Cynulliad Cenedlaethol Cymru | National Assembly for Wales

Y Pwyllgor Plant, Pobl Ifanc ac Addysg | Children, Young People and Education Committee

Hynt y gwaith gan Lywodraeth Cymru wrth ddatblygu Cwricwlwm newydd Cymru | Welsh Government's progress in developing the new Curriculum for Wales

CR 08

Ymateb gan: Y Gymdeithas Gemeg Frenhinol
Response from: The Royal Society of Chemistry

Dear Sir/Madam

Children, Young People and Education Committee consultation on the Welsh Government's progress in developing the new Curriculum for Wales

The Royal Society of Chemistry welcomes the opportunity to comment on the development of a new Curriculum for Wales.

The Royal Society of Chemistry is the world's leading chemistry community with over 1500 members in Wales. We invest in supporting quality scientific education in Wales, including: a school support team operating across the country, our freely available Learn Chemistry Partnership connecting over 80% of schools in Wales to the chemistry community, activities and resources, and the popular Spectroscopy in a Suitcase programme.

Our comments respond to selected questions outlined in the consultation letter. All comments can only be taken as applying to the Science and Technology AoLE; we have no detailed knowledge of developments in other areas of the curriculum.

Our involvement in the development of the new Curriculum for Wales

1. A representative from our organisation has attended selected meetings, on invitation, of the Science and Technology AoLE Pioneer Group since October 2017, and provided feedback on drafted documents outside of those meetings. Our focus, in keeping with our expertise, is the aspects of the curriculum that relate to chemistry and scientific enquiry. We are grateful to have had the opportunity to contribute in this way.
2. Additionally, several representatives met with the Cabinet Secretary for Education in March 2018 to discuss aspects of the reform process. More recently, we have written to Welsh Government officials and to the Cabinet Secretary for Education to express some views about the development process and the curriculum; these views are echoed in the present response.

Progress towards producing a draft Curriculum for Wales in time for its publication by the Welsh Government for public feedback in April 2019

3. We have recently seen a draft of the Science and Technology AoLE, submitted for final feedback at the end of November, that represents significant progress from previous drafts. It appears likely that a draft will be ready for publication and consultation in April 2019.

The role of Pioneer Schools and any opportunities and challenges in their involvement in curriculum design

4. The Science and Technology AoLE Pioneer Group has comprised teachers from Pioneer Schools, who have been asked to develop the What Matters statements, progression framework and achievement outcomes for this area of the curriculum.
5. We were concerned about the balance of representation in this Pioneer Group in the early stages of our involvement. In many meetings, the majority of teachers present were from primary schools, while much of the complex development of ideas in science and technology occurs at secondary level and such expertise is needed in developing the curriculum. Some disciplines

This communication (including any attachments) is intended for the use of the addressee only and may contain confidential, privileged or copyright material. It may not be relied upon or disclosed to any other person without the consent of the Royal Society of Chemistry (RSC). If you have received it in error, please contact us immediately. Any advice given by the RSC has been carefully formulated but is necessarily based on the information available, and the RSC cannot be held responsible for accuracy or completeness. In this respect, the RSC owes no duty of care and shall not be liable for any resulting damage or loss. The RSC acknowledges that a disclaimer cannot restrict liability at law for personal injury or death arising through a finding of negligence.

VAT registration number GB 342 1764 71 Registered charity number 207890

were particularly poorly represented, including chemistry and physics; on occasion our representative attended meetings where no secondary chemistry teachers were present.

6. We raised our concern about the balance of representation on several occasions with officials and with the Cabinet Secretary for Education, who acknowledged the problem. We believe that much effort was made to recruit additional Pioneers to represent certain disciplines, including chemistry. We did see improvement over time, and understand that the chemistry specialists also met outside of formal meetings to complete development work. This is positive, but it is likely that the opportunity was lost to make better progress earlier in the process.
7. We take this opportunity to commend the commitment and professionalism we have seen from the members of the Science and Technology Pioneer Group.

The involvement of academic and other external expertise in informing curriculum design

8. The purpose of our presence has largely been to 'be on hand' to provide input and answer questions, to help the work move forward. It has been valuable to join the discussions; however, on multiple occasions inefficient use was made of our time, for example:
    - on occasion no work was done in our area of expertise, where no secondary chemistry teachers were present
    - agendas for meetings have usually been very general, giving limited opportunity to prepare; drafts shared ahead of time were frequently changed by the time we attended
    - frequently it has taken time to 'catch up' with the group when we arrived, and so to be able to contribute usefully.
9. We accept that a process of this nature will be iterative, and that there is a need to be flexible and deal with matters as they arise. However, due to the nature of the process and the way we were engaged, we feel that we have not always been able to put across our recommendations coherently, or focus on those aspects that we found most important.
10. Lately, we have been given the opportunity to feed back on more complete drafts of the curriculum outside of meetings, which has felt more comfortable.
11. We are aware that academic expertise has been engaged through the Camau project, who are advising on how to construct progression in curriculum. There is also curriculum expertise, including in science, present on the Curriculum and Assessment Group. However, from our experience an opportunity has been missed to engage specific disciplinary expertise in curriculum design at the day-to-day level of the Pioneer Group. There is much research available on, for example, embedding ideas about the nature of science or the development of scientific concepts, which would have benefited the curriculum.

How the 'What Matters?' statements, published in December 2017, are evolving into the design of curriculum content in each of the six AoLEs

12. We support the principle of using core statements as a framework for the curriculum, which can provide curriculum coherence, and a clear path along which to define progression in learning.
13. The What Matters? statements themselves have evolved since the publication in December 2017, although the general areas each covers remain the same. While it is understandable that the statements are revisited, it is notable how much time we have seen the Pioneer Group spend on re-wording the statements.
14. We believe that the pressure to express the What Matters? in as few statements as possible (so that teachers need not manage an excessive number of statements) has been a particular issue for the Science and Technology AoLE, due to the following combination of factors:
    - the number of disciplines within the AoLE and the disparity between them; the breadth from biology to computer science is significant
    - the fact that the sciences are characterised by the areas of *knowledge* that each science is interested in, *as well as* the approaches taken to develop that knowledge (which are not homogeneous across the sciences); additionally, the ways we use science and technology and the impacts that they have on individuals, society and environment also, clearly, matter

- the level of development in abstract understanding and introduction of new ideas that occurs between ages 3 and 16, meaning finding wording that works across the whole range of the curriculum is challenging.

15. Conveying all that genuinely matters in science and technology in a small number of statements has proven difficult. We have seen attempts to add in all relevant ideas, followed by shortening the statements again because they have become too long and unwieldy. This suggests there are not sufficient statements to adequately characterise this area of the curriculum.

16. Accordingly, we are concerned about important areas of the curriculum falling through the cracks. In particular, a previously included statement about the impacts of science and technology (e.g. on society and environment) was removed in favour of integrating those ideas in the remaining statements. Going by the latest we have seen, this has not (yet) been managed consistently or comprehensively. It was further suggested at one point that the statement on the nature of scientific knowledge and enquiry be similarly integrated. We opposed this, and the statement remains, but this felt indicative of the pressure to over-reduce the detail in the curriculum.

17. The Science and Technology curriculum as drafted does not present a clear identity for the scientific disciplines, which is contrary to the recommendation in *Successful Futures* that AoLEs should have an identifiable core of disciplinary knowledge. We believe that identification and definition of the core sciences of biology, chemistry and physics in the curriculum is beneficial to learners' attainment and progression.

Progress in defining achievement outcomes at the various progression steps within the new curriculum

18. Prior to spring/summer 2018 we understood, from feedback given to the Pioneer Group, that the achievement outcomes would be written to an appreciable level of detail. Since then a marked shift occurred: the progression step descriptors have been removed altogether and the achievement outcomes have become very high level descriptors.

19. We are severely concerned about this development. The recent drafts we have seen provide insufficient clarity on the expected learning. The risks of this are:

    - Teachers coming to different interpretations of the breadth and depth required, leading to significant variation in attainment, experience and outcomes for learners in different schools.
    - Loss of confidence among teachers due to uncertainty over whether they are meeting the requirements; this will be most pronounced for less experienced teachers and those teaching outside of their subject expertise (which is common in the sciences).
    - Increased workload for teachers in having to interpret and implement the curriculum.

20. We are thus concerned about outcomes for learners, but also about the effect on teachers. Shortages of science specialist teachers already exist;[1] dissatisfaction and workload issues on implementing the new curriculum can realistically lead to teachers leaving the profession and potential new teachers being discouraged from entering the profession. The plans for professional learning and other teacher support must take a realistic view on what will be required to help smooth the transition.

21. These concerns do *not* imply that the curriculum should be written in exhaustive detail or that more content should be added. A curriculum restrained in the amount of content allows focus on the key concepts and ideas as well as flexibility for teachers to use different teaching approaches, and bring in a range of examples and contexts. However, the level of understanding and skill expected must be clearly defined;[2] indeed, a curriculum that does not clearly define this expectation may be easily over-interpreted in terms of amount of content.

Communication with schools and teachers of the curriculum development work being undertaken and the engagement of all schools (not only Pioneer Schools).

[1] https://beta.gov.wales/sites/default/files/publications/2018-09/teaching-a-valued-profession-report-of-the-independent-review.pdf
[2] https://www.bbc.co.uk/news/uk-wales-44522981

22. Our school support team in Wales report that many teachers they speak to do not know any detail of the ongoing work. Some teachers are not aware that there is a reform process ongoing.

The preparedness of schools and teachers for delivering the new curriculum and to what extents some of the concepts of Professor Donaldson's *Successful Futures* review are being tested and carried out already.

23. As point 22 suggests, many schools are not aware of reforms in whole or in detail, and are therefore not in a good position to prepare.
24. We are concerned about whether the teaching profession as a whole is well placed to support the successful introduction of such a major reform. Shortages of teachers with a range of specialisms, particularly in the sciences, are well-documented.[3] It is recently reported that recruitment of ITE trainees for Welsh-medium provision is declining.[4]
25. Despite the strong emphasis on project-based, multidisciplinary learning, *Successful Futures* states that 'subjects and disciplines should remain important'. Research has shown that teachers' subject knowledge can have a significant influence on their effectiveness.[5] We additionally believe that specialist chemistry teachers' enthusiasm for their subject and understanding of relevant career pathways encourages students to choose chemistry and related options in post-compulsory study and careers.
26. We fear that many teachers currently may not have the time or capacity to implement the suggested changes. Many teachers do not receive sufficient support for professional development, whether formal or informal, as a consequence of both funding and workload pressures. In the sciences the situation is already more difficult because many teachers are teaching across multiple specialisms, which brings with it a higher workload and a need for broader development.
27. Considering these factors, we suggest it should be a priority to develop the teaching profession ahead of implementation of the curriculum reform, including time allocated for professional development and developing the local curriculum, and focus on recruitment and deployment of teachers with appropriate disciplinary expertise in the sciences and other shortage areas.

Progress in developing new assessment arrangements

28. We have seen very little information regarding new assessments. We understand that there may be changes to the structure and assessment formats of GCSEs to better align with the new curriculum, and that Qualifications Wales are developing proposals for consultation in late 2019.
29. We agree with the principle that the qualifications should 'come from the curriculum', and that to date it has been too early to develop revised qualifications in any detail. However, many stakeholders want to understand what qualifications will look like; teachers will need to be able to prepare and for supporting resources to be in place in good time. We advocate an open development process so interested parties can see the direction of travel.
30. We would like to understand how a curriculum that does not clearly identify the scientific disciplines will feed into GCSEs. Given the Cabinet Secretary for Education's vocal support for the study of the individual sciences at this level, we would expect and support GCSE courses in which the science disciplines have distinct identities.

[3] https://beta.gov.wales/sites/default/files/publications/2018-09/teaching-a-valued-profession-report-of-the-independent-review.pdf

[4] https://gov.wales/docs/caecd/research/2018/180928-evaluation-welsh-medium-provision-initial-teacher-education-summary-en.pdf

[5] What makes great teaching? Review of the underpinning research. Coe, R., Aloisi, Sutton Trust report https://www.suttontrust.com/wp-content/uploads/2014/10/What-makes-great-teaching-FINAL-4.11.14-1.pdf