Qualifications Wales Consultation on new STEM GCSEs

1. Introduction

Enginuity's response to Qualifications Wales' 'Have Our Say' consultation on the new GCSEs for Curriculum was submitted through an online survey with a multiple choice selection (Strongly agree, Agree, Neither agree or disagree, Disagree, Strongly disagree – in italics below), and a text box to explain the choice.

2. GCSE Computer Science

1. To what extent do you agree or disagree that the proposed design of GCSE Computer Science supports the Curriculum for Wales?

   No response

2. To what extent do you agree or disagree with the proposed purposes and aims of GCSE Computer Science?

   No response

3. To what extent do you agree or disagree with the proposed content (knowledge, understanding, skills and experiences) for GCSE Computer Science?

   No response

4. To what extent do you agree or disagree with the proposed assessment arrangements, including the role of digital technology, for GCSE Computer Science?

   No response

5. To what extent do you agree or disagree that the proposal for GCSE Computer Science meets the reasonable needs of learners in Wales? Please consider factors such as accessibility, manageability, wellbeing and progression onto post-16 pathways.

   No response

6. To what extent do you agree or disagree that the proposed GCSE in Computer Science is manageable for teachers to deliver? Please consider factors such as the size of the qualification, resources and the proposed approach to assessment.

   No response

7. Overall, to what extent do you agree or disagree with our proposal for GCSE Computer Science?

   No response

3. GCSE Engineering

The Design Proposal for GCSE Engineering is here.

1. To what extent do you agree or disagree that the proposed design of GCSE Engineering supports the Curriculum for Wales?

   Strongly agree

   We strongly agree that the proposed design of GCSE Engineering supports the Curriculum for Wales and the four purposes of curriculum design. Engineering is a sector which empowers people to be ambitious and capable lifelong learners. We are confident that GCSE Engineering will help develop ambitious, capable learners, ready to learn throughout their lives.

   Engineering is and will provide solutions to a wide range of problems faced by society, from climate change to automated systems. It is a sector for enterprising and creative contributors, and GCSE Engineering will set learners on that path. GCSE Engineering will help to create informed citizens who better understand the challenges society faces. It will enable them to develop problem solving skills and start them on the path to obtaining the skillset to one day develop engineering solutions.

2. To what extent do you agree or disagree with the proposed purposes and aims of GCSE Engineering?

   Strongly agree

   Enginuity strongly supports the proposed purposes and aims of GCSE Engineering. The creation of this qualification is a timely response to the increasingly rich and diverse educational and career opportunities available at post-16 in the Advanced Manufacturing and Engineering sector. GCSE Engineering as proposed will provide learners between the ages of 14 and 16 with the foundation skills and understanding to help realise their educational and career ambitions in our sector. Importantly, introducing GCSE Engineering will increase the prestige of the subject area and increase the likelihood of attracting learners with an interest in Engineering to study the subject.

   While we agree with the proposed purpose and aims, we think that there is a broader context which should also be considered:

   - How the pipeline from 3-11 will support GCSE Engineering, and

- How GCSE Engineering will work with current and future post-16 qualifications, so learners clearer understand the pathway forward.

Ensuring the education pipeline supports GCSE Engineering

GCSE Engineering is a great step forward. Evidence suggests, however, that it will need to be supported by interventions earlier in the education pipeline. Engineering UK found that among young people aged 13 to 19 only 41% knew the subjects needed to become an engineer, while UK-wide research commissioned by Enginuity from CHILDWISE, a leading specialist in research with children and young people, which found that most children (aged 11-14) surveyed said they knew only a little (46%), nothing at all (36%), or didn't know (10%), about careers in engineering, with only 8% knowing a lot. 63% said they would not be interested in a career in engineering, with concerns about its being boring, as well as too hard, too dirty, and not creative or well paid enough. These findings are particularly significant given how early career ambitions seem to form, with 37% of surveyed children (11-14) knowing, and 45% having some idea of, what sort of job they wanted to do when they were older.

Incorporating inspiring and accessible STEM career resources into lessons of pre-14 learners is essential to provide those learners with the chance to explore the opportunities offered by engineering careers, and STEM careers more broadly. The extent of this engagement with children under 14, including primary school age learners, is likely to impact the degree of success and take-up of GCSE Engineering.

Enginuity is developing a range of innovative tools to inspire learners to engage with engineering. For example, we are using. Skills Miner, an educational game using the Minecraft platform to provides an accessible way for children to uncover engineering skills through gameplay and exploration. Further information about Skills Miner is available at https://enginuity.org/innovation-lab/skills-miner/.

Ensuring GCSE Engineering provides post-16 guidance

It is also important to consider how GCSE Engineering will work with current and future post-16 qualifications. Learners considering this qualification need to be clear about the pathways forward into education and careers. We strongly support ensuring, as the proposed content suggest, that GCSE Engineering incorporates effective and inspiring post-16 educational and careers guidance.

Enginuity is developing career pathways for Engineering which will show the knowledge and skills required for different careers in the sector, and the routes into those careers. The data will be accessible through a user-friendly digital interface. This could be a useful resource to assist teachers and careers professionals provide advice to learners on post-16 education and career opportunities.

Delayed introduction

We appreciate the challenges, but we are concerned about the proposal to delay the introduction of GCSE Engineering beyond the September 2025 date for other

new GCSEs. Our sector is changing rapidly, especially with the introduction of new technologies, and it is important for GCSE Engineering to be available to learners as soon as practical to ensure they can obtain the skills to support their educational and career ambitions. Employers are reporting huge skill and labour shortages in the Engineering and Manufacturing sector, which are only likely to grow, with research suggesting 1.82 million vacancies will be created in the sector in the next 10 years for jobs that do not yet exist (see https://myport.port.ac.uk/guidance-and-support/careers-support/getting-into-your-chosen-career/career-guides/engineering-and-manufacturing). There is, and will be, a huge opportunity for learners in our sector, and the sooner GCSE Engineering can be implemented, the better empowered learners will be to take advantage of those opportunities.

3. To what extent do you agree or disagree with the proposed content (knowledge, understanding, skills and experiences) for GCSE Engineering?

Agree

Digital manufacturing and industrial digitalisation

The content of the GCSE Engineering should include an introduction to digital manufacturing and industrial digitalisation which are increasingly important aspects of the sector. This may be included within the proposed content (for example, 'engineering tools and techniques' and 'determining the appropriate tools, techniques and processes'), but even if this is the case, it should be included more explicitly in the content.

Engagement on content development

We would like to emphasis the importance of engaging with employers, as well as FE and HE providers, on the development of the next level of content. The Advanced Manufacturing and Engineering sector is rapidly changing with introductions of new technology. Engaging effectively with employers, and FE and HE providers, is essential to ensure that the curriculum provides learners with the most relevant and up-to-date skills to support their educational and career ambitions.

We particularly support the first item listed under content as 'Experiences':

> "Engage with engineering professionals, or watch recordings, to strengthen learners' understanding of engineering projects and practices, and their awareness of the diverse career and progression opportunities available in the sector."

It is important that learners have sufficient opportunity to engage with authentic materials and practicing engineers and, where possible, visit engineering workplaces. We have discussed above the importance of incorporating effective and inspiring guidance on post-16 education and careers opportunities in our sector.

Mathematical and science content

We would encourage the inclusion of sufficient mathematical and scientific content to support GCSE Engineering.

Linking content to issues learners care about

In developing the next level of content, we recommend considering links to engineering solutions for issues that learners aged 14-16 care about and engage with, such as sustainability.

4. To what extent do you agree or disagree with the proposed assessment arrangements, including the role of digital technology, for GCSE Engineering?

Strongly agree

We support the proposed composition of the assessment with its focus on practical tasks: exam (20%), portfolio (60%), and practical assessment (20%). Focusing on the assessment of practical work, and engagement with authentic materials and experiences, is the best preparation for future education and career opportunities. It encourages learners to understand and engage primarily with the practical nature of engineering at an age when leaners have not yet decided whether to pursue apprenticeships, FE, or to continue on academic routes.

5. To what extent do you agree or disagree that the proposal for GCSE Engineering meets the reasonable needs of learners in Wales? Please consider factors such as accessibility, manageability, wellbeing and progression onto post-16 pathways.

Agree

As well as considering progression onto post-16 pathways, it is important to recognise that the barriers to participation in engineering education and careers by under-represented groups are present throughout the pipeline and require solutions at all stages. For example, research by CHILDWISE found that girls aged 11-14 say they know less about, and are four times less likely to be interested in, an engineering career than boys of the same age. Unless efforts are made to reduce these barriers earlier in the pipeline, GCSE Engineering may remain inaccessible or unattractive to many members of under-represented groups.

6. To what extent do you agree or disagree that the proposed GCSE in Engineering is manageable for teachers to deliver? Please consider factors such as the size of the qualification, resources and the proposed approach to assessment.

Agree

Teacher capability

We suggest that careful consideration be given to increasing teacher capability, including the provision of teaching equipment and access to professional

development, especially through direct engagement with engineering professionals and organisations. We would particularly encourage industrial placements and professional development opportunities for teachers, such as those supported through STEM Learnings ENTHUSE Partnerships. We would also support investigating the possibility of attracting retiring engineers to participate in the curriculum in some form.

The Engineering sector is rapidly changing with the introduction of new technology and schools will face a challenge maintaining up-to-date teaching equipment and facilities. We noted above the importance of emphasising the practical side of GCSE Engineering – making that work effectively for learners depends on schools maintaining suitable teaching equipment and facilities. In implementing GCSE Engineering, careful consideration should be given to how schools, especially schools in more deprived areas, can provide learners with access to suitable equipment and facilities. Schools are likely to need additional funding support, but this could be supported by initiatives such as avoiding duplication by creating facilities shared among local schools or facilitating schools to work in partnership with local FE colleges and employers.

STEM Careers Advice

The evidence suggests that teachers of learners aged 14-16 may also need support to incorporate STEM careers advice into their lessons. Among the STEM teachers (of 11–14-year-olds) surveyed by CHILDWISE, 41% felt they did not know enough to help students who asked for advice about a career in engineering. They also expected most of their students to know only a little (76%) or nothing (18%) about potential careers in engineering. Only 30% regularly incorporated information about possible STEM careers into their lessons, with 51% occasionally and 19% rarely doing so. Although lack of time was the most common reason for this (52%), 26% indicated they did not know enough about it, and 18% that they didn't know where to find it.

7. Overall, to what extent do you agree or disagree with our proposal for GCSE Engineering?

Strongly agree

We strongly support the proposal for GCSE Engineering. It is a timely and well-considered proposal which will place learners in a much stronger position to access the rich and diverse range of educational and career opportunities that our sector offers.

4. GCSE The Sciences (Double Award)

1. To what extent do you agree or disagree with our proposed qualification title of GCSE The Sciences (Double Award)?

Agree

We agree with the proposed GCSE The Sciences (Double Award) as long as it meets the concerns set out in response to questions 7 and 8.

2. To what extent do you agree or disagree that the proposed design of GCSE The Sciences supports the Curriculum for Wales?

   No response.

3. To what extent do you agree or disagree with the proposed purposes and aims of GCSE The Sciences?

   No response.

4. To what extent do you agree or disagree with the proposed content (knowledge, understanding, skills and experiences) for GCSE The Sciences?

   Agree

   It is important that the content of GCSE The Sciences (Double Award) provides a solid foundation in all science disciplines and fully support progression to A Level science subjects. It must also support the provision of the supplementary science qualifications (worth 1/3 or 2/3s of a GCSE) and progression to Engineering and Manufacturing apprenticeships.

5. We have proposed two options for how the external exams could be structured:
   - Option 1: Separate biology, chemistry and physics exams would be taken by learners at the end of year 11 (this could enable separate grades for each subject to be reported).
   - Option 2: Three exams, each one featuring a mix of biology, chemistry, and physics content, would be taken across years 10 and 11. Which of these options do you prefer?

     No response.

6. To what extent do you agree or disagree with the proposed assessment arrangements, including the role of digital technology, for GCSE The Sciences?

   No response.

7. To what extent do you agree or disagree that the proposal for GCSE The Sciences meets the reasonable needs of learners in Wales? Please consider factors such as accessibility, manageability, wellbeing and progression onto post-16 pathways.

   No response.

8. To what extent do you agree or disagree that the proposed GCSE in The Sciences is manageable for teachers to deliver? Please consider factors such as the size of the qualification, resources and the proposed approach to assessment.

    No response.

9. Overall, to what extent do you agree or disagree with our proposal for GCSE The Sciences?

    No response.