and-centres/departments/education-practice-and-society/aspires-research