

IOP Institute of Physics

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Dear Mr Shield,

National 4/5 Consultation

Please find attached the Institute's responses to the consultation on the proposals. The Institute of Physics is a scientific charity devoted to increasing the practice, understanding and application of physics. It has a worldwide membership of over 40,000 and is a leading communicator of physics-related science to all audiences, from specialists through to government and the general public. Its publishing company, IOP Publishing, is a world leader in scientific publishing and the electronic dissemination of physics.

Yours sincerely



Prof Andrew Long
Chair, IOP in Scotland



Prof. Peter Main
Director of Education and Science

Institute of Physics Response to the National 4/5 Draft Documents

Rationale

The Course rationale shows clearly the links with, and progression from, Curriculum for Excellence. The purpose and aims of the course are commendable.

We do however have some concerns about the progression routes. While clearly many of the required skills are common (though not identical) across the sciences, it is difficult to see how “successful completion of a National 4 Course” in (say) Biology will help prepare a learner who has failed to “achieve secure understanding” of the third and fourth level physics outcomes for a National 5 course in Physics (and indeed vice versa.)

The Institute also has great concern about the curriculum structures currently being proposed or implemented in S2-S4 in many schools. These are likely to restrict the access of students to these National 4 and 5 courses. It would be a great pity if SQA develop modern and relevant National 4 and 5 courses that both prepare students well for further study at Higher, Advanced Higher and university or for employment in science and technology based industries, but that many students cannot access due to schools offering only a choice of five or six subjects in S4. Modern science and technology is multi-disciplinary in nature. Schools and local authorities must be encouraged to introduce curriculum structures that do not mitigate against doing more than one of the sciences; if Scotland is to have the scientific and technologically literate population it will need in the future, the structure should allow the study of maths and several of the science and technology subjects in S2-S4 (as well as some choice of languages, social subject and creative subjects).

Unit titles

The three unit titles proposed for Physics are rather dull and uninspiring and describe poorly what physics is either in terms of topics or contexts.

The brief details of content given for each unit are not well matched to the titles. For example, since most of our knowledge of Space is made by observing electromagnetic radiations we would have expected this unit to cover much more than “It will focus mainly on relationships involving forces.” We might add that ‘Space’ is not a very good unit title. In addition, the Energy unit does not seem to be the logical place to be studying electronic systems and components.

Without greater detail in the documentation it is difficult to make much more meaningful comment.

There has been much discussion about the fact that the unit titles are the same for National 4 and 5. If the intention is to have the same experiences at each level and allow differentiation by outcome (as is the case with the current Standard Grade courses), then this will enable schools to offer courses at both levels more easily. This will also permit the National 4 course to be a fall-back for learners who do not succeed in the external assessment for National 5. If on the other hand the experiences are to be different and will show progression then the unit titles should reflect this progression.

It is essential that the content of the physics courses complements that in mathematics as far as possible so that important topics used in physics such as algebra, scientific notation, proportional and inverse relationships and the equation of a straight line are supported by other areas of the curriculum and skills can be seen to be genuinely transferable by students.

Assessment

Unit assessment should not be overly burdensome for students or teachers and a pass in the National 5 course assessment should be possible without passing all of the component units.

This would remove the need for the distraction of re-sitting unit assessments at the time when learners should be focussing on their preparation for the external assessment.

The only component of National 5 to be externally assessed should be the written examination. We are not in favour of there being external assessment in other forms such as a project, investigation, portfolio or external assessment of practical work. The National 5 examination should have questions on skills such as data analysis, handling of information and more open-ended questions assessing understanding.

The internal assessment of National 4 is a rather contentious issue. The external verification will need to be much more extensive than is currently the case, with many more centres undergoing verification. We know of many centres which have not been verified at Standard Grade for over 15 years.

It is unclear whether Assessment Instruments will be provided for internal assessment as is currently the case, or whether there will be a few exemplars given in the National Assessment Resource, with centres left to construct their own assessments. This latter course would lead to even greater variation between centres than at present, with a corresponding loss in credibility.

We are concerned that using both a project and a test to assess the National 4 Added Value Unit, might over-burden students with assessment, especially if they are completing the Unit as a safety net to not passing the National 5 External Assessment.