CONSULTATION DECISIONS

Computer Science GCSE (9 to 1): Regulatory Impact Assessment

Regulatory Impact Assessment

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Introduction

We have considered the regulatory impact of our proposals in light of responses received to the consultation. We set out our view of the potential impacts below.

Regulatory impact: January 2018 decision

In January 2018 we announced decisions on interim arrangements for assessment of GCSE computer science. In the impact assessment published alongside our decision we reported the following estimated costs and savings, based on qualification entry numbers of 71,500:

Exam boards:

- One-off cost of IT development: £200k across four exam boards (2018)
- Annual saving of no longer having to moderate NEA: £331k per annum across four exam boards
- Annual saving of reduced seniority of exam board visitors: £23k per annum across four exam boards.

Exam boards net saving 2018: c£150k (£200k cost - £350k saving)

Exam boards net saving 2019: c£350k

Schools[1]:

- Annual saving to schools of removal of the requirement to record NEA marks formally = £500k per annum

Annual saving to schools - c£500k across 2,630 schools (from 2019)

Our analysis and the assumptions on which it is based were set out in detail in our impact assessment.

We anticipate the ongoing savings reported here for exam boards and schools will continue until the new arrangements come into effect.

Regulatory impact: January 2019 decision

The costs incurred by exam boards on the implementation of our proposals will be dependent on the approach they choose to take to assessment of the content in GCSE computer science, including programming skills, by examination. Our rules will allow exam boards the flexibility to develop their own approach to assessment of programming skills by examination, which could be (but would not be limited to) on-screen, online or paper based.

All four exam boards offering GCSE computer science responded to our consultation. Two agreed that to assess all content in GCSE computer science, including programming skills, by examination is the best approach. One responded that it is appropriate to assess programming skills either through an extended

[1] GCSE computer science is almost exclusively delivered in schools – around 99.8% of entries.

programming task or through examination. One exam board did not agree that to assess by examination is the best approach, proposing that some form of extended programming task is the best approach.

Exam boards: one-off costs

We expect that all four exam boards will incur one-off design and development costs. These are likely to include costs of the development of the assessment strategy, subject specification and sample assessment materials. The extent to which there will be system development costs will be dependent on whether awarding organisations choose an online, on-screen, paper based or other approach to the programming skills examination. One exam board indicated it is already consulting with assessors and teachers to explore which approaches might work best. Another exam board made reference to a possible approach based on a pre-release task which is then followed up in the examination.

If choosing a paper based approach, it would be open to the exam boards to incorporate questions relating to programming into existing papers, or to develop a further, separate examination paper. While a paper based approach may not require system development, one exam board response confirmed there would nevertheless be a one-off development cost associated with this approach.

Two exam boards indicated they already offer on-screen versions of assessments – one at AS/A level and one for a component of the existing GCSE computer science qualification. For these exam boards, any redevelopment required to deliver on-screen assessment of programming skills in GCSE computer science may be less expensive than setting up this model for the first time.

One of the exam boards that currently uses an on-screen platform indicated that one-off development costs for paper based and on-screen approaches would be similar, but that an online approach would be more costly to develop.

Two exam boards did not provide any estimate in their responses of the one-off costs they expected to incur if we were to implement our proposals, indicating that costs would be dependent on the approach they choose to develop. Both indicated the type and range of development activity that would likely give rise to costs. These included development of infrastructure and delivery methods, technical, operational and market insights costs.

One exam board indicated that the one-off development cost of the proposal could be around **£5,000**. This is calculated on the basis of developing the subject specification, sample assessment materials, assessment strategy, and also includes the cost of producing or amending guidance for teachers delivering the course. This exam board currently uses an on-screen platform for GCSE computer science.

Another exam board indicated the one-off development cost could be up to **£22,000** for making changes to the qualification and associated materials. This organisation also indicated they may incur costs in recruitment and training of markers but did not provide specific costs for this.

Based on the figures provided, and in the absence of figures from two exam boards, we estimate the one-off cost to exam boards could be as follows:

£22,000 (higher of the two estimates provided) x four exam boards = **£88,000 total one off cost across four exam boards.**

This may be a generous estimate, given that one exam board indicated costs of around £5k. On the other hand, the development of a new online or on-screen assessment could lead to higher costs than those we estimate above. We have made the calculation based on the information provided to us in response to the consultation. We will continue to monitor the impact of the revised arrangements as the exam boards develop their approaches to assessment.

Exam boards: ongoing costs

Whichever approach exam boards choose to develop, we expect there will be an additional annual cost incurred in the delivery of the programming skills element of the examination, including marking.

The exam board with the smallest proportion of entries to GCSE computer science indicated an annual cost of **£13k** to deliver one additional assessment by examination in each series. We note this is based on an assumption that an additional assessment would be necessary; our revised rules are not requiring this. The exam board stated this is a net cost which takes into account the saving to that organisation of no longer having to moderate the NEA, but did not provide a detailed breakdown to show how they had arrived at this figure. We did not receive estimates of ongoing costs from the other exam boards.

We reported in our January 2018 impact assessment that we estimated annual savings across all exam boards of no longer having to moderate NEA to be in the region of **£350k** per annum.

Of the possible approaches under the proposed new arrangements, online and on-screen may lead to lower annual costs, as there are no examination papers to produce, print and distribute. That said, there may be ongoing technical costs associated with online and on-screen approaches.

One exam board stated that technical approaches would lead to costs associated with the delivery of assessment in multiple programming languages, though did not specify what these costs might be. Our understanding is that exam boards have already adopted approaches which allow them to assess students using different programming languages.

Marking costs will be dependent on the outputs that candidates will be required to produce. Marking of the programming skills element of the examination could be time consuming and complex, though equally, exam boards may develop technology to support this process (e.g. software that can check code). One exam board noted that if requiring a third examination paper, the costs would be higher. This is not something we are specifically requiring; it is for exam boards to decide their approach to assessment of programming skills by examination.

We have decided that we will require exam boards to continue to gather statements from schools. The statement must confirm that students have been given the opportunity to design, write, test and refine programs using a high-level programming language with a textual definition, either to a specification or to solve a problem. This was required for the first time in 2018 under our interim arrangements. On whether we should retain this requirement, one exam board said that we should and another

said that while not necessary to retain, they would not object to it continuing. Two exam boards responded that the statement is not needed, and of these, one said that to retain it would impose a disproportionate administrative burden. We have set out in detail in our decisions document why we consider this requirement is proportionate. We have also explained that we consider this requirement should impose only a small additional administrative burden given that exam boards are already gathering similar statements from schools for a number of other GCSE subjects.

In the absence of detailed cost information from all exam boards offering this qualification, we have estimated the annual additional cost to exam boards could be as follows:

- Approx. £10k to write/ set an additional examination x four exam boards = £40k

The figure of £10k is based on evidence provided to Ofqual in relation to the delivery of the reformed Functional Skills Qualifications, adjusted upwards to reflect the potential increased complexity of assessing the programming skills content of GCSE computer science. We consider this figure would allow for any associated technical costs, as described above.

- Approx £4.50 per learner cost of marking x c71k learners (2018 entry figures) = **£320k**

The £4.50 cost is a 'piecework' rate paid to external markers per script, based on rates paid to examiners for a small sample of units in summer 2014 and adjusted to reflect 2018 prices.

Estimated annual cost across four awarding organisations = £360k pa

Taking into account the £350k per annum savings of no longer moderating NEA, we estimate therefore there could be **a net incremental cost in the region of £10k per annum** across four exam boards.

It should be noted that the net incremental cost quoted above is simply the difference between two large, estimated numbers. Small changes to the assumptions underlying these larger numbers would disproportionately alter the net impact figure. Our calculation is not definitive, but does illustrate that we expect the net impact of these changes to be small. We are aware that one exam board, with a smaller proportion of entries in this subject, estimated the net cost for them to be £13k. As mentioned above, this is based on the assumption that an additional assessment would be necessary; our revised rules are not requiring this. This exam board response indicates that, even with different methods of estimation, by a smaller exam board with lower economies of scale and fewer resources to manage change, the net impact is still relatively minor. We acknowledge there will always be variance across exam boards, dependent not only on entry numbers but also on other factors including systems, processes and resourcing arrangements. The actual net impact for exam boards may therefore be lower or higher than our estimate.

Innovation

Three exam boards agreed that our proposals would allow flexibility in their approach to assessing programming skills by examination. One of these indicated they would

not be able to say definitively that the proposals would allow innovative approaches to work until they had fully explored the options available, but were satisfied that the proposed arrangements were not prescriptive. Two of the three added, however, that other factors may inhibit technical innovation, in particular the range and quality of resource and technological infrastructure in schools.

The fourth exam board neither agreed nor disagreed with our statement on innovation, stating that the proposals would provide flexibility to innovate, though in line with other exam board comments reported above, that school resource and technical infrastructure could limit innovative approaches.

Based on the responses we received, we acknowledge there may be factors beyond our regulatory requirements that could limit the innovative approaches to assessment offered by the exam boards. Despite this, we are satisfied that our proposed arrangements will give exam boards the flexibility to develop new and innovative approaches to the assessment of programming skills, and we are keen to encourage this.

Impact on schools

Two exam boards agreed that the proposals would lead to an overall reduction in burden on teachers. Both provided comments indicating that the removal of the requirement to allocate 20 hours teaching time to programming skills would free up teachers to maximise teaching and delivery time, and would give teachers the flexibility to deliver programming skills in a way that works best for learners.

Two exam boards neither agreed nor disagreed with the statement that the proposed arrangements would reduce teacher burden.

Of these, one noted the change would reduce burden on teachers, but added that teachers like the current arrangements as it gives them the confidence that they are teaching the required programming skills content.

The second of the two indicated that the extent to which teacher burden would be reduced by not having to assess the programming skills project would be limited by the pressure on teachers to prepare students for the examination. They also indicated the potential of increased burden when teaching AS and A level students who have not completed a programming course as part of their GCSE course.

Teachers provided a range of responses. Many thought that the proposed arrangements would reduce administrative burdens. Internal assessment of programming tasks was identified as a major drain on teachers' time and teachers noted that in addition to marking there was also the burden of carrying out internal moderation and submitting NEA marks and moderation samples. Some teachers responded that the proposed arrangements would reduce burden by allowing greater teaching flexibility, enabling them to tailor teaching better to the needs of learners.

Other teachers did not agree that the proposed revised arrangements would reduce burden on them. Some stated the burden would shift to planning their own approach to the teaching of programming skills and preparing students for the programming skills examination. Some also indicated that *any* change to current arrangements would create burden as they would have to adapt schemes of work and curriculum planning to meet the exam boards' new specifications.

In January 2018 we estimated a saving across all schools of £500k (from 2019). This was based on the removal of the internal standardisation and administration involved in recording a formal mark for NEA submission. This was calculated as follows:

- 71,500 learners x 15 minutes for NEA standardisation & administration = c.18,000 hours x £28 per hour average teaching professional cost.
- Resulting in a saving across 2,630 schools of c£500k per annum.

The sources of the assumptions on which this analysis is based were set out in detail in the impact assessment published alongside our interim decision.

This figure did not include any saving of no longer having to mark the NEA, as we recognised that teachers may at that time continue to use the NEA for formative feedback. We note the comments from both teachers and exam boards that the burden may shift from NEA to different activity. We nevertheless consider it is reasonable to estimate that the annual saving to schools will continue, as this saving was limited to the removal of the internal standardisation and administration involved in recording a formal mark for NEA submission.

Annual saving to schools: c£500k across 2,630 schools

In response to our question on whether we should continue to require a statement from schools, around two-thirds of teachers responded that this should not be required, and a third that it should be required. We are requiring that schools provide statements to exam boards confirming that students have been given the opportunity to design, write, test and refine programs using a high-level programming language with a textual definition, either to a specification or to solve a problem. We expect this requirement will impose a small additional administrative burden on schools, though as explained in our decisions document we do not consider the burden will be significant as Heads of Centre already provide statements to exam boards for other GCSEs and could reasonably absorb this into existing processes. We have also set out in that document why we consider the requirement to be proportionate.

The arrangements put in place by each exam board will determine the impact on schools' IT resources. Exam boards indicated they would need to consider school IT infrastructure and resource as they develop an assessment approach to meet the new requirements. Where IT resources in schools are not sufficient to accommodate any new assessment approach, there may be associated costs for some schools to update these. However, we expect any investment would have benefits beyond delivery of this GCSE. We have no basis on which to estimate the likely cost or incidence of this. It is worth noting that it is open to schools to choose an exam board that they consider offers arrangements most suitable for their context.

Summary

The overall estimated net impact of implementing the proposed arrangements is set out below:

Exam boards: One-off cost of c£88k across four exam boards

Annual savings of c£350k across four exam boards until new arrangements in place

Annual net cost of c£10k across four exam boards from 2022

Schools: Annual saving of c£500k across 2,630 schools

It is worth noting that our decision that the arrangements will take effect for teaching from 2020 (first awarding 2022) reduces burden by providing exam boards sufficient time to make the necessary changes and to spread any associated costs. The estimated annual savings to both exam boards and schools continue during this interim period as a result of no longer having to operate NEA; we consider this should free up resources for exam boards to invest in new approaches.

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Earlsdon Park
53-55 Butts Road
Coventry
CV1 3BH

0300 303 3344
public.enquiries@ofqual.gov.uk
www.gov.uk/ofqual

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