GCSE Computer Science

Introduction

GCSE Computer Science is being reformed in Wales for first teaching from September 2017. The reformed GCSE Computer Science will be developed by WJEC and will be the only version of the qualification available to learners on state funded programmes in Wales, as no other exam board has decided to develop these qualifications for use in Wales. As part of the reform process we are asking for views on the proposed subject aims, learning outcomes, subject content, structure and assessment of the reformed qualification.

We have developed the proposals in this questionnaire through consultation with a number of stakeholders including the WJEC, school and college practitioners, universities, Estyn and the Welsh Government. The outcomes of this questionnaire will help inform the development of design criteria for the qualification: GCSE Computer Science. The specification and sample assessment materials for the reformed GCSE Computer Science will be developed and approved on the basis of the approval criteria published by Qualifications Wales.

Subject aims and content

GCSE Computer Science has been reformed in England for first delivery from September 2016. The stakeholders in Wales who have been consulted to date on the reform of the qualification in Wales are mindful of comparability between what has been proposed for England and what is proposed for Wales. Currently there is no centrally prescribed subject aims and content for GCSE Computer Science.

The subject content for the reformed GCSE Computer Science qualification in England can be found at the link below:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/397550/GCSE_subject_content_for_computer_science.pdf

Subject aims and objectives

We propose adopting the same high level subject aims and objectives as those prescribed for the new GCSE Computer Science in England.
Specifications must enable learners to:

- understand and apply the fundamental principles and concepts of computer science, including abstraction, decomposition, logic, algorithms, and data representation;
- analyse problems in computational terms through practical experience of solving such problems, including designing, writing and debugging programs;
- think creatively, innovatively, analytically, logically and critically;
- understand the components that make up digital systems, and how they communicate with one another and with other systems;
- understand the impacts of digital technology to the individual and to wider society;
- apply mathematical skills relevant to computer science.

Q1: To what extent do you agree/disagree with the proposed subject aims and objectives for GCSE Computer Science in Wales?

- ◯ I strongly agree
- ◯ I agree
- ◯ I neither agree nor disagree
- ◯ I disagree
- ◯ I strongly disagree
- ◯ I don't know

Comments (we would encourage you to make a comment, particularly if you disagree with the proposal)

Subject content

The subject content outlined by the Department for Education (DfE) for new GCSE Computer Science in England requires learners to understand and have knowledge of topics such as algorithms, networks, programme language, cyber security and the ethical, legal and environmental impacts of digital technology.

Learners are also required to obtain the following skills:

- take a systematic approach to problem solving;
- design, write, test and refine programs;
- use appropriate security techniques;
- evaluate the fitness for purpose of algorithms;
- use abstraction effectively;
- model selected aspects of the external world in a program;
- appropriately structure programs;
- apply computing-related mathematics.

The full subject content can be found at the link below:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/397550/GCSE_subject_content_for_computer_science.pdf

We propose the DfE subject content for GCSE Computer Science in England should be adopted for the GCSE Computer Science in Wales.

Q2: To what extent do you agree/disagree with the proposed subject content for GCSE Computer Science in Wales?

- ◯ I strongly agree
- ◯ I agree
- ◯ I neither agree nor disagree
- ◯ I disagree
- ◯ I strongly disagree
- ◯ I don't know

Comments (we would encourage you to make a comment, particularly if you disagree with the proposal)

Assessment objectives

Currently there is no centrally prescribed assessment objectives for GCSE Computer Science. Table 1 outlines the high level assessment objectives used in current specifications for GCSE Computer Science:

Objective	Requirements
AO1	Recall, select and communicate
AO2	Apply knowledge, understanding and skills
AO3	Analyse and evaluate

Table 1

The following assessment objectives and weightings have been specified by Ofqual for the reformed GCSE Computer Science in England:

Objective	Requirements	**Weighting**
AO1	Demonstrate knowledge and understanding of the key concepts and principles of computer science.	30%
AO2	Apply knowledge and understanding of key concepts and principles of computer science.	40%
AO3	Analyse problems in computational terms; - to make reasoned judgements - to design, program, evaluate and refine solutions.	30%

Table 2

We propose adopting the assessment objective prescribed in England for the GCSE Computer Science in Wales but making minor changes to AO3. The proposed assessment objectives for GCSE Computer Science in Wales are highlighted in the table below:

Objective	Requirements	**Weighting**
AO1	Demonstrate knowledge and understanding of the key concepts and principles of computer science.	30%
AO2	Apply knowledge and understanding of key concepts and principles of computer science.	40%
AO3	Analyse problems in computational terms to design, program, evaluate and refine solutions	30%

Table 3

Q3: To what extent do you agree/disagree that the proposed assessment objectives and weightings should apply to the reformed GCSE Computer Science in Wales?

- ◯ I strongly agree
- ◯ I agree
- ◯ I neither agree nor disagree
- ◯ I disagree
- ◯ I strongly disagree
- ◯ I don't know

Comments (we would encourage you to make a comment, particularly if you disagree with the proposal)

Non examination assessment (NEA)

In reformed qualifications in Wales, non examination assessment is only used where it is the most suitable form of assessment, for example, to carry out a field study or a musical performance. Non examination assessment is therefore only used when written examinations cannot provide valid assessment of specific skills or knowledge.

The proportion of non examination assessment for the new GCSE Computer Science in England is set at 20%, with 80% of the qualification assessed by written exam.

We propose that the reformed GCSE Computer Science in Wales should have a weighting of 80% examination and 20% non examination assessment which will ensure comparability with GCSE Computer Science in England.

Q4: To what extent do you agree/disagree with the proposal to adopt the same NEA weighting as England, for GCSE Computer Science in Wales?

- ◯ I strongly agree
- ◯ I agree
- ◯ I neither agree nor disagree
- ◯ I disagree
- ◯ I strongly disagree
- ◯ I don't know

Comments (we would encourage you to make a comment, particularly if you disagree with the proposal)

Tiering

In some GCSEs, some or all of the qualification is assessed through tiered exam papers. In tiered assessments different grades are available at each tier; in most GCSEs the grades available are A* to D are the higher tier and grades C to G in the foundation tier. GCSEs in some subjects are tiered because for some subjects the level of difficulty of the assessment is determined more by how candidates respond to questions (essay style questions for example) than by the question itself, whereas in other subjects the level of difficulty is determined more by the nature of the questions asked than on the answer given (such as where there is only one correct answer). Subjects that rely more on the difficulty of the questions to differentiate between candidates tend to have tiered assessment. Tiered assessment avoids the challenges involved in trying to set a single paper to assess the whole cohort. If these subjects were not tiered, then the exam papers would need to be bigger to include enough questions at each level of difficulty, which would increase the amount of assessment required. There is also a risk that the assessment would be less reliable, because research shows that more able candidates often lose marks on the less challenging questions and less able candidates are demotivated by the more challenging ones.

The Review of Qualifications for 14 to 19 year olds in Wales recommended that “tiering should only be allowed where there is a clear case for doing so due to the nature of the subject”.

We propose that GCSE Computer Science in Wales should not be tiered.

Q5: To what extent do you agree/disagree with the proposal that GCSE Computer Science will not be tiered?

- ◯ I strongly agree
- ◯ I agree
- ◯ I neither agree nor disagree
- ◯ I disagree
- ◯ I strongly disagree
- ◯ I don't know

Comments (we would encourage you to make a comment, particularly if you disagree with the proposal)

Continuing professional development/resources

Q6: What support and resources do you feel centres and teachers may require to achieve maximum readiness to deliver the revised specification?

Please provide comments

Equality impact

The Equality Act 2010 states that public bodies must have 'due regard', when making decisions, to ensure there is no discrimination, harassment or victimisation of individuals or groups, to ensure equality and to foster good relations in relation to protected characteristics (age, sex, disability, sexual orientation, race, religion, marriage and civil partnership, pregnancy and maternity and sexual reassignment).

Q7: With this is mind, please highlight below if you feel any of this proposal has the potential to have a positive or negative impact on individuals with protected characteristics and whether any of the proposal would cause accessibility issues for learners in Wales.

GCSE Computer Science

Personal details

Participants under the age of 16 are requested NOT to fill in this section.

If you supply contact details, we may contact you for clarification of your answers. Qualifications Wales (QW) will not share these details, or details of your answers with any third party.

Personal details

Name

Company

Email Address

Are you responding as an individual or on behalf of your organisation?

- ◯ Individual
- ◯ Organisation

Please select the type of organisation or choose 'not applicable' if responding as an individual

- ◯ School
- ◯ College
- ◯ University
- ◯ Qualification Awarding Body
- ◯ Government (Local, National, UK or EU)
- ◯ Non-Applicable
- ◯ Other (please specify)

Are you a: (please select as appropriate)

- [ ] Teacher
- [ ] College Lecturer
- [ ] University Lecturer
- [ ] Student
- [ ] Parent
- [ ] Other (please specify)