Review of Junior Cycle Science

January 2014

Background

Ibec welcomes the opportunity to contribute to the consultation on Junior Cycle Science by making a submission to the NCCA. The ambition to change from a curriculum based primarily on "knowledge and content" (NCCA, 2013) to one in which skills development focuses on knowledge *of* and *about* science is welcomed by industry. An overhaul of the current syllabus dominated by the exact sciences, to a more contemporary specification which takes into account the need to develop an inquiry based approach to science is well overdue.

Concerns regarding science education

One concern regarding the science syllabus at Junior Cycle is the depth of treatment of the subject across the curriculum. While the aim is to ensure the content is not prescriptive and broad enough to allow for entrepreneurial activity, there is a concern that there may not be sufficient guidance to inform teachers regarding the depth of coverage required. This may result in varying levels of outcome and competence leaving some students at a disadvantage entering senior cycle.

A further concern that has been raised regarding the practical aspects of the science curriculum including whether the intended learning was achieved i.e. the link being made between objects and ideas. Structured inquiry is a useful way of teaching the basics of investigation as well as techniques of using various equipment and procedures. Learners are provided with a practical problem to investigate as well as the procedures and materials necessary to complete the investigation. They discover relationships between variables or make deductions from data collected. This equips students with the capacity to form reasonable and measured arguments based on evidence analysed and interpreted. This will be important regardless of the field of further study but especially for students taking physics, chemistry or biology at senior cycle.

A stronger bridging, in terms of a curriculum framework and information flows is required between primary and secondary school. While Junior Cycle Science for some students will be an end in itself it is necessary to consider this subject as an integral part of a national approach to science starting at primary science and culminating at third level. Therefore, there needs to be significant interconnectivity rather than seeing this as a standalone module. In this way a balance is required between the need for change in the methodology but without sacrificing the content necessary to progress competently at senior cycle.

Resourcing and assessment

Ibec welcomes the investigative approach promoted by the background document but notes the concern that has been raised surrounding appropriate resourcing for practical work which is key to the success of meeting the overall aims. Given the constraints on resourcing, more creative ways of engaging in practical work may be required for some aspects of the Junior Cycle programme. For example the use of virtual environments or lab "kits" could reduce the demand on teachers. Similarly, sharing of resources such as lab technicians, across schools may ease the burden somewhat on resourcing and the demand on teachers' time without impacting the learning for students.

Ibec welcomes the concept of the e-portfolio as an assessment tool. It offers huge potential in terms of demonstrating the achievement of learning outcomes and in a fashion that reflects the breadth of media available to 21st century learners.

Teacher training and subject status

The quality of an education system cannot exceed the quality of its teachers and international evidence suggests that the empowerment of the teaching profession produces good results. Teachers should not be seen as technicians whose work is to implement strictly dictated syllabi, but rather as professionals who have the space for innovation to improve learning for all.

A vital component for the delivery of a new science curriculum must be met through rigorous and intensive continuous professional development (CPD) for teachers. Understanding and appreciation of the goals and all aspects of the curriculum and assessment are key to successful implementation of this new syllabus. Given the significance of its expected deviation from the existing curriculum, CPD will be expected to be similar to that afforded to Project Maths. Ultimately the success of the curriculum change will depend on the flexibility of teachers, the allocation of adequate resources to their continuing professional development and their access to alternative sources of material.

Finally, Ibec would recommend that science be designated as a core compulsory subject. This has a very practical implication as core subjects are allocated longer teaching time than other subjects. The skills proposed by a new science curriculum are broader educational skills which will add value to other subjects. In addition, to fully understand and participate in the modern world requires an ability to think scientifically if we are to make informed decisions regarding key social and personal issues. Without understanding the scientific

method, citizens cannot make reasonable decisions about which medical course to follow when confronted with a set of options or how to evaluate competing claims about child rearing, psychotherapy, genetic testing or treatment of the elderly. Moreover, informed opinions about controversial issues like stem cell research, nuclear power, genetically modified foods or global warming presuppose a grounding in the relevant science and technology.

From a labour market perspective a focus on science is also critical given its function as a crucial in-demand skill. This not only equips individuals with the skills industry needs but maximises both their ability to have fulfilling and rewarding careers and a good quality of life.

Conclusion

Given the pivotal role that science and technology will play in future economic growth, the science curriculum at primary, junior and senior cycle, their integration and fitness for purpose cannot be underestimated. Ibec would, in general, agree with much of the background paper on the science curriculum. The future of organisations in science and technology related fields depend on having sufficient numbers of suitably qualified graduates. For students to pursue these disciplines, they must have a strong foundation in science at secondary school. This new contemporary curriculum should contribute to strengthening student motivation and creating engaging learning and teaching environments.