



30 May 2013

Members
Education and Science Committee

Inquiry into ‘compulsory vs. elective subjects in secondary schools – should subjects like science be compulsory?’

The Education and Science Committee has been asked to conduct an inquiry into: ‘compulsory vs. elective subjects in secondary schools – should subjects like science be compulsory?’ This paper has been prepared to assist the Committee with its examination. The paper identifies issues and provides possible lines of inquiry for the Committee to consider. The Committee may also wish to raise these matters with the witnesses who have been asked to appear before the Committee to give evidence on this inquiry.

Introduction

The purpose of the New Zealand education system is to equip all New Zealanders with the knowledge, skills and values to be successful citizens. Educational curriculum should meet the needs and current demands of the culture, the society, and the expectations of the population being served. To achieve this vision, the Government directs what students should learn through its national curriculum.

In our rapidly changing world, continually updating school curricula ensures that the next generation is fully equipped to function well in society. There is a growing need for specialised training for certain career pathways, which requires more formal training. This has created demand for greater pre-professional and/or vocational education in secondary school, to help ensure a smooth transition into on-going education, training or work.

Given the new and emerging expectations and challenges in our society, the national curriculum may require updating, with a special emphasis on certain types of learning and knowledge. This includes potentially making some subjects compulsory for secondary students, to ensure they acquire the knowledge and skills which are necessary to be an engaged and productive member of society.

Recent changes to our education system (such as the introduction of the National Certificate of Educational Achievement) have allowed secondary schools and students greater freedom in designing their course of study. Some subjects, such as those relating to basic requirements in literacy and numeracy, remain compulsory. However, for senior students (Years 11-13), there is the flexibility to choose subjects to study.

The current New Zealand Curriculum

The *New Zealand Curriculum* (the Curriculum) is the statement of official policy relating to teaching and learning in New Zealand schools. It sets out the vision and principles that are the foundations of decision-making in school curriculum. Schools are required to base their curriculum on the principles of the Curriculum, to encourage and model the values, and to develop the key competencies at all year levels. The key competencies identified in the Curriculum are:

- thinking
- using language, symbols, and texts

- managing self
- relating to others
- participating and contributing

The Curriculum also specifies eight 'learning areas' (subjects):

- English
- the arts
- health and physical education
- learning languages
- mathematics and statistics
- science
- social sciences (eg history, geography, economics, social studies)
- technology

The learning associated with each of these areas is part of a broad, general education and lays the foundation for later specialisation. While these learning areas are presented as distinct, they are not meant to limit the ways schools structure the learning experiences offered to students. All learning is expected to make use of the natural connections that exist between learning areas, and that link learning areas to key competencies.

The National Administration Guidelines (NAGs) outline the administrative requirements of schools in delivering on the national curriculum. Under the NAGs, the national curriculum is compulsory until Year 10, so schools are required to provide subjects that relate to the learning areas above and are compulsory for all students.

Subject choice under NCEA

In 2002, National Certificate of Educational Achievement (NCEA) was introduced as the main secondary schools qualification, beginning with NCEA Level One in Year 11. This replaced School Certificate and Bursary qualifications, which during the 1990s had progressively been adjusted to become more flexible in subject choice and assessment. NCEA was regarded as a natural progression to a qualification that is outcomes-based and recognises a wider range of competencies and skills, which were often not taken into account by the old system.

As part of this reform, schools and students were given greater flexibility in the course design and assessment. This reflected that many students have different learning needs and different beyond-school pathways in mind. For senior students (Years 11-13), NCEA only requires a basic level of numeracy and literacy at Year 11, leaving schools to decide which subjects to provide and which to make compulsory.

Currently, secondary schools in New Zealand provide students a mix of compulsory and elective subject choices. For Year 9 and 10 students, 'core' compulsory subjects include mathematics, English, science, social sciences, technology, and health and physical education (as outlined in the NAGs, with some variation). From Year 11 onwards, schools are free to choose which subjects are compulsory. It is common for schools to make mathematics, English and science compulsory for Year 11 students, English only for Year 12, and no compulsory subjects by Year 13 (NZQA).

Overall, the current regulatory framework for secondary schools in New Zealand gives considerable freedom in course design. There has been a clear shift in the last decade toward a more flexible model, with students having greater subject choice, and significantly more and varied subjects being offered by schools.

Impetus for reform of school curricula

Reform of school curricula is based on the idea that our education system must keep up-to-date with the continuous evolution of knowledge and technological change, so students are fully equipped to function well in society.

In New Zealand, there are concerns that given recent and emerging challenges (e.g. debt and employment issues related to the Global Financial Crisis, and the economy shifting away from traditional production sectors), school curricula may not be developing the skills and knowledge necessary to meet these challenges. Specific issues perceived as being important to address include:

- a lack of financial education (i.e. budgeting and spending habits)
- falling participation and academic performance in 'core' subjects such as science and mathematics
- ensuring students have the skills to keep up with rapid technological innovation
- 'citizenship' classes to improve participation and contribution to society, and
- environmental and sustainability pressures

In addition, there is debate about whether Te Reo Maori should also be compulsory in schools given it is an official language of New Zealand. This can cultivate an understanding of Maori culture and appreciation of cultural diversity.

Reasons for compulsory subjects

Compulsory subjects exist because the learning area in which they belong are regarded as fundamental to building the key competencies of students. Reasons for making some secondary school subjects compulsory include:

- The perception that many students do not always know what might be best for their future learning or employment. This is highlighted by the shortage of skilled professionals in certain employment areas, and the comparative over-supply in others. The Government has identified employment areas that are suffering from - in some cases, severe - skills shortages. This includes areas such as engineering (4.4% of all students studying) and information technology (5.7%). However, current tertiary students appear to be focussing their study on low-demand work areas, such as in marketing and communications (8.8%), conservation/environmental studies (7.5%), and the arts (6.8%) (Ministry of Business, Innovation and Employment, 2012). The Government has identified engagement with secondary school students as important to help direct them into training and employment in high-demand work areas. This could be assisted through the introduction of compulsory courses relating to these learning areas.
- There is a concern that current subject choices (and even achievement standards *within* subjects) by secondary school students could have a negative impact on our ability to replace our existing pool of science and technology professionals. A high level of knowledge in these learning areas is essential to developing a career in some professions (e.g. secondary school science and later studies in scientific fields). While to a degree this knowledge can be learnt at university, it is important that a 'foundational' knowledge is developed at secondary school. However, the number of secondary students choosing to study maths and science (once they are no longer compulsory) is steadily declining (Gluckman, 2011).
- Some knowledge is also essential for people to be able to engage in public debates as informed citizens. This is especially true for decisions relating to the economy, science and technology, all of which have become increasingly complex and influential for individuals (for example, the issue of climate change and the potential social and economic consequences of this). A minimum level of knowledge, and the ability to interpret new and varied information, is important for New Zealanders to be able to engage effectively in decisions which affect New Zealand.
- Compulsory attendance in courses deemed to be 'core' (such as English, science and maths) has been shown to improve academic performance for *all* students in these learning areas, but most significantly for those from disadvantaged backgrounds (PISA, 2001). International studies have shown that for students from disadvantaged backgrounds, a key contributing factor to academic

success is actual time in class. This is especially important for lower-achieving students who may not have the confidence or motivation to take these more challenging core courses (Programme for International Student Assessment, 2001).

Reasons for freedom of subject choice

Subject choice in schools is consistent with the principle of 'self-directed learning', in which students decide what learning areas they have an interest in and would like to develop further skills and knowledge. Reasons for allowing greater freedom in subject choice, for schools and students alike, include:

- Greater freedom in subject choice is linked with greater student satisfaction, and higher academic performance at secondary school. Studies have shown that students have improved satisfaction and academic achievement in subjects that they choose for themselves (NZCER, 2009). Student satisfaction with their learning is important in its own right, but also has the added benefit of improved academic performance.
- Academic performance at university is more closely related to how well students performed at secondary school generally, rather than to the particular subjects they studied at school (Ministry of Education, 2010). This means that general academic achievement (in the learning areas outlined in the curriculum) is more important than foundational/pre-professional studies in specific subject areas, when looking at higher level studies and employment. Given that students enjoy, and perform better in, subjects they choose for themselves, making more subjects compulsory may be counterproductive to improving knowledge in a specific learning area.
- Future employment opportunities are not necessarily related to 'foundational learning' undertaken at secondary school. Rather, with the rapidly changing workplace of the modern world, a wide range of transportable and transferable skills is preferable. This includes students from the arts and social sciences, which help to develop skills in critical thinking, analysis and writing ability. Well-rounded students can graduate into a variety of different roles, and are able to quickly retrain to meet new and different employment needs (Eriksen, 2012).

How do we compare internationally?

Australia does not currently have a National Curriculum, though one is under development. Education is administered at a State level, with (in some cases, considerable) variation in systems. The education system in Victoria is most like New Zealand's, with a similar curriculum from 'Foundation to Year 10', in which nearly all courses are compulsory. From Years 11 to 13 there is greater freedom to choose subjects, with all courses in Year 13 elective.

The national curriculum in the United Kingdom (UK) has far more compulsory subjects for students in Years 9 -11, with the 'core' subjects of English (or Welsh, depending on the jurisdiction), maths and science supplemented with subjects such as:

- history
- geography
- information and communication technology (ICT)
- religious education
- citizenship
- music

Years 12 and 13 have greater freedom in subject selection for their 'A-levels' (the most commonly taken national qualification). The UK government is currently in the process of drafting a new national curriculum. On 7 February 2013, a draft version of the curriculum was released for public consultation. Some of the proposed changes include the adoption of 'financial education' as part of the compulsory subject of citizenship, and the development of a stand-alone computing course,

which would include programming. The curriculum is considerably 'slimmed down', with a greater emphasis on the 'core' (and compulsory) subjects of science, maths and English (UK DoE, 2013).

Comparisons are often drawn with countries in Asia (the most common comparisons being made with Singapore, Hong Kong, Shanghai¹, South Korea, and Japan), which are perceived to have education curricula that are more rigid, including more compulsory courses. Rapid improvement in educational outcomes, not least maths and science, has sparked debate as to whether a stricter system of learning is desirable in New Zealand. Countering this are arguments by educators that the strengths of these systems relate more to improvements in teaching methods, as opposed to course design. In fact, in some of these countries the national curriculum has been reduced, with greater flexibility for students to plan their studies. However, cultural attitudes toward education remain strong, and pressure for students to focus on 'traditional' subjects, such as maths and science rather than others, such as the arts.

The education system in Finland is widely regarded as one of the best in the world, with Programme for International Student Assessment (PISA) rankings of first in science, and second in both reading and maths. The national curriculum for secondary students in 'upper secondary school' has a considerable element of compulsory courses. The government requires that students complete (usually over three years) a minimum of 75 courses (38 hours each) of which 47-51 courses are compulsory and 10 are specialised subjects (and more in-depth than compulsory courses). At that end of this study period, students take a national examination comprised of at least four tests; one of these must be the student's native language² with the others being from among the following: the second national language, a foreign language, maths, and one other subject from the science and humanities learning areas (UNESCO, 2012).

Report to the House

The Committee is required to report its findings on this inquiry to the House. The purpose of your report is first to inform the House and stimulate debate. In doing so your report should reflect both the oral and written evidence the Committee received, the issues the Committee considered in-depth, and the views of the members. From these the Committee should develop conclusions and recommendations to the Government.

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¹ Hong Kong and Shanghai are used in comparative studies as they are centres of educational innovation in the Chinese system, with education systems distinct from that in most other areas of China.

² Both Finnish and Swedish are national languages.

Members may wish to ask:

- What key competencies and knowledge will students require to be successful in the modern workforce?
- What key competencies and knowledge will students require to ensure they will be able to make decisions about complex social, economic and scientific issues?
- How important are subjects such as science, maths, information technology and computing in modern society?
- Do the current learning areas of the national curriculum need to be adjusted to reflect new competencies?
- Should more subjects be compulsory? If so, which ones?
- Should students have more choice about the subjects they take currently? If so, which subjects shouldn't be compulsory?
- What other subjects would be useful to be taught at school?

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Key words and search phrases:

- Advantages of compulsory subjects
- Disadvantages of compulsory subjects
- Reasons for elective subjects
- Reasons against elective subjects
- Student subject choice and motivation
- Impact of subject choice at school and influence on work choices