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Technical Schools
a tale of four countries

Fred Naylor

CENTRE FOR POLICY STUDIES

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Another author whose work I have drawn on and who has given me valuable assistance in the preparation of this study is Dr Arthur Hearnden.

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Summary of Recommendations

1. New attitudes to open elites and healthy competition are urgently needed in our education system. The pursuit of uniformity has been a mistake and has greatly hindered our attempts to become competitive in world trade. If political courage is needed to admit this, so be it.

2. There should be an immediate moratorium on any further comprehensivisation. Such schools of specialised character as still exist (including technical schools) should be supported.

3. The Department of Education and Science should set aside money for a special programme in support of technical schools. The Department in co-operation with institutions of higher education and industry should sponsor experiments with technical schools. It might be necessary for such schools to be part of an 'experimental' branch in the state system, responsible directly to the Secretary of State instead of to local education authorities.

   Some of the experimental schools should be as much as possible like those found in West Germany. Special attention should be devoted to curricula, selection procedures and leaving certificates. Teachers would have to be appropriately recruited and trained.

   Such an alternative tripartite system might have advantages over our own in that the intermediate school would be a clearer cut alternative to the grammar school than our present technical school.

4. The recent moves towards greater parental freedom of choice and control have been half-hearted and hesitant. The movement needs quickening.

   If local education authorities took their responsibilities in this area more seriously they would ascertain the wishes of parents, expressed without any restriction concerning school type, before making any proposals.

   The setting up of magnet schools, or mass schools with special profile, should be one of the options canvassed and LEAs should be encouraged in this direction. Variety would provide a number of growth points for the free evolution of the school system.

5. In the longer term the goal of a broader sixth-form curriculum, including English, mathematics and science for all, should be vigorously pursued. It is recognised that such a change will probably never be feasible if it implies the extension of the university honours degree course from three to four years' duration. Simpler and less expensive options are available (see Appendix 7 for some suggestions).

6. In the shorter term efforts to use *all* subjects in the curriculum to greater effect in developing intelligence and imagination must be made.

7. The importance of including some manual work in the curriculum of all pupils should be recognised.

Introduction

'How much money should we spend on our schools?'
'Are we getting value for the money spent?'
'How can schooling be made to contribute more effectively to the health of our economy?'

Economic questions such as these cannot be avoided and determine many of the conclusions and recommendations we make in our comparative study of technical schools in England and Wales, the USA, the USSR and West Germany.

The complacency which educationalists have displayed over the last two or three decades will not do. The easy view that it is enough to throw money into the system and then idly await the results is no longer tenable. For one thing, since 1976 when the Labour Government went cap in hand to the International Monetary Fund for help we have had to keep spending on education strictly within our financial means. Thus the Labour Government's Green Paper 'Education in Schools' reported that 'Education in company with other programmes such as housing and roads has had to take its share of these cuts amounting in the period 1975 to 1977 to £150 million' (2.4%).

Successive governments have been forced to show a similar realism. But over the same period our schools have been subjected to a number of violent structural changes and a succession of fads and fancies. Teachers are now complaining of 'innovatory exhaustion'. Evidence is accumulating that the only triumph has been that of hope over experience.

In much of this we are a step or two behind the Americans. (Nothing unusual about that.) In his latest work on school achievement,* the University of Chicago's distinguished Professor of Sociology, James S. Coleman writes:

> Not so many years ago, educators measured the 'quality' of a school by the resources which went into the school, not by the quality of the students who came out of it. The most ambitious attempt to do this systematically was that of Paul Mort (1946) who established a set of criteria of a good school, most of which were indicated by the resources that could be provided by outlays from the board of education. They included such things as

* *High School Achievement*, James S. Coleman, Thomas Hoffer, Sally Kilgore, 1982, Basic Books Inc.

> increased school library facilities, smaller pupil-teacher ratios, and non-teaching professional support staffs.

Coleman goes on to show how in the '60s attention in the USA began to shift from 'resource inputs' to outcomes and, in particular, to achievements in verbal and mathematical skills. After a period in which it was felt that schools had a fairly small effect on pupils' achievements, evidence to the contrary began to emerge in the late '70s. As Coleman says, the studies undertaken by the International Project for the Evaluation of Educational Achievement (IEA)* point to the same conclusion:

> The IEA studies (see Coleman, 1975) show substantial intercountry differences in achievement, suggesting that intercountry variations in schools, possibly greater than the variations within a country, lead to sharply different levels of achievement.

If America was shocked into activity by 'Sputnik', the alarm bells in Britain were sounded by industry — after many early warnings by the writers of the 'Black Papers'. A recognition of how few national facts and figures were available on which to base statements about standards in schools led to the setting up by the Department of Education and Science in 1975 of the Assessment of Performance Unit (APU). The aim of the APU was to provide a national cross-curricular picture to complement the work of the public examining boards which were primarily concerned with subject-based assessments of individual pupils. One might ask why any such picture is needed in view of the work of the public examining boards. Unfortunately reliance on O- and A-levels leads to many pitfalls (see Appendix 1).

By 1977 two new questions began to exercise the public mind. What is happening in our schools to general standards of literacy and numeracy? Do our schools fit their pupils to make a proper contribution to British industry and commerce in the competition for world markets? The APU by this time was well set to undertake a national monitoring programme — initially in language, mathematics and science — of a sample of 11, 13 and 15 year-olds to answer such questions. Whereas the USA had compared itself unfavourably with the USSR, our fears stemmed from the education and economic superiority shown by West Germany, whose technical education in schools and training of apprentices was outstandingly successful.

* *International Study of Achievement in Mathematics: a comparison in 12 countries.* Edited by Torsten Husén. Stockholm, Almquist, Wicksell; and New York, Wiley.

Today Sir Keith Joseph, Secretary of State for Education, is determined to see that schools do more to prepare pupils for entry into a world of rapidly changing technology. Although there are many other problems in education it is this question which provides the theme of the present study. Not that there can be any doubt of the Government's commitment to reform in the area of technical and vocational education. For example, in 1980 the Department of Education and Science provided £9 million to fund a variety of projects in its Microelectronics in Education Programme (MEP). In 1981 the Department of Industry gave £5 million towards the purchase of computers in schools. Then in the summer of 1982 the Secretary of State announced a special fund to support new curriculum development projects for the lower-attaining pupils. This was followed by a request from the Government to the Manpower Services Commission to introduce a lavish pilot scheme by September of the same year for technical and vocational education for 14-18 year-olds. At the same time with the approval of the DES the Certificate of Pre-Vocational Education (CPVE) for 17 year-olds was timed to start nationally in September 1985. The aim was 'to improve the vocational relevance of education in schools and colleges, and also assist the rationalisation of the complicated pattern of pre-vocational qualifications currently available to young people in this age group'.

But there are already grave doubts among those most closely involved whether these projects, whatever the good intentions behind them, are working well. The ambitions are too broad, too vague. Nor does it require much perspicacity to realise that we may simply be setting up a new set of Mort criteria — e.g. asking how much money are we spending on our technical education? how many computers have we in our schools? — instead of focusing attention on the *outcomes* of technical education.

It is at this stage that we need to consider the constraints of our subject.

'Technical' and 'vocational' are not easy words to define. In the everyday sense 'technical' means 'relating to the mechanical arts' and also by extension 'relating to the commercial arts'. These are the senses in which it is used in the Norwood Report (see p. 13) which subsumed business and commercial schools under the generic title of technical schools. Originally these schools were seen to provide an education for those who would spend as few years as possible at school before entering industry or commerce as craftsmen or would-be technicians.

As the technical school evolved in England it extended its scope to serve those preparing to enter industry or commerce at the professional or semi-professional level. What became distinctive about such schools was that they combined general education (with an emphasis on the pure and applied sciences) with training in manual skills. Their ethos encouraged pupils from a fairly wide range of ability to consider different methods of entry open to them in industry and commerce — at the levels of professional (technologist), semi-professional (technician) and craft.

Greater ambiguities unfortunately surround the meaning of 'vocational'. For example the word is used in different ways in different countries. In the USA any education or training which has attracted specific government funding may be described as 'vocational'. Worse, there is often felt to be an inherent contradiction between academic and vocational education. This however is false. What could be more academic than a nineteenth-century classical education? Yet it served as the direct route to the priesthood, civil service and government. And the same is true of a modern scientific sixth-form education in England. Besides being academic it leads directly towards a career as a professional scientist, engineer, doctor or teacher. The Manpower Services Commission in its recent publication 'Competence and Competition' did define vocational training 'as learning activities which contribute to successful economic performance'. At least this has the advantage of not excluding purely academic studies. Unfortunately there is an ambiguity. Whose economic performance? The individual's or the nation's? It is probably best to think of education or training as being vocational when there is a specific occupation or area of employment in view for the person undergoing it. The more specific the occupation the more directly vocational will the education be, and the nearer it will approach training.

In ensuring a proper direction for technical education, careful monitoring and experiments are essential. This is slow and difficult. But we can at least start by making a study of what we know about technical education at home and abroad. If, as Coleman believes, the IEA study suggests that 'inter-country variations in schools *lead to* sharply different levels of achievement' (my italics to emphasise the imputed causal connection) then comparative studies may be regarded as a substitute for some of the experiments. But even if we do not share Coleman's conviction our examination may nonetheless be very valuable to those designing the experiments.

The study, then, will examine the situation in England and Wales, West Germany, the USA and the USSR. We have chosen these countries because their educational systems share West European roots although two of them, the USA and the USSR, reflect, each in its very different way, radical attempts to create new forms of society. The main forces at work in our own educational system are discernible in the other three.

The final chapter attempts to answer some fundamental questions. In particular:

- what is the future of comprehensive schools?*
- should encouragement be given to schools with special curricula?
- what kinds of education should be given to students of different ability?
- how broad-based should vocational education be — and should training be accompanied by general education?

* In the USA these are usually called 'common' schools; except in the English context, this is the appellation which we have preferred.

1

Technical Schools in England and Wales

A brief history

Few people know much about our own technical schools. Bare statistics about them could give a false impression of weakness. They have always been concentrated in certain parts of the country and in many areas have never existed at all. So any apparent weakness relates simply to failures to set up technical schools. Where they were established they were often exceedingly strong, with academic achievements close to those of grammar schools. Had they been adopted nationally there is reason to believe that they would have strengthened the educational system — as they did locally.

Technical schools were at their peak in the '60s. Just as their reputation was growing they fell victim to the onrush of comprehensivisation, which struck down successful schools of every type. But there are still a few technical schools left in those authorities which have either fought off comprehensivisation altogether, or have adopted a mixed system of secondary schools.

Whereas the other two partners of the tripartite system — grammar and secondary modern schools — had historical roots and a rich soil of experience on which to build, the base of the technical school was not so strong, its forerunners being the less clearly defined 'higher grade', 'selective central' and 'junior technical schools' of prewar days. The vision of the technical school as a major partner in a tripartite system was first adumbrated in the Spens Report of 1938.[1] But first a word about the tripartite system itself.

The tripartite system as a concept is often linked with what has been called the 'Norwood typology' — a view that there are three types of pupil whose needs are best met in three types of school. Although psychological evidence along such lines has sometimes been called in support of the tripartite system a careful reading of the Norwood Report[2] makes it clear that to speak of a 'Norwood typology' would be grossly to oversimplify the view of its authors. They were at pains to point out that mass education systems here as in most European countries have had to establish rough groupings, and that it was profitless to inquire 'whether such groupings are distinct on strictly psychological grounds, whether they represent types of mind, whether the differences are differences in kind or in degree'. In English education, they went on (and could have added other countries too), a

group of pupils who were interested in learning for its own sake, who could grasp an argument and were interested in causes and in the relatedness of related things and who could take a long-term view, were educated by the curriculum commonly associated with the grammar school. These are the people who entered the learned professions or took up higher administrative or business jobs. *They may have been good with their hands or they may not.*

The Norwood Committee clearly saw distinctive roles for grammar and technical schools. Just as their support for grammar schools was based on historical, not psychological, grounds they also felt that the history of technical education had demonstrated the needs of pupils whose interests and abilities lay markedly in the field of applied science or applied art. As they themselves put it:

> The various kinds of technical school were not instituted to satisfy the intellectual needs of an arbitrarily assumed group of children but to prepare boys and girls for taking up certain crafts – engineering, agriculture, and the like. Nevertheless it is usual to think of the engineer or other craftsman as possessing a particular set of interests or aptitudes by virtue of which he becomes a successful engineer or whatever he may become.

The Norwood Committee recognised another grouping of pupils and of occupations. These pupils were 'interested only in the moment' and their ability was to deal with facts rather than ideas. The prospect of specific careers was fixed in their minds at a relatively early age. The committee was of course referring to pupils from elementary schools who, after the 1944 Act, were destined to enter the new secondary modern schools.

Such sturdy commonsense, such preference for historical and pragmatic considerations rather than for dogma, might have prevailed but for a new factor — the abolition of fee-paying by the 1944 Act. It seemed improbable that parity of esteem between well-established grammar schools and two relatively new creations could be established overnight. Selection was therefore an immediate issue.

It is important to recognise that selection only becomes necessary when the demand for places in any school exceeds the number that the authority is prepared, for whatever reason, to make available. It is not the existence of different types of school that constitutes a selective system. Strictly, the tripartite system is a differentiated, not a selective, system, in contradistinction to an undifferentiated or comprehensive system. In the same way the wider debate is better viewed as one

between differentiators and non-differentiators (egalitarians).

Given that grammar and technical schools were oversubscribed selection was needed, and in devising suitable tests of interest, ability and so forth theory was invoked. The grammar school pupils who were interested in causes and the relatedness of related things and the modern school pupils who dealt more happily with concrete facts were seen to represent opposite ends of a continuum along the line of general intelligence. Pupils of technical schools occupied an intermediate position — if only on the grounds that they were aware of the general direction in which their future occupations lay. For them, a test of intelligence in conjunction with a test of a particular set of abilities or interests seemed appropriate.

Selections for the technical high school (as recommended in the Spens Report) was to be made from those children who had attained the necessary standard in the examination and was to be in accordance with (a) the choice of parents, (b) the report of the head of the primary school, and (c) the result of an interview of the child and its parent or parents, with the head of the technical high school and a representative of the local education authority. In effect this recognised that the headmaster and parents are to be deemed better judges of a child's particular interests and aptitudes than any specific tests, and that parents have the right to make judgments about the merits of different schools.

Thus Spens was as flexible about selection as Norwood was about the schools themselves. The danger of being too dogmatic or theoretical about our schools and the tripartite system was admirably summed up in the Norwood Report:

> . . . each type [catering for the needs of three broad groups of pupils] containing the possibility of variation and each school offering alternative courses which would yet keep the school true to type.

It is against this background — that there is a type of school called 'technical' but no typical technical school — that the author later introduces a case study based on six years' experience as headmaster of one technical school, the City of Bath Technical School, at a time when these schools were at their peak in the late 1960s.

Achievements of technical schools

National statistics, as compiled by the DES, provide no evidence of the ability and potential of pupils entering our secondary schools but they

are nonetheless useful in presenting a general picture. The number both of technical schools and of pupils in them was at its peak in 1960. But to have chosen this period for a review would have been to miss the great wave of sixth-form and A-level expansion which was to reach its high tidemark in 1968 — an expansion in which technical schools played a most notable part. We have therefore chosen 1968 for a look at the national achievements of technical schools. In evaluating the statistics one must bear in mind that:

(a) even with a nationwide tripartite system only about 15% of school-leavers would come from the technical schools, compared with about 20-25% from grammar schools. From the numbers of actual leavers in 1968, we are led to believe that the number of technical schools then in existence was about one-eighth of the maximum possible under a fully developed national system.

(b) most of the technical school pupils would probably *not* have qualified for entry into grammar schools.

There were, in 1968, 121 technical schools (50 boys', 24 girls' and 47 mixed) with a population of 62,021 pupils. The figures for state grammar schools were 1155 schools and 655,702 pupils. Thus the population of the former was approximately one-tenth that of the latter.

38.1%* of the 11,010 leavers from the technical schools obtained five or more O-level passes, compared with 65.5% of the 105,160 leavers from the grammar schools.

The great contribution which technical schools made to sixth-form work and A-level achievement may be gauged from the following table of comparative statistics.

		Technical Schools	*Grammar Schools*
(i)	No. of pupils in sixth form	8,403**	130,953°
(ii)	No. of sixth-formers following A-level courses	7,468	127,321
	No. from (ii) in first year	4,064	65,189
	No. from (ii) in second or later year	3,404	62,132
	Percentage of (ii) studying mathematics	44%	32%
	Percentage of (ii) offering A-levels in the mathematics, science group only	37%	32%
(iii)	Percentage of leavers attaining 2 or more A-level passes	15.9% †	39.1%°°

* made up of 39.2 boys and 36.5 girls
** boy to girl ratio 1.84: 1
† boys 19.5%; girls 10.4%
° boy to girl ratio 1.2: 1
°° boys 44.0%; girls 34.1%

(iv)	Percentage of leavers proceeding to university or colleges of education	13.2%	31.1%
(v)	Percentage of leavers proceeding directly into other full-time further education	12.2%	16.3%

Remembering the caveat with which our evaluation started, we can reasonably hold up the performance of technical schools to admiration. They produced pupils whose academic attainments did not fall far short of grammar schools, especially in mathematics and science. Further light on their performance may be shed by the case study below.

A case study: the City of Bath Technical School (CBTS)

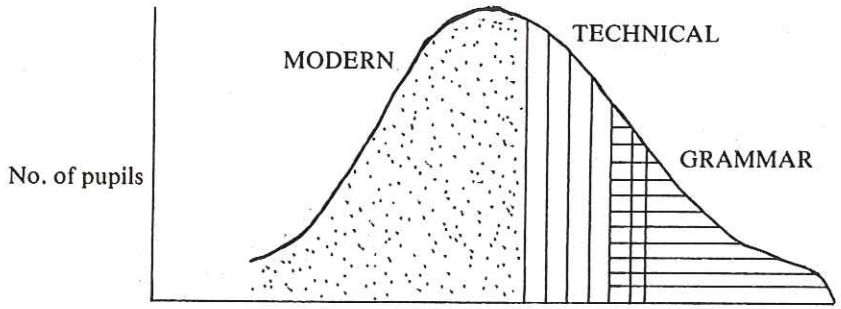
The pupils

The selection procedure was the one recommended by Spens — except that the interview of the child, whose parents were usually *not* interviewed after the written tests, was reserved for candidates on the borderline. All pupils were tested in writing for verbal reasoning and mathematics, equal weight being accorded to each, and then listed in an order of merit (which, however, headmasters' reports could override). As a rule those in the top quartile were allocated to grammar or technical school (and very occasionally secondary moderns) in accordance with their parents' wishes. Grammar and technical schools however did not enjoy equal esteem* and few really able pupils entered the technical school. That had to be faced. Grammar schools were usually filled entirely by pupils whose parents had made them their first choice but some pupils in the same category who were just below the top quartile had to be content with a technical school place. In addition there was a borderline zone where allocation depended upon special aptitudes and interests identified during the interview.**

The situation in Bath in 1968 could be summed up in the following diagram.

* Parity of esteem is not something that can be guaranteed by the fair distribution of resources or by Act of Parliament. In a free society esteem, like open elites, are determined by public opinion.

** See p. 19 for a profile of the VRQ scores of CBTS pupils forming the fifth form in 1968. One rare case is recalled when the top pupil in the 11+ exam, with maximum scores in all the standardised tests, opted for the technical school. He was of course accepted (with open arms!).



General scholastic ability (VRQ + Mathematics Quotient)

Thus the top 30% or so of pupils went to grammar or technical school.* Another 10% followed overlap GCE courses in the secondary moderns and had the opportunity to transfer to grammar or technical school (or further education college) at 16+. In recognition of the somewhat arbitrary nature of the cut-off points in the selection process, the Norwood Report had recommended that the first two years in the secondary schools should be regarded as provisional but the practice of the secondary modern schools running overlap GCE courses was seen as a better way of providing the necessary flexibility and opportunities for lateral transfer. There was however a substantial number of late entrants (13+) from neighbouring counties, some of whom were prepared to travel twenty miles each way daily to attend school.

Their achievements

The author had occasion[3] to make a detailed analysis of the academic potential of the fifth-form pupils who presented themselves for O-level at the City of Bath Technical School in 1968.** The entire fifth form of 81 pupils took the O-level exams. There were four pupils whose VRQ scores could not be obtained since they were late entrants to the school. The distribution of the VRQ scores of the rest are shown in the table on the page opposite.

* *Note*: these percentages apply only to boys. Bath did not provide technical schools for girls.

** The 1968 results were slightly better than those in previous years. Over the previous two years the average number of passes per fifth-form pupil was 5.3.

VRQ	*No. of pupils*
130 or over	1
125-129	3
120-124	11
115-119	14
110-114	31
105-109	10
100-104	5
95- 99	2
Total	77

The total number of O-level passes gained by these 77 pupils was 470: giving an average of 6.1 passes per pupil. 60 of the 81 pupils gained five or more passes.* Performances in mathematics and physics were especially good, with 66 and 61 passes respectively. *Yet about half these pupils would not have been accepted for grammar school entry.*

It is also notable that in the same year 13 pupils from one of the two boys' secondary modern schools in the city (the one most closely associated with CBTS and the academically weaker of the two) also obtained five or more O-level passes or CSE Grade 1s. These results demonstrate that the junior partners to the grammar school in the tripartite system were both providing good overlap courses and that this flexible system was performing excellently up to 16+.

A-level successes were striking, too. Over a period of six years from 1963-8 about 45% of fifth-formers stayed on into the second-year sixth, of whom a total of 272 pupils gained altogether 535 A-level passes. Nearly half of these passes (46%) were in mathematics and physics.

The average number of passes gained each year during the same six-year period was 21 in mathematics and 19 in physics. 28.2% of all leavers gained two or more A-level passes (excluding those who achieved this by repeating).**

Although the O-level results were the equal of many grammar schools, overall A-level results, it is true, were less favourable. (This is scarcely surprising, given the paucity of very able pupils.) The results in mathematics and physics were, however, outstanding and would have

* Nationally 65.5% of grammar school pupils gained the same qualifications.

** The national figure for grammar schools in 1968 was 39.1% (boys 44.0%); the corresponding figure for technical schools was 15.9% (boys 19.5%) (repeaters not excluded).

done credit to a 3-form-entry grammar school.

* * *

The readers unacquainted with the technical schools — and they unfortunately are in the majority — may not find it easy to delve underneath the statistics and comprehend the fundamental reasons for the success of technical schools. But the author, having worked in one such school, is in no doubt about the explanation. First, the schools were small and their staff devoted to the aims of a technical education, with a bias towards science and technology.* The pupils appreciated this special ethos. Next — and most important — the pupils benefited from the sheer relief from concentrated academic studies that they experienced in various manual activities.

Of course such relief is experienced by *all* pupils in all schools in the form of PE, games and occasional exercises into arts and crafts. But in addition to these the curriculum of the technical school offers opportunities to practise woodwork, metalwork, engineering drawing, engineering projects and art. This complements and contrasts with the main academic syllabuses. For the pupil who as a rule is less academically able than his grammar school counterpart such a curriculum is ideal not only in educational terms but as a grounding for the world of industry and commerce. These are amongst the qualities which make a full tripartite system operate as successfully as the one which we will study in the following chapter on West Germany.

* In addition to the very strong maths and physics, 11 other subjects were offered at A-level. A foreign language was not offered beyond O-level.

2

Technical Schools in West Germany

There has been much interest of late in looking for links between Germany's outstanding economic performance and its educational system. Attention has focused mainly on the Realschule, the phenomenal growth of which has matched that of the German economy itself. The Realschule is in some important respects the near-equivalent of the English technical school. Another type of school which has made an outstanding contribution to German secondary education is the Hauptschule, which resembles the English secondary modern school. From this it may be gathered that the tripartite system is flourishing in Germany. In considering the role of the technical school, or Realschule, in German education something must also be said about its other partners in the tripartite system and about the system itself.

The tripartite system

Ludwig Erhard, who became Germany's Minister of Economic Affairs in 1949, showed great courage in resisting the then conventional wisdom established in the High Commission — one hostile to markets and soft on inflation. Against all advice Erhard remained firm, devising the stratagems necessary to counter pressure upon him to adopt measures which he considered dangerous and unnecessary. With what success, in the matter of the German Miracle, is now part of history.[1]

The same courage and faith was shown by Germany's educators in resisting the blandishments of the Americans in the advocacy of their own model of secondary school — the common school (see p. 39). This policy has been maintained to the present day, and many will attribute Germany's educational miracle to the same firmness of purpose that produced the economic miracle. Certainly Germany has experimented with comprehensive schools. But the percentage of leavers coming from them in 1979 was only 3%. To all intents therefore the German system may be considered as a fully tripartite one. Its main characteristics are summarised in the table on the following page.

School type	*Age*	*Terminal exam**	*Function*	*% of leavers 1979***	*English equivalent*
Gymnasium	10/12-19	Abitur	Preparation for university	18	Grammar School
Realschule	10/12-16	Realschul-abschluss	Preparation of technicians	24	Technical School †
Hauptschule	10/12-15	Hauptschul-abschluss	General education vocationally orientated	49	Secondary Modern School

The Gymnasium

This school has traditionally provided the main route to the university in Germany. It continues to do so. Different types of gymnasium offer their own different varieties of curriculum. The bias exhibited by each of the three main types of gymnasium:

Classical Gymnasium (Altsprachliches),

Modern Languages Gymnasium (Neusprachliches)

Mathematics/Nat. Sciences Gymnasium (Naturwissenschaftliches)

is however only slight. For the first six years (10-16) the balance between the subjects taught in each type is almost identical, except for the nature — and amount — of foreign language studied. Even in the last three years (16-19), when a certain amount of specialisation occurs to give the schools their distinctive features, the common core curriculum is remarkably large by English standards. The curricula in all schools are academic; all have a strong linguistic content.

The Gymnasium is a selective school but selection has never been the sensitive issue which it has been in England. This is mainly due to the high standing of the Realschule in public esteem, and to the greater weight given to parental wishes. As a rule selection occurs at 10 and is based on parental choice and the recommendation of primary teachers. Where there is disagreement which cannot be resolved the parents can demand that their child sit a special examination. Even if the child fails this the parents can still insist on the school of their choice. It takes a very insistent and independent parent, however, to ignore teachers'

* All three types of school have appropriate leaving certificates. Pupils at a higher type may be awarded a lower type certificate, and there are opportunities to convert lower level certificates into higher level ones.

** The 9% of leavers not included here are accounted for as follows: 6% in special schools, 3% in Gesamtschulen (comprehensive).[2]

† Most technical schools in England offered their pupils the opportunity to stay on to take A-levels at 18+. Unlike the Realschulen they provided an alternative route to the grammar schools for entry into higher education.

recommendations which are backed up by objective evidence.

Although selection has met criticism in Germany as elsewhere this has been answered by regarding selection at 10+ as provisional. In many *Länder* selection at 10 is followed by a review two years later. In some others (e.g. Berlin) it has been postponed to 12+ by the extension of primary education by two years. In general, however, Germany has maintained the vertical divisions in its secondary system of schooling but in the face of criticisms of undue rigour has made the system as flexible as possible — by ensuring that lateral movement between the divisions is possible at all stages.

The final leaving certificate of the Gymnasium is the Abitur. Its possession used to give automatic right of entry to any university course but limits have been imposed on the number of places in some university departments ('numerus clausus') and selection has to operate. In 1980 a total of 220,000 pupils (21% of the age group) attained university entrance requirements but nearly a quarter of these came by routes other than that of the Gymnasium,[3] thereby demonstrating the great flexibility of the system.

The Gymnasium has always provided a broad, general and *academic* curriculum. At first sight, and especially with the prejudices to be found in English education, the relevance of such an academic education to a country's economic needs may not be apparent. There are many reasons for believing that first impressions are wrong and these will be discussed in the final chapter. One difference however between the academic curriculum of the Gymnasium and that of the English grammar school (and its equivalent in comprehensives) deserves mention here. It is that the much broader curriculum of the Gymnasium ensures that mathematics and science are obligatory for all pupils up to the 12th Grade (18+). The result is that the great majority of those entering university have a higher mathematical competence than their English counterparts. This was confirmed by the IEA studies,[4] although as might be expected the position was reversed in the case of science specialists in the two countries. The German advantage is however achieved at the expense of delaying the completion of secondary schooling by two years[5] and by the provision of an extra year's schooling.[6]

The percentages of the age group entering universities in the two countries are estimated as Germany 18% and England 12% (if polytechnics are included). The drop-out rate from higher education in Germany is greater, however, and the numbers emerging with first

in the much greater time devoted to science and foreign languages in the Realschule. This is achieved at the expense of history, geography, social studies and other general subjects. The balance of subjects was similar to that found in English technical schools, except that in the latter an obligatory foreign language would lack the orientation towards commerce found in the Realschule, and would not usually extend beyond the second or third year.

The most significant difference, however, between the curriculum of the Realschule and that for corresponding pupils in England, lies in the obligatory core of three subjects (mathematics, native language and foreign language) examined for the Realschulabschluss. An outright fail in a core subject is not permitted. The German group examination also includes one or two optional subjects.

Prais and Wagner found that the standards achieved in the Realschule were considerably higher than those of corresponding pupils in England. The final standard aimed at, and very largely achieved, in the Realschule is that of O-level in each subject. Since mathematics is obligatory for all pupils it is probably true that 40% of all German pupils reach a standard of O-level in that subject. This compares with an estimated 25% in England in 1977-9 (but rising to 30% in 1981). Furthermore all these German pupils will have studied science and most will have offered it as an optional subject in the Realschulabschluss.

Perhaps it is the group examination, similar to the old School Certificate in England, which helps to produce these high standards. Whatever it is, approximately 30% of all 16 year-old leavers in Germany, compared with some 12% in England, attain the equivalent of O-level passes in at least four core subjects. Clearly the Realschulen contribute very greatly to this marked German superiority.

Hauptschule (Volkschule)

It can be seen from the table on p. 22 that the Hauptschule is the German near-equivalent of the English secondary modern school. It originated as the Volkschule offering a four-year secondary education but a compulsory ninth year of schooling was added, followed by a voluntary tenth year for which an appropriate leaving certificate was designed. Possession of this (Hauptschulabschluss) either enables pupils to proceed further in the educational system or qualifies them for entry into skilled jobs. About 38% of the age group left their full-time schooling in 1979 with this certificate. Only 11% obtained no certificate at all, including about one-eighth of the Hauptschulen pupils.[12]

The Hauptschulabschluss is normally based on attainments in about 10 subjects. The syllabus for each subject is centrally determined in each *Land* and a basic core of subjects is prescribed. This includes a foreign language (usually English) and mathematics (see Appendix 2 for further details). Outright failure is not tolerated in more than one subject and a near fail in a second subject is permissible only if above average marks are attained in other subjects. There is thus a powerful incentive for pupils to reach a good standard in a wide range of subjects.

Prais and Wagner compared the standards of mathematics of pupils in the Hauptschulen with those of their counterparts in the English secondary moderns and comprehensives. They concluded that *the German pupils at 16 were two years ahead of their English counterparts, or put another way the weakest 50% of German pupils had been raised to the standard of the average for all pupils in England.*[13]

Hauptschulen prepare for apprenticeships not only by providing a very sound foundation in the basic subjects but also by the introduction of a thoroughgoing programme of pre-vocational studies. In Berlin for example, this takes the form of 4 periods per week of Arbeitslehre (work tuition) beginning at 13+. Two years later this increases to 8 periods per week and includes 2 periods of Career Guidance and 3 weeks' work experience at a local place of employment. Between the ages of 12 and 14 all pupils receive compulsory basic instruction in general work techniques (filing, bank accounts, role of national production standards, etc). This is accompanied by specialised instruction in a chosen option (mechanical technology, electronics, textiles, household projects etc.). Further specialisation is introduced in the last two years at school, e.g. an industrial option or a household option course. The careers work includes knowledge of training and available qualifications, the consequence of failure, recognition of signs of occupational obsolescence, etc. As Prais and Wagner say,[14] the above details (and their work includes a lot more) are not isolated peculiarities of this school or that but form part of the framework within which all the Hauptschulen in Berlin are obliged to operate. The regulations vary from *Land* to *Land* both in the time devoted to work tuition and in its content but there is a general trend towards the more intensive form of instruction as described above for Berlin.

3

Technical Schools in the USSR

There is no exact equivalent of our technical schools in the Soviet Union. This is hardly surprising considering that a cherished goal of Soviet education has been the 10-year common school offering the same general education to pupils of all abilities. Although not abandoned this ideal did however suffer a serious setback some 25 years ago. As a result a number of very distinctive types of school have emerged and some of these may properly be described as, or at least compared to, technical schools. Firstly there are the specialised secondary schools catering for the less able, and secondly the special schools (not to be confused with the specialised secondary schools) which have been developed to meet the needs of the very able pupils.

The complex schooling situation in the USSR may be better understood if something is first said about two closely linked movements — polytechnicalisation and the emergence of the special schools.

Polytechnicalisation

Polytechnicalisation has had an abiding fascination for the Soviet political establishment and its educationalists. Although it has proved something of a will-o'-the-wisp and over the period from the revolution to the present day has assumed many different forms, the concept is usually found to lie at the heart of any problem facing Soviet education.

The years immediately following the revolution are now regarded as a romantic period in Soviet education. The proletarian reaction to the predominantly academic and classical education of pre-revolutionary Russia is neatly summed up by the motto of the time, 'Throw the books out of the classroom window'. Under the influence of the American progressives, and the early Dewey in particular, the development of the child was viewed not in terms of thinking but of doing, not in terms of knowledge but of activity. The forging of the closest possible links between classroom and workshop became an accepted educational shibboleth.

In the early 1930s a sea-change took place in Soviet educational thinking. It began to be realised that educational romanticism was ill-suited to preparing children for their tasks in the real world, and that the neglect of basic educational standards and the erosion of discipline had much to answer for.

The schools now returned to the old, well-tried methods. The task of producing highly qualified professional cadres — engineers, scientists, managers and the like — took on great urgency as the USSR struggled to expand its industrial economy. In what was possibly an overreaction against the romantic period — both by teachers who had had their confidence destroyed and by the establishment which wanted very quick results — polytechnical instruction had to play a poor second fiddle to academic studies. The new mood of realism did however reflect the view that technological progress was first and foremost dependent on basic achievement in mathematics and physics.

The importance of polytechnicalisation during this period may be judged from the nature of one of its major triumphs — a re-writing of physics textbooks so that the theoretical problems in dynamics, traditionally couched in terms of falling bodies and projectiles, were translated into bombs from Soviet planes or shells from the guns of the Red Army! Nevertheless in 1955 about 8% of the weekly programme was directed to 'shopwork and other socially useful work'.

The new approach proved so successful that by 1956 the schools were producing about five pupils qualified for entry to *vuzy** for every place available. Furthermore those qualified school-leavers who could not be absorbed into *vuzy* felt keenly disappointed after being led to believe that they had 'had it made'. They had no desire to enter industry and commerce at the lower levels, although their broad general education would have provided a very good base for training for such roles. It was these disenchanted and politically unreliable *beloruchki* ('white-handed ones') that Kruschev had in mind when at the 20th Party Congress in 1956 he called for stronger polytechnicalisation of schooling. This resulted in a 50% increase of shop work in many schools.

Two years later Kruschev decided on a more drastic solution. The Soviet goal of 10-grade schools** for all, which was in sight of being realised, was suddenly abandoned. By a new school law passed by the Supreme Soviet in December 1958, 8-grade schools were to become the norm and after that all pupils would have three years of 'work

* *vuz* is the Russian word, formed from the initials in 'vysshee uchebnoe zavedenie', higher education institute, university. Pl. *vuzy* (pron. voosey).

** In the USSR children start school at the age of seven.

experience' in a factory, during which time they would be able to take part-time courses qualifying them for entry to *vuzy*. This proposal however aroused so much opposition from both university professors and factory managers that a compromise was adopted.

In the short-term the three years' work experience became three years' schooling for the majority of pupils. This was provided either in new schools or was added on to the 8-year courses in the old 10-year schools. In both cases it was heavily polytechnicalised, the amount of shopwork being trebled.* In the longer-term a 10-year course was once again established as the norm and the amount of shopwork was reduced. The first eight years of schooling, known as 'incomplete secondary schooling' became obligatory for all pupils. Those who aspired to enter *vuzy* — about two-thirds of the pupils — continued in their schools to complete a full 10-year course. The rest transferred to technical education at one of two levels (see p. 38).

The full curriculum for the 10-year school, in 1977/8 and as proposed for 1981/2, is shown in Appendix 3. The proportion of the curriculum devoted to direct vocational training, i.e. labour training, but omitting military training, had dropped back in 1977/8 to 7% or 6% (depending on whether the time considered was the total curriculum time or only that in Grade 10). More recently there has been an increase, to 9% and 12% respectively, as the figures for 1981/2 show.

This labour training consists mainly of woodwork, metalwork and domestic science in the lowest grades. In Grade 4 courses on electrical circuits, including elementary TV, are introduced and the domestic science includes sewing, weaving and the maintenance of electric irons. Examples of the courses provided in Grades 9 and 10 are motor vehicles, practical woodworking and (in the rural schools only) agricultural machinery, the mechanisation of state farms and the fundamentals of stockbreeding. Some courses are optional, e.g. tractors in Grades 7 and 8. Special textbooks have been written for all these courses and the work is formal.

The emergence of special schools

It comes as a surprise to the uncommitted and a shock to English socialists to discover that there has been a retreat from the comprehensive principle in the USSR. Shock may be too mild a word to describe the reaction of our egalitarians on learning that selection for

* From about two to six periods a week, averaged over the full 10/11 years.

some of the special schools in the USSR occurs at the age of seven. The implications of this educational shift will be discussed alongside the situations in some other countries in the final chapter but an examination of the reasons for the adoption of the new approach will assist in painting a clearer picture of the special schools.

The key-word is 'retreat', since apart from the long-standing special schools for musicians and others in training for the performing arts the Soviet system was fully comprehensive at the end of the 1950s. Yet here a cautionary note must be sounded. The fully comprehensive (and fully mixed-ability) system had a strong but hidden element of selection built into it. Yearly promotion was decided by merit and pupils who did not achieve a satisfactory mark for performance and effort in every subject had to repeat the year's work. Evidence on the extent of such repetition is not consistent, but it was put by Hearnden* at about 20% for the country as a whole. In practice therefore the system was vertical selection. Soviet educators could deny the theory that there were innate differences between pupils whilst at the same time creating a system which effectively differentiated between pupils whose abilities did differ (whether or not these differences were wholly or in part innate). It was an outstanding triumph of Russian realism over official Soviet ideology.

The most significant transformation of official thinking was that which rehabilitated competition. The Stakhanovite movement launched competitive attitudes and practices on to the shop floor, but whereas competition found only limited application in the economic field it came in time to dominate the entire field of educational endeavour. It had of course initially been execrated. What then could be made to justify so dramatic a volte-face? Russian realism once more came to the rescue. The trick was to distinguish between two kinds of competition — the old kind beloved by capitalist societies in which successful competitors were deemed to reach the top by climbing on the bodies of those they trampled underfoot, and a new kind, socialist competition, in which those who succeeded did so out of a desire to benefit society while those who were left behind were nonetheless happy to contribute to the common good. The approach had the advantage of simultaneously raising the level of endeavour and of educational standards. Elites, provided they were open ones, were no longer to be despised on ideological grounds, nor were their members to be objects of envy.

* See Note 10 on p. 25.

In the words of Academician Lavrent'ev an elite was to be regarded as 'the ornament of society, its pride, the best part of it'.[1]

Socialist competition not only generated a new word in the Russian language (*sotssorevnovanie*), it also became the mainspring of Soviet education. The official handbook, 'Socialist Competition in the Schools', became an educational bible for teachers and parents. It was used to stimulate academic and moral behaviour alike, and accepted as an indispensable tool in the creation of New Soviet Man.

There seems little doubt that the trigger for these new attitudes towards competition was the failure of the Soviet economic and educational systems to meet the goals set by the Central Committee in its national plans for industrial expansion. The party faithful however proved themselves fully capable of justifying socialist competition on purely ideological grounds. It was easy to see it as a natural working-out of the dialectical process, conflicting forces becoming reconciled in the creation of higher forms of social organisation.

The big changes which followed the Kruschev reforms of 1958 undoubtedly diverted a sizeable number of average Soviet pupils from the higher education route into the more humble pathways which led, through the technical/vocational schools, directly into lower and intermediate occupations. Concern about the effect of the Kruschev reforms on able pupils, expressed by academics and factory managers, has already been mentioned.* Given the all-pervasive influence of socialist competition by 1959 the appearance of special schools in the post-1960 period should occasion no surprise.

Special schools

There are a number of different kinds of special school. The 'mass schools with special profile' most closely resemble our own technical schools. Other types — the mathematics and physics boarding schools (FMSh) and foreign language schools — also have affinities with technical schools and the story of technical schools in the USSR would be incomplete without some reference to them.

1. *Mathematics and physics boarding schools (Fiziko-matematicheskie shkoly, FMSh)*

The first FMSh was set up in Novosibirsk in 1963 as part of an experiment to ensure that the talents of clever children with special aptitudes in mathematics and science were fully exploited by the nation. The Novosibirsk school was quickly followed by 12 others and the number of FMSh still stands at 13 today. They are all boarding schools and cater for 15-18 year-olds.

The curriculum of the FMSh is heavily biased toward the physical sciences and specially tailored for really gifted children. Each school is linked to a university and leading mathematicians and scientists from the university are closely involved in the teaching. There is little evidence of any direct technological input into these courses but it is of course widely recognised that specialised mathematicians and physicists have a major contribution to make to Soviet technology. It is significant that the curriculum of the FMSh places great emphasis on problem-solving in mathematics and physics, and to a lesser degree in chemistry and biology (see Appendix 4).

There is said to be a hothouse atmosphere in the FMSh. Hours of study are long, even for boarding schools, and pupils who obtain no more than 'satisfactory' grades are weeded out. Those who complete the course have improved chances of entry into *vuz* and, as might be expected, there is a very great demand for the limited places available in the schools. Selection is therefore necessary and is accomplished by the use of highly competitive examinations in mathematics, physics, etc. In many cases the annual Olympiad competitions, which are used to find the best mathematician, physicist, etc. in the region, serve also as the entry examinations for FMSh.

The FMSh cater for a very small minority indeed of pupils in the USSR. They are still regarded as experimental and there has been no move by the authorities to increase their numbers. In a socialist country there is a natural unease over their existence. In the long-standing struggle between the egalitarians and the differentiators* they do however represent an important ideological concession to the differentiators.

2. *Foreign language schools*

These are different from the FMSh in a number of important ways. They are much more widespread than the latter and embrace both the

* In discussing educational standards in the USSR, it should be observed that no objective studies have been made of performance in the Soviet Union, compared with those of other countries.

* John Dunstan provides a very perceptive analysis of this struggle. Murray Yanowitch describes the tension between 'egalitarian' and 'efficiency' (or 'meritocratic') orientations in Soviet education and sees both as integral parts of the ideology and functioning of Soviet education (see Bibliography).

elementary* and secondary sectors (indeed they are the only special schools, part from those in the performing arts, to be found in the elementary sector). They also have a much longer history, partly because they are less offensive to the egalitarian conscience. This is to be explained by the way in which they are officially regarded more as schools offering linguistic training to pupils of *all* abilities rather than as schools for linguists. It is this aspect, and in particular their role of preparing pupils for lower and middle-level occupational roles in commerce, that qualifies them for serious consideration as, or alongside, technical schools.

Their development may be traced back to 1940 when a number of experimental schools (30 in Moscow and 20 in Leningrad) introduced language teaching in Grade 3 instead of the normal Grade 5. In 1944 Academician Shcherba called for special boarding schools in which, beginning in the second grade, pupils would be taught some of the normal subjects in the curriculum through the medium of a foreign language. Insofar as Shcherba's model was designed to produce select cadres of diplomats and commercial specialists it was clearly elitist. The idea was however before its time and nothing came of it.

The general dissatisfaction with language teaching in the common school continued however, and in 1948 further experiments were cautiously introduced in Moscow and Leningrad. Things came to a head in 1958 during the debate on the Kruschev reforms with a general attack on the state of foreign language teaching in the schools. This was followed by the 1961 decree of the USSR Council of Ministers, 'On Improving the Study of Foreign Languages', which proved to be the signal for change.

This decree called for specialists in all fields and at all levels. It rejected the idea of a small number of boarding schools and proposed instead the setting up of more than 700 special language day schools catering for pupils from the age of seven. It also recommended the establishment of special language groups in nursery and primary schools at the request, and the expense, of parents.

Whilst the foreign language schools are officially intended to contribute to the linguistic training of pupils bound for entry into all the occupations for which such training is desirable — railcar attendants, travel couriers, librarians, shop assistants, etc. — the penchant of Soviet citizens for playing the system has rendered these

* At present, the first three years of schooling, i.e. 7-10 years of age.

schools extremely popular and prestigious. The proportion of their leavers entering *vuzy* is often two to three times as great as that for the leavers from the 10-year common schools. Not surprisingly the demand for places in the schools greatly exceeds the supply. A selection process is therefore necessary. This seems to be based on tests of general linguistic ability. The difficulties faced by parents of 7 year-olds anxious about these tests are graphically described in an article in *Izvestiya*. According to this, details of the tests were available only from assistants in the school corridors (see *Paths to Excellence and the Soviet School*, p. 98).

Due to the initiatives in the early 1960s about 1.6% of all schools in the USSR, it is estimated, are now foreign language schools. Usually only one foreign language is taught. English, French and German are the favoured ones with English leading by about three to one. The curriculum of the foreign language schools is basically the same as that of the common schools except for the foreign language teaching itself, which over the whole 10-year period is about three times the normal amount. Classes in the foreign languages are also smaller.

The schools, as we would expect, tend to be concentrated in urban areas. 9% of the schools in Moscow and Leningrad are of this type and in Moscow alone there are over 80 such schools. It is said that for a pupil in Leningrad the chances of entry to a foreign language school are seven times greater than the national average.

3. *Mass schools with special profile*

The notion that every pupil had to follow exactly the same common curriculum during 10 years of schooling was a consequence of the belief, widespread among Soviet educationalists, that the environment was the dominating factor in the development of abilities. As we have seen, however, by the late 1950s the curriculum in the 10-year schools was beginning to come under increasing criticism from many different quarters.

Persuasive social and economic arguments not only led to the creation of special schools and specialised secondary schools but also introduced a greater degree of polytechnicalisation into the common curriculum. Another effect, which owed as much to psychological as to social and economic argument, was the introduction of electives into the upper grades of the 10-year complete secondary education. Even the egalitarians were forced to concede that pupils' interests varied, and that to recognise this by abandoning the strait-jacket of the common

curriculum in the upper stages of schooling could not fail to lighten the task of teachers. The fact however that the special studies introduced were, as will be shown, predominantly scientific or technological, clearly demonstrates the underlying importance of the economic argument.

The story of the evolution of the mass schools with special profile, following the introduction of electives, is so complex that it is helpful to think in terms of an oversimplified model of three kinds of solution to the problem of the rigid curriculum, each of which had its own supporters in the continuing debate.

(i) Furcation (*furkatsiya*).
Senior classes of the secondary school are divided into two or three branches or forks, with pupils choosing one to provide them with a specialism. If the division into arts and sciences in our own sixth forms were completely rigid this would provide an example of furcation. This solution was one of the earlier ones canvassed.

(ii) Common core, with options.
A number of courses, usually a majority, are followed by all pupils. For the rest of the time one of a number of options must be chosen. All the options may be provided in the same school, but when a school specialises in one particular option (at least for this stage of the secondary schooling) it may legitimately be called a mass school with special profile.

(iii) Common curriculum, plus additional voluntary options.
In theory the specialised options are intended to be additional to the normal programme and are not meant to interfere with the common curriculum. In practice those additional options are often in the main timetable with the justification that the pupil is meant to devote an extra amount of his or her own time to the normal subjects. Such an arrangement obviously favours able pupils.

The mass school with special profile may be ideally pictured as described in the latter part of (ii) but during the experimental period in particular and also when they were fully established the schools exhibited great variety and contained the elements of (i) and (ii) in differing degrees. The failure of some of the schools to operate strictly according to regulations contributes to the variety. One of the most persuasive arguments in favour of the mass schools with special profile

was that they would weaken the argument for special schools and it is this which accounts for their rapid growth. In fact they represent a half-way (compromise) stage between special and common schools. (See Appendix 5 for the curriculum of a mathematics school in Moscow.)

Following experiments with schools in Moscow, with special mathematics and computing, in 1961 the Ministry set up a commission to investigate specialised mathematics schools. Mass schools with special profile were legitimised by a decree in 1966 and the following year witnessed their formal establishment. They were reaffirmed in 1973. It is reported that by 1971, 1.2% of all the 10-year schools had become mass schools with special profile. They were therefore about as common as the foreign language schools.

The schools are mainly concentrated in the most populous areas and like the FMSh are assisted by teachers from the universities. They may also be given resources by research associations in the neighbourhood. By 1968 Moscow alone had more than 100 such schools. The special profiles usually begin in Grade 9 (15+) and include mathematics, physics, computing, chemistry, biology and to a lesser extent some arts courses.

The schools are intended to cater for pupils with special interests in science and technology etc., rather than for pupils of higher ability. Although in theory they are open to *any* proficient pupil they have a very great attraction for both pupils and parents and demand for entry outstrips supply. According to some reports, a school may have five applications for every place available and this calls for a process of selection. It is based either on marks obtained in the special subjects, or in some areas on specially designed entrance examinations. Successful candidates may already be in the schools (at the incomplete secondary level) or may be transferred at 15+.

In any large city the mass schools with special profiles are arranged in a hierarchy according to parental demand and determined to no small extent by the school's relationship to the university or other sponsoring institution. Between 70 and 90% of pupils emerging from these schools secure entry to *vuzy*, compared with 25% from ordinary 10-year schools. Those who do not go on to higher education, but opt for medium level training, are also more successful than their counterparts from the common schools. Parents work the system and the schools are in practice elitist institutions catering for pupils of above average ability. According to some commentators special mathematics teaching may even begin in the sixth grade, i.e. at the age of 12.

Technical schools for the less able

Between 60% and 70% of pupils completing the eighth grade ('incomplete secondary education') stay on at school for another two years of general education in the 10-year school ('complete secondary education') in the hope of entering *vuz*. Another 10% enter employment and the remainder (20-30%) continue their education in one of the following institutions:

1. *Specialised secondary school (tekhnikum)**

These schools offer 3- or 4-year courses which combine general education up to the level of the complete secondary school stage with specialised training in one of the semi-professional areas, e.g. technician, nurse, primary school teacher, etc. It is reported that about 35% of the time is spent on general education and 65% on the specialised training.

The schools serve as avenues to the lower levels of the specialist or intelligentsia strata of society (semi-professional classes). They are also open to graduates of the 10-year schools who can gain their semi-professional qualifications by following 1- or 2-year courses. Although students who qualify in these schools are eligible for entry to *vuzy*, this is an unusual route into higher education.

2. *Vocational-technical school (proftekhuchilishche)*

These schools have evolved from the labour reserve schools which were introduced in 1940. The USSR has never officially admitted that it has backward children but those who repeatedly failed to reach the required standards ended up in these schools. Never widely publicised, they trained about a million youngsters a year for purely manual work. The training lasted four years and the trainees were expected to undertake any task assigned to them.

In 1958 they were renamed 'vocational-technical schools' and developed short vocational courses (1-1½ years) for about 800 different lower-grade occupations. They made no attempt to top up general education to the level of the 10-year school although students were expected to attend evening schools for this purpose. Since 1969 an increasing number of them have extended their courses to 3-4 years' duration in order to combine vocational training in a trade with the completion of general secondary education.

* The title 'tekhnikum' is sometimes reserved for those specialised secondary schools which train technicians in the stricter sense of the term.

4

Technical Schools in the USA

The autonomy possessed by the individual states of the USA leads to a bewildering variety of educational provision and renders very hazardous any generalising on such matters as the school curriculum or school organisation. Nevertheless the US system possesses certain broad general features in virtue of shared historical goals.

The common school

Democratic thought in nineteenth- and twentieth-century America found educational expression in the common school, which was seen as the ideal instrument for fashioning Americans out of the motley collection of nationalities that formed the new Republic. Taught in English their children would learn how to live together and govern themselves. The notion of the common school was refined and elaborated by Dewey and his followers, and by the middle of the twentieth century an appropriate curriculum had been developed.

The common school emphasises citizenship and stresses those educational objectives which are concerned with the individual and his social relationships in a democracy. Education is conceived as broad and general. Occupational labour is a worthy subject of study since it leads to social awareness and an understanding of the forces at work in society. But there has, until recently, been little call for direct vocational training.

Pupils start school at six and attendance is compulsory up to the age of 16 (17 in some states). Entry to high school may take place at any age between 10 and 14 according to state. A large majority of pupils (about 85%) follow predominantly academic courses which prepare them for college entrance after graduating. The rest are on the lowest, basic, track and will usually be following business, vocational or general programmes. About 70% of students graduate through the award of the high school diploma, which is often at the discretion of individual schools. About 50% of high school graduates enter college.

To an observer from Britain these figures seem to flatter the system. For it is widely acknowledged that the standard of achievement of high school graduates is both too low and too variable. As an indication of the general level of standards it may observed that the relatively small number of very bright students who are permitted to take part in the Advanced Placement Program reach a standard about

half-way between our own O- and A-levels.[1] The extreme variation in standards is revealed by the fact that a litigant in California recently sued a school board because his child had graduated from high school, but was unable to read or write. Although he lost his case the facts were not disputed, but it was judged that, unlike doctors, teachers could not be held responsible for the state of their charges. Employers and college authorities alike are now complaining about the amount of remedial education they are having to provide. Some states, such as New York, have always validated their high school diplomas by setting examinations, and the pressure is now on the others to set 'tests of minimum competency' in key subjects. Presumably this should help to reduce the wastage rate in colleges which has been estimated to be as high as 50%.

High school courses, even in the compulsory core subjects, are not continuous as in Britain but are based on modules. Graduation is achieved by the accumulation of a specified number of units of credit. The credits required for the college preparatory course are in the main obtained from a common core (e.g. English, mathematics, science, social studies, health and physical education) though at different levels of ability. This common core forms the bulk of the curriculum, but the complementary electives provide the opportunity to choose from a range of vocational and technical studies, e.g. business studies, wood-turning, auto-mechanics, home economics, etc. In some high schools students may combine preparation for college with intensive training in one of the vocational majors. Students following the business and vocational programmes have a core which places greater emphasis on vocational studies. They too may graduate and go on to higher education. Those following the general programme are usually prepared for direct employment (e.g. hairdressing, shoe repair) on leaving school. This is very narrowly vocational and it appears that such work became acceptable in the schools with the rise in juvenile unemployment in the '60s. It was seen as a means of reducing the number of school drop-outs.

An overall picture of the curriculum in the American high school is presented in Appendix 6. This shows the number of semesters in Grades 10, 11 and 12 devoted to each subject or area of the curriculum in 1980, in a sample of nearly 1000 schools. If business studies are included, all vocational studies (and these will also include home economics) account for rather more semesters than mathematics and rather less than English. As the author of the study[2] put it, 'academic

subjects [are] more or less standard fare for all students (though at differing levels of difficulty) and vocational courses [are] taken primarily by those students who go into (or are directed toward) a vocational program'.

Special schools

There has always been a very small number of special, mainly senior high, schools in the public (i.e. state) sector of American education. Some of them, such as Stuyvesant HS, the Bronx Senior HS for Science, the Brooklyn Technical HS (all in New York City) and schools in Buffalo and Chicago, resemble our technical schools in that they either have a curriculum which is scientifically biased compared with the norm or provide programmes with a strong vocational element. They are open-access schools and because of their great prestige need to operate a selection procedure. Accordingly they enrol pupils of superior ability.

Stuyvesant HS has claimed that its students go on to gain more Ph.D degrees in maths and science than any other school in America. It is best thought of as a grammar school with a scientific bias. The other vocational high schools offer courses in two categories: trade, and business and technical. In the upper two grades (11 and 12) vocational studies expand to occupy about half the total time available. Since the students are above the average for the college preparatory group in most high schools, a good proportion go on to higher education to become technologists or sub-professional technicians.

Other special schools, most of them resembling selective grammar schools, are to be found in San Francisco, Philadelphia and Boston.

The junior, or community college

If vocational/technical education receives a low priority amongst the aims and objectives of the common school, how does the USA ensure that an adequate proportion of its population receives a training in vocational skills at the intermediate (technician) and lower (craft) levels? The answer lies in that very characteristically American institution, the junior college. This provides low-cost tuition for any state resident over the age of 18 who has graduated from high school or who wishes to continue full- or part-time education as an adult. Originally intended as a close-to-home transitional facility providing the first two years of university courses in order to relieve the pressure on the large universities, they developed by diversifying to meet the educational and vocational needs of the local community. The junior

college has been a phenomenal success as can be seen from the growth of its numbers — 52 in 1920, 509 in 1960 and around 1300 today.

The programmes offered vary widely from state to state.[3] In some states the students in the 'university or college parallel' courses still form a majority and are awarded an Associate in Arts degree after two years' study. Substantial numbers follow two-year courses in occupational education ('semi-professional programs'): these usually reflect the employment requirements of the region and range from accounting, through electrical-electronics engineering technology and retail floristry to the visual arts. They normally include an element of work experience. The successful student receives an accredited award, e.g. associate degree or certificate of proficiency based on progress in his major study and for supplementary courses in general education, which might amount to a third of his time. For these courses the goals of education are defined not solely in vocational terms. The junior college also provides shorter 'non-credit' vocational courses of a terminal nature.

School records are not usually used in matching student to courses but guidance based on performance in tests in English and mathematics is common. In some colleges students can enter any course but are liable to be quickly transferred if performance is not satisfactory. The general philosophy is that a suitable course can be found for any student, and accordingly remedial courses are widely available too. In addition to junior colleges, 'trade' schools exist to provide vocational education. These are as a rule privately run and concentrate on rapid and efficient training for jobs in specific occupational areas. In 1981 they accounted for 9% of all post-16 year-old enrolments.

Demise of the common school[4]

Criticism of the common school became general in the late 1950s. Not only academic achievements came under fire. Problems of discipline and religious/moral instruction were also perceived as posing a threat to the quality of education. Trenchant criticisms made by a number of distinguished educationalists were supported by the findings of a succession of official commissions, of which the Senior Advisory Committee of President Eisenhower set up in 1959 — in response to Sputnik — provides the first, and the National Commission of Excellence in Education is the most recent example.

The roots of the religious problem were analysed by Will Herberg in *Protestant, Catholic, Jew* (1955).[5] As sectarian instruction had been

recognised as contrary to the law and non-sectarian religious instruction too had come to be regarded with suspicion (because of the possible conflict between groups holding different views) the public school had become secularised. If Herberg provided the theoretical analysis of the problem it was the American public who produced the practical reaction. The flight of pupils from the public to the private sector, nearly 80% of which is church-affiliated, rose to an unprecedented level between 1966 and 1976, when it is reported that enrolment at Christian schools increased from 992,000 to over three million.[6]

Nor should all of this be attributed to a religious revival. There was, and still is, a widespread public belief that the important attributes of church-affiliated schools are the order and discipline they provide. The collapse of order and discipline in the public schools by the mid-1970s was well documented by the authoritative report of the US Senate sub-committee to investigate juvenile delinquency (the Bayh Report) 1975-7.[7] It is difficult to know which is the more horrific: an annual rate of 70,000 *serious* physical attacks on teachers, an annual rate of 9000 forcible rapes in schools or the fact that one of the most important teacher-union concerns was whether principals of schools should carry guns. The Bayh Committee seemed to have been justified in summing up the situation in these words, 'Clearly the American elementary school system is facing a crisis of serious dimensions'.

The well-founded correctness of the public belief that the relative success of private schools is associated with their greater order and discipline had to await the research of Coleman in 1982.[8] As he put it, 'the greatest difference found in any aspect of school functioning between public and private schools was in the degree of discipline and order in the schools (Chap. 5, pp. 97-115).' Coleman was also able to show that the myth of the common school as an equalising and integrative force in society had become even more illusory as the 'community' had grown in size, and as parents had increasingly selected a school within the public sector by choice of residence. Looking ahead he foresaw that this might mean 'a more pluralistic and flexible definition of "community", one which need not be based on locus of residence . . .' To be successful, this would mean that the choice for those parents who do not have the necessary resources under the existing system would need to be provided.

To sum up, educationalists and parents alike were becoming rapidly disillusioned with schooling in the '70s. The stage was being set for an attempt, in the form of the magnet school movement, to regain

the badly shaken confidence in the public school.

Magnet schools

Our interest then in magnet schools is twofold. Firstly *some* magnet schools bear a very strong resemblance to technical schools. Secondly their appearance on the educational scene reflects a dissatisfaction with the performance of the common schools, and thereby suggests that special schools may have a much more important public role than has hitherto been suspected.

The magnet school concept has been developed over the last decade and there are at present an estimated 1000 such schools, which for reasons which will become apparent are all in urban areas. The models for the magnet school curricula were based on the well-known special schools which had for many years offered advanced programmes to selected students, e.g. the Bronx Senior HS for Science (see p. 41).

A magnet school represents a complex response to a number of different educational pressures and accordingly has a number of distinctive features. Thus it is officially recognised by their proponents and researchers[9] that magnet schools, properly so-called, must:

(i) possess a distinctive school curriculum based on a special theme *or* method of instruction
(ii) assist desegregation
(iii) involve voluntary choice by student and parent (i.e. is a non-districted school)
(iv) be an open-access school.

Those are the criteria. The report[10] of a national study for the US Department of Education (1983) based on a sample of 45 magnet schools, showed that only about 5% have a curricular theme involving occupations/careers and can therefore possess any claim to be considered as technical/vocational schools. This appears to be a significant statement concerning American attitudes to vocational education. About 9% have a science theme but no less than 42% are academic or arts.

The magnet programme at Carpenter High, Sunshine City[11] is typical of schools with a science theme. Its main objective is to provide excellent preparation for college and careers in science, mathematics, computers and health. It offers the students in Grades 7-12 19 science and mathematics courses, Russian, German and Spanish, and required courses in English, social studies and fine and practical arts.

A school with an explicit vocational theme is Baines High, Millville. This is described as 'a health science professions magnet high school which emphasises broad-based preparation for future health-related careers'. The presence of the State Medical College in the city and the interest of the faculty and deans of the medical college were important factors in the school's development. Close curricular links are maintained between the school and the college and as a regular part of the curriculum Baines students enjoy the opportunity to gain practical experience working in hospitals and health centres under professional supervision.

The Baines curriculum is designed around a college preparatory programme with an emphasis on mathematics, science and health studies. Students take a common core of courses from Grades 9 through to 11. The first year is the most structured. Everyone enrolled must take typing, a foreign language and family living (sex education). Health career courses begin in the 10th grade and laboratory skills and instruction in patient care is given in the 11th. Advanced sciences and two-hour practicum (internship) can be taken in the 12th grade. Baines High is known for providing a well-designed science programme which serves as a good background for further medical or science education. It also has a reputation for supplying the type of skilled training which makes possible immediate employment in fields related to health.

It is clear from the descriptions of these two magnet schools that their curricula do not depart very radically from those of the common school. A broad general education is provided in each, although it could be fairly described as scientifically or vocationally orientated as the case may be. They are reminiscent of the mass schools with special profile found in the USSR.

Examination of the last three of the four defining features (p. 44) will help us to understand the development of magnet schools. In 1976 a major fillip to their movement was provided when the US Congress passed an amendment to the Emergency School Act which authorised grants to districts planning magnet schools for the purpose of de-segregating. Because urban neighbourhoods were not sufficiently ethnically heterogeneous, neighbourhood schools were far from being racially balanced. 'Forced bussing' had been tried and found unworkable. A non-districted school involving choice by student and parent and open to all, had the attraction of possessing the potential to take schooling out of the area of conflict. This would be more likely to be achieved if the choice of school could be directly related to a

matching of student interest to the offer of a distinctive curriculum.

The question of selectivity has haunted magnet schools from their inception. Advocates have countered charges of elitism by stressing that the schools are open to all interested students and that any selection that occurs is self-selection. However, as we have already seen, whenever demand exceeds supply some form of student screening is necessary. Research[12] has shown that most magnets (60%) are only 'somewhat to moderately selective'. Only a small proportion are either 'highly selective' (13%) or 'non-selective' (11%). On the scale adopted, a highly selective magnet is one that (a) relies substantially on some combination of grades, test scores, teacher recommendations and interviews of applicants and their parents; and (b) operates a 'remand system' which sends students back to their regular schools if they fail to maintain standards of academic performance and behaviour. A non-selective magnet:

(i) accepts students on a first-come first-served basis or by means of a lottery, the only consideration being interest in the theme
(ii) does not remand students for any reason
(iii) gives places to lower-spectrum special-needs students (e.g. learning-disabled, emotionally disturbed).

If these considerations raise questions about the effect of magnet schools on the regular schools in urban areas it is well to remember how many problems of American education refer to needs to improve educational quality in core academic subjects, to offer choice and diversity in public education (including opportunities for career and vocational education) and to regain badly shaken public confidence in the regular schools. Research[13] has shown that magnet schools have been very successful in achieving their stated objectives and the hope is that they will continue to be models for, and act as a catalyst in improving the quality of, the other district schools.

Of particular interest is the conclusion in the research report that one of the major reasons for the success of magnet schools is the favourable ethos they generate. Their success is said to be closely related to their 'definiteness', i.e. 'strong identity with the theme, curriculum, teaching methods, goals, activities and staff effectively meshed to form a coherent whole'. The consequence is seen by parents to be a good school. Even more to the point, 'by being part of a program composed of other students of similar interests and having teachers who are also there voluntarily with the same interests, students

come to place a higher value on their education'. There is in the magnet school a feeling of common aspiration and common endeavour that by a telling irony is found to be lacking in the common school. It is exactly the same feeling of positive self-identity which was described in relation to the success of our own technical schools (p. 20).

5

Some Issues

1. The relationship between mental and manual work

The nature of this relationship is of prime importance in any consideration of technical education and the delicate issues which it raises must be squarely faced. The history of schooling in the USSR provides a grim warning against accepting solutions based primarily on ideology or class. The answer to this most difficult question, it is suggested, lies not in sociology but in psychology and epistemology and is to be found in the Principle of Minimal Motor Activity. 'In solving any problem that solution is to be preferred which involves the minimum of muscle power and the maximum of brain power.' In other words we should learn to bring intelligence to bear in solving all our problems. Intelligence it must be remembered is possessed by all and it is the job of education to increase the intelligence of every pupil. Intelligence must not be confused with IQ, which unlike intelligence has a tendency to remain unchanged.[1]

The pure sciences are therefore to be considered more valuable than the empirical ones. An Einstein who can produce an equation such as the energy/mass relationship $E = mc^2$, without as much as entering a laboratory, is more useful as a solver of practical problems than an army of physicists and chemists. These less pure sciences of course throw up their own Einsteins and save their practitioners endless drudgery and false trails. Learning by insight is infinitely preferable to learning by trial and error wherever these are genuine alternatives. In all the sciences, and the applied sciences too, advances are made by the construction of ever better theoretical frameworks and the aim of all the sciences is the ultimate establishment of one supreme general law from which everything else can be deduced. The aim of the sciences is to become pure or mathematical.

The Principle of Minimal Motor Activity is applicable at all levels. A farm worker may learn from experience, or be told authoritatively, that a squeegee is better than a shovel for mucking out a shippen. The first method of learning is expensive of time and material and the second may be unconvincing and therefore likely to be ineffective. The best way of solving the problem is by taking thought based on commonsense or elementary physics. The fine ridges on the concrete floor have been provided to prevent the cows from slipping. Constant scraping with a steel shovel will gradually smooth out the

ridges, whereas the application of a rubber surface will have hardly any effect.

The Principle is highly relevant in education. For example, there are three ways of finding the sum of, say, the first thousand odd numbers. The first is the long and laborious one of writing them all down and adding them up. The second is by setting out in turn the additions of the first one, two, three, four, etc. odd numbers and discerning a pattern; and the third is by mathematical proof. The second is certainly an improvement on the first but lacks the certainty and elegance of the third, which shows why the answer *must* be one million. Similarly the discovery by the use of measurement and induction of the relationship between the lengths of the sides of right-angled triangles can never possess the certainty and the elegance of the theorem of Pythagoras. The use of concrete examples in mathematics as long as it is not overdone is helpful as a staging post for those who require it but should not be confused with mathematics itself, as often happens in the primary school. That education should include a cultivation of the intelligence has been accepted by traditionalist and progressive alike. This maxim and the Principle of Minimal Motor Activity provide a sound guide for relating mental and manual work in the curriculum.

The Principle applies in our industrial life too. It is now almost a commonplace that whereas the first industrial revolution was concerned with machines which replaced muscle-power, the second industrial revolution involves machines designed to replace men's brains. We are only at the beginning of the new revolution and the robots that help manufacture our cars are still replacing workers' muscles. The tasks, however, are now concerned with dexterity rather than sheer physical force, as they used to be. Although the construction and operation of industrial plant is in the future increasingly likely to be performed by robots, it is impossible as yet to foresee a situation in which manual industrial skills will disappear and training in them will be rendered superfluous. It must be remembered too that in another equally important area of the curriculum — the aesthetic — the individual's need to create beautiful three-dimensional objects[2] out of wood, metal, stone and clay will guarantee the place of manual skills in the curriculum long after robots have banished them from industry.

So far we have talked only in terms of ideals and directions in which the curriculum should be advancing. But it should be emphasised that, whilst the search for one deductive system in science is legitimate,

findings must of course always be subjected to tests of experience. There are also many important practical constraints in the real world of schooling. These relate both to teachers and pupils.

The author has been present at many discussions of A-level syllabuses by examiners and teachers and has been struck by the fact that opposition to a change in emphasis from knowledge to understanding has more often than not come from teachers, who have felt themselves threatened by the proposed greater stress on intelligence. Many of the pupils too show the same kind of conservatism. It is undoubtedly true, as the Norwood Report pointed out, that pupils who are interested in learning for its own sake and are interested in causes and the relatedness of related ideas — at least for any sustained length of time — are in a minority. As explained in Chapter 1, part of the success of our own technical schools was attributable to the fact that they offered pupils who were not always part of this Norwood minority an opportunity to combine academic studies with the practice of manual skills. Some of these skills were provided in the basic science subjects which properly belonged to a technical education, whilst others were in the more specific technical subjects. Learning by insight, although an ideal, has in the real world of the schools to be tempered to the limitations of teachers and pupils.

One of the most important lessons to be learned from this comparative study is the need to cultivate intelligence and at the same time to avoid creating 'white-handed ones' (p. 29). All advanced societies in the real world, even socialist ones, seek to optimise the cultivation of intelligence by offering higher financial rewards to its professional than to its semi-professional work force. The real world has been invoked in order to put to rout those Utopian socialists who have damaged our educational system by pretending that it is possible to have a society without professions and classes and urging that it is the job of our schools to prepare for such a society.[3] They have failed to heed the good advice of George Bernard Shaw, given when chiding a disciple who hankered after a classless society. In the most perfect socialist state, Shaw said, people would occasionally break their bones and need surgeons to set them, houses could not be built without craftsmen and master builders, nor babies born without midwives; in short, under socialism there would be as many crafts, professions and callings as ever, if not several more. 'Classes under socialism? . . . Yes: plenty of them, possibly on fighting terms, but always on speaking and marrying terms: that is, on equal terms.'[4] It was Shaw too who

provided the best justification for the offer of higher financial rewards for trained intelligence. As he put it, the needs of the cabin boy and admiral as human beings are the same, but it costs more to train the admiral. If we were to reduce them to a common denominator we should get a superfluity of cabin boys and no admirals.[5]

If cultivated intelligence is valued in any society, whether or not by the offer of financial rewards, membership of the professional classes will be valued and such classes will therefore become elites. As Academician Lavrent'ev put it (p. 32), elites are the ornaments of society. A society without elites is unthinkable. Whether it is the USSR, where the government is directly involved in determining the status of groups, or in the freer Western societies where public opinion is the main determinant, so long as the elites are open ones, i.e. open to the talents, they are healthy and to be encouraged. By fostering healthy socialist competition the Soviet Union seeks to transform feelings of disappointment and possible envy on the part of the less successful pupils into pride in the success of the group. This surely is preferable to the practice of encouraging the belief that the less successful are failures and thereby fuelling envy, except of course to those Equality Merchants who for their own political ends wish to raise expectations beyond possibility of fulfilment. West Germany seems to have solved this problem without agonising over it. In Britain it remains our main task to remove the stigma that surrounds the notion of an open elite.

It is not only among the less successful that healthy attitudes need encouraging. Members of the academic and professional elites must develop responsible attitudes to the semi-professional and less skilled workers who enter industry at earlier stages and earn their living by a less exclusive use of brain power. The Principle of Minimal Motor Activity calls upon us to value intelligence but does not ask us to look down upon those who are less successful and slower in developing it. The hidden curriculum has the major role to play in this by shaping attitudes. An element of manual training in the formal curriculum of all pupils would do much to enforce it.

The problem of an elite of the intelligentsia is part of a wider one. In any society that has a plurality of cultures it is inevitable that one or more of them will come to be regarded as superior and therefore more desirable than the others. A common culture could come about only by being imposed. An ideal of equality therefore, if it is to be compatible with liberty, should not be understood to entail a common culture. But if liberty demands a multiplicity of values and cultures then equality

must insist upon a respect for *persons*, whatever their values and standing.[6] This is the main lesson to be learned by educationalists in Britain today.

2. The place of the common school

In discussing whether there is a future for a distinctive kind of school, called a technical school, it is crucial to examine the position of the common school.

For most of the 1950s it was generally assumed both in the USA and the USSR that the common school represented the way forward. Yet as we have seen in both countries mounting criticism of the common school led to the undermining of this assumption and the appearance of markedly new forms of schooling. In the one-party state of the Soviet Union, where politicians have less fear of changing course, action was quick and decisive. This resulted in the FMSh, the foreign language schools and the mass schools with special profile.

In the pluralistic USA, with its strong and unchallenged independent sector, the change was much slower. It originated spontaneously at the grassroots and was less well co-ordinated than in the USSR. The private sector — a safety valve in any free society — not only provided relief for many of the dissatisfied parents, but by its dramatic expansion served a warning on the public sector which could not go unheeded. The consequent magnet school movement is a major phenomenon. It is only as yet in its infancy and its success will be ultimately measured by its ability to reverse the flight into private schools and to regain the confidence of parents and the community. It may be too early to speak of the decline of the common school as its demise, as Coleman does. Yet the magnet school movement does represent a new emphasis on variety and an understanding that a school builds a strong self-identity by having students and staff happy to subscribe to the special purpose which brings them together.

There are a number of reasons why the decline of the common school is more significant in the USSR than it is in the USA. In the USA dissatisfaction was based on various grounds — low academic standards and purposes, appalling levels of violence and vandalism, low disciplinary demands by teachers and little or no moral training. It is possible to argue that these are all interconnected, being associated with or expressions of an extreme form of egalitarianism, but the situation is too complex to permit clear conclusions to be drawn about the causes. In the Soviet Union, however, standards of discipline and behaviour

have remained high throughout; and the perceived inadequacy of the common schools — particularly in catering for the high-flyers — may be attributed wholly to academic and curricular factors.

Again, the appearance of a differentiated system of schooling in a socialist country must have a special significance. In his *Paths to Excellence and the Soviet School*,[7] John Dunstan gives a fascinating account of the see-saw struggle between the egalitarians and the differentiators (which has been continual since the revolution and is by no means confined to the USSR). Certainly socialist thought in our own country has shown the same swings. Up to about 1950 the emphasis among British socialists was on equality of opportunity and an education 'open to the talents'. In the more egalitarian late '60s and '70s the new emphasis was Marxist,[8] as the goal of equality of opportunity was replaced by that of equality of results, or outcome, and a curse was called down upon all independent schools. The Labour Party had played a major role in establishing grammar and technical schools after 1944, but in the '70s it was rare to find socialists such as Iris Murdoch[9] defending differentiated schooling and selection. Ironically Soviet dissatisfaction with common schools, following long experience and the highest possible degree of commitment, was being manifested at the very time that the socialist adherence to the comprehensive school was gaining strength in England.

The fact that nations so politically opposed as the USA and the USSR, both highly committed to the value of education, have found it necessary independently to re-introduce differentiated schooling must surely possess significance for Britain. This does not of itself provide an argument for technical schools, even though many of the new schools introduced can be considered as such. It is the experience of West Germany that is decisive.

Of all the countries examined, West Germany is closest to Britain in culture and in its need for a successful and competitive economy. Whilst showing a willingness to experiment with common schools it had the courage and wisdom to retain a tripartite system in stark contrast to Britain. Its faith has been fully justified by the phenomenal popularity of the Realschule, and by the latest findings of Prais and Wagner which show that attention to basic educational standards in all schools and an appropriate vocational education in the Hauptschule have provided a much better springboard for the training of apprentices than is now found in Britain. The myth that a differentiated system of schooling leads to conflict in industrial relations — assiduously fostered in an

unthinking way by a section of opinion in this country — has been fully exploded by the German experience.

3. The place of technical and vocational education in schools

It is helpful to make use of a classification that has proved its worth in the area of comparative studies. Educational objectives can be conceived in terms of (i) the individual, (ii) social relations, and (iii) the economic well-being of the country. These obviously overlap to some extent but an education system is characterised by the relative weights it gives to each of these sets of objectives.

The USA and USSR

The USA has traditionally made little attempt to use the education system for securing economic goals. Almost equal stress has been placed on developing the individual and encouraging a particular form of social democracy. In the last 25 years, however, much more attention has been given to national goals in education. The growing competition with the USSR, dramatised by Sputnik in 1957, was not primarily economic — because the two countries were members of different economic systems — but was rather concerned with military and other prestige projects designed to secure military advantage or to capture the hearts and minds of the Third World countries. But this growing preoccupation with national goals took on an economic slant when it was recognised in the '70s that Japan had become a new challenger. The debate on vocational education was sharpened. Some have argued for specifically vocational subjects in the curriculum; others have seen the solution in cutting out the frills, e.g. health education and vocational education in particular, placing a greater emphasis on the 'hard' sciences and tightening up academic standards. On balance the latter view seems to have been the more influential one as the relatively low representation of technical and vocational studies amongst the special themes of the magnet schools shows.

In the USSR the main emphasis has been consistently on social objectives — the chief of which has been the creation of the New Soviet Man fit to live in a communist society. Economic objectives, however, have not been far behind, as witnessed by the dramatic shifts that have had to be made from time to time when it was realised that social and ideological considerations were in danger of becoming obsessive.

Despite their occupying ideological poles, there is a surprising similarity between the USA and the USSR in respect of vocational/

technical education. Or is it surprising? People tend to forget, in emphasising this difference that the two countries are alike in attaching the highest importance to education in promoting radical social experiments — the creation of a republic in the one case and a communist state in the other.

Since the early 1930s, when the USSR abandoned the old shibboleth of the closest possible link between the classroom and the workshop, both countries have placed little emphasis on direct vocational training in schools. Instead, there is a strong belief in a broad general education, preparing pupils for life as well as for future occupations, which at the same time will provide the best foundation for national economic performance. Perhaps because of the greater wealth of the USA broad general education is continued for slightly longer than in the USSR. In the latter approximately one-third of pupils are diverted from the main route leading into higher education at the age of 15, into separate establishments providing vocationally-orientated education and training to a greater or lesser extent. In the USA the relatively small numbers (10-15%) not on college preparatory courses usually combine vocational majors with general education. Vocationally-orientated education begins in earnest in the junior college. The general curriculum in the USSR is more technical than in the USA in the sense that mathematics and science receive a much greater emphasis. This reflects a greater concern (and a greater ability to convert concern into action) that education should be harnessed to national economic production. But the fraction of the curriculum (ca. 10%) that is devoted to shopwork and other socially useful work is justified as much by its contribution to the formation of correct attitudes as by the needs of the national economy.

There are other similarities between the two countries. The FMSh in the USSR and the majority of special schools in the USA are alike in that they form a very small minority element, have a strongly scientific bias and are highly selective. The Soviet schools were the child of the government and their greater freedom from any direct vocational element is indicative of the Soviet perception of the needs of the able pupil for a mental discipline that is achieved through problem-solving in academic subjects. The similarity between the magnet schools in the USA and the mass schools with special profile in the USSR is particularly striking. Both are in urban areas and cater for about the same proportion of the population. Their curricula have a special bias and they are selective in varying degrees. If they owe their existence to

similar causes the earlier emergence of the Soviet schools can be attributed to the power of intervention of the state. The most obvious difference between them is that whereas nearly all the mass schools with special profile have a theme which may be described as technical/vocational this is true of only 5% of the magnet schools. Here is probably the clearest indication of the relative importance which the USSR and the USA attach to technical/vocational education for the pupil of average and above-average ability.

The foreign language schools in the USSR are unique. Insofar as they are intended to provide special linguistic training for pupils of all abilities, for which justification is seen in the need for linguistic skills in a wide range of occupations, they may properly be viewed as technical/vocational.

West Germany

The distinguishing feature of West German schooling is the absence of the twists and turns that have been characteristic of the other three countries. A steady course has been charted but full allowance has been made for genuine experimentation. The main task of post-war education has been to educate for democracy and national recovery — all within the framework of the Western liberal tradition. A balance has been struck between individual, social and economic objectives in education. Some adaptions have made and the amazing expansion of the Realschule has been the main feature. These schools are in many ways like our own technical schools as originally conceived. Their prime concern is the education of those who will enter semi-professional occupations at the technician level. The curriculum of the Realschule can however in no way be described as vocational or technical in the common sense of these terms. It is constructed on the basis that the best grounding for would-be semi-professionals, no less than for the would-be professional classes in the Gymnasium, is a broad general education in basic subjects, especially mathematics, their native language, foreign languages and science. Only in the sense that the curriculum places more emphasis on mathematics and vocational subjects (compared with that of the Gymnasium) can it be thought of as technical. The Gymnasium too offers a very broad academic curriculum with special attention given to foreign languages. Nevertheless it includes more science than the Realschule, and maths and science are continued for all pupils up to the age of 18. It may well be that the absence of an arts/science split in education is the main reason for the more favourable attitudes to industry in W. Germany than in Britain.

It is to the Hauptschule that we must turn to find what is usually thought of as vocational education. Even here, however, the main stress is on performance in a basic core — native language, mathematics and foreign language. Pre-vocational studies are undertaken in these schools. They occupy about a fifth of the timetable in the later years and are of a general nature, being concerned more with work habits and the appreciation of industrial and commercial activity than with preparation for a particular occupation. The leaving certificate of the Hauptschule qualifies for entry to a skilled job and an apprenticeship. It is here that direct vocational training begins and it is largely controlled by industry in agreement with unions and the educational service. It builds on the basic foundations laid down in the schools.

England and Wales

By 1944 there was a good balance between individual, social and economic objectives in our education but subsequently there were two influences which in their different ways upset this balance, almost eclipsing the economic component. The influence of the Progressive movement permeated the fabric of education in a slow trickle. In its extreme form it propagated the wholly radical view that the curriculum should not be designed to prepare children for the contemporary adult world. Rather it should be based upon the recently elaborated theories of child development.[10] In consequence a new world of uncertain nature, but fit for the children to inhabit, would arise. With such a massive shift of emphasis to the alleged needs of the child, national economic considerations could be happily ignored.

The other influence did not trickle into the educational fabric gradually: it stormed in. The radical left had a Utopian view of a classless society into which the idea of occupations and professions did not fit. The traditional system was attacked because it was successful in preparing pupils for employment in a capitalist society. This extreme form of egalitarianism largely ignored consideration of the individual and the economic objectives alike. Primarily, almost above all its emphasis was on a social ideology to the point of obsession. The rapidity of its spread may be judged from the fact that in 1964 Brian Jackson was pleading for an 'experimental' branch in state education responsible to the Ministry instead of LEAs, which would set up primary schools with mixed ability teaching.[11] He was also lamenting the fact that he could discover only two sociology lecturers among the 3980 lecturers who were then currently attached to teacher-training colleges.

By 1970 many members of the educational establishment were pressing for mixed ability teaching in the sixth form,[12] and the flood of sociologists into education had reached such a high tidemark that a recent chairman of the Schools Council could utter, in a moment of irritation, that now celebrated remark, 'No more bloody sociologists'.

The same hysteria has gripped government too. The LEAs were threatened with wholesale comprehensivisation through the Labour Government's Circular 10/65, and in 1976 the threat was legally backed by the Act of that year. Although this was repealed in 1979 in almost the first action taken by the new Conservative Government, most of the change that had occurred appeared irreversible. Our technical schools were threatened with extinction. Their splendid achievements had been sacrificed on the altar of egalitarianism.

Summary

The three other countries in our study despite differences in school organisation, seek to postpone the introduction of what is usually thought of as vocational training for as long as possible. When it is introduced it is for those pupils, usually the less able, who expect to enter employment immediately on leaving school, and it is made as wide and as general as possible. These countries see an academic education as best fitting the needs of those likely to go on to higher education and form the bulk of the professional cadres upon which their industries and businesses will depend. All of them look for cultivated intelligence and imagination.

It seems fortunate that there is such strong agreement amongst educationalists that a broad general education, maintained for as long as possible, constitutes the best form of vocational training. It means that the broad aims of education, which include the preparation for living, need not be sacrificed to the narrower one of preparation to earn a living. Although some industrialists and politicians in the countries we studied often press for more directly vocational education in schools, there are also powerful industrial lobbies who agree with the educationalists. Many would support the recent recommendation of the Association of British Chambers of Commerce, 'Industry prefers to manage the provision of training itself and sees the job of schools as providing a foundation on which training can be based, supplying trainable but not trained recruits'.[13] The Association's idea of the desirable qualities, 'The ability to learn; the ability to get on with other people; the ability to communicate; reliability, basic literacy and numeracy and an understanding of how the community's wealth is created', differs little from the advice employers have been giving over the last fifteen years.[14]

Employers recognise that in a technological age a piecemeal approach to education defeats itself. By the time we have brought up a generation of a particular kind of specialists the need for the speciality has often disappeared — and is replaced by some other more pressing need which could not have been foreseen. In all the countries studied, including our own, education in further education colleges or their equivalents may become less academic but the training offered is made as wide as possible and there is an attempt to retain an element of general education for as long as possible or feasible. The merciful recognition of the principle that new specialisms are most quickly developed from a broad education or training must be encouraged.

Conclusions

1. The common (or comprehensive) school has been discredited in widely differing countries, such as the USA and the USSR, both of which have had powerful reasons for promoting it.

   In both countries the advantages of schools with a special curriculum bias operating a system of selection, are more and more widely recognised. This finding is supported by recent evidence from England.[1]

   In the USA this new perception has been accompanied by calls for greater parental choice in the public system and a realisation that the more successful schools are those with a strong self-identity, in which pupils and teachers share similar interests and are there by choice.

2. The magnet schools in the USA and the mass schools with special profile in the USSR — both arising out of the dissatisfaction with the common schools — show remarkable similarities. But they differ in one important respect. Whereas few American schools include vocational/technical themes nearly all the Soviet schools do.

3. The two great successes have been the Realschule (West Germany) and the junior college (USA), although the latter is not part of the school system. The Realschule is a near-equivalent of our own technical school which was showing great promise in the 1960s before it fell victim to the Procrustean doctrines of egality.

4. Only West Germany has been free from twists and turns in its schools' policy. Its tripartite system has been outstandingly successful in providing a suitable base for an industrial training scheme which has received wide acclaim. It has pleased parents and industrialists alike. This is probably due to the following factors:
   (i) The most able 16-19 year-olds in the Gymnasien receive a broad general education, which includes mathematics and science for all.
   (ii) The Realschule and the Hauptschule provide broad-based education in basic subjects, and success is encouraged by the award of appropriate certificates which recognise both level of achievement and suitable breadth.

   It has been demonstrated that the pupils in the lower half of of the ability range achieve standards in mathematics which are the equal of those of the average of pupils of *all* abilities in England.
   (iii) The system provides realistic goals for all pupils by recognising their different capabilities and the fact that they will enter employment at different ages and at different levels. It possesses flexibility by allowing for lateral transfer between the different educational routes at a number of points. Such transfers occur on a substantial scale and facilitate equality of opportunity.

5. There is a general recognition that the best vocational education is a broad-based general education continued for as long as possible. Direct vocational education is usually reserved for pupils contemplating early entry to employment, and these are usually the less able.

   Direct vocational training, when it begins, is as wide-ranging as possible and is usually complemented with general education. It is seen as useful in schools insofar as it supplies motivation through the setting of short-term goals, and provides a preview of the opportunities available in employment.

6. The school system in most countries, and especially in West Germany, is regarded as the base on which all direct vocational training must subsequently be built.

7. If technical education is education which has a bias towards mathematics and the sciences and/or seeks to prepare pupils for industry and commerce, and technical schools are schools which have this as a main aim for all pupils, then:
   (i) The USA has a small number of technical schools amongst its special schools, and a larger and growing number amongst its magnet schools.
   (ii) The USSR has technical schools for the less able, and a growing number for more able pupils in the mass schools with special profile. Its foreign language schools may also be thought of as technical schools for pupils of all abilities, although in practice the pupils they admit are above average in ability.

(iii) West Germany's highly successful Realschulen are similar to our own technical schools, but there is a case for regarding its successful Hauptschulen as technical schools too.

(iv) In Britain technical schools were very successful but a policy of wholesale comprehensivisation in many areas has drastically reduced their numbers. Radical politicians have replaced the goal of equality of opportunity with the Marxist one of equality of results, and have ignored national economic considerations.

8. Initiatives such as TVEI and CPVE should be welcomed *as experiments*, and bearing in mind:
   (i) Little can be done to remedy a faulty educational system by making adjustments at its top end, i.e. at the later stages of the process.
   (ii) All experiments must be accompanied by a clear set of aims and objectives and must subsequently be evaluated. Standards in mathematics and the basic sciences must be given special attention. The vast amount of curricular innovation which took place at great expense under the aegis of the Schools Council had, according to HM Inspectorate,[2] very little effect on the schools. To innovate is not to reform.

9. A comparative study, while it may be incapable of identifying with certainty causes of the differences of achievement across countries (see p. 11), can suggest where experiments should be undertaken. But if decisions are to be made without any experimentation, comparative findings cannot be disregarded.

Appendix 1

One of the reasons why O-level and CSE results cannot give an accurate picture of average performances at 16+ is of course that the exams are not designed for the lowest 40 per cent of the ability range. The same is true *a fortiori* for A-level results in respect of 18 year-olds.

There are, however, much more serious difficulties in relying on these results to register ups and downs in national achievement. Chief of these is the boards' practice of using norm-referencing, i.e. passing roughly the same proportion of candidates each year as a method of determining the pass standard. Nothing about standards can therefore be deduced from an increase or decrease in the number of passes awarded.

The most significant feature of the change in A-level performance over recent years is that whilst the percentage of leavers from maintained schools in England and Wales, with two or more A- level passes, rose from 4.8 to 9.6 between 1962 and 1968 it subsequently virtually flattened out. For instance, it reached a peak in 1971 (10.6%) and later fluctuated between 9.6% and 11.2%. Even if the most recently published figure — 11.2% in 1982 — represents a genuine rise and not merely another temporary peak it amounts only to a 6% increase over 11 years, compared with a 100% increase over the six years between 1962 and 1968.

The same shortfall in the number of qualified leavers from our schools is illustrated by another set of figures. In DES Planning Paper No 2,* published in 1970, it was estimated that in 1981 there would be 171,900 school-leavers from all schools in England and Wales, including independents, with two or more A-levels. The actual figure turned out to be 104,510, indicating *a massive shortfall.*

O-level/CSE results are particularly deceptive because of the large increase in the number of candidates following the raising of the school-leaving age in 1973 and the increasing tendency for new sixth-formers to add the odd Grade 1, either directly or via the so-called Certificate of Extended Education, to those they obtained at 16+.

* 'Planning Paper No 2: Student Numbers in Higher Education in England and Wales', Dept. of Education and Science, 1970.

Appendix 2

Number of school-periods a week at age 16 devoted to main subject-groups in England (1977) and West Berlin (1982).

	England (average, all schools)	Berlin			
		Average[k]	Hauptschulen	Realschulen[f]	Gymnasien[g]
Own Language	5.8	3.1	2	4.4	3
Mathematics	5.6	4.1	4	4.4	3.5
Science	5.0	5.5	4	6.4	7.5
Foreign Languages	2.0[a]	3.9	3[d]	3.8	6.5[h]
History, Geography, Social Studies	6.5	5.4	6	4.8	5
Vocational	5.6[b]	4.7	8	2.8	—
Art/Craft, Music	2.2	3.4	3	3.4	4.5
Religious Education	1.0	2.0	2[e]	2[e]	2[e]
Physical Education	2.9	3.0	3	3	3
All Other Subjects	3.4[c]	—	—	—	—
Total	40*	35*	35[e]	35[e]	35[e]

Sources

England: DES Secondary School Staffing survey, 1977, for year-group 5; see DES *Statistical Bulletin 6/80*. The data are based on a representative sample of 500 maintained secondary schools in England and Wales.

Germany: Timetable for 10th class as prescribed in the *Dienstblatt des Senats von Berlin*, III, no. 9, 11 June 1982.

Notes

a French was the only language explicitly tabulated in the DES summary of their survey, and averaged 1.5 periods a week; to allow for other languages, this has here been increased by a third (on the basis of CSE and O-level examination returns); a compensatory reduction has been made to the residual category 'all other subjects' as shown in the summary tabulation.

b Metalwork and woodwork, technical drawing, shorthand and typewriting, home economics; plus an estimate of half a period of career guidance (transferred from the residual 'all other subjects'). Much of the work in this group despite its appellation, aims at craftwork rather than direct industrial application.

c Includes 'library' periods, free periods, pastoral periods, remedial classes (average of 0.2 periods), less periods transferred as in preceding footnotes.

d Usually English.

e Religious instruction is governed by separate regulations, but has been included here for comparability with England.

* An average school period in England is 35 minutes, compared with 45 minutes in Germany. The total time per week is therefore approximately the same.

f Four periods a week in these schools are required to be devoted by each pupil to optional specialisations; the options fall into five groups, though not all are necessarily available at each school. These optional periods have here been allocated equally to the various optional subjects.

g Three periods are to be devoted to optional specialisations, which may include a third foreign language (if Greek is the third language, an additional two periods a week are required). These optional periods have here been allocated equally to the various possible subjects.

h Usually two foreign languages; three for those who specialise in languages.

k Weighted average of following three columns, with weights approximately proportional to numbers at day-schools attaining each *Abschluss* in all Germany in 1980 (4.6 : 3.7 : 1.8).

Appendix 3

New Model Curriculum for Primary, Eight-Year and Secondary Schools, USSR. 1981/82 (1977/78 in parentheses, where different).

Subjects	*Periods per week per form* I	II	III	IV	V	VI	VII	VIII	IX	X	Total
1. Russian Language	12	11	10	6	6	4	3	2	-	—	54
2. Literature	-	-	-	2	2	2	2	3	4	3	18
3. Mathematics	6	6	6	6	6	6	6	6	5	5/4(5)	57.5(56)
4. History	-	-	-	2	2	2	2	3	4	3	18
5. Soviet State & Law	-	-	-	-	-	-	-	1	-	-	1
6. Social Studies	-	-	-	-	-	-	-	-	-	2	2
7. Nature Study	-	1	2	1(2)	-	-	-	-	-	-	4(5)
8. Geography	-	-	-	-	2	3	2	2	2	-	11
9. Biology	-	-	-	-	2	2	2	2	1	2	11
10. Physics	-	-	-	-	-	2	2	3	4	4/5(5)	15.5(16)
11. Astronomy	-	-	-	-	-	-	-	-	-	1	1
12. Techn. Drawing	-	-	-	-	-	-	1	1	-(1)	-	2(3)
13. Chemistry	-	-	-	-	-	-	2	2	3	3	10
14. Foreign Language	-	-	-	4(-)	3(4)	2(3)	2(3)	1(2)	1(2)	1(2)	14(16)
15. Art	1	1	1	1	1	1	-	-	-	-	6
16. Music, Singing	1	1	1	1	1	1	1	-	-	-	7
17. Physical Education	2	2	2	2	2	2	2	2	2	2	20
18. Labour Training	2	2	2	2	2	2	2	2	4(2)	4(2)	24(20)
19. Elem. Milit. Tr.	-	-	-	-	-	-	-	-	2	2	4
Total compulsory periods	24	24	24	27(24)	29(30)	29(30)	29(30)	30(31)	32	32	280 (281)
20. Options	-	-	-	-	-	-	2	3	4	4	13

Source
Byulleten' normativnykh aktov Ministerstva prosveshcheniya SSSR, 1980, no. 12, pp. 27-30.

Appendix 4

Curriculum for Two-Year Course, Novosibirsk Mathematics and Physics Boarding School, 1968/69.

Subjects		*Periods per week per form* 9 *Term 1*	9 *Term 2*	10 *Term 1*	10 *Term 2*
Mathematics	Lectures	2	2	2	—
	Problem-solving	6	6	5	6
Physics	Lectures	2	2	2	2
	Problem-solving	5	3	4	4
	Practicals	—	3	3	—
Chemistry	Lectures	—	2	2	—
	Problem-solving	—	2	2	—
Literature		2	2	3	3
History		4	2	2	2
Social Studies		—	—	—	3
Biology	Lectures	—	1	1	—
	Problem-solving	—	2	1	—
Physical Geography		3	—	—	—
Foreign Language		2	2	2	2
Physical Education		2	2	2	2
Photography and Radio Engineering		2	—	—	—
Specialism		—	—	—	5
Total		30	31	31	29
Special Courses and Options		4	4	4	2
Total instruction periods per week		34	35	35	31
Tests, Handing in Assignments, Lab. Work:					
	Physics	0.5	0.5	0.5	0.5
	Chemistry	—	0.5	0.5	—
	History	—	0.5	0.5	—
	Biology	—	0.5	0.5	—
	Physical Geography	0.5	—	—	—
Total		1	2	2	0.5
Method Work and Tutorials		1	1	1	1
Grand Total		36	38	38	32.5

Note
For practical work in mathematics, physics, chemistry and biology, and also in foreign language lessons and PE, the class is divided into two groups.

Source
S. I. Literat, 'Vyyavlyat' i razvivat' sposobnosti', *Sov. ped.*, 1969, no. 4, p. 83. (Subsequent changes have been insignificant.)

Appendix 5

Draft Curriculum in a Special-Profile School, 1967/68
(Secondary Mathematics School No. 2, Moscow)

Periods per week per form (showing forms 6 to 10 only)[1]

Subject	6	7	8	9	10
Russian Language	4(3)[2]	3	2	1	1(-)
Literature	2	2	3	3(4)	3
Mathematics[3]	6	6	6	6(5)	7(5)
History	2	2	2(3)	2(4)	3
Social Studies	-	-	-	1(-)	1(2)
Nature Study	-	-	-	-	-
Geography	2(3)	2	2	2	-
Biology	2	1(2)	1(2)	-(1)	2
Physics	1(2)	2	5(3)	6/5(4)	6(5)
Astronomy	1(-)	-	-	-	-(1)
Technical Drawing	-(1)	-(1)	-(1)	1(-)	-
Chemistry	-	2	2	2/3(3)	3
Foreign Language[4]	5(3)	5(3)	3(2)	3(2)	2
Art	1	1(-)	-	-	-
Music and Singing	-(1)	-(1)	-	-	-
Physical Education	4(2)	4(2)	4(2)	3(2)	2
Labour Training	-(2)	-(2)	-(2)	-(2)	-(2)
Total periods per week	30	30	30	30	30
Option: Mathematics[3]	2(-)	2	4	6	6

Notes

1 The periods for forms 1 to 5 are as for ordinary schools.

2 The periods in parentheses are those for ordinary schools when differing from this school and do not appear in the original.

3 The mathematics option is integrated with the compulsory subject and thus becomes in effect compulsory.

4 For the foreign language there is a choice between English, French and German.

Source

Helmut Brauer and Hans Deubler, 'Stundentafeln der Spezialschulen und Spezialklassen für Mathematik in sozialistischen Ländern', *Vergleichende Pädagogik*, 1971, no. 4, 457-58.

Appendix 6

USA

*Average number of Semesters * taken by Seniors, in Public and Private Schools, in Grades 10, 11 and 12: Spring 1980***

	Major Sectors		
Subject	*Public*	*Catholic*	*Other Private*
Mathematics	4.0	4.9	4.7
Science †	3.4	4.0	4.0
English	5.8	6.2	6.1
History	4.6	4.9	4.7
Spanish	0.9	1.8	1.4
French	0.5	1.0	1.4
German	0.2	0.2	0.4
Business	2.1	2.1	1.5
Trade. technical	1.8	0.5	0.8
Other vocational	1.3	0.9	0.9
Total	24.6	26.5	25.9

* The three years represented by Grades 10, 11 and 12 translate into six semesters of course work, but the total number of semesters taken in a subject can exceed six since students can enrol in more than one course in a subject per semester.

** The information in this table is taken from *High School Achievement*, see Note 2, Chap. 4.

† In the public sector the percentages of seniors completing academic courses in physics and in chemistry are 18% and 37% respectively.

Appendix 7

Possible Schemes for Broadening the Sixth-Form Curriculum

Many unsuccessful attempts to broaden the sixth-form curriculum have been made over the last 20 years. None stood a chance of success because we were naive enough to think that radical changes could be made in the sixth form without any corresponding changes in the universities.

Many of the efforts at reform have centred round the idea of a study of five subjects, for five periods a week each, over two years instead of the present pattern of three subjects for seven periods a week over the same period. This would be the minimum change needed to bring to fruition the recommendation we have made. It is estimated that under this new arrangement the amount of teaching time devoted to each subject would be decreased by approximately 88 hours over the two years. The assumptions made in this calculation are: (i) a 40-week school year; (ii) 40-minute periods; (iii) a second-year summer term reduced to about two weeks of genuine teaching; (iv) the loss of two weeks' teaching each year through internal examinations, including mock A-levels.

If we wished to broaden the sixth-form curriculum in this way without lowering standards in the subjects to be continued at university, our problem would be to find 88 hours of teaching time for each subject. This is not impossible. There are three possible areas where our search could be made.

The first is the final summer term at school. So far as teaching time is concerned this has gradually withered away over the years, and with the ever earlier onset of the public examinations and the lengthening of their duration schools have come to regard this term as very difficult indeed. The second is the final term of the three-year honours degree course. In some universities there is now no teaching at all in this term, and also very little in the summer term of the second year in those universities having Part I examinations. As in the schools this situation has been reached gradually over the years. What is remarkable about both these changes is the assumption that there has been no lowering of standards as a result of the gradual shrinking in the length of the courses.

The third area where this extra time could be found is in the summer vacations. A two-week concentrated course for each subject in one of the summer vacations would be sufficient. Long vacations for extra study are nothing new for the universities.

There are many possible solutions within the parameters outlined — some very radical and others not so. The solution might involve taking the time from just one of the areas mentioned or again it might require time from two or three areas in combination. One of the most radical would be to postpone A-level examinations until July and to start the university year in January. This would allow all A-level candidates a five-month break between school and the next stage in their career, and enable universities to select entrants after their A- level results were known. If university finals were taken in June little extra teaching in the universities would be looked for. Another possibility would be to start the university year in January and to make use of some of the features of the two-year, four terms a year, arrangement for honours degrees at the University of Buckingham.

Whichever solution were adopted — and the range of possible solutions is wide — there would have to be some change in the existing habits of the schools or the universities, or both. For the achievement of such an important curricular goal we ought to be prepared to consider any change, provided that it would not result in the extension of the university honours degree course.

References

Chapter 1

1. Report of the Consultative Committee of the Board of Education on Secondary Education with special reference to grammar schools and technical high schools (the Spens Report), HMSO, 1938.
2. Report of the Committee of the Secondary Schools Examination Council on curriculum and examinations in secondary schools (the Norwood Report), HMSO, 1943.
3. It arose following claims by the National Union of Teachers (NUT) that the examination results of Woodlands School, Coventry, after the introduction of mixed ability teaching, proved the value of that form of organisation. In 'A Tale of Two Schools', *TES*, 24.10.75 and 'Educational Myths and Research' *in* 'The Right to Learn', ed. Caroline Cox and John Marks, Centre for Policy Studies, 1982, the author showed that the CBTS results analysed here were two to three times as good as the improved Woodlands' results and demonstrated the logical faults in the NUT argument.

Chapter 2

1. *Prosperity through Competition: the economics of the German miracle*, Ludwig Erhard, Thames and Hudson, London, 1958.
2. Source: 'Schooling Standards in Britain and Germany: some summary comparisons bearing on economic efficiency', S. J. Prais and Karin Wagner. An unpublished paper circulated for discussion, National Institute of Economic and Social Research, 1983. Publication is expected in May 1985.
3. Ibid.
4. *International Study of Achievement in Mathematics: a comparison in 12 countries*, ed. Torsten Husén, Stockholm, Almqvist and Wicksell; and New York, Wiley, 1967.
5. The average age of the sample of German students in the above study was 19 years 10 months, compared with 17 years 11 months of the English sample.
6. The extra schooling is only of one year's duration because German children start their education one year later than their English counterparts.
7. The source for these statistics is Prais and Wagner's unpublished paper (see Note 2).
8. 'Vocational Qualifications of the Labour Force in Britain and Germany', National Institute Economic Review, November 1981, S. J. Prais.
9. The table is compiled from information taken from 'Preparation, Assessment and Selection for University', A. G. Hearnden, Schools Council, 1971; and the work referred to in Note 2.
   Hearnden's figures (1963 and 1966) are for 13 year-olds; Prais and Wagner's (1979) for school-leavers.
10. A. G. Hearnden (Note 9).
11. See Note 2.
12. See Note 2.
13. See Note 2.
14. See Note 2.

Chapter 3

1. *Paths to Excellence and the Soviet School*, John Dunstan, NFER Publishing Company, 1978, p. 134.

Chapter 4

1. Comparisons of educational standards between the USA and Britain usually have to be based on subjective judgments. The best known objective comparison is that undertaken in mathematics in the IEA study (see Note 4 in Chapter 2). Tests on students in 'science sixth forms' who took mathematics as one of their subjects showed the USA as bottom of the 12 countries studied, whilst England was next to the top. The sample of students in England was, however, a more selective one. Comparisons of populations which were non-selective (the 13 year-old grade) placed England fifth (with a score of 23.8) and the USA next but one to the bottom (score of 17.8).
2. *High School Achievement: Public, Catholic and Private Schools Compared*, James S. Coleman, Thomas Hoffer, Sally Kilgore, Basic Books Inc., New York, 1982.
3. See 'Competence and Competition', National Economic Development Office and Manpower Services Commission, 1984, for some specific programmes.
4. 'Demise' may seem too strong a word but it is that used by Coleman in the epilogue to the research report referred to in Note 2.
5. *Protestant, Catholic, Jew: an essay in American religious sociology*, Will Herberg, Doubleday & Co. Inc., New York, 1955.
6. 'Education Phenomenon', Stuart Thody, *Methodist Recorder*, 2, III, 1978.
7. 'Report of the Sub-committee to Investigate Juvenile Delinquency', Senator Birch Bayh, Chairman to the Committee on the Judiciary, United States Senate, 1975-7.
8. See Note 2.
9. 'Survey of Magnet Schools: analyzing a model for quality integrated education', September 1983, Rolf Blank, Robert Dentler, D. Catherine Baltzell and Kent Chabotar. Final report of a national study for US Department of Education.
10. Ibid.
11. The names of all schools in this research are pseudonyms.
12. See Note 9.
13. See Note 9.

Chapter 5

1. Intelligence increases with age and education, but IQ measures an individual's intelligence compared with that of the average of his age cohort. Because of a strong genetic component in IQ the latter tends to remain fairly constant. It has been fashionable for radical psychologists, whose declared objective is to use their subject to overthrow capitalism rather than in a disinterested search for truth, to play down the genetic component of IQ. Philip E. Vernon, who is one of our most distinguished psychologists, in an invited address to the Scottish Council for Research in Education, 'Intelligence Testing, and the Nature/Nurture debate, 1928-78, What Next?', concluded that differences in IQ scores could be accounted for as follows: genetic 65%; environmental 23% and covariance 12%. The (genetic-environmental) covariance is a term that refers to the interaction between heredity and environment, in the sense that intelligent parents who pass on superior genes to their offspring are also likely to provide them with a more stimulating environment. So long as parents are allowed to bring up their own children such covariance factors can for all practical purposes be counted as part of heredity.
2. Paintings, made by the application of layers of pigment on board or paper, should also be regarded as three-dimensional objects. Computer pictures on the other hand are two-dimensional objects which demand little in the way of manual skill. They may be considered either as art from which technique has been virtually eliminated to leave only the artist's imagination, or perhaps more properly as design. It should also be remembered in this connection that some will wish to create three-dimensional objects not for their beauty but for simple utilitarian purposes using their own time and labour.
3. An outstanding example is provided by David H. Hargreaves in his *Social Relations*

in a Secondary School, Routledge & Kegan Paul, 1967. This is discussed in 'Educational Myths and Research' by Fred Naylor *in* 'The Right to Learn', ed. Caroline Cox and John Marks, Centre for Policy Studies, 1982.

4. 'The Proposed Abolition of Classes', in *Everybody's Political What's What?*, G. B. Shaw, Constable, 1944.
5. 'Equality', in *Everybody's Political What's What?*, G. B. Shaw, Constable, 1944.
6. More on this theme will be found in *The Democratic Citizen*, Dennis F. Thompson, Cambridge University Press, 1976.
7. See Note 1, Chapter 3.
8. See 'Social Infuences on Educational Attainment', Torsten Husén, OECD, 1975, for a detailed account of the replacement of the liberal goal of equality of opportunity by the Marxist one of equality of results.
9. 'Socialism and Selection', Iris Murdoch, in *Black Paper 1975*, ed. C. B. Cox and Rhodes Boyson, J. M. Dent & Sons, 1975.
10. 'The Ideal School as Based on Child Study', G. Stanley Hall, *The Forum*, Vol. XXXII (1901-2).
11. *Streaming: an education system in miniature*, Brian Jackson, Routledge & Kegan Paul, 1964.
12. During formulation of the Q and F Proposals, Schools Councils, 1970.
13. 'Business and the School Curriculum', The Association of British Chambers of Commerce. 1984.
14. For an account of employers' views on the sixth-form curriculum in 1972, see Schools Council Working Paper 45.

Conclusions

1. 'Standards in English Schools', John Marks, Caroline Cox, Maciej Pomian-Srzednicki, National Council for Educational Standards, 1983; and 'Standards in English Schools — a second report', by the same authors, in press.
2. See the quotation from HMI's evidence to Nancy Trenaman, in the Trenaman Review of the Schools Council, 1981: 'In general the Council's activities have not had a widespread influence on work in the classroom'.

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