

**REPORT
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Victoria Junior College

Anderson Junior College

Singapore Polytechnic

Temasek Polytechnic

Ngee Ann Polytechnic

Nanyang Polytechnic

The Institute of Technical Education

Singapore Productivity and Standards Board

Singapore Institute of Management

Singapore National Employers' Federation

The Council for Professional and Technical Education

Asia Pacific Breweries

Nanyang Technological University, including the National Institute of Education

The National University of Singapore

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COMMENTARY

1 Singapore is a small densely populated city state and the busiest port in the world. Its economic growth and development has been exceptionally rapid and it has for many years been a full-employment economy. Singapore has a multilingual society in which English and Mandarin Chinese predominate, with English the major language for education and business. A high proportion of the population is bilingual.

2 Singapore has developed a competitive, meritocratic education system which has the twin aims of building and sustaining a cohesive society, and promoting rapid economic and industrial development. These aims, and Singapore's size, have encouraged the development of a highly centralised planning model in which the needs of industry and business are closely matched to the output of the education system. Some young Singaporeans sidestep government subject quotas by travelling overseas, principally to Australia and the United Kingdom, for their higher education.

3 Education has a very high status in Singapore and it generates a high level of social and political consensus. Social attitudes to education, the close links between education and employment, and substantial investment in education have led to a private and public emphasis on hard work and achievement. Government policies on language learning and moral education are highly influential. Schoolchildren are streamed at an early age.

4 According to comparative international surveys, Singaporean children are very good at science and mathematics, subjects which are more popular with students and parents in Singapore than in many Western countries. Success in these subjects is widely sought as the key to a good general education for managers as well as a basis for scientific and technical careers.

5 The education system is closely modelled on aspects of the British system, particularly as it was before comprehensive schools were introduced, along with the general certificate of secondary education (GCSE). In particular, general certificate of education advanced levels (GCE A levels) have a high status. Singapore has many productive educational links with Britain. It has also sought to benefit from the example of other countries, for instance Germany's experience in developing an apprenticeship system. There is a strong emphasis on extra-curricular activities, sport and physical education, especially for GCE A level students but also for students in vocational education.

6 A clear hierarchy in education routes post-16 means that skills training, particularly below the equivalent of advanced level/national vocational qualification (NVQ) level 3, has until comparatively recently received less attention than other forms of education and training. It is in this area that national educational planning targets are at present

furthest from being met. With its full-employment economy, Singapore has suffered from skills shortages at basic and technician levels, which at present it fills with workers from overseas. Few students with learning difficulties and/or disabilities are integrated into mainstream vocational education at any level. Most follow courses run by private providers and charities, which receive government support.

7 Quality assurance in vocational education and training is entirely in the hands of individual institutions, and there are no awarding bodies or national guarantors of standards. However, high rates of progression to employment and, where appropriate, to university in Singapore and abroad, suggest that vocational education and training successfully meets the purposes for which it was designed.

8 The government is concerned that Singaporeans develop greater creativity and intellectual independence as a means of enhancing their productivity in higher level occupations, and is taking steps to encourage this. Some teaching methods and methods of study may need to be reconsidered if the initiative is to succeed. In this context, many teachers also see the need to alter cultural attitudes.

INTRODUCTION

9 This report is mainly based on a visit to Singapore by a group of four inspectors during the teaching year 1996-97. The visit formed part of the inspectorate's programme of international work. This programme is approved by the quality assessment committee in order to fulfil its terms of reference. The group was accompanied by an official from the Department for Education and Employment and a member of the quality assessment committee. The report also draws on a subsequent visit in the summer of 1997 by one inspector at the request of Singapore Polytechnic. The visit, co-ordinated by the British Council, involved participation in Singapore Polytechnic's curriculum review procedures. This contact has led to visits to seven colleges in England by staff from Singapore Polytechnic during 1997-98.

10 Singapore has a centralised education system. This enabled the group to explore post-16 education, including institutions which in England would be part of the further education sector but in Singapore are not classified as such, for example the junior colleges. The aim of the visit was to explore characteristics of policy and practice which might inform thinking in the further education sector in England, and to identify issues and areas of common interest.

11 Following extensive initial briefings from the British Council in Singapore, and the Ministry of Education of the Republic of Singapore, the group visited: two junior colleges; all four polytechnics; both universities; the Institute of Technical Education; Singapore Productivity and Standards Board; Singapore National Employers' Federation; Council for Professional and Technical Education; and Asia Pacific Breweries.

SINGAPORE AND ITS ECONOMY

12 The Republic of Singapore comprises one main island and about 60 very much smaller islands at the end of the Malaysian peninsula. It is linked to the peninsula by a road and rail causeway across the Straits of Johore. Its nearest neighbour is Indonesia. The Republic is 137 kilometres north of the equator and consequently has a humid tropical climate with little seasonal variation. Its total land area, at approximately 650 square kilometres, is a little larger than that of the Isle of Man. Most of the island is taken up by the city of Singapore and its outlying estates, suburbs and new towns.

13 The country has a population similar in size to that of Birmingham and the surrounding West Midlands conurbation in the United Kingdom. In June 1996, there were three million people, an increase of 1.9 per cent since 1994. Singapore is a young society compared with the United Kingdom. Some 23 per cent of the population are below the age of 15; 10 per cent are over the age of 60. The median age of the population is 32 years. Approximately 77 per cent of Singapore's residents are of Chinese origin, 14 per cent Malay; 7 per cent are from Indian ethnic groups, the largest of which is Tamil. Chinese Singaporeans have their origins in several different geographical, ethnic and dialect groups, which include Hokkien, Cantonese, Hakka, Hainanese and Teochew.

14 The official languages of Singapore are Malay, Mandarin Chinese, Tamil and English. Mandarin is promoted by the government in preference to Chinese dialects. Almost half the population was recorded as literate in two or more languages in 1990. English was the main language in 21 per cent of households and both Mandarin Chinese and English are growing in popularity. English is increasingly the common medium for education at all levels, especially for business. English-speaking visitors experience few communication problems. The predominant religions are Buddhism and Taoism, and there are substantial groups which follow Islamic, Hindu and Christian teachings.

15 The history of settlement in Singapore can be traced back to third century AD Chinese manuscripts. Modern Singapore, however, has its origins in the trading settlement established by Sir Stamford Raffles in 1819 by agreement with the Sultan of Johore. Between 1824 and 1959, Singapore was under British rule and for most of that period fell under the Straits Settlements administration which included Penang and Malacca. For three years during the 1938–45 war, the country was under Japanese occupation. Singapore's first prime minister, Lee Kuan Yew, was sworn in on 5 June 1959 and the country was part of the Federation of Malaysia for a short time before becoming an independent republic in 1965, and a member of the Commonwealth of Nations and of the United Nations. Lee Kuan Yew remained prime minister for 31 years until 1990, when the prime ministership passed to Mr Goh Chok Tong with Mr Lee taking the position of senior minister. The president, by

election since 1993, is the head of state. Parliament is the main legislative body. The People's Action Party has won every election since independence. There are 14 government ministries, including the ministry of education (MoE).

16 Singapore is the busiest port in the world, in terms of volume. The country is also a regional centre for financial and business services, manufacturing (especially of electronics components), transport, communications and oil refining. The tourist trade is substantial, consisting mostly of stop-over or short-term visits. In 1996, imports and exports almost balanced. Major trading partners, in order of priority, are the USA, Malaysia, Hong Kong and Japan. The major imports and exports in 1995 were machinery and equipment, manufactured goods, mineral fuels and chemicals. The main areas of foreign investment have been in the electrical and electronic industries and in petroleum-related industries.

17 Singapore is a free-market economy with a substantial degree of government regulation and financial co-operation between industrial and business enterprise. Recently, the economy has, by most criteria, consistently out-performed those of its economic competitors in Southeast and East Asia and it has overtaken the United Kingdom in terms of gross domestic product per capita. Singapore's economy grew by 7.8 per cent in 1996, the most rapid growth coming in construction, transport and communications, financial and business services, manufacturing (especially electronics), and commerce. The current government forecast is that growth will drop to between 2.5 and 4.5 per cent in 1998, as a result of the regional economic downturn. Inflation fell from 3.1 per cent to 1.4 per cent between 1994 and 1996. Gross national product per capita in 1996 was S\$37,036. The exchange rate is currently S\$2.67 to the pound. Singapore enjoys full employment, with labour shortages made up by recruiting workers from overseas.

18 Standards of living in Singapore have risen rapidly over the last 20 years. Car and home ownership, often seen as the norm in the West, are costly. A medium-sized three-bedroom apartment is likely to cost the equivalent of £400,000 freehold outside fashionable areas. However, lower-paid workers and their families are supported by heavily subsidised rents. In 1995, 86 per cent of the population were living in publicly subsidised housing. Buses, taxis and the mass rapid transit metro system are efficient and, by United Kingdom standards, very cheap. A basic meal can be bought much more cheaply than in the United Kingdom and phone charges are very low. At the opposite end of the economic spectrum, Singapore is a regional retailing centre where traders and shoppers can purchase luxury goods from around the world.

AN OVERVIEW OF THE EDUCATION SYSTEM

19 Education is not compulsory. However, for most Singaporeans it is axiomatic that students will make the most of schooling in order to improve their career prospects, and parents vigorously encourage their children to do well. Teachers have a high social status and there is a national teachers' day on which pupils express their thanks and respect for the work of their teachers. Teachers are, in comparison with some European countries, well paid. 'People are our only resource' is a frequent observation. The links between personal aspiration, educational achievement and national economic performance are seen by the government as crucial to the nation's future.

The Social and National Role of Education

20 'Nation building' is an important part of the role of education in a relatively new country with a multi-ethnic population. The school day begins with the national anthem and a flag-raising ceremony.

21 Singapore is often described as a highly competitive society and this competitiveness extends to aspects of the education system, such as entry to GCE A level courses and entry to university. However, part of the role of education is to encourage social cohesion and a sense of collective responsibility, virtues which Singaporean planners and politicians contrast with the social disorder and family breakdown they have seen in affluent Western societies.

22 The importance of collective responsibility and the family in maintaining a stable society are part of what is meant by the 'Asian values' which educators have been keen to maintain during the recent phase of rapid economic, technological and social development. The role of Asian values is at the heart of the emphasis by the MoE on moral education, and on bilingual education in English and a mother tongue (usually Mandarin Chinese, Tamil or Malay). Every Singaporean child studies English and a mother tongue throughout their schooling.

23 Educational routes and qualifications in Singapore are a modified version of English systems and structures as they existed before the introduction of comprehensive education and the GCSE. A diagram summarising routes through the Singapore system is given at the annex to this report.

Schools and Qualifications

24 The secondary curriculum is dominated by preparation for GCE A level, GCE alternative ordinary level (GCE AO level) and GCE ordinary level (GCE O level) examinations which are set by the Cambridge-Singapore Examinations Board. Vocational qualifications are validated by the institutions (for example the polytechnics) which award them. Some students leave school at 16 for employment, either with or without part-time training.

25 Primary education culminates in the primary school leaving examination, roughly equivalent to the '11 plus' examination in England. Secondary education at 16 culminates in:

- GCE O level
- GCE normal level (GCE N level), which is at a standard below GCE O level.

Post-16 education culminates in:

- GCE A level
- GCE AO level
- vocational qualifications.

Streaming

26 Streaming plays an important part in the Singaporean school system. Children enter primary school aged six and are streamed at the age of 10 for the final two years of primary education. Depending on their score in the primary school-leaving examination, they are then placed, at 12 years old, in one of three streams in secondary school, normal, special or express:

- the normal stream prepares pupils for GCE N level examinations in their fourth year, at 16 or over
- the normal stream is divided into normal (academic) and normal (technical)
- normal (academic) stream pupils who do well enough can go on for a fifth year, which prepares them for GCE O level at 17 or over
- the special and express streams prepare pupils for GCE O levels after four years at 16 or over.

27 According to the MoE, streaming has an egalitarian aim, since it is intended to allow each child to achieve to the best of his or her ability in the most appropriate context. It is possible, although not common, for children to move from one stream to another.

Routes Post-16

28 Pupils from the normal stream whose highest level of attainment is GCE N level normally have two choices:

- to attend a full-time course at one of the centres run by the Institute of Technical Education (ITE), which provides vocational courses approximately corresponding to foundation and intermediate levels in England
- to seek employment at 16 or over, which might include further part-time training.

29 The ITE also provides full-time training courses for pupils who leave secondary school before the age of 16.

30 Pupils with high enough GCE O level scores proceed to 'pre-university' education. The 14 junior colleges offer a two-year course consisting of GCE A and AO levels. There is a small and dwindling number of places available on three-year GCE A level courses at four centralised institutes. Pupils without a high enough GCE O level score to study for GCE A levels can enrol for a full-time vocational course at a polytechnic.

Students with Learning Difficulties and/or Disabilities

31 The education of young people with learning difficulties and/or disabilities is administered by the tripartite Co-ordinating Body for Special Education, made up of parents and representatives of voluntary welfare organisations and the MoE. The government recognises particular voluntary organisations as competent to manage the 14 special education schools. Approximately 3 per cent of the school population are calculated to have special learning needs. The National Institute of Education (NIE) provides part-time in-service and full-time pre-service certificate/diploma courses in special education. Most children with learning difficulties and/or disabilities are enrolled in the 14 special schools. Only a small proportion, mostly with visual impairments, are totally integrated in specialist schools and in the polytechnics. The MoE sends qualified teachers to supplement any shortages of expertise in the special education schools. There is also a per capita grant to support pupils with learning difficulties. There is an agency specialising in vocational assessments and job placements for people with disabilities who are seen as able to compete on the open employment market. The agency also promotes the employment of the disabled through public education. In general the vocational education and training of students with learning difficulties and/or disabilities in Singapore is not closely integrated with that of other students, and it has a relatively low public profile.

Higher Education

32 All male Singaporeans are eligible for two-and-a-half years of national service, either in the armed forces or in a uniformed service such as the police. This usually comes at the age of 18, or on completion of pre-university studies.

33 Students with GCE A levels can apply for degree programmes at either the National University of Singapore (NUS) or Nanyang Technological University (NTU). Both universities place great emphasis on links with industry, and NTU in particular is largely given over to business and technology.

34 The government uses a labour supply planning model to relate the output of graduates from the two universities to the planned development of the economy. Limits are set on the number of undergraduates admitted to each degree programme. Students whose GCE A level scores do not allow them to enter the degree of their first

choice have the option, if they can afford it, of studying abroad. Some Singaporeans make higher education abroad their first choice. Australia and the United Kingdom, in that order, are the two most popular choices. The Singapore government provides some scholarships at overseas universities, including Oxford and Cambridge.

35 Another higher education route for those without high enough GCE A level grades for their chosen degree is a course at a polytechnic, studying for the approximate equivalent of an English higher national diploma (HND). Success on such courses can get them onto a degree course at one of the two universities, usually on to the second year of a three-year programme, or into an overseas university.

36 It is the government's aim to have at least 85 per cent of school-leavers receiving post-secondary education by the year 2000. Leaving aside the junior colleges, which are part of the secondary sector, the MoE's targets are that 20 per cent of young Singaporeans should go to university, 40 per cent to a polytechnic and 25 per cent to the ITE. In 1996-97, the actual figures were approximately 18 per cent, 36 per cent and 15 per cent, respectively. Leaving aside the sizeable minority of young people who travel abroad for their studies, these figures suggest that more young people than the government would wish are still leaving school for employment. They also suggest that the ITE, which is furthest from achieving its target quota, has difficulty attracting enough students to the lower levels of vocational training, especially in times of full employment.

37 The NIE is part of the NTU. All teacher training in Singapore is carried out at the NIE, which offers teaching diplomas, degrees which include a teaching qualification, postgraduate studies in education and in-service training for teachers.

Planning

38 Education and training are clearly linked to the government's plans for economic development and its projections for future employment and skills requirements. Institutions are not left to offer courses in higher and advanced vocational education according to the interests and preferences of the students alone. The number of students in each curriculum area, at universities, polytechnics and the ITE, is directly related to national economic objectives. The Council for Professional and Technical Education, a governmental body, agrees approximate targets for the numbers expected to graduate from the institutions in each area. The numbers recruited are controlled by raising and lowering entry standards. Those who fail to gain a place either undertake their higher education abroad, change their choice of study or enter the employment market, possibly with a view to taking further qualifications at a later date. An institution is free to diversify its course offer within a general occupational area, but cannot exceed its quotas even if applicants are appropriately qualified. The projections of employment levels and skills needs made by the Council for Professional and Technical Education

directly affect the intake to ITE courses, all of which are below the equivalent of advanced/NVQ level 3 in the United Kingdom. Similar planning constraints affect the allocation of diploma places at polytechnics and undergraduate places at the two universities.

39 Like many industrial economies, Singapore is concerned to upgrade the skills of existing workers. A governmental body, the Productivity and Standards Board, whose board of directors includes academics, directly addresses planning for economic growth and competitiveness. One of its initiatives is the Skills Development Fund, which levies a charge on companies for each employee earning less than S\$1000 a month. The fund is used to provide financial incentives to employers to train their employees. In 1996, the fund supported over 460,000 training places for employees in almost 10,000 companies.

JUNIOR COLLEGES

40 Singapore's 14 junior colleges provide academic education for 16 to 19 year olds. Although part of the post-school sector, they come under the direct control of the MoE and are financed and staffed in a similar way to secondary schools. Junior colleges are primarily for pupils from the secondary special and express streams who have successfully completed their four-year GCE O level courses. Entry to junior college, based on GCE O level points scores, is extremely competitive. The points score needed to enter each college is set by the MoE, and students are allocated to colleges on the basis of their points score and expressed preferences. Junior colleges are ranked according to their GCE A level pass rates and this information is published. This ranking has recently been adjusted to take account of value-added calculations, which involved a comparison of students' GCE O level entry grades with their GCE A level grades. The top five colleges jockey keenly for the lead. A college at the bottom of the table may find that some of the students whose GCE O level qualifications would have entitled them to attend have chosen to go to a polytechnic instead. A few of the less popular GCE A level subjects at the least popular junior colleges have difficulty attracting sufficient numbers of students.

41 The junior college day starts at 07:30 hours with assembly, involving a flag-raising ceremony and the national anthem. Singaporean schools are non-denominational, and there is no established state religion. Some government-aided junior colleges were church foundations; they include a Roman Catholic and a Methodist institution. Classes generally run through to the early afternoon, with extra-curricular activities, consultation and extra sessions taking a student or teacher through to 16:00 hours on some days. The college year starts in January with a week-long orientation exercise involving much social activity. Initial places are allocated provisionally, on the basis of predicted GCE O level results. The teaching year has four terms, with total holiday time being roughly similar to that in the United Kingdom.

Enrolments

42 Places are confirmed in late February following the release of GCE O level results, and some students have to change colleges. In 1997, there were 21,273 enrolments in junior colleges, an average of 1,520 in each college. Male students comprised 46.4 per cent of the total. A small and declining number of GCE A level enrolments (9 per cent in 1996) were in the four pre-university centres, or 'centralised institutes', which offer a three-year GCE A level programme. The average class size in junior colleges in 1997 was 23.3. Some junior colleges have 'feeder' schools, which are given a points discount on the GCE O level scores of their pupils. Others draw students on an equal basis from any school in the country. Students tend to travel further in order to attend colleges higher up the rank order, but even in a small country with good public transport, the location of the nearest college is a factor in some students' choice.

43 Students are placed in one of three streams: science, arts (mainly humanities subjects) and commerce, which usually includes economics and accounts. It was announced in late 1997 that the commerce stream would be phased out from the junior colleges from 1999, with a corresponding increase in business studies courses at the polytechnics. There is some variation between colleges in the proportion of students in each stream. At one junior college in 1996 the distribution in each stream was 70 per cent in science, 15 per cent in arts and 15 per cent in commerce. However, the overall enrolments in 1996 were:

- 64 per cent in science
- 23 per cent in commerce
- 13 per cent in arts.

44 The proportion of science enrolments has increased steadily over the last four years. The general perception is that a higher proportion of the most competent students at GCE A level take science than other subjects. Science is seen as providing a good general education for future managers as well as a more specialised foundation for engineers, scientists and technologists.

The Curriculum

45 Junior colleges are viewed by Singaporeans as existing to get students into university. They are referred to as the 'pre-university' sector. Even at a lower-ranked junior college, over 90 per cent of leavers will typically proceed to university. The small proportion of students from the secondary school normal stream, who enter junior college at 17 or over after taking an extra year to achieve their GCE O levels, generally progress to polytechnics to study for diplomas. The curriculum and purpose of junior colleges is more narrowly defined than that of sixth form colleges in the United Kingdom. Junior colleges do not provide adult or community education and there is no equivalent of the general

national vocational qualification (GNVQ) programmes often found in United Kingdom sixth form colleges. This mirrors the firm distinction between the academic and vocational missions of universities and polytechnics in Singapore.

46 The junior college curriculum consists entirely of GCE A and AO levels plus physical education, and extra-curricular activities. Only the GCE A level syllabuses approved by the MoE may be offered by the colleges. The limited number and identical nature of GCE A level syllabuses to be found at all junior colleges helps to facilitate student transfers between colleges. The approved list of 19 subjects is restricted almost entirely to the longer established academic disciplines and to advanced studies in Mandarin Chinese, Tamil and Malay. There is some specialisation. Colleges offer one each of the less common subjects, such as divinity or theatre studies and drama. There are also specialised elective programmes in some colleges; for example, modern European languages or music. Selected colleges provide special GCE A level schemes for top-scoring GCE O level students to enable them to obtain government scholarships at overseas universities. Recipients of these schemes are bonded for a minimum number of years on their return to Singapore to take up employment as required by the government, for example in the civil service.

47 All students are required to sit a GCE AO level general paper, which comprises an English comprehension test and an essay question chosen from a wide range of current affairs topics. The examination is a means of encouraging improvements in written English. Students are also required to sit GCE AO level in their mother tongue. Success in the general paper and mother tongue examination may be influential in deciding whether or not an individual goes to university in Singapore, travels overseas for higher education or goes directly into employment at 18 plus.

48 Other compulsory but non-examined elements of the curriculum include physical education and extra-curricular activities. These include, for example: music and drama from both Asian and Western traditions; sport; outdoor pursuits; community work; computing; chess, and debating. Extra-curricular activities are highly organised, frequently involve inter-college tournaments, and contribute to a large annual Singapore youth festival. Some activities involve expeditions and visits overseas, as do some academic subjects. Some are allocated to specific colleges by the ministry and supported by earmarked resources. Colleges invest considerable amounts of time and resources in them. For example, a junior college on the coast has a fleet of 20 fast modern sailing dinghies. Success in extra-curricular activities is given a high profile. Students consulted during the visit regarded extra-curricular activities as a valuable means of self-expression whilst acknowledging the additional pressure on time they created during a very busy college week.

49 There is no formal learning support or timetabled work on key skills. Subject staff are expected to offer additional support to individual students requiring help in any aspects of their programme. As in the United Kingdom, staff give a lot of extra time and support to students. There are often discrete tutorials for the more academically able students, and opportunities to take special papers at GCE A level.

50 In most subjects, students are taught using a combination of lectures to large groups, lessons, tutorials and practicals. There is little group work and students spend most of their lessons listening to the teacher. There is rather more room for discussion and group work in humanities than in science subjects. Each GCE A level subject is taught for five or six hours a week. Typically, a humanities student may be taught for 28 hours and a science student for 33 hours a week. More able students may take four GCE A level subjects and sit for special papers as well. Students calculated that they needed to do approximately two or three hours of homework a day.

Student Achievements

51 Pre-university students, especially those at the higher ranked colleges, see themselves as at the apex of a highly competitive system, and in general they work hard to remain there. Retention rates at junior colleges are extremely high, as are examination success rates. For example, at the top-ranked college in 1996, 11 of the 15 GCE A level subjects had pass rates of 100 per cent and the lowest subject pass rate was 95.2 per cent. In 10 subjects over 90 per cent of students achieved grades A to C. Pass rates in the GCE AO level examinations were broadly comparable. Out of 2,456 subject entries, the 11 fail grades were all the equivalent of a grade N in the United Kingdom. Results in several other colleges were almost as good. The pressure of pre-university education means that some lower-scoring GCE O level students who are entitled to a GCE A level course choose vocational qualifications at a polytechnic because they think the vocational curriculum and the relative lack of academic pressure will suit them better. There is no way of knowing how many Singaporeans who might have enjoyed a modest level of success with GCE A levels do not enrol for them. What is clear is that there is not in Singapore the equivalent of the GCE A level programmes in some English schools and colleges which have small numbers of students and poor success rates. Although it is possible to resit GCE O levels, there are no full-time, repeat-year courses for GCE O levels, as can still be found for GCSEs in England.

Resources

52 All junior colleges receive a standard minimum level of resource. For example, the standard number of books for each student is 15. However, colleges work hard at fund-raising to supplement their resources. One junior college had a ratio of 30 books to each student. The ratio of students to computers is generally higher than in English

sixth form and further education colleges, typically 25:1. Colleges use the small monthly fee (approximately £5.30), paid by all but the poorest students, to provide additional support for teaching, learning and extra-curricular activities.

53 Junior colleges are staffed directly by the MoE from requests made by qualified graduate teachers for placement or transfer. The student:staff ratio for all junior colleges in 1997 was 14:1.1, compared with 25:1 for primary schools and 20.7:1 for secondary schools. Some 59 per cent of junior college teachers are women, compared with 78 per cent of primary teachers. Junior college staff teach a standard 18 hours a week. Extra-curricular activities and individual student support ('consultation' time) typically add several more hours each week.

54 Students are supported by a group tutor or class teacher and by individual teachers. There are no counsellors; a designated member of staff has responsibility for student welfare. This approach to personal support reflects a traditional culture of self-reliance, family support and confidentiality. Careers and higher education guidance is provided by teachers and visiting specialist speakers, and through exhibitions and seminars. Colleges generally have a careers room or similar resource base.

Quality Assurance

55 Junior colleges, like secondary schools, are subject to an inspection regime. Teams of MoE inspectors visit each junior college in turn to observe teaching and learning, inspect the work of students and hold discussions with teachers, in a pattern familiar to school and college teachers in the United Kingdom. There is no link between inspection and self-assessment. Senior staff in the junior colleges are expected to follow up the inspection by disseminating its outcomes and discussing progress on issues identified by inspectors with the staff concerned. There is no published inspection report, and the findings of inspections are confidential to the college. The process may be seen as more closely related to staff appraisal and performance management than either the schools or further education inspection models in the United Kingdom. Public perceptions of the comparative quality of education at the various junior colleges is firmly fixed upon the published performance tables of GCE A and AO level results, and on general reputation.

POLYTECHNICS

56 Singapore has four polytechnics. Their mission is to produce middle managers and technologists who can support the country's economic development. Some polytechnic students progress to universities in Singapore and abroad. All four polytechnics are statutory bodies for which the MoE has oversight. The ministry does not exert direct control over the staffing, academic and financial management of

the polytechnics in the same way as it does for the junior colleges. As with the universities, the ministry's role is in general policy direction, funding policy, major personnel issues, legislative matters and general performance review. Ministry representatives meet with the four polytechnics to co-ordinate policy and strategic development. Each polytechnic has a governing body, principal, senate, board of studies and advisory committee. Each member of a polytechnic's governing body is appointed by the government for a three-year term. Polytechnic staff are appointed by and responsible to the principal.

The Curriculum: Planning and Qualifications

57 The curriculum at the polytechnics is determined by each polytechnic in collaboration with industry. Nevertheless, for a polytechnic to expand, and in particular to offer a new subject, it must fit in with the government's planning model. Labour planning at the ministerial level sets general trends, and student numbers are capped in each employment sector. Within each sector, however, a polytechnic is free to decide in consultation with industry which particular courses it will offer. For example, it may choose to develop software engineering rather than electronics. If a polytechnic wins approval within government planning constraints, new programmes are likely to be well supported financially. The polytechnics are heavily dependent on government funding, which, in 1997 for example, comprised between 95 and 98 per cent of the income at one polytechnic.

58 It is not at present government policy to encourage the development of the polytechnics into degree-awarding institutions. Their curricula are firmly vocational, largely in technological disciplines. The polytechnics are perceived to be part of the post-secondary sector of education, along with junior colleges and the ITE, rather than a part of higher education. The core work of the polytechnics is the full-time three-year diploma. In recent years, some polytechnics have developed an increasing number of part-time programmes, leading to part-time certificates, diplomas and advanced diplomas, largely taught in the evenings. The three-year diploma takes students from leaving school at 16 or over to a qualification which prepares them for employment as middle managers or senior technicians. It can also secure admission to the second year of degree programmes both in Singapore and in universities overseas, including many in the United Kingdom. The polytechnics straddle the divide between further and higher education in the United Kingdom system. Students are taken from GCE O level at 16 to an equivalent to the English HND over a period of three years.

Enrolments and Funding

59 The polytechnics are large institutions with extensive campuses. Singapore Polytechnic was established in 1954, Ngee Ann Polytechnic in 1963, Temasek Polytechnic in 1990 and Nanyang Polytechnic in 1992. Singapore and Ngee Ann Polytechnics are similar in size. In 1997, they

each had about 14,000 full-time students compared with 7,700 each at Temasek and Nanyang. A high proportion of the work of polytechnics is with full-time students. For example, in the teaching year 1996-97, 4 per cent of enrolments at Ngee Ann Polytechnic were part time. All four polytechnics offer substantial provision in engineering, business studies, and computing and information technology (IT). In addition, each offers distinctive specialisms. Singapore Polytechnic provides courses in nautical studies, optometry and architectural technology. Ngee Ann Polytechnic specialises in aspects of media production and mass communication. Temasek Polytechnic offers courses in design, tourism management and legal studies. Nanyang Polytechnic specialises in health science, sports management, and insurance management.

60 Most Singaporeans accord GCE A levels a higher status than polytechnic diplomas and parental influence is strong. However, a minority of students who could attend junior college choose instead to take polytechnic diplomas because they prefer a more practical curriculum, or because they perceive a polytechnic course to involve less intense pressure than taking GCE A levels at a junior college. Polytechnics generally have little trouble in filling their quota of places on most courses. Students do not necessarily get their first choice. At one polytechnic, for example, 60 per cent of applicants are placed on the course of their first choice. Retention rates are estimated to be approximately 90 per cent at one polytechnic. The polytechnic's view of those who leave early is that some resit GCE O levels and succeed in achieving sufficiently high grades to enter a junior college and some lose interest in their studies and leave to seek employment, but few leave for financial reasons.

61 Government investment in the polytechnics has been considerable. Nanyang Polytechnic, located at various sites, is to be relocated during 1998 at a cost of approximately S\$700 million, and the striking Temasek Polytechnic campus was designed by Sir James Stirling. Polytechnic staff speak positively of government funding and industry support in providing new equipment. The new virtual reality simulator for teaching deck officers in the nautical studies diploma at Singapore Polytechnic cost over S\$1 million and its purchase committed the polytechnic to sending staff to the manufacturers in Norway for training. In 1994, the government decided to support the country's developing role as a regional media hub by training people in Singapore, rather than abroad, for film, television and radio. Ngee Ann Polytechnic was selected to receive S\$6 million to set up film and television courses.

Industrial Links and Teaching Staff

62 The polytechnics maintain close relationships with industry. Governing bodies include members from industry as well as representatives of the MoE. Work-based projects are a large part of teaching and assessment. Diploma students generally undertake a large project which takes up about six months of their final year. These

typically have a supervisor from industry. Companies also support project work by supplying equipment. Industrial links are used to update and develop staff expertise as well as to provide realistic project work. One polytechnic favours a 'teaching factory' concept, to keep conditions as close to industrial practice as possible. Students on most courses are put into work placements, and much effort goes into keeping up their number and quality. On some courses, students benefit from broadening their studies by carrying out work experience in other countries, including the People's Republic of China and locations in Southeast Asia. Advisory committees with industrial members help with course design. Course review panels have members from industry.

63 Teaching staff are encouraged or required to take up industrial placements in order to update their knowledge of industrial processes, typically every three years or so. External consultancy work is also a valued part of industrial liaison. At one polytechnic, some 35 per cent of teaching staff are involved in consultancy work for up to eight hours a week. There are in-service staff training schemes. For example, at one polytechnic there is an in-service certificate for teaching in higher education which is accredited by a United Kingdom agency. There are good-quality teaching materials for staff training, covering theory and practice. Staff can draw on useful 'tool-kits' of practical teaching materials, and documents providing advice and guidance. Working conditions for polytechnic staff are closer to those in higher education than in the junior colleges. Extensive sporting facilities are available to staff and students, and there are childcare facilities for staff. A small, but significant, proportion of polytechnic teachers come from overseas. At one polytechnic, for example, 8 per cent of teachers are expatriate staff, and at another a head of faculty is from the United Kingdom. Staff are appropriately qualified academically, as well as in terms of industrial and business experience. At one polytechnic, 38 per cent of the teachers are qualified to degree level, 42 per cent to masters level, 9 per cent have doctorates and the remaining 11 per cent have appropriate specialist professional qualifications.

The Curriculum: Teaching and Learning

64 The teaching year is organised into two semesters, each divided into two terms of eight or nine weeks. On some courses, vacations can be taken up by work placements. Typically, students have between 25 and 30 hours of classes each week. The balance between lectures, practical sessions and seminars or tutorials varies according to the nature of the course. At one polytechnic, for instance, the balance ranges from 60 per cent for lectures and 30 per cent for practical work to 20 per cent for lectures and 70 per cent for practicals, with the remaining 10 per cent in both cases being taken up with academic tutorials. There are common elements in the different curricula, such as those relating to the government's emphasis on quality and productivity, and a compulsory element of personal development and character

education. Assessment is a mix, depending on the course, of continuous assessment for practical and project work and formal examinations. Examinations are the principal means of assessment, typically forming 60 per cent of total assessment. The final practical project is given a high profile with, for example, public exhibitions of the most successful.

65 There is an impetus towards greater emphasis on students' ability to work on their own; for example, by making maximum use of IT facilities and industry-standard equipment. Some staff complain of the relatively inflexible study skills and rigid thinking exhibited by students in the first year after school, perceptions which chime with the government's desire to encourage greater creativity and innovative thinking in the workforce. Some students still spend a lot of time copying down notes and being tested on their ability to remember the information in them. Many polytechnic staff, however, are aware of the need to strike an effective balance between teaching essential factual material and developing the independence of students as learners and future workers. Polytechnic students certainly value the 'hands-on', practical nature of much of their work.

66 Extra-curricular activities are compulsory in the first year, and typically include some fitness training or sports. Students find it hard to include them in the later years of study, although the polytechnics all manage to maintain sporting and athletics teams. Polytechnics offer a counselling service to students. Tutors, who are likely to have been trained in basic counselling skills, are expected to be a student's first point of contact for help and advice.

67 Detailed statistics on student progression are not widely maintained, but one polytechnic estimates that 20 per cent of those who successfully complete their courses go on to degrees. Another estimates a figure of between 12 and 15 per cent. A third polytechnic estimates that up to 30 per cent eventually go on to a degree, some at overseas universities. Polytechnic students who achieve their awards tend to aim for the NTU rather than the NUS, because the former is seen as being more closely oriented towards industry. Tracking student destinations is not given as high a priority as it usually is in the United Kingdom, but the issue is complicated by the fact that male students will usually go from the polytechnics into national service before seeking employment.

Quality Assurance

68 As a statutory body each polytechnic is responsible for its own quality assurance, and each is responsible for the standards of its awards. There is no awarding body for vocational qualifications in Singapore, no specification of the standard of polytechnic qualifications and no objective way of comparing the standards of polytechnics offering the same or similar qualifications. Close liaison with industry, and the success enjoyed by polytechnic diplomates in securing employment or entering the second year of universities in Singapore and abroad,

reassures polytechnics that their standards are appropriate. However, one polytechnic representative pointed out that employment has limited use as an indicator of quality since all graduates can expect to be employed within three months of entering the employment market.

69 There is no common system of quality assurance for all four polytechnics. In most cases, there is an external examiner for each diploma course, often from an overseas institution. Many polytechnic departments have their own institutional links, including those with United Kingdom institutions, which they use to appoint external examiners. One polytechnic, for example, has close links with a United Kingdom university and with 20 other higher education institutions worldwide. External examiners are used to confirm the appropriateness of the standards of qualifications, and to bring in an element of international comparability. As in the United Kingdom, the system is relatively informal.

70 At one polytechnic, new courses are drawn up by an advisory committee of the department concerned, and the format of the course is presented to the senate for approval. Course teams carry out regular course review and monitoring for their own use. Courses are reviewed every four years by a panel, which is likely to include representatives from the relevant industry or business sector. The panel may also include an external consultant. The course team submits a course review report, to a standard specification, in advance of the panel meeting. To draw up the report, employers and students are asked their views about the appropriateness of the curriculum and the quality of its delivery. The panel meets the students, may pay a brief visit to look at teaching accommodation and resources, and questions the course leader and members of the course management team. At the end of the one- or two-day review, the panel presents its conclusions and recommendations to the course team. The panel's report is written up and presented to the senior management of the polytechnic. Progress with the recommendations made in the report are reviewed before the next course review.

71 This course review process is closer to a quality audit than to either a quality assessment such as that carried out in United Kingdom universities or an inspection as carried out in United Kingdom further education colleges. For example, there is no direct observation of teaching and learning, and only limited analysis of, and comment on, student achievements. There may be an element of self-assessment in the course team's report to the panel, based, for example, on the questionnaires used to elicit views from past and current students, and from employers.

INSTITUTE OF TECHNICAL EDUCATION

72 The ITE is a federation of training institutions with a central management and administrative hub. It was established in 1992, having evolved from trade schools, vocational institutes, and industrial training and adult education boards. It has a dual role. The ITE is the largest single provider of full-time and part-time vocational education and training for secondary school-leavers and working adults, at the equivalent of the United Kingdom's foundation to advanced level work. It is also a major provider of adult basic pre-vocational education. In addition to its direct training activities, the ITE is the awarding body for all its own qualifications.

Industrial Links and Collaboration

73 The ITE is a statutory self-governing body, for which the MoE has strategic and policy oversight. Its status is thus similar to that of the polytechnics. The board of governors of the ITE includes members from government bodies such as the Productivity and Standards Board and the Economic and Development Board, and from industry and the trade unions. ITE developments are closely co-ordinated with the government's labour supply planning. Collaboration with industry is seen as central to the development and success of the ITE. Industrial liaison is maintained through surveys of ITE students successfully completing their courses, visits by ITE board members and managers to companies, and the work of the 12 ITE training advisory committees, each representing an industrial and commercial sector. The ITE has links with vocational training organisations in other countries, in particular with Canada and the USA, Germany, Hong Kong and Taiwan.

74 The ITE is managed by a director and chief executive officer, three deputy directors and nine divisional directors. Each of the 10 individual institutes is headed by a training manager and a deputy training manager. The individual institutes do not have identified specialisms, although not all of them offer the whole ITE curriculum. The institutes are strategically located around Singapore, taking account of population centres and transport facilities such as the mass rapid transit rail system. In total, the ITE employs approximately 1,350 training and 650 support and management full-time staff. There are also approximately 2,200 part-time teaching staff involved in the continuing education and training programme.

75 In its role as an awarding body for vocational and pre-vocational qualifications, the ITE works with companies to develop approved training centres. These train employees and apprentices and test them for certification by the ITE. There were 73 approved training centres by the end of 1996, with an intake capacity of about 6,500. Companies may also plan and conduct training programmes tailor-made for their workers, with the ITE providing assistance and auditing the quality of

company systems. ITE approval results in certified on-the-job training centre status.

76 ITE training programmes fall into three categories:

- full-time training for school-leavers at the 10 institutes
- the New Apprenticeship System (NAS) providing workplace practical training and work experience supported by theoretical studies
- a variety of schemes providing part-time education and training for adult workers.

The Curriculum

77 School-leavers with GCE N or O level qualifications can select from a wide range of courses in electrical and mechanical engineering, mechatronics, electronics, business studies and drafting. The office skills course is one year long; other courses involve two years of full-time study. More specialised areas are being developed, including air conditioning and refrigeration, wafer fabrication, video technology, broadcasting electronics, electronic instrumentation and aircraft maintenance. Business areas include accounts, tourism and travel services and office skills. Some of these more specialised areas are offered only as apprenticeships. In 1996, approximately 7,500 full-time students aged 16 or over were enrolled on vocational programmes at the ITE.

Apprenticeships

78 There are over 70 apprenticeship programmes on offer under the NAS, including some curriculum areas not available to full-time students, such as building and drafting, catering, garments and textiles, hairdressing, printing, retailing and agrotechnology. Off-the-job theoretical studies take place for one day a week at ITE centres or at ITE-approved training centres. There are over 60 companies with registered and approved training centres. The ITE approves standards and trains company instructors who then carry out the practical elements of training and assessment in the work place. Apprenticeships resemble those in the German system. They usually last four years. In 1996, 1,700 apprentices were registered with the ITE, and 707 companies had received approval to participate in the NAS. Compared with full-time vocational education and company training schemes, however, apprenticeships are a small part of the total training provision in Singapore.

79 The development of the apprenticeship scheme may help to answer the objection from some employers that vocational education in Singapore places too much emphasis on full-time students, when more needs to be done to raise the skills of those who enter employment at 16 or over with low skills levels, and of those workers from overseas who make up a significant proportion of manual and semi-skilled workers.

One of the larger Singaporean companies involved in the domestic consumer market, with approximately 500 employees, had only five students attending part time at the ITE at the time of the visit. The company carries out its own training, but none of the ITE's qualifications were seen as specific enough for the company's purposes, at levels below the supervisory and management levels.

Community Education and Training

80 Programmes of part-time study for older workers fall into two categories, skills training and basic education. They include three technical training programmes. Modular Skills Training (MOST) offers upgrading modules from the ITE's certificate programme. In 1996 there were 13,700 training places on MOST. A similarly structured programme, Training Initiatives for Mature Employees (TIME) is aimed at workers over the age of 40. Since some older workers are less fluent in English, TIME modules are available in all of Singapore's four official languages. Take-up in 1996 was for 400 places. The Adult Co-operative Training Scheme (ACTS) is aimed at workers between 20 and 40 years of age with few skills. In 1996, 300 places were taken up on ACTS, which has an apprenticeship model of workplace training and off-the-job education and support.

81 The Basic Education for Skills Training (BEST) course helps adults to acquire basic proficiency in English and mathematics, up to primary school-leaving standard. In 1996, 20,800 places were filled on BEST. Workers can move from BEST to the Worker Improvement through Secondary Education programme (WISE), which enables working adults who have completed their primary school-leaving examination (or completed BEST) to work towards the GCE N level examination in English and mathematics. There were 16,200 training places on WISE in 1996. BEST and WISE programmes are offered on some company premises at the end of the shift or working day and employees may be paid to attend. After WISE, a part-time continuing education programme offers GCE O and GCE A level courses. The intake for 1996 was 12,400.

82 ITE institutes offer training from 07.30 to 21.30 hours for full-time and part-time students. Depending on their courses, students may be taught for between 25 and 42 hours each week, which is considerably more than their counterparts in the United Kingdom. The day starts with an assembly and flag-raising ceremony. Full-time students attend weekly physical education sessions and are encouraged to take part in sports and games. Across all the individual institutes, the ITE offers 75 different extra-curricular activities. The programme includes community service and citizenship elements. In addition to classes in vocational subjects, students are required to attend classes in English, science, mathematics and personal development. The time given to these core areas depends on the vocational curriculum of each course. It is intended that key social, technical and learning competencies are

emphasised through four common teaching strategies: work planning, experimenting, individual and group projects. This approach is intended to enhance teamwork and independent learning. The ITE part-time community education and training programmes, such as WISE and BEST, offer evening classes of between one-and-a-half and six hours each week. There are also weekly centres offering the same programmes on Saturdays and Sundays.

83 The total enrolments in the adult skills and basic education part-time programme in 1996 were approximately 63,800. The apprenticeship scheme totalled 1,700 enrolments, giving a part-time study body for the ITE's part-time training and continuing education programme of approximately 65,500. Total full-time enrolments totalled 7,500. With a total of over 70,000 enrolments, the ITE is similar in size to the very largest further education college in England.

Funding

84 The ITE receives a recurrent budget from the government of S\$9,700 for each full-time student, which compares favourably with funding levels for the polytechnics (S\$8,500). This is partly because its fees are low. ITE fees represent a recovery of 6 per cent of the cost of a student's programme, compared with 15 per cent for the polytechnics and 15 per cent to 20 per cent at the two universities. For part-time adult students, fees are kept at 20 per cent of cost recovery. Many such students are sponsored by their companies, which receive a subsidy from the Skills Development Fund.

85 The ITE offers some financial assistance to help with fees and living expenses for full-time students. The top 10 per cent of the annual intake, in terms of GCE N and O level passes, receive a scholarship of S\$1,200 a year. Low-income families can apply for a bursary of S\$6,800 a year, and there are incentive payments of S\$400 for the top 25 per cent of ITE students from low-income families who complete their studies. Sports excellence awards and armed forces sponsorships are also available. Nevertheless, Singapore has a full-employment economy in which it is not usually difficult to find some sort of job at 16 or over. The investment involved in staying in full-time education for many ITE students from low-income families is considerable. The ITE is careful to point out the advantages of further technical education. In its recruitment information, the median starting salary for ex-ITE students is quoted as S\$1,100 a month, about S\$300 less than that of a polytechnic graduate. An ITE survey demonstrated that this salary level is likely to double in five years. ITE publicity materials refer to ex-students who are now successful business people and state that 85 per cent of those who successfully complete their training at ITE are now working in an occupation related to their training.

The Institute's Role

86 The composition of the ITE student body is likely to change in the near future. There is a pool of low-paid employees aged over 45 who received little or poor-quality basic education as school children during the final years of colonial rule and the early years of independence. The BEST and WISE programmes are largely aimed at these workers. As these older workers leave the active workforce, the need for this provision is likely to change and diminish. Improvements in the school system should steadily reduce the need for adult basic education. The ITE is seeking to develop its position as a central force in Singapore's vocational education. Its predecessor took in students with only primary school-leaving qualifications. The streaming arrangements which have resulted in a secondary normal (technical) and a secondary normal (academic) pattern produced its first output in December 1997, and ITE programmes are designed specifically for these students.

87 The ITE's role will be to make itself a first choice for normal stream school-leavers. The annual output of students from all secondary education is approximately 40,000. The ITE is expected to take 25 per cent of these, about 10,000 enrolments each year. At present it takes in about 7,500 school-leavers. Put simply, this means that the entire ITE enrolment for full-time vocational education below United Kingdom advanced level (NVQ level 3) standard is about half that of the largest of the four polytechnics. There is no other provider in Singapore of full-time vocational education at these levels. It is difficult to draw exact comparisons with the United Kingdom system of NVQ levels, but the proportion of enrolments below advanced level in Singapore at junior colleges, polytechnics and the ITE is clearly smaller than it is in the United Kingdom. Without entering into competition with the polytechnics, whose role it is to provide vocational advanced/higher education, the ITE will be seeking to increase its full-time 16 plus enrolment as the need for basic skills provision for older workers declines.

88 Two threats to this expansion are clear. One is the temptation, as long as full employment continues, for secondary normal stream school-leavers to take semi-skilled or unskilled jobs rather than go into full-time vocational education. The ITE's answer to this threat is the apprenticeship system. Here it faces some challenges similar to those in other industrial economies. Singapore has a prevalence of small- and medium-sized employers, comprising approximately 80 per cent of companies and 50 per cent of the workforce. In smaller companies there may still be a perception that training, even with government subsidies, might be wasted on 'job hoppers'. The ITE is likely to continue to fill a need for less well-educated workers who leave school with few or no GCE N levels and take up poorly paid unskilled work. The second threat is a smaller and less complex issue. Of the 20 per cent of ITE full-time students who drop out before the end of their courses, half do so because

they have resat GCE examinations after one year and moved into a polytechnic diploma course.

89 Despite incentives and employment statistics, the ITE, and technical education in general, has suffered from the public's lower awareness of their activities and the higher status accorded to GCE O and A levels and advanced vocational education such as that offered at the polytechnics. This is despite the progression routes to the polytechnic established for those successfully attaining their awards at ITE. A certificate of merit from the ITE gains exemption from the first year of the polytechnics' three-year diploma courses, although the numbers so far using this progression route have been relatively small.

90 Parity of esteem for different aspects of education, a difficulty common to many countries, is being attacked directly. In summer 1996, a team of 30 full-time teachers was deployed to visit schools and raise the profile of technical education. The government is eager to reduce the proportion of school-leavers who go straight into work at 16 or over. Its commitment took visible form in the S\$300 million funding for new buildings and facilities provided on the establishment of the ITE in 1992. Nevertheless, Singapore has a highly competitive educational environment in which GCE examinations have a seemingly unassailable prominence. The ITE has the challenging task of seeking to improve the status of vocational education and training so that it seems an appropriate route for a specific cohort of school-leavers rather than a second-best alternative for those who cannot succeed in the academic route. In this it has a mission common with that of the polytechnics.

UNIVERSITIES

91 Singapore has two universities, the National University of Singapore (NUS) and Nanyang Technological University (NTU). NUS was formally established in 1980 by merging two institutions, the University of Singapore, which dates back to 1905 and was once the University of Malaya, and the Nanyang University, founded in 1956. NTU was established as the Nanyang Technological Institute in 1981 and became a university in 1991. 'Nanyang' means 'south seas' in Chinese and usually implies an institution set up by the expatriate Chinese communities of Southeast Asia before the countries in which they lived achieved nationhood.

92 These two universities are large regional centres of higher education and research. In August 1996, NTU had 12,200 enrolments on undergraduate programmes (not including the National Institute of Education which had an additional 2,000 enrolments). Numbers at NTU were projected to reach over 14,000 by 1999. The larger of the two, NUS, enrolled 17,700 undergraduates and 3,500 postgraduates for the teaching year 1995-96. NUS at the time of the visit had over 2,300 teaching and research staff.

93 Both universities have a role in continuing education, which has received greater emphasis in recent years as a result of international attention to the importance of lifelong learning. For example, NUS offers short, specialised non-examination courses and extramural programmes as well as postgraduate diplomas in specialist areas. NTU has recently developed a part-time bachelor of technology degree.

94 A more concentrated vocational view of the value of higher education is often to be found amongst young people and parents in Singapore than in England. One indication of this is the preponderance of science, technology and business as first choices for GCE A level students and undergraduates. Humanities and arts subjects are valued as a general education for a wide variety of jobs. Science and technology are, however, more widely accepted to provide sound general preparation for business and the professions. These subjects are also the most popular among more able students as a specific career path. The government encourages and, to some degree, controls this preference by its system of quotas for each faculty for undergraduate entry. For example, some years ago the government considered that too many of the most able students were opting for law degrees, unbalancing the labour supply planning model used by the government to link education and planned economic development. It also, in the government's view, risked encouraging the development of a more litigious society. The quota of undergraduate places was therefore reduced. The only way for individuals to circumnavigate this obstacle to their aspirations was to take a law degree at an overseas university. Although Singaporean parents expect to invest in their children's education, the costs of overseas study, if it is without government support from bursaries and scholarships, puts it beyond many families.

95 NUS has eight faculties, only two of which, arts and social sciences, and law, are not concerned with a scientific, technological or business discipline. The others are: business administration, dentistry, engineering, medicine, science and architecture and building. NTU has 10 schools, three of which are in engineering. The others are: accountancy and business, applied science, communication studies, and the four faculties of the National Institute of Education, relating to teacher education: arts, science, education and physical education.

96 Government policy in Singapore emphasises the development of advanced technology industries. It seeks to develop rapidly the country's IT infrastructure and regional communications role. An important part of this strategy is the tripartite planning and development undertaken by the universities, industry and government officials involving, for example, the Productivity and Standards Board and the National Science and Technology Board. There are many links between the universities and industry. NTU has set up an innovation centre to encourage local industries to carry out their research and development activities on campus. Each school of the university (and every faculty of NUS) has an

advisory committee comprising industrialists, business leaders, senior government officers and academic staff. NTU specialist research institutes involving private industry and government agencies include those for manufacturing technology, construction studies, microelectronics, transportation studies, robotics, advanced materials and environmental technology. NUS has five advanced training and research institutes in systems science, molecular and cell biology, microelectronics, molecular agrobiolgy and medicine. A national supercomputing research centre is also hosted by the university. Research and development partnerships have been established with major international companies operating in the region. The university estimates that over 1,000 consultancy projects a year are being carried out by staff. With the assistance of the government's steering body for science and technology, the university has set up a holding company to transfer technological developments to companies and help them to exploit it. In 1995, five such spin-off companies were formed in areas such as enzyme production, the biotreatment of waste water and health care. Recent research specialisms at NUS have included nuclear microscopy and biopharmaceuticals.

97 In addition to the major post-school institutions, there are several bodies in Singapore providing routes to vocational education and training. In higher education, the Singapore Institute of Management (SIM), an independent non-profit training organisation, offers degrees in collaboration with the United Kingdom's Open University. It offers doctorates and masters degrees, including the masters degree in business administration (MBA), certificated by overseas universities, and part-time diploma and certificate courses. There is a large and competitive market for MBAs in Singapore. In 1996 there were approximately 11,000 students enrolled on SIM programmes, representing an equivalent of about 2,000 full-time students. SIM operates on four sites and delivers its Open University programmes in a building on the Ngee Ann Polytechnic site. With government support, it is currently building a new campus on the same site, intended for 1,300 students. Plans are under discussion to form a third university for Singapore around the institute's provision, in a new venture which would combine government funding and private finance. The new institution, to be known as Singapore Management University (SMU), will take on much of the undergraduate business studies teaching currently conducted at NUS and NTU, from 2000 onwards. Initially SMU degrees will be awarded by NTU. NUS and NTU will develop predominantly graduate business schools. It is intended to develop further SIM's emphasis on part-time higher education and degree-level study by flexible modes of attendance rather than to enter into competition with the universities or polytechnics for full-time students. The governing council of SIM includes representatives of the polytechnics and universities and most SIM tutors are from the universities and polytechnics, working for the institute part time. Teachers use SIM

programmes to upgrade their skills and qualify for higher salaries, as there are substantial numbers of teachers in Singaporean primary schools who hold teaching diplomas rather than degrees.

98 Specialised providers of vocational education, largely concerned with provision not offered by the ITE and the polytechnics, include the School of Horticulture, the Nanyang Academy of Fine Arts (NAFA), the Singapore Hotel Association Training and Education Centre and the Singapore College of Insurance. A government committee was set up in late 1997 to review education and training for the cultural industries and to recommend a development strategy for the NAFA and the LaSalle/SIA College of the Arts. The committee, which was due to report in July 1998, is expected to recommend substantial new government support for this sector. There are many private providers of business and management qualifications, mostly franchised from overseas institutions. Many private providers also compete to offer part-time certificates and diplomas in specialised vocational areas. Excluding those described elsewhere in this report, there were approximately 90 providers listed in the *Continuing Education and Training Directory 1997*, offering courses from basic vocational skills levels to postgraduate programmes.

CONCLUSIONS

99 Despite the close links and similarities between Singaporean and British educational institutions and systems, the contexts are very different. The size, cultural and linguistic factors, the relatively short history of the nation, and the economic context all combine to create more significant differences than appear evident at first to the casual visitor.

100 It would be inappropriate to draw definite conclusions from a brief visit but some general observations are noted here:

Planning

- political stability and social consensus encourage long-term and decisive educational planning
- the government has a planning model which seeks to match closely the needs of industry and the output of the education system by establishing subject/course quotas in higher education and in vocational education and training
- some young Singaporeans sidestep the planning model by using vocational qualifications as well as GCE A levels for entry to universities in other countries, particularly in Australia and the United Kingdom
- the highly centralised planning model directly affects the curriculum, development and output of all post-16 institutions, including those which are governed as independent statutory bodies.

Funding and Status

- Singapore invests heavily in vocational education and training and new developments are often equipped and accommodated to a very high standard
- the Skills Development Fund is built up by a levy on employers of low-paid workers and used to subsidise vocational training
- teachers' salaries are at present at least as good and sometimes better than those in many Western countries
- education and educators enjoy a high degree of respect and status in Singapore
- young Singaporeans are generally highly motivated and work hard and long
- the education system is highly competitive, both between students for places and between institutions for status
- streaming according to academic ability occurs at an early age, and transfers between streams are possible but not common.

Technical Education

- Singapore enjoys full employment; students leaving vocational education and training at any level generally have little difficulty in gaining appropriate employment, and students with few qualifications generally find it easier to get some kind of employment than they would in many Western countries
- considerable efforts are being made to increase enrolments for vocational training and skills development up to the equivalent of the United Kingdom 'advanced' level (NVQ level 3) but it is this category of education which is furthest from reaching its national recruitment targets for school-leavers. At present skills shortages at lower levels in particular are filled by workers from other countries
- government language policies have created a largely bilingual nation; some students may be steered towards a vocational route at 16 or over because of the language demands accompanying GCE A level courses.

Curriculum Features

- moral and social education and 'nation building' are a significant factor in the full-time education and training of school-leavers, especially in junior colleges
- mathematics and science are the most prestigious academic disciplines, sought after by the majority of school-leavers and regarded as a good basis not only for scientific and technical but also for management careers

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- Singapore has many productive links with educational institutions in other countries, including the United Kingdom, and maintains an internationalist approach to educational development
 - the education system is closely modelled on aspects of British education, as it was before the development of comprehensive schools and GCSEs; GCE A levels enjoy very high status; there are very many links between British and Singaporean institutions
 - in order to compete internationally in technological innovation, the government perceives a need for Singaporeans to develop more creativity and greater intellectual independence; some approaches to teaching and learning may need to be modified in the light of this aspiration
 - few students with learning difficulties and/or disabilities are integrated into vocational education and training at any level and their education is largely dependent on private providers and charities, with government support.

Quality Assurance

- quality assurance in junior colleges is maintained by an inspection regime similar to that in schools; quality assurance in the rest of the post-secondary and higher education sectors is the responsibility of individual institutions, which grant their own qualifications. For vocational education and training there are no national awarding bodies
- high levels of progression to employment and higher education suggest that vocational education and training is suited to its purpose.

101 Singapore continues to share educational experience and expertise with the United Kingdom, as well as with other countries. Issues of potential common interest to educationalists in Singapore and the United Kingdom might include:

- institutional quality assurance and the value of external quality assessment in vocational education
- the roles of institutions and awarding bodies as guarantors of standards in vocational education
- the success of Singaporean pupils and students at mathematics and science, and the need perceived by the government to develop further young Singaporeans' creativity and independence as learners
- the difficulties associated with attracting sufficient young Singaporeans into the lower levels of vocational education rather than directly into employment.

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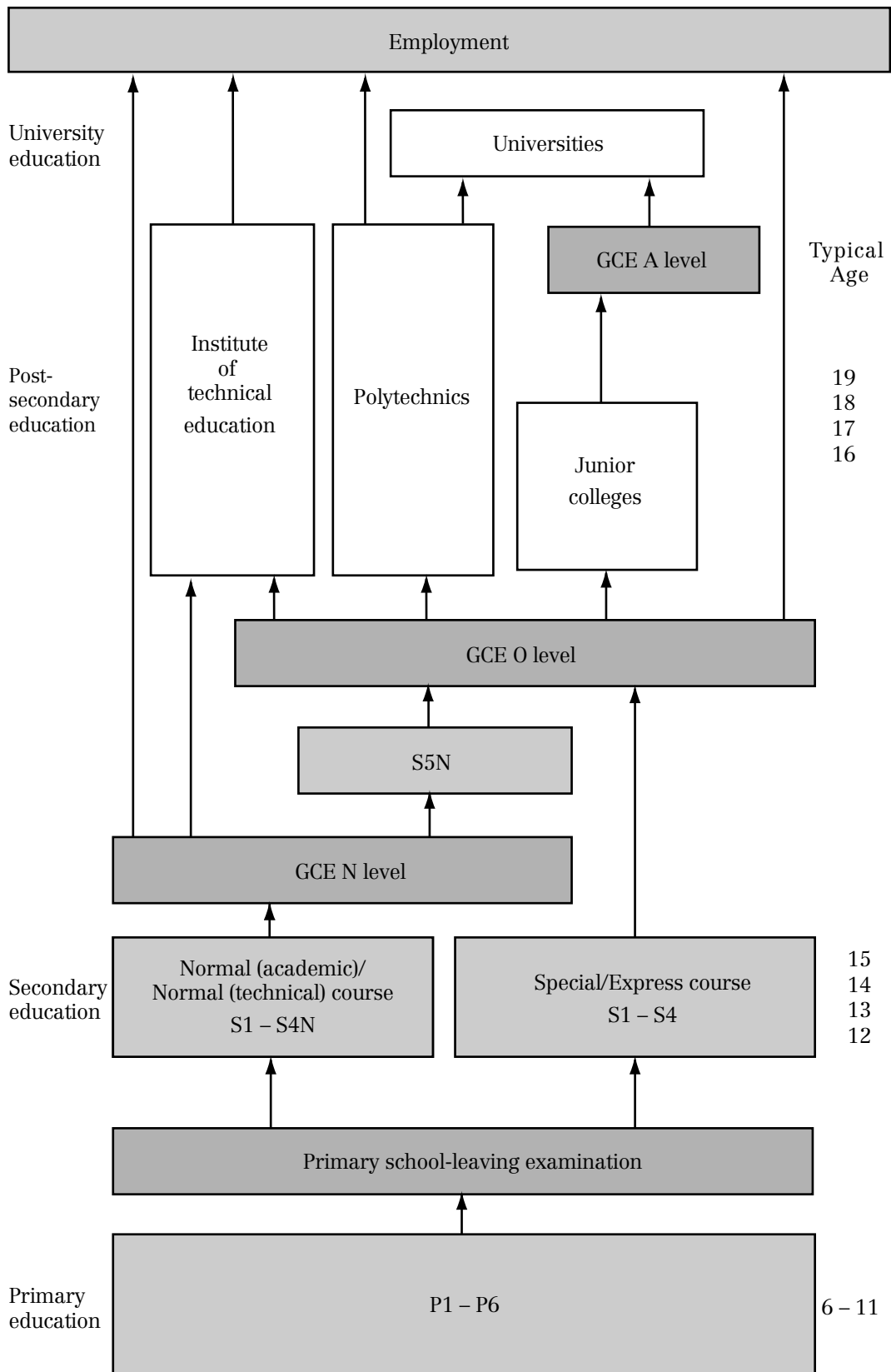
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