9-1-2005

Year 12 subjects and further study.

Australian Council for Educational Research (ACER)

LSAY Briefing Number 11
September 2005

Year 12 subjects and further study

Introduction

The subjects studied in the senior secondary years have a significant influence on the educational and career options available to young people when they leave school, over and above other factors. They also represent an outcome of previous school and other experiences, which shapes interests, proficiencies and decisions about careers.

Policy interest in patterns of subject choice is partly stimulated by the change in school retention rates over the past two decades. Between 1983 and 1992 the percentage of each cohort of young people remaining at school to Year 12 increased from 36% in 1982 to 77% in 1992 before falling a little during the 1990s to rise again to 76% in 2004.

One perspective on subject uptake in the senior secondary years focuses on changes over time in participation in particular areas of study. For example, the national review of teaching and teacher education noted that the there has been a swing away from science: the percentage of Year 12 students participating in biology, chemistry and physics, as well as advanced mathematics, had declined over the 1990s.

A second perspective looks at differences between students enrolled in various subjects. Survey data such as those derived from LSAY are needed to monitor the associations between subject uptake and student characteristics. For example, these data reveal the differences between those who study advanced mathematics and physical sciences in terms of their earlier school achievement, as well as differences associated with social background and sex.

A third perspective looks at the consequences of subject choice. This perspective examines the education and training activities undertaken after Year 12 by those who study in different subjects during that final year. For example, analyses of longitudinal data indicate a higher level of university participation among those who study the sciences in Year 12 compared to other students.

This LSAY briefing uses research based on subject enrolment data from a sample of students in Year 12 in 2001, and data from other groups of Year 12 students to examine these issues. Explanations of some of the terms and methods used in this *Briefing* are contained in the notes section at the end.

LSAY Briefings is a series produced by the Australian Council for Educational Research (ACER). The aim is to bring summaries of findings from research to a wide audience – in an accessible format and language, and identifying some of the implications for policy and further research. *LSAY Briefings* draw on data from the Longitudinal Surveys of Australian Youth (LSAY) program, which studies the experiences of young people as they move from school to post secondary education, training and work. ACER and the Australian Government Department of Education, Science and Training (DEST) jointly manage the program. LSAY reports on which this paper is based, and related references, are listed at the end of the paper.

Longitudinal Surveys of Australian Youth
BRIEFING

HIGHLIGHTS

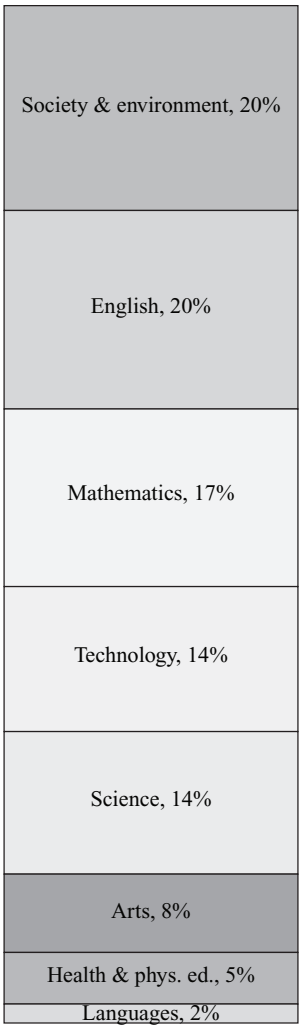
- **Since the early 1990s participation has grown in Year 12 business and secretarial studies, creative and performing arts, and computer studies, and has declined in the traditional humanities, biology, physics, chemistry, economics and accounting.**
- **Studying advanced mathematics and the physical sciences is strongly influenced by earlier school achievement.**
- **The combination of subjects studied in Year 12 influences entry to university and vocational education and training.**
- **Students who study advanced mathematics and physical sciences are more likely to continue study after they complete school.**

Recent distribution of Year 12 subject enrolments

Among the cohort of students who participated in Year 12 in 2001, the three key learning areas of English, mathematics and science accounted for just over half of all subject enrolments (20% in English, 17% in mathematics and 14% in the sciences) with a further 20% in studies of society and environment (see Figure 1). The largest of the four remaining key learning areas was technology with 14% of subject enrolments, followed by the arts with 8%, health and physical education with 5% and languages other than English with just 2%. The percentage distribution of subject enrolments is not the same as the percentage distribution of students who study at least one subject in each learning area, because each student studies several subjects. In Year 12 in 2001, 96% studied English, 84% studied a mathematics subject, 68% studied a subject from society and environment and 55% studied a science.

Within studies of society and environment, economics and business contributed just fewer than 10% of subject enrolments, and the humanities and social sciences contributed just fewer than 8%. From the science key learning area, the physical sciences contributed 6%, with the biological and other sciences contributing 8%.

Figure 1 Year 12 enrolment distribution by key learning area in 2001



Changes in Year 12 subject uptake

There were four groups of subjects in which the participation grew over the period from 1993 to 2001 and a number in which participation declined.

Growth in subject participation: 1993 to 2001

- Business/Secretarial/Hospitality Studies, from 15% to 26% of students
- Computer Studies, from 21% to 27% (having peaked at 28% in 1998)
- Food and Catering, from 4% to 10%
- Music and Performing Arts, from 11% to 16%
- Creative and Visual Arts, from 17% to 21%

Declines in subject participation: 1993-2001

- Economics, from 18% to 7%
- Politics/Social Studies, from 15% to 7%
- Geography, from 18% to 12%
- Biology, from 32% to 25%
- Accounting, from 12% to 6%
- Home Science, from 11% to 6%
- Chemistry, from 23% to 18%
- Physics, from 20% to 17%
- Legal Studies, from 15% to 12%
- History, from 21% to 18%

There are three indications of a broadening of student subject selections during the past decade. The first is in the distribution of subject enrolments across key learning areas. In the early 1990s the four largest key learning areas (English, mathematics, society and environment, and the sciences) accounted for 76% of subject enrolments, but by 2001 those areas accounted for only 71% of all subject enrolments.

The second was a trend towards increasing enrolments in vocationally oriented studies. Over the period from 1990 to 2001 there have been declines in the humanities and social sciences, the biological sciences and the physical sciences. There has been growth in computer studies and technical studies, as well as the arts. There has also been a substantial shift away from subjects such as economics and accounting and towards subjects such as business studies, although overall enrolments have remained steady. In addition, there has been a decline in the more general home science (sometimes called home economics) subjects and an increase in the more explicitly vocational subject called food and catering.

The third indication of broadening subject selections has been a decline in the proportion of students taking two subjects from traditional areas of specialisation. The combination of physics and chemistry was taken by just under 10% of Year 12 students in 2001, whereas it had been studied by 11% in 1998, 13% in 1993 and 15% in 1990. A combination of two subjects from the humanities and social sciences was taken by 6% of Year 12 students in 2001, 8% in 1998, 13% in 1993 and 12% in 1990.

Influences on subject participation

Student participation in the subjects available to them in Year 12 is an outcome of a combination of influences from their background, interests and earlier school experiences. Since a range of factors, rather than one factor, determines subject selection, it is

important to analyse simultaneously those factors so as to identify the effects of each influence when other influences are held constant. These effects are referred to as 'net effects', because they are 'net of' the influence of the other factors. Differences associated with sex, earlier achievement and aspects of social background are evident in the patterns of subject participation.

Students with higher levels of earlier school achievement (even after allowing for the effect of other related influences), as well as those with aspirations to higher education, are more likely than other students to be enrolled in advanced mathematics and the physical sciences (chemistry and physics).

Participation in advanced mathematics and physical science is:

- Twelve times as likely among students from the top quarter of earlier school achievement as among their peers from the bottom quarter.
- Three times as likely among students who intend to proceed to university as among other students.
- Twice as likely among males as females.
- From 30% to 50% more likely among students from the highest quarter of socioeconomic status homes than among the bottom quarter.
- Twice as likely among students from language backgrounds other than English as other students.

Participation in the biological sciences is:

- Twice as high among females as among males.
- Higher among the middle socioeconomic group, compared to either the lowest or highest socioeconomic groups.
- Less likely among students from language backgrounds other than English as other students.
- Forty per cent more likely among students from independent schools than among students from government schools.

Participation in the humanities is:

- More likely among females than males (by 20%).
- Forty per cent more likely among students from the highest quarter of the achievement distribution in Year 9 than students in the bottom quarter.
- About 70% more likely among students from independent schools than students from government schools.
- Less among those from a language background other than English than other students.

Participation in the creative and performing arts is:

- More than twice as likely among females as males.
- Less likely among students of a language background other than English than other students.
- Less likely among students from Catholic schools than government schools.

Participation in technical studies and computing is:

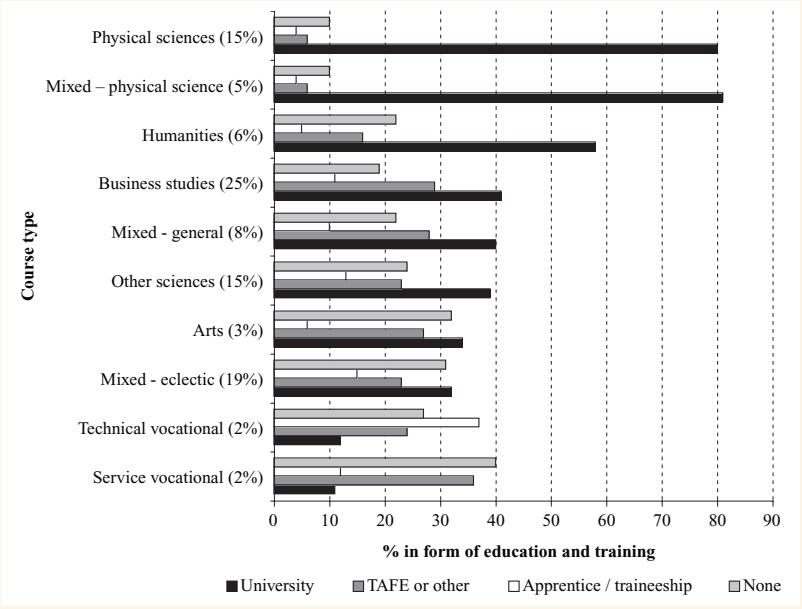
- Five times as likely among males as it is for females for technical studies and 2.5 times as likely for computer studies.
- Approximately twice as likely among students from the lowest earlier achievement quarter as among students from the highest earlier achievement quarter.
- From 30% to 40% less likely among students from independent schools than students from government schools.
- In computer studies, 70% more likely among students whose language background is other than English than among other students.
- In technical studies, only 70% as likely among students whose language background is other than English as other students.

Year 12 studies and post-school education

Types of courses in Year 12

Although many subject combinations are possible, students commonly take certain combinations in senior secondary school. The combination, or package, of subjects that students study in Year 12 has a stronger influence on educational and occupational pathways beyond school than participation in any individual subject. The most common combinations of subjects have been

Figure 2 Post-school education and training participation for different course types in Year 12



labelled as distinct course types. Seven subject-specific course types have been identified through the LSAY analyses: advanced mathematics–physical sciences, business studies, humanities and social sciences, arts, technical vocational studies, service-clerical vocational studies and other sciences. Three mixed course types have also been defined: one with two major foci, including two or more mathematics or physical science subjects, one with two major foci but without multiple mathematics or physical science subjects, and an eclectic group for which no major focus was identifiable. Thus, in total there were ten course types in Year 12.

Post-school educational destinations

Figure 2 shows the different post-school educational participation from each of the ten course types. Three course types resulted in more than half of their participants proceeding to university: advanced mathematics–physical sciences; mixed–including mathematics–physical sciences; and humanities and social sciences. All three involved students with higher levels of earlier achievement.

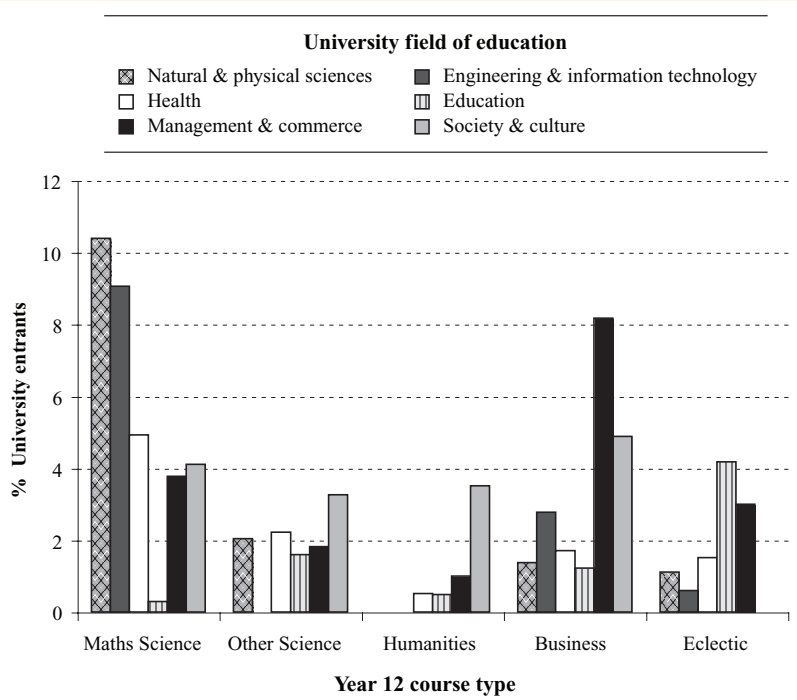
Business studies, other sciences and technical vocational resulted in a range of post-school educational activities with up to one quarter not pursuing any form of post-school education and training. The courses that resulted in the least propensity for post-school education and training of any type were the service–clerical vocational, mixed-eclectic and visual and performing arts courses.

Influences of Year 12 course type on post-school destinations

Differences in post school educational destinations are influenced by the type of the course studied in Year 12 over and above the influence of student background and earlier school achievement. In other words, students' subject choices in their senior secondary years influence the type or discipline focus of their future education. An analysis of the sources of variation in destinations indicated that nearly one-fifth of the variation in entry to university is related to differences between courses of Year 12 study rather than differences between individuals. In other words, course type in Year 12 is a strong influence on entry to higher education over and above the type of school a student attends, their sex, social, cultural and ethnic background, and their earlier school achievement level.

The type of course taken in Year 12 is also an influence, albeit weaker, on participation in VET, with about 10% of the variation in rates of participation due to differences between courses of Year 12 study rather than to differences between students. Enrolment in particular Year 12 courses significantly increases the likelihood of entering VET.

Figure 3 Year 12 course type and university field of education for university entrants



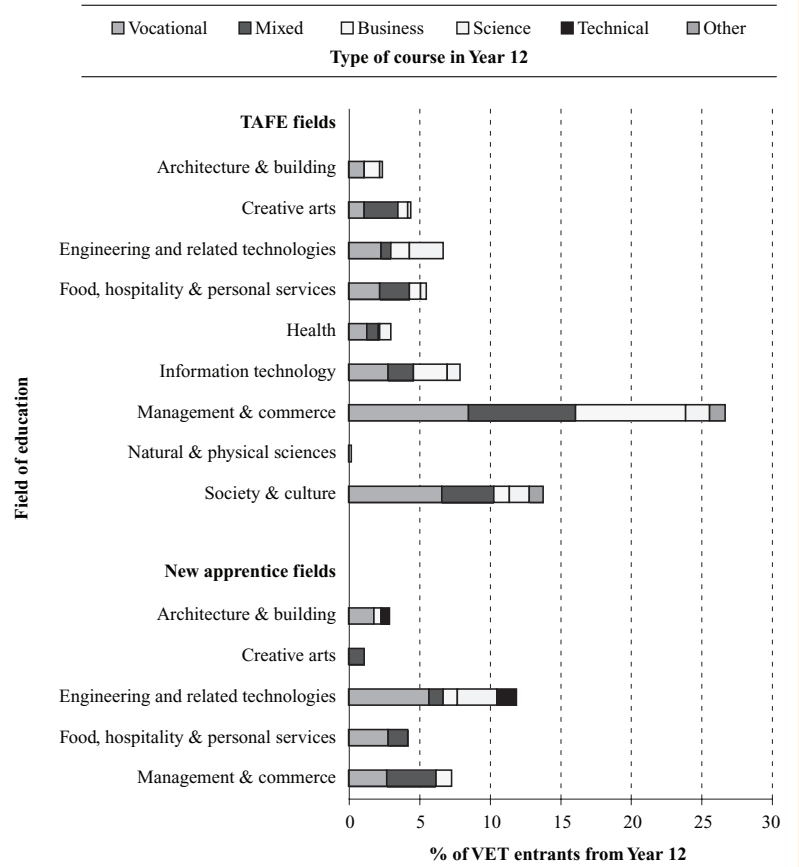
Field of education for entrants to university

For those who enter university the combination of subjects studied in Year 12 is related to, but not always the same as, their broad field of education in university. Figure 3 shows the percentage of all university entrants from Year 12 in 2001 into selected broad fields of education. To simplify the picture, the mathematics–physical science course type has been combined with the mixed–physical science course type and course types from which there are few university entrants have been omitted.

Seventy-one per cent of those who studied in a mathematics–science course type or a mixed mathematics–science course type and entered university studied in a science-related field of study (natural and physical sciences, information technology, engineering, architecture and building, agriculture and environment or health). In contrast, only 40% of those who studied in another science course type in Year 12 and entered university studied in a science-related field (mainly health).

Thirty-six per cent of those who studied a business course in Year 12 entered university in the management and commerce field of education, with a further 21% in the society and

Figure 4 Year 12 course type and field of education for VET entrants from Year 12



Note: Course types such as those involving science, and the various mixed course types have been combined).

culture field. Half of those who studied a humanities course type in Year 12 and then entered university studied in the society and culture field of education.

Field of education for entrants to vocational education and training from Year 12

Many students enter VET courses after completing Year 12. The fields of education that those young people entered are shown, separately for TAFE and New Apprentice vocational education and training, in Figure 4. For those who entered TAFE courses, the main field of education was management and commerce; for those who entered New Apprenticeships, the main field was engineering and related technologies, followed by management and commerce. Those data also indicate the type of course studied in year 12. Entrants to management and commerce fields in TAFE were drawn from the business, mixed and vocational courses. Entrants to the engineering and related technologies in New Apprenticeships were drawn mainly from the vocational and the science course types in Year 12. In general, the types of course studied in Year 12 corresponded to fields of education that students entered in VET after Year 12.

Notes

This briefing paper uses some terms and methods elaborated more fully in the LSAY reports on which it is based. These are briefly summarised in this section.

Groupings of subjects

The paper uses the terms 'key learning areas', 'subject areas', and 'subjects' as a basis for describing the patterns of studies undertaken by students. Among the issues that complicate the analysis of the patterns of subjects studied in senior secondary school is that different labels are applied across States and Territories to similar subjects, and different curriculum structures operate in those jurisdictions. To provide a basis for comparison, it is necessary to group like subjects. One grouping developed under the aegis of the Ministerial Council for Education, Employment, Training and Youth Affairs (MCEETYA) during the 1990s is based on 8 Key Learning Areas: English, mathematics, studies of society and environment (including humanities and business studies), science (including physical and biological sciences), arts, languages other than English, technology (including computer studies, technical studies, home science and agriculture) and health and physical education. A more fine-grained classification makes use of sub-groups within some key learning areas to yield a scheme of 15 subject areas. This two-stage classification has been used by DEST to monitor trends in subject choice since the middle of the 1990s.

Fields of education

The basis for classifying and grouping the many subjects studied at university or in VET is the Australian Standard Classification of Education (ASCED). Its highest level classification consists of the 10 broad fields of education used in the sections of the paper concerned with post-school education and training.

Indicators of subject choice

Subject area participation is usually defined relative to the Year 12 population. Two indicators are commonly used: participation rates and enrolment indices. Participation rates in subjects, and groups of subjects, are the percentages of Year 12 students taking that subject, or at least one subject from a group of subjects. The large number of specific subjects provided in Year 12 makes it convenient to refer to groups of related subjects or key learning areas. Students are regarded as having participated in an area if they indicated they were enrolled in a subject from the area for part or all of their Year 12.

Enrolment indices are the sums of enrolments in an area expressed as a weighted percentage of all enrolments (in full-time equivalent subjects). Values of enrolment indices are additive across areas and sum to 100 for any student or group of students. They have the advantage over participation rates of reflecting the extent to which students enrol in more than one subject from an area. Enrolment indices can be considered as reflecting curriculum share

for the program of an individual student or across a group of students.

Course types

As students study a number of subjects, the combination of subjects is often of greater interest than levels of enrolments in subjects or subject areas. Among the myriad combinations of subjects studied in Year 12, it is possible to identify a series of course types. Each student could be uniquely classified in one of the 10 course types identified by the statistical technique known as cluster analysis, which has been used as the basis for the analyses summarised in this paper. For further information on the identification of course types please see Thomson (2005).

Influences on subject choice

Investigations of influences on subject participation use multivariate analysis because a range of factors, rather than one factor, determines subject selection. Multivariate logistic regression is used to examine the effects of each influence where other influences are held constant and thus identify 'net effects'. The results in this paper are based on odds ratios derived from logistic regression. For further information on these techniques please see Thomson (2005).

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The Longitudinal Surveys of Australian Youth

The Longitudinal Surveys of Australian Youth (LSAY) is a research program jointly managed by ACER and the Australian Government Department of Education, Science and Training (DEST).

The program includes more than 25 years' worth of data on young Australians as they move through school and into tertiary education, the labour market and adult life.

LSAY commenced in its present form in 1995 with a national sample of 13 000 Year 9 students. Another sample of Year 9 students was drawn in 1998, and a further sample of 15 year-olds was drawn in 2003. Data are first collected in schools and later via mail and telephone interviews.

Advice and guidance are provided by a Steering Committee, with representatives from DEST, other Australian Government departments, the Australian Education Systems Officials Committee (AESOC), the Chief Executive Officers of State and Territory training authorities, non-government schools, academics and ACER.

The data collected through LSAY are deposited with the Australian Social Science Data Archive for access by other analysts. Further information on the LSAY program is available from ACER's Website: www.acer.edu.au

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