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Policy Study No. 93

Correct Core

Simple curricula for English, maths and science

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CENTRE FOR POLICY STUDIES

Contents

PART I

Introduction

The CPS Core Curriculum sets out curricula for English, Maths and Science. In order to ensure that pupils leave school literate, numerate and with a modicum of scientific knowledge, it should not extend beyond these three core subjects, nor attempt to do more than set minimum standards in basic knowledge and technique.

It is regrettable that these aims appear recently to have been abandoned by those in charge of producing and implementing education policy. As the following pages show, the official committees, the DES and Her Majesty's Inspectorate no longer adhere to the belief that teachers should teach and pupils should learn a simple body of knowledge and a simple set of techniques. Should the curriculum go beyond three core subjects, it would undermine the fundamental purpose of the present educational reforms – to raise standards for all pupils and to give greater responsibility to those most directly concerned with the education of the young. Above all it would greatly reduce the power of Heads to offer the subjects which best meet the needs of their pupils.

It is not for the Government to impose exactly what individual schools should teach, nor to decide how Heads should draw up timetables. In denying them the freedom to teach the subjects of their choice to the highest level, a Conservative Government would add to the threats to educational standards already posed by the 'education professionals'.

1
The problem

The most marked characteristic of Mrs Thatcher's Governments is the way in which they have changed the nature and premises of political debate. This has been particularly true in economic and industrial policy. Here a set of assumptions had developed since the War and become an orthodoxy. But so successful has the challenge been that even the Labour Party has come to accept many Thatcherite premises.

The challenge has been extended to other orthodoxies which inhibited the exercise of individual freedom. For example, in local government and housing the imbalance of power exercised by the State, its agents, and a variety of vested interests has been corrected in favour of the individual. Greater freedom and responsibility will be further enhanced by the reform of local government finance to make authorities more accountable. Here also the Labour Party has shifted its position.

But the orthodoxies which have dominated education policy have been challenged in one respect only – by tilting the administrative balance away from the monopolies of the state and its agents, the LEAs and education establishment, slightly in favour of the parents and the schools themselves. They have not been challenged when it comes to the the content of education. Even whilst introducing limited measures of administrative reform, successive Conservative Secretaries of State have continued to subscribe to the recent orthodoxies and have even introduced new ones.

The National Curriculum proposed in the new Education Reform Bill presents an opportunity for change but the danger exists that far from tackling the orthodoxies, it will further entrench them. If the content of the proposed National Curriculum merely reflects the views of members of the 'education service' – teachers, their unions, LEAs, education theorists and worst of all Her Majesty's Inspectorate (HMI) – then the National Curriculum, instead of serving to raise standards, will lower them.

The proposed National Curriculum recognises English, Mathematics and Science as its three 'core' subjects. What are the assumptions which dominate thinking about these subjects within the 'education service'?

The most recent and comprehensive exposition of them can be found for English in the Bullock report *A Language for Life* (HMSO; 1974), and for maths in the Cockcroft report *Mathematics Counts* (HMSO; 1982).[1] Their recommendations have been summarised and promulgated by HMI in *English from 5 to 16* and *Mathematics from 5 to 16* – pamphlets intended to guide teachers and LEAs in what and how to teach.[2] In science there is no equivalent report, although the HMI document *Science 5-16: A Statement of Policy* (HMSO; 1985), shows how many assumptions behind science teaching are similar to those of the Bullock and Cockroft reports.[3] They all assume:

* that individual subjects are a thing of the past and can usefully be approached 'across the curriculum';
* that pupils should not be expected to master much information or knowledge beyond their immediate experience and that concentration on – or memorising – information, facts and principles should be discouraged;
* that pupils should master complicated and sophisticated concepts more appropriate to academic research;
* that there can be no external standards set to which pupils might be taught; rather, what is taught must be relative to each pupil and his ability, and restricted accordingly;
* that oral work and discussion matter as much as written work;
* that learning must take place without effort and in the guise of games, puzzles and activities;
* that teaching is akin to salesmanship; what is taught, and how it is taught, needs to 'continue to catch the pupil's interest and imagination';
* that pupils must not be allowed to experience failure; and
* that the purpose of teaching is as much social as academic, in order to reflect the issues 'with which pupils will have to come to terms' such as 'multi-cultural' society, 'a greater diversity of personal values', and 'the equal treatment of men and women . . . which needs to be supported in the curriculum'[4].

2

The official reports

English : The Bullock report

The assumptions on which Lord Bullock based his report on English teaching are evident in its title: *A Language for Life*. English should not be regarded as a subject; it 'does not hold together as a body of knowledge which can be identified, quantified and then transmitted'. Rather, English lessons should be regarded as one opportunity among others for the learning of 'language'; and this language-learning must be closely connected with 'life'. 'Language competence', the report explains:

> grows, incrementally, through an interaction of writing, talking, reading and experience, the body of resulting work forming an organic whole.

Moreover, competence in language is not seen as very much to do with an ability to write correct Standard English. Bullock does not accept the concept of correctness in English, but prefers to talk of 'appropriateness'. Prescriptive approaches to grammar, spelling and punctuation are dismissed by the report, not so much with contempt as with amusement.

Not surprisingly, therefore, Bullock does not favour traditional methods of English teaching. The teaching of formal grammar, and the setting of exercises designed to inculcate a given point of grammatical practice, is not to be encouraged as a normal method of instruction. Comprehension exercises and spelling tests are of little value. Rather, children should 'learn about language', as Bullock puts it, 'by experiencing it and experimenting with its use'. Emphasis must be put on spoken language just as much as on writing; and writing should always be for a purpose and for a particular audience. Spelling should not be taught from lists, but based on the pupil's needs. Restriction of study-material to books would be unduly limited: 'press clippings, photographs, printed extracts and all manner of ephemeral material' should be used; whilst high quality recording, film and videotapes are also desirable parts of the

English teacher's equipment[5].

Mathematics: The Cockroft report

The Cockroft committee published its report, *Mathematics Counts*, in 1982. The report reflects how the recent emphasis has shifted away from teaching pupils specific facts; and away from expecting them to master quickly the basic numerical and arithmetical skills. Instead, pupils were, from a young age, to be introduced to complex and sophisticated mathematical concepts without necessarily mastering, or even being expected to master, the basic skills and knowledge on which these rest. In Cockroft's view, maths had an aim at once vague and ambitious. Maths was:

> a powerful means of communication [and this provided] . . . the principal reason for teaching maths to all children.

Although Cockroft did not urge the elimination of computational skills, he warned that there must not be narrow concentration upon them. Indeed, for Cockroft, numeracy involved an acquaintance with, rather than a mastery of, numbers: an 'at homeness' with them and 'some appreciation and understanding of information which is presented in mathematical terms, for instance, in graphs, charts or tables'.

Cockroft's view of mathematics is as a 'means of communication', rather than as a subject with a clear body of knowledge and techniques – as is evident in his recommendations to teachers: they should promote 'good attitudes'. The pupil should enjoy the activity: be encouraged by being given puzzles. But Cockroft did not allow that clear and correct knowledge assisted 'understanding'. Instead, he seemed to deprecate the ability to solve a problem correctly, because it did not prove a pupil's 'understanding' – the development of which he saw as a thing apart from training. Mathematics must be relevant to the pupil's experience; and it should not 'be necessary in the learning of mathematics to commit things to memory without at the same time seeking to develop a proper understanding of the maths to which they relate'.

The thrust of Cockroft's argument was therefore against the mastering of knowledge, or techniques, whether for their own sake or as a base on which to build. Committing to memory,

or seeing that pupils concentrated on their weaker areas, was discouraged. There was to be greater emphasis on practical work and discussion between teacher and pupils and amongst pupils themselves.

These aims and methods of maths teaching were to be pursued from the start. At the primary school, maths was not to be seen as the teaching or learning of skills and techniques nor solely as preparation for the next stage. Rather, it should 'enrich children's aesthetic and linguistic experience'. The emphasis should be on practical work, which was 'essential'; and, though number and computation should be tackled as one of six topics, Cockroft insisted that the learning of number facts needed to be based on understanding. Moreover, young children ought not to move too quickly to written work in maths, for forming a figure was a 'skill' and the report opposed a premature start on formal arithmetic[6].

Science 5–16

The teaching of science has not been the subject of a recent committee of inquiry, as English and maths have been. But the way in which science teaching has developed, and may continue to develop, can be gauged from the DES document *Science 5-16: A Statement of Policy* (HMSO; 1985) which draws on an earlier DES document *Science Education in Schools: A Consultative Document* (HMSO; 1982) and the responses to it.

Like the Bullock and Cockroft reports for English and maths and the HMI series, the thrust of *Science 5-16* is away from the teaching or mastery of a body of factual information and abstract principles, in favour of what is seen as 'relevant' science. It emphasises practical and investigative work. Yet it also recommends that science education should be seen as a 'continuum' and that even young pupils should be introduced to sophisticated concepts.

Science 5-16 stated that the essential characteristic of a science education is that pupils should be introduced to the methods of science which constitute scientific competence; and not expressly to scientific knowledge and principles. Pupils ought to develop certain abilities – such as making observations, carrying out experiments, conducting investigations. In respect of the acquisition of knowledge (not accorded especial

significance), the suggestion was that 'facts' should be selected and taught only insofar as they were relevant to the wider world. Just what knowledge of facts and principles should be taught was for 'continued review'; but in any case, knowledge should be approached 'through practical work and otherwise'.

Science teaching did not, therefore, specifically involve the mastery of scientific principles and knowledge either as an end in itself, or as a base on which to build. Rather, as *Science 5-16* expressly sets out, the characteristics to be emphasised in science teaching were to be:

* a balance between acquisition of knowledge and practice of method;
* relevance to everyday experience and suitability to different abilities;
* the introduction of a wide range of concepts and cross curricular links;
* its practical nature, with emphasis on science as an investigative and problem-solving activity; and,
* assessment should be designed to test skills and processes as well as the ability to reproduce and apply scientific knowledge, and to test, not what pupils ought to know, but simply what they do.

Pupils, from an early age, should become accustomed to processes and appropriate work should begin in infant classes. Secondary science education should be determined by considerations of 'breadth', 'balance' and 'relevance'. Teaching should be closely related to everyday and industrial applications of science. Full weight should be given to the development of scientific skills and processes as well as to knowledge and understanding. A reduction in the overall amount of factual knowledge was 'unavoidable'.

Pupils should balance their studies of biological and physical sciences up to the age of 16. 'Balance', again, between the different components of science education, including the development of skills, should be kept. In addition, science should have relevance to the daily lives of those who learned it. It was thought that too much time was spent accumulating facts and principles which had little apparent – or real – relevance. Topics should be included on the basis of such relevance to pupils' future working lives; there must be

differentiation in the science course to allow for all abilities, and there should be equal opportunities for girls and boys to benefit from balanced courses – with special attention paid to girls' expectations and attitudes[7].

3

Theory into practice

HMI directives

In its two pamphlets *English 5 to 16* and *Mathematics 5 to 16*, HMI echoes the ideas of the Bullock and Cockroft reports. These pamphlets helped in practice to make their recommendations and views mandatory. This was not unwelcome, seeing that they reflected (and reflect) prevailing views; and seeing that the HMI Inspectorate were inspecting, and would continue to inspect, teaching on their basis[8].

Although *English 5 to 16* contained some apparently traditional recommendations about teaching grammar, the general tenor of the document, as its authors emphasised, was far from traditional. It suggested that the objectives of teaching English are less clear than those of other subjects. It encouraged teaching based not on the acquisition of information and the mastery of rules and skills, but an 'understanding' of the use of English 'for the transactions of our everyday lives' and 'for personal and social relationships'. Tasks should be set which require 'communication for real or realistic purposes'. It advised that social factors, as well as different abilities, must be taken into account; and it was not appropriate to teach by setting out 'objects in ascending scale of difficulty, or by defining a limited range of skills that most pupils should be able to master, and then adding others which are suitable only for the able'[9].

Mathematics 5 to 16 explains that the main reason for teaching maths is as a means of communication. What it refers to as the 'mere manipulation of numerical and algebraic symbols' is of secondary importance. Maths itself, indeed, is not important, but the result is. And it warns that pupils preoccupied with trying to master the details might not appreciate the relationships within mathematics. Neither should maths involve an imposed body of knowledge, nor be too solitary an activity; rather, thinking, discussion and mutual refinement of ideas contribute to mathematical development. No pupil should be so extended that his principal feeling is of failure. 'In depth' mathematics should be encouraged, not through in-depth teaching, but through salesmanship; enthusiastic teaching;

surveys of people's opinions; attractive resource materials; investigative activities; games, puzzles, television material[10].

The interim reports

Once it was decided to institute a National Curriculum, the Secretary of State for Education appointed two working groups in maths and science to make recommendations. No working party was appointed for English, but it is possible that the report of the Kingman Commission, which had already begun its investigation of English Language teaching in schools, will be used to determine the curriculum. From the interim reports of the maths and science working parties, and from remarks made by members of the Kingman Commission, it is becoming clear that misgivings about the form which the National Curriculum will take are not unjustified.

(i) Mathematics Working Group

The Maths *Interim Report* failed to set specific targets for pupils at given ages. Nor did it consider which areas of mathematics should be given priority, nor recommend that any particular attention be paid to the pupil's need to master numerical and arithmetical skills.

The authors of the report did not challenge the developments in, and assumptions behind, maths teaching as propagated by Cockroft. Indeed, they were 'much influenced by' the Cockroft report. They welcomed its consequences for developments in the classroom – such as 'more practical, problem-solving and investigative work'. They saw their task as building on 'existing good practice'.

Instead of setting out clearly defined topics and targets to be reached by a given age, the report suggested that attainment targets should be grouped into three categories, which it describes as 'personal qualities', 'mathematical strategies for problem solving' and 'areas of mathematics'.

When the report was published in December 1987, Professor S J Prais, FBA, a member of the working group (who has since resigned), published a critical *Note of Dissent*. He considered that the committee had not tackled the problems of mathematical attainment – of raising it or of narrowing the wide gap between high and low attainers. Nor did it address itself to

such issues as which areas of maths were important at which age, the question of school organisation, or the implications of the proposed system of testing. Prais argued that it was wrong to take maths teaching in England as practised now as a satisfactory base from which to build. He pointed out that the mathematical attainments of school-leavers in this country compared badly with those of our European competitors and of Japan; and that this had consequences for further education, for industry and for Britain's competitiveness. Prais insisted that not enough attention had been paid to basic arithmetic, the skills of which should be mastered mainly at primary school; many difficulties at the secondary level were due to poor foundations laid at the primary level. Even if, in later life, calculators were to be used, it was important as a child to carry out pencil and paper work, and drill and rote learning. Nor had it yet been shown that the substitution of other topics for numerical practices at earlier ages tended to improve ultimate attainments. The Germans and the Japanese place greater emphasis than we do on such things; and they restrict the use of the calculator[11].

(ii) Science Working Group

The *Interim Report* from the Science Working Group makes its proposals within the framework of the DES statement *Science 5–16*. Like the Mathematics Group, it professed an intention to build on 'existing good practice'. It held that development of practical skills and attitudes was as important as knowledge which, in any case, should be of a relevant and practical nature.

Science teaching should be 'broad' (covering social, economic, personal and ethical implications); 'balanced'; 'relevant' to today's world; differentiated (to be accessible to all, irrespective of ability, race, gender or social and cultural background). And it should also have cross-curricular links.

The *Interim Report* saw science learning as having three principal constituents, none of which was more important than the other: knowledge and understanding; skills; and attitudes. It was to the development of these that science at school should be directed – and on which pupils might be assessed.

The authors of the report claimed that the 'teaching of pure or formal science by itself can lead to ineffective learning by many pupils'. Yet they also had ambitious aims for pupils which

even research scientists develop only with mastery of their subject. The report expected all pupils, not only 'to learn and to use scientific methods of investigation' but:

> to develop the skills of imaginative but disciplined enquiry which include systematic observation, making and testing hypotheses, designing and carrying out experiments competently and surely, drawing inferences from evidence, formulating and communicating conclusions in an appropriate form and applying them to new situations[12].

Pupils should come to learn how to gain access to, and use selectively and appropriately, published scientific knowledge.

(iii) The Kingman Commission

The Kingman Commission, the terms of reference and members of which were announced in January 1987, has not yet produced its report on English Language teaching. Its members are now bound to silence by the Official Secrets Act. Comments to the Press at an earlier stage in its deliberations suggest that the report may not deviate far from the views and presumptions dominant in the 'education service': 'appropriateness' of language rather than correctness in standard English should be the aim; and exercises in spelling, punctuation and syntax should remain things of the past.

Although some members of the Commission – writers and journalists as distinct from professional educationalists – have had doubts, they appear not to have felt able to sustain their views against experts whose acquaintance with linguistics and educational theory gives their comments apparent weight and cogency[13].

4

Mistaken assumptions

The preceding pages have shown the set of presumptions on which it is all too likely that the content of the proposed National Curriculum will be based. The theory is that there should be no absolute standards; that teaching is not a matter of passing on a body of knowledge; that what is taught must be relevant to the child's world; that practical and investigative work is as important as other work – as also is discussion and talking; that teaching should not be confined to narrow subjects, but should be across the curriculum; that education has a 'social role'; and that learning should be promoted through games, puzzles, enjoyment.

Such assumptions in the recent past have not led to higher standards. On the contrary, many pupils leave school today illiterate and innumerate. They are unable to write simple, correct English; do elementary arithmetical calculations; or satisfy employers understandably disillusioned with levels of competency. There may indeed have always been a shortage of educated and trained school-leavers, as theorists are quick to affirm. But these shortages occurred when most pupils left school with little or no secondary education. Yet today, although all pupils are obliged to attend secondary school until 16, the deficiencies are very great, as is attested not only by employers' organisations but even by the reports of HMI.

The case of mathematics shows with particular clarity how standards in English schools are too low, in comparison with those of Europe and Japan. This is particularly true of mathematical pupils in the lower range of ability. Surveys by the International Association for the Evaluation of Educational Achievement reveal that Britain has a larger spread between top and bottom attainment than any other country covered in its enquiries – due to the 'long tail' of low achievers. This is particularly evident when we contrast arithmetical attainment in this country with that of Germany; and the basic aptitudes of pupils in vocational schools in France and Germany with those in our Further Education Colleges[14].

The presumptions discussed in these chapters have not,

then, led to higher standards. So why should they be accepted? Consider the opposite case:

(i) Without learning a body of knowledge, pupils will flounder. They cannot master a discrete subject; and they will not – without sure, detailed knowledge and a framework – have the substance on which to reflect, or a basis on which to develop, analytical powers.

(ii) Standards can be maintained only if they are evident. Pupils need to have clear targets to which to work; and most teachers need some externally imposed level to be set as a target if they are to teach effectively. Only the exceptional teacher can in practice ensure that each child reaches his 'own' top level.

(iii) Teaching only what is 'relevant' amounts to teaching merely what an adult deems to be 'relevant'. It reflects the adult's world and his experience of 'everyday', not that of the child. Unlike the adult the child is delighted to learn 'irrelevant' information. His interest is in what is relevant to the subject, not to the 'everyday' world. Moreover, what is 'relevant' today will not necessarily be 'relevant' when the pupil leaves school. Far better that he master the principles so that whatever the nature of the problem, he can apply them.

(iv) The emphasis placed on practical and investigative work has become an end in itself, instead of a means towards acquiring knowledge. Without adequate instruction, practical work is a poor and time-consuming means of teaching. Pupils – of all ages – want, and need, to master a framework and body of knowledge. It is for teachers and schools to decide the best methods; but the curriculum should not contain any requirement for every school to follow a given method.

And why should greater emphasis be put on pupils discussing amongst themselves and with the teacher (as opposed to more formal questions-and-answers)? It is not clear. There is no reason to imagine that pupils learn from

talking. Indeed, they may not want to talk. They may have nothing to say. If it is a matter of building confidence, then the best way to do so is through building their knowledge.

(v) The emphasis on cross-curricular teaching makes it difficult for pupils to acquire knowledge and techniques in any given area as a necessary first step. Although a cross-curricular approach might be suitable at a higher level, at school it merely imposes an adult's over-sophisticated approach on pupils who are not ready for it.

(vi) The 'social role' of education, often deemed to be as important as the academic content, is no more than a crude attempt at social conditioning. This should not be the task of any school.

(vii) Teaching should not be a form of salesmanship; and pupils will not necessarily learn through games and puzzles, or without hard and conscious effort. Very many things in life – at school and later – including the acquisition of knowledge, require effort and concentration. Unless pupils are trained to concentrate and make the effort to master knowledge they will suffer in two ways: they will not necessarily master the required information and they will not become trained to cope with the demands of adult life.

The curricula for English, maths and scienc 'art 2 avoid these presumptions and propose for each subjec .. solid basis of knowledge and fundamental techniques. This is the proper function of a National Curriculum: one which will really enable standards to be raised.

5

Testing

In this paper's second part, when discussing English, mathematics and science curricula, a set of requirements will be proposed which should be reached by children at the ages of 7, 11, 14 and (for English) 16: the ages at which the Government proposes that tests should be conducted in accordance with the National Curriculum. It is not the purpose of this pamphlet to discuss the question of testing itself: what sort of tests should there be; who should know their results; what should happen to pupils who fail. Such questions deserve a pamphlet to themselves. But it is worth noting that the dislike of formal tests felt by many in the 'education service' is of a piece with the attitudes to teaching identified in the preceding pages; and that the emphasis on basic techniques and knowledge which will be found in this pamphlet's curricula makes them very suitable for testing by formal (and for the most part written) examination.

A number of those consulted in the preparation of this pamphlet suggested that tests should not be tied to particular ages, but graded in a series which pupils would take in order, more or less quickly, according to their ability. The curricula presented here could be used as the basis for such a system, were it preferred to age-related tests. They set out the minimum of what pupils should know by the given ages. But the average child should be taught beyond, and know more than, that minimum.

PART II

The curricula

6

English

The teaching of English today – even more so than of other subjects – suffers from too many ambitious but vague aims, and from a neglect of the importance of basic skills and knowledge. That is why pupils leave school unable to read precisely and confidently, and to write clear, correct English. The aim of the National Curriculum should be to ensure that no child suffers these disadvantages. Its concern should be basic literacy: the ability to read standard English with fluency and understanding, and to write standard English using good grammar, spelling and punctuation.

The National Curriculum should set out the basic skills and areas of knowledge to be acquired by the ages proposed in the Bill – 7, 11, 14 and 16. Its requirements should be minimum. It should not set out a complete teaching scheme, but indicate the minimum fundamental levels of knowledge and skills without which there can be no progress in the wider subject. It should acknowledge that there is much of value in the subject besides these basic skills; and expect that teachers would be free to use whatever methods and to pursue whatever additional aims they wished, provided that their pupils reached the basic standards of literacy required.

Here are some features of this curriculum which require additional explanation:

(1) **Reading**

Emphasis today tends to be placed on ability to catch the general sense of the passage, rather than to correlate individual words with a set of sounds. But it is important to be able to read precisely – word for word – as well as to gauge the general sense. So our curriculum demands that pupils should be able to read aloud.

(2) **Grammatical description**

This curriculum will expect pupils to be taught how to distinguish and identify the components of a sentence. Without knowledge of grammatical terms, pupils are not equipped to form a correct

sentence. The knowledge of such technical terms in learning to write English well should be regarded as no less essential than that appropriate for other skills (such as driving a car or playing tennis or working a computer).

(3) **The literary heritage**

This curriculum leaves the general choice of texts and authors to teachers and schools. Its only specific requirement is that pupils should be acquainted with the recognised classics of English literature – as a first step towards understanding the literary heritage. It will expect pupils to learn by heart certain passages of literature, and to read carefully certain books.

(4) **Assessment**

The standards which pupils should reach by the ages of 7, 11, 14 and 16 represent the minimum level and should be reached by about 85% of children. Most children should be able to go beyond these.

(5) **Terminology**

(a) ***syntax***

Certain terms will be used in special ways in specifying these requirements:

* 'Simple syntax' uses sentences of only a single clause, or of more than one clause, linked by 'and', 'but', 'when', 'after', 'before', 'because' or other very common conjunctions; it does not use the subjunctive or the conditional:
  eg: 'John has gone to his friend's house'; 'After he had read the book, Peter went to bed'.
* 'Complex syntax' uses sentences with three or more subordinate clauses; and/or one or more of the following: complex correlations between clauses and sentences, ellipsis, word-play, extended metaphor, hyperbaton.
  eg: 'When we remember the pressures that lay upon us to prepare the battle in the Libyan desert, and the deep anxieties about Japan which brooded over all our affairs in Malaya and the Far East, and that everything sent out to Russia was subtracted from British vital needs, it was necessary that the Russian claims should be so vehemently

championed at the summit of our war thought'; 'Talking about the apparent speeds of aeroplanes is not talking about the speeds of appearances of aeroplanes'.

* Syntax which is neither simple nor complex is 'ordinary' syntax.

  eg: 'When I discover who has done it, I shall reward him'; 'If he had succeeded, he still would not have been happy'.

(b) ***vocabulary***

* 'Simple vocabulary' includes all the words common in everyday life. It therefore embraces the nouns which name the animate and inanimate things which a child would normally encounter from day to day, (eg. 'woman'; 'baby'; 'dog'; 'table'; 'light'; 'fire'; 'car'); the verbs for common activities (eg. 'walk'; 'speak'; 'sleep'; 'eat'; 'drink'); common adjectives and adverbs, such as those for widely-found colours, textures, smells, tastes, sounds, shapes and sizes, (eg. 'red'; 'smooth'; 'sweet'; 'loudly'; 'square'; 'big'); numbers and common words used in telling the time or distance, (eg. 'seven'; 'hour'; 'mile'); the normal auxiliary verbs, (eg. 'be'; 'have'; 'do'; 'can'; 'must'); and conjunctions and prepositions in ordinary, casual, spoken use, (eg. 'when'; 'because'; 'to'; 'with'; 'behind').
* 'Specialised vocabulary' includes the technical terms from various areas with which an educated non-specialist might be expected to be familiar, (eg. 'proportional representation'; 'hydro-electric energy'; 'symphony'); words not usually encountered outside poetry, (eg. 'damsel'); words which would not today normally be used in speech – as opposed to writing – outside an academic, technical or literary context, (eg. 'perturbation'; 'antiquity'; 'misanthropy'; 'socialisation').
* 'Current vocabulary' includes whatever words are neither part of a simple vocabulary nor part of specialised one, nor are archaisms, technical terms or proper names, (eg. 'debt'; 'unfortunately'; 'lilac'; 'sideboard'; 'whether'; 'simultaneous').

Requirements

(a) *By the age of 7 pupils should be able to:*

* **read aloud,** with fluency and precision, a piece of writing in simple syntax and common vocabulary and to read such writing with understanding. They should show some proficiency in reading aloud and in reading a more complicated piece. (This would include some ordinary, as well as simple, syntax; and some current, as well as simple vocabulary.)

Example of a passage which a 7 year old should be able to read aloud with fluency, precision and understanding:

> John opened the door and went into the house. The dog began to bark, but John was not afraid. The dog had big, friendly eyes. Soon it stopped barking and lay down on the floor. Then John looked at the window. Why was it open?

* **write legibly;** use a wide range of simple vocabulary in his writing; construct sentences in simple syntax with a fair degree of correctness; use full stops and capital letters accurately; spell correctly many words belonging to simple vocabulary.

* **know by heart** a few simple, short, rhyming poems.

Example of a poem which a 7 year old might learn by heart:

I had a little nut-tree,
  Nothing would it bear
But a silver nutmeg
  And a golden pear.

The King of Spain's daughter
  Came to visit me,
All for the sake
  Of my little nut-tree.

I skipped over ocean,
  I danced over sea;
And all the birds in the air
  Couldn't catch me.

(b) *By the age of 11, pupils should be able to:*

* **read aloud** writing in normal syntax and current vocabulary with fluency and precision, and read with understanding writing in normal syntax and simple vocabulary; use a dictionary to find out the meanings of words they do not know; read intelligently writing in normal syntax and current vocabulary, using a dictionary where needed. Example:

> To be the pilot of a modern fighter plane is not an easy job. Complete concentration is essential. You have to fly as close to the ground as possible, otherwise you will be detected by enemy radar. If your thoughts should wander for a moment, the plane may hit the ground. You may not even have the time to push the button which operates your ejector-seat.

* **write legibly,** in print and cursive script; use the full range of simple vocabulary and a variety of current vocabulary in their writing; construct sentences in simple syntax accurately and use some sentences in normal syntax with a fair degree of accuracy; use capital letters, full stops, commas, question marks and apostrophes correctly; organise writing into paragraphs; spell correctly most words belonging to simple vocabulary and many words belonging to current vocabulary;

* **identify** in most simple contexts nouns, adjectives, verbs and adverbs; singulars and plurals; past present and future tenses; subjects and their verbs;
Sample grammar exercise for an 11 year old;

> Read the following passage:
> The tall lady ran quickly down the long street. "Will I catch up with him?", she asked herself. "I must run faster", she decided.
> [a] Say which word(s) are nouns, adjectives, verbs and adverbs.
> [b] What are the tenses of the verbs? What are their subjects?

* **know by heart** several short, famous passages from the authorised version of the Bible; several passages of poetry in rhyme and in blank verse, including some written before this century.

Examples of passages which an 11 year old might learn by heart:

> In the beginning God created the heaven and the earth. And the earth was without form, and void; and darkness was upon the face of the deep. And the spirit of God moved upon the face of the waters. And God said, Let there be light: and there was light. And God saw the light, that it was good: and God divided the light from the darkness. And God called the light Day, and the darkness He called Night. And the evening and the morning were the first day. (Genesis).
>
> When icicles hang by the wall,
> And Dick the shepherd blows his nail,
> And Tom bears logs into the hall,
> And milk comes frozen home in pail;
>
> When blood is nipped and ways be foul,
> Then nightly sings the staring owl,
> To-whit! to-who!
>
> A merry note,
> While greasy Joan doth keel the pot.
> (Shakespeare).

(c) *By the age of 14, pupils should be able to:*

* **read aloud** writing in complex syntax, involving specialised vocabulary, with precision; read with understanding writing in complex syntax and normal vocabulary; and, with a dictionary, read intelligently writing in complex syntax using specialised vocabulary;

Example of a passage which a 14 year old should be able to read with understanding without a dictionary:

> I was talking recently to a British cook who was enthusing about what she called the 'French Revolution'. 'Just look what the Roux brothers

have done for us,' she said; 'trained all those young British chefs so that we now have some of the most exciting cooking in Europe'.

* **write legibly** and accurately in normal syntax using a wide range of current vocabulary and be able to construct some more complex sentences and use some words of specialised vocabulary; use correctly capital letters, full stops, commas, apostrophes, question and exclamation marks, inverted commas, brackets and dashes and organize writing into paragraphs; spell correctly words belonging to simple vocabulary and most words belonging to current vocabulary, and to judge when their spelling of a word might well be wrong and should be checked in a dictionary;
* **identify nouns,** adjectives, verbs and adverbs in most contexts, and pronouns, conjunctions and prepositions in most simple contexts; and analyse a simple sentence in terms of subject, object and predicate.

Sample grammar exercise for a 14 year old:

[i] Read the following passage and list the nouns, adjectives, verbs, adverbs, pronouns, conjunctions and prepositions:-

I was eagerly waiting to know when he had arrived. Would he come with his old friend, or would he travel alone?

[ii] Analyse the following sentences in terms of subject, verb and (where appropriate) predicate:

I am bored.
The number of people unemployed is smaller.
How shall we escape?

They should also have read carefully at least one play by Shakespeare and a variety of poetry, including some written before this century; and know by heart several further passages from the authorised version of the Bible; a speech or soliloquy by Shakespeare; several short poems (or extracts from longer poems) by Milton, Pope, Wordsworth, Keats and Tennyson.

(d) *By the age of 16, pupils should be able to:*

* **read aloud** a piece of non-technical writing in modern standard English with precision and fluency and read with understanding any piece of such writing (making, if necessary, occasional use of a dictionary for specialised vocabulary); for example, the leader in a newspaper such as *The Times*.
* **write legibly** and correctly in normal syntax using the full range of current vocabulary and employing, at least on occasion, complex syntax and specialised vocabulary with accuracy; employ correctly capital letters, paragraph-division and all the usual marks of punctuation; spell correctly words belonging to simple and current vocabulary and, by judicious use of a dictionary, generally avoid errors in spelling words belonging to specialised vocabulary;
* **identify** all the normal parts of speech in most contexts and distinguish between phrases, clauses and sentences; analyse a simple sentence in terms of subject, predicate, object, indirect object, and have some understanding of the functions of the present and past participles.

Sample grammar exercise for a 16 year old:

[i] List the examples of different parts of speech used in the following passage. You should mention separately any participles which you find:

Breakfast was quite an affair, with a certain amount of present-giving, and a large bowl of firmity, rather like sweet porridge, made of cream and barley among other things, that you were supposed by Yorkshire, as by Scottish, custom to eat standing up. What the origin of this was I do not know, but I remember firmity being very nasty.

[ii] Analyse the following sentences into subject, verb and (where appropriate) predicate, object, indirect object:

[a] I prefer to avoid the breakfast, which is usually nasty.

[b] The visitor tried to give his firmity to the dog, but the dog would not eat it and bit him instead.

They should also have read carefully two further plays by Shakespeare, a wider selection of poetry and at least one novel by Jane Austen, Charles Dickens or George Eliot; and know by heart more of the material listed for age 14, including poetry by a wider range of authors.

7

Mathematics

Mathematics, like other subjects, has suffered from the shift of emphasis away from pupils being taught a clear body of knowledge. Instead of teaching basic arithmetic in the early stages, many teachers have, over the last 20 years, set out to introduce pupils to complicated mathematical concepts without an adequate foundation.

Behind this lies the view that pupils ought not to be taxed by having to learn anything which is too difficult – or which seems irrelevant to their daily lives. Yet it is ironic that the complex concepts to which they are introduced are often those with which only trained mathematicians could cope. Moreover, a weak grounding in arithmetic makes it more difficult to progress with learning higher maths – algebra, geometry, trigonometry. Valuable secondary school-time is often wasted trying to make up for the deficiencies which should have been made good at primary school.

The upshot of all this is that too many pupils leave school innumerate and without a knowledge of even basic arithmetic. These failings at the early stages help undermine maths teaching at the later ones. To tackle this problem, the National Curriculum should require that all pupils in primary schools be taught to master basic arithmetic. Whereas primary teachers who are not trained mathematicians can be trained to teach arithmetic, they should not attempt to teach complicated mathematical concepts, lest they do more harm than good.

Unless the National Curriculum sets out to overcome failings in arithmetic – where pupils here have fallen behind pupils in competitor countries – it will not raise standards. Moreover, a danger exists that the National Curriculum in mathematics might lower standards further if programmes of study and tests simply legitimise existing bad practice and make it compulsory.

The maths curriculum should indicate what ought to be achieved as a minimum at each of the given ages. The emphasis at the start should be – as it has traditionally been – on arithmetic and on pupils becoming numerate. Pupils would, having mastered basic arithmetic, be taught other areas such as algebra, geometry and trigonometry. Weaker pupils would be expected to concentrate on making good deficiencies in arithmetic – and encouraged to proceed as quickly as possible.

The proposals are designed to show clearly what children should have mastered at the ages at which it is proposed to test: 7, 11, and 14. (See separate note for 16.) They represent the minimum which should be expected. Once pupils have mastered the minimum they should be expected to move on. The proposals are not designed to provide teachers with a detailed breakdown of what precisely ought to be involved or how it might be taught. That is a matter for the teacher, who will, as much as the pupil, stand to benefit from having clear core targets to which to work. The percentage of class time to be taken will depend upon the ability of the pupils. But – it should be emphasised – enough time must be spent so that this minimum is achieved.

Requirements

By the age of 7, pupils should:	Sample Test Questions
be able to look at two numbers and add up or subtract all single digit numbers without paper	9 + 8
do simple addition or simple subtraction (without carrying) on paper, up to three figures	642 – 121
add up and take away with some carrying (two digits)	44 – 26
know the basics of money (pence and pounds) up to £1	
tell the time to the nearest hour	
have started learning tables	

By the age of 11, pupils should know – as a minimum:

	Sample Test Question
Multiplication facts up to 10 x 10	8 x 9
Addition & subtraction of positive integers (answer bigger than nought)	work out 389 + 475 work out 579 – 85
The process of division (from knowledge of multiplication facts)	work out 45 ÷ 5
Multiplication of 2 positive integers less than 100	work out 34 x 17
Multiplication of positive integer by a fraction	find ⅓ of 21
Addition of decimals (up to 2 places of decimal)	work out 8.30 + 2.55
Multiplication of decimal by small positive integer	work out 8.7 x 5
simple money transactions (involving addition, multiplication, subtraction)	a) find the cost of 12 items which cost 30p each b) 3 items cost £1.07, £2.05 and £0.90. Find the total cost.
Simple measurement skills & facts (for length, weight, time)	write down the length of this line in cm a) ———————— b) 37 mm = cm c) 1 km = metres
Reading & making use of information in tabulated form	

* Most children should to be able to tackle more difficult questions.

By the age of 14 all pupils should know the basic arithmetic set out below; and they should also have been taught simple algebra and geometry as below; and applications of Pythagoras' theorem. Pupils ought to be taught to pay attention to the methods of proof and verification which are an essential part of mathematics. The following sets out the minimum content for arithmetic, algebra and geometry. An extra note suggests the course teaching might take when minimum standards in arithmetic are reached.

Arithmetic

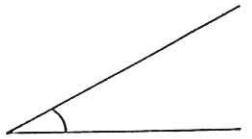
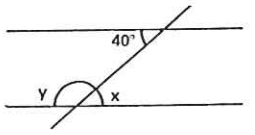
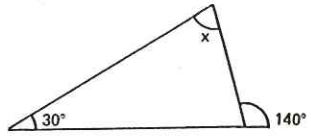
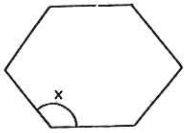
	Sample Test Questions
4 rules for positive integers	(a) 85 x 17 (b) 375 ÷ 15 (c) 1015 + 20125 (d) 1451 – 78
Extension of 4 rules to fractions and to decimals and negative numbers	(a) ½ + ⅜ (b) ¾ + 4/7 (c) 1⅗ – ½ (d) 15 x 1 ⅗ (e) ⅓ x 2/7 (f) 8 ÷ ½ (g) ⅞ ÷ 2 (h) 7/10 ÷ ⅖ (i) 8.4 x 7.1 (j) 18.47 – 5.39 (k) 18.5 ÷ 0.2 (l) (–2) x (–3)
Find the average of a given set of numbers	find the mean of 13,17,5,41
Convert fractions to decimals	change ⅜ to a decimal
Convert decimals to fractions	write 0.35 as a fraction in its lowest terms
Percentages	find 5% of 180

Area of rectangle, triangle	find the area of a square of side 5cm
Circumference & area of circle Volume of cube and cylinder	find the circumference & area of a circle radius 5cm
Time, distance, speed	a car travels 250km at an average speed of 40km per hour Find the time it takes to complete the journey
Ratio & proportion	divide 180 in the ratio 7 : 5

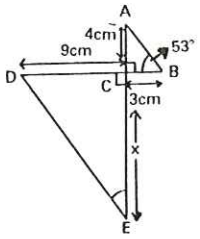
Algebra

Substitution, powers, addition, multiplication, simple factorisation, solution of linear equations, solution of simultaneous linear equations	Sample Test Questions (a) If $x = 5$ and $y = 4$ find the value of $xy + 3(x + y)^2$ (b) simplify $3x + 4y - x + 2y$ (c) remove the brackets and simplify $3(x+2)-(2x-1)$ (d) if $3x - 5 = 16$ find x. (e) solve the following pair of simultaneous equations $3x + y = 4$ $x + 2y = 13$ (f) factorise $3x^2 - 6x$

Geometry

Topic	Sample Test Questions
Use of terms acute, reflex and obtuse angles, parallel lines	State whether this angle is acute, reflex or obtuse 
Angle properties of intersecting straight lines	 Write down the size of angles X and Y X = _____ 0 Y = _____ 0
Angle sum of a triangle. Use of this fact in calculation.	Write down the size of angle X.  X = _____ 0
Angle sum of Polygons	The diagram below shows a regular hexagon  (i) write down the size of angle X (ii) Prove that the angle sum of the hexagon is 720°

Similar triangles



Triangles ABC and CDE are similar. Write down
(a) the length of X
(b) the size of angle CÊD

By the age of 16 years, any pupil identified by the test at 14 as not having mastered the minimum, should have been quickly brought to that standard in arithmetic, algebra and geometry. At this stage it is premature to set out minimum standards for 16 – when attainment can be expected to rise over the next five years as a result of the implementation of the national curriculum on the lines above. Cockroft's proposals for the bottom 40% set much too low a standard of expectation.

8

Science

The emphasis in science teaching, like that in English and maths, has moved away from the mastery of a body of knowledge, principles, information and facts. Instead, pupils have been encouraged to treat the acquisition of knowledge as of equal importance with the development of skills and attitudes. In addition, there has been a tendency to play down the specifically scientific nature of science – and science subjects – in an attempt to make it seem more relevant to pupils' everyday experiences. Physics, chemistry and biology tend to be subsumed into broader 'topics' or themes. This tendency is also reflected in attempts to promote an integrated or combined science course and the emphasis given to the 'cross-curricular' nature of science. In addition, the thrust in science teaching towards practical, investigative and experimental work has left less class-time available for its teaching, and has undermined further the acquisition of knowledge. As has happened with maths, pupils are very often expected to deal with complicated concepts without necessarily having mastered the groundwork on which these are based.

This curriculum sets out the minimum content which a pupil ought to know by each of the given ages. It does not lay down how that should be taught – or what else might be covered. This is a matter for the individual schools and teachers. If, for example, it is felt that the best way to introduce a pupil to content is through practical experiment, then that is for the teacher to decide. The curriculum is drawn up on the basis that it is desirable to retain the option of learning science by studying its component subjects one by one, even although there may be considerable overlapping. It would support a more broadly based science course in the years up to 14, with opportunity to specialise afterwards. Ideally, pupils ought to be able to continue with all three subjects up to 16 – but not unless there are trained teachers available. A biologist without undergraduate training in physics cannot teach physics adequately – and should not try to do so.

We do not recommend how the content of the curriculum

should be mastered. Our aim is only to propose what the minimum content should be; and not what skills or attitudes might be developed, or how. The curriculum for science is necessarily very brief since the number of subjects and their complexity is such that it is only the underlying principles which can be sensibly set out. How the curriculum is then developed and which subjects are chosen will depend on the training of the teachers in each school. So the curriculum confines itself to the general headings which might be considered for a broader based course up to the age of 14. What is important is that a body of information of a limited kind shuuld be taught.

Ages 7 to 11

While the curriculum would expect a pupil to be able to begin science at 11, this does not necessarily depend on his having done science in primary school. But a pupil does need to have acquired some basic skills to tackle science at secondary school. He needs to know, for example, the difference between animal and vegetable and between living and dead (simple classifying); the terms acid, alkali, seconds, metres, kilogrammes; and he should either already be able, or quickly become able, to use scientific equipment with some familiarity.

By the age of 14 a pupil should know:

Biology

classification of materials into groups and subgroups
(eg: living/not living, vertebrate/non vertebrate)
cells – structure, properties, reproduction, hierarchy, functions
composition of water and air
photosynthesis
food chains
ecosystems
micro-organisms

Chemistry

simple kinetic model
solubility
filtration – evaporation, chromatography
electrolysis

oxides
materials – structures and properties
acids and alkalis, pH values
definition of an element – atom, molecule, compound, mixture, periodic table, chemical symbols
reactivity
growth and structure of crystals

Physics

states of matter
energy
temperature in Celsius
heat capacity, heat loss
electricity – measuring devices, circuits, conductivity
magnets
springs – properties (Hooke's law)
forces – pressure, levers and pulleys
motion – acceleration, velocity, friction
Boyle's law
light – refraction, reflection

Age 14 to 16

After the age of 14, pupils should if they wish have the chance to specialise in one or more of the individual sciences, or to continue with broader, non-specialist teaching. This should be a matter for individual schools and teachers.

Conclusion

Behind the proposed National Curriculum lie two aims. The first, that pupils should not drop essential subjects, may be realised through legislation. The second, that standards must be raised, is more problematical, and cannot be achieved by the stroke of a pen. Unless those directly responsible – the teachers and their unions, the Inspectorate, the LEAs, the education theorists – all recognise how low standards are and understand why this is so, the National Curriculum will bring no favourable change. Indeed, things may get even worse if the assumptions and practices of what is known as the 'education service' become legitimised under the new Act. Already the interim reports of the two working groups in maths and science, and that on testing and assessment, suggest that this will indeed be the case[15].

Poor standards must be tackled by correcting the assumptions outlined, and by changing the expectations of teachers and pupils alike. Teachers must be expected to teach; and they, along with the other groups most responsible for running schools, must be held to account for pupils who do not learn. Pupils must be expected to leave school having mastered a modicum of knowledge and techniques in specific subjects. They should be numerate. They should be able to read without difficulty and to write grammatical, clear and simple English. But the pupil must also have been taught so that he will grow to understand – according to ability and inclination – the world in which he lives: one to which he will never belong if the necessary information and knowledge of it is denied him.

References

1 *A Language for Life.* Report of the Committee of Inquiry appointed by the Secretary of State, Department of Education & Science under the Chairmanship of Sir Alan [now Lord] Bullock, FBA; HMSO (1975). [Hereafter referred to as the Bullock report]

– *Mathematics Counts.* Report of the committee of inquiry into the teaching of mathematics in schools under the Chairmanship of Dr W H D Cockroft; HMSO (1982). [Hereafter referred to as the Cockroft report]

2 *English from 5 to 16.* (Second Edition incorporating responses); *Curriculum matters 1;* an HMI series; HMSO (1986). [Hereafter referred to as *English 5 to 16*]

– *Mathematics from 5 to 16.* (Second Edition incorporating responses); *Curriculum Matters 3;* an HMI series; HMSO (1987). [Hereafter referred to as *Mathematics 5-16*]

3 Department of Education and Science, Welsh Office; *Science 5-16; A Statement of Policy;* HMSO (1985). [Hereafter referred to as *Science 5-16*]

4 *The School Curriculum,* DES, Welsh Office; HMSO (1981); 7th impression (1985), also made the general case for a curriculum to be relative to the pupil's world, for continuity in learning for each pupil (rather than set absolute standards), and for an approach 'across the curriculum' (rather than concentration on individual subjects), the titles of which were described as 'a kind of shorthand'; see *The School Curriculum*

5 Bullock report, see especially pp 5, 7, 169-70, 171, 173, 234-5, 515

6 Cockroft report, see especially pp 1, 11, 61, 70, 71, 92

7 *Science 5-16;* and *Science Education in Schools: A Consultative Document;* HMSO (1985)

– for the characteristics of, and priorities within, science education, see *Science 5-16,* pp 3-5

– for science in secondary education, ibid, pp 12-18

– for recommendations on science in primary schools, ibid, pp 6-11; see also *Science in Primary Schools,* a discussion paper from the HMI Science Committee; HMSO (1984)

– for changes proposed to the existing science curriculum,

see *Science Education in Schools, A Consultative Document;* DES & Welsh Office (1982); pp 6-28

8 *English 5 to 16*, pp 5-43; *Mathematics 5-16*, pp 67-81; *English our English* (CPS 1987), pp 13-16, 39-40

9 *English from 5 to 16*, pp 3-4

10 *Mathermatics from 5 to 16*, pp 2-3, 5-7

11 National Curriculum Mathematics Working Group, *Interim Report;* DES & Welsh Office; December, 1987; pp 1-3, 13-78

– see the statement issued by the Secretary of State for Education and Science 17 December 1987, DES Press Release 382/87

– for Prais' comments, National Curriculum, Mathematics Working Group, *Interim Report, Note of Dissent;* S J Prais, FBA; 17 December, 1987

12 National Curriculum Science Working Group *Interim Report;* DES and Welsh Office; pp 6, 8, 10-13, 15-16, 25; see chapter 3 which develops the 'three essential elements'

13 Membership and terms of reference of the Kingman Committee were announced in January 1987, Hansard, 21.1.87, cols 555-6. They were asked to recommend 'a model of the English language, whether written or spoken, which would:

(i) serve as a basis of how teachers are trained to understand how the English language works;

(ii) inform professional discussion of all aspects of English teaching'.

The *Daily Telegraph*, 13 May, 1987

14 For example, 58% of Japanese 14-year olds, but only 22% of British 14-year olds knew the answer to the following question:

what is the value of 'x' if $5x + 4 = 4x - 31$?

For other examples and discussion, see

– *The Times*, 18 February 1988

– S J Prais, National Curriculum Mathematics Working Group: *Interim Report, Note of Dissent*, 17 December 1987

– *National Institute Economic Review*, May 1985, February 1987

– M Cresswell and J Gubb, *The Second International Mathematics Study in England and Wales* (NFER, Nelson 1987)

International comparisons are not possible in English teaching, but evidence has been assembled in *English our English*, pp 6-7 to show that here too standards are unacceptably low. For this year's IEA report on Science, see *TES*, 14 March 1988

15 National Curriculum Task Group on Assessment and Testing, *A Report*, January 1988

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