The primary mathematics textbook: Intermediary in the cycle of change

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A recurring feature of the primary mathematics curriculum since the inception of compulsory state education in 1870 has been debate. Hardly a decade has passed without concern being expressed over the level of children's attainment, the nature of the mathematics curriculum or the quality of children's learning. In response politicians, parents, mathematicians and mathematics educators have each presented various philosophies for the mathematics taught within the schools. But as each has had the opportunity to play the dominant role, so too has each initiative been subject to the accusation that it has failed children and/or society. Unfortunately, there has been discord, even contradiction, between each group's perception of the curriculum and its purpose.

Classroom teachers do not usually take part in the broader philosophical or socio-economic arguments. Despite observing from the sidelines, they are conscious of the debate. Most accept that if innovation dominates they may need to encompass a change in direction; although predominantly passive in creation they are active in implementation. However, the eloquence of a reformer's rhetoric does not provide most teachers with the means to accomplish this. Widespread implementation of mathematical innovation proceeds when the change in emphasis is tangible, with the publication of a textbook, the intermediary in the cycle of change.

The primary mathematics textbook is a resource that is taken for granted within most modern primary classrooms. It is hard to imagine what we would do if we did not have one available. We expect so much from it; a maths curriculum, child appeal, the ability to cope with the individual, administrative flexibility and even the encouragement of different teaching styles. Traditionally, they were no more than a permanent collection of suitable problems to support teaching. In their modern role, the function of primary mathematics textbooks has expanded to include attempts to:

- help teachers respond to the mathematical requirements of society;
- remedy and prevent weaknesses in children's level of mathematical attainment;
- provide a structured and sequential development of mathematics;
- develop motivation through presentation and learning through understanding.

However, perhaps because of their wider function, textbooks do not always satisfactorily provide a coherent approach to the various elements of a broader mathematics curriculum. If a mathematical strand e.g. arithmetic, has a clearly-defined hierarchy, textbooks can provide sound support. Curriculum elements without an agreed hierarchy, e.g. shape, usually receive fragmentary treatment and teachers need to look for supplementary material. Sometimes, it appears that mathematical structure and continuity loses out to to other features, particularly the textbook's attempts to motivate children's learning.

In initial teacher training many students invited to consider an appropriate textbook to support their teaching, focus upon the visual appeal of the text. Criteria such as the need to be 'visually attractive', have a 'child-centred approach' and be 'accessible to children' appear to precede mathematical considerations. Words such as 'attractive' 'lively' and 'fun' permeate students' evaluation of textbooks, but they are also words that flow easily from the pens of those who attempt to describe the qualities of the texts they promote. Over the past few years, the pre-publication material for new textbooks has claimed that a particular series was 'setting new standards of child appeal', was 'highly motivating' and 'purposefully illustrated in full colour with lively and varied drawings and photographs'. It appears that if a modern textbook can inspire motivation, interest and enthusiasm and 'cater for the individual', then it has overcome an important hurdle in the selection stakes.

Advances in print technology, and the extensive use of peripheral writing combine to strengthen the view that the modern primary mathematics textbook is addressed directly to pupils. Innovation in printing and reproductive techniques have enabled publishers to make extensive use of colour at relatively little cost to ensure that textbooks have ‘child appeal’; within some texts, the use of actual pictures has replaced schematic representation. Introductory remarks such as ‘Do you remember when...’ or ‘Let us investigate....’ are now coupled with attempts to jolly readers along through cartoons, suggestions, statements and comments. These writing styles complement more usual instructions to the child to do something and are supplementary to the extent to which teaching components are contained within textbooks. Textbook writers now communicate a view of the mathematics curriculum within books that are becoming increasingly more personalised for the children who use them.

Publication of the National Curriculum Requirements in Mathematics (1989) leaves us in no doubt as to the mathematical content identified for primary schools and the place of this content in terms of continuity and progression throughout the child’s schooling. The translation of these explicit requirements into action within the classroom may increasingly make teachers continue to turn to textbooks for topic definition, stage-by-stage mathematical progression and mathematical activities for children. If history is anything to go by writers and publishers will respond to the need.

That politicians should now be making statements about content and attainment in primary school through a National Curriculum in Mathematics is not new. They did so in the first decade of state education and set the ground rules for the dominance of arithmetic in the primary school curriculum.

> The demand of parents for thoroughly good arithmetic appears to us to be one which must be satisfied, whatever else has to give way to it. Both for its utility and for its educational power, nothing else can stand in its way. (Taunton Commission Report, 1868)

Arithmetic became a compulsory part of the curriculum for the child of the 1870's and its place was further ensured by the 1876 Education Act which introduced what has become known as ‘payment by results’. Through this Act, 50% of the children above seven years of age were assessed in arithmetic, reading and writing. If over one half of the children tested failed in one subject or more the school faced the prospect of no longer being certified as efficient.

Of course, at that time the textbook was not the partner in the attainment of the appropriate level of achievement that it was to become in the future. Costs for schools were prohibitive and few, if any, texts on the market were suitable for the public elementary schools. The blackboard was the medium through which most problems were set. Children carried out their calculations with slate and chalk. However, primary textbooks did attempt to help the teacher’s in their task.

> To ensure the Excellent Merit Grant teachers should adopt these little books, which afford ample practice in every variety of problem set by the Department.
>
> (Capel,1887, intro.)

The Department of Education requirement that the children of standard 2 , eight-to ten-year-olds should deal with numeration to 100 000 and the four simple rules to short division gave the text plenty of scope to provide examples for practice:

> A gardener gathered 7008 apples from twelve trees and each tree produced the same number. How many from each tree?
>
> What number is multiplied by eleven to give the answer 10,208?
>
> Divide the product of 19 and 20 by half the sum of 19+1.

(Capel,1887, p.12)

Such was the pace of this little book that children of Standard eight were faced with this lovely example:

A owned $\frac{4}{17}$ of a vessel and sold of $\frac{3}{11}$ his $\frac{2}{9}$ share for £ . $\frac{33}{400}$

What was the value of of $\dfrac{1\frac{2}{8}}{4\frac{1}{4}}$ of the $\frac{2}{5}$ vessel?

(Capel, 1887, p.82)

A standardised curriculum for arithmetic in the latter part of the nineteenth century, did not lead to attempts to standardise the texts that schools used. Neither did a proscribed curriculum, outlined within *Codes of Regulations* which were:

> designed in the first instance to serve the necessary purpose of setting forth the conditions which an elementary school must satisfy to obtain the parliamentary grants available for public elementary schools.
>
> (Board of Education, 1901)

and accompanying assessment lead to success. These, together with conscientious but uninspired teaching, conspired to reduce arithmetic teaching to a soulless routine of the same kind of sum day in and day out, week in and week out, until mechanical accuracy became a habit and the required percentage of passes in the annual examinations could be guaranteed.

The centralisation which dominated the curriculum of the elementary schools gradually receded so that by the nineteen-twenties the initiative within the classroom gradually moved from the teacher as teacher to the child as learner. The cycle was beginning to turn. Success had not been achieved through centralisation and a process-driven curriculum which had taken very little account of the appropriateness of the content.

The reorganisation of elementary schools into junior and infant schools gave an impetus to the publication of textbooks to "meet the needs of the new type of school organisation" (Ballard, 1926). The infant sector was largely omitted from these attempts to provide the mathematics curriculum through the medium of the textbook; there were considered to be too many practical problems, not least being the one of reading level.

Authors of the new school texts, many of whom were drawn from the inspectorate within local authorities or from the ranks of tutors within teacher-training establishments, made assumptions about the level of attainment in arithmetic that children would have by the time they entered the Junior school and responded to general concerns about standards.

> Our scholars are, in fact, weak in the fundamentals, and it is this weakness that these little books are specially designed to remedy .
>
> (Ballard, 1926, **1**, p.17) .

Fundamental Arithmetic (Ballard,1926) not only included a permanent set of problems but attempted to remedy weakness by providing a systematic training in the fundamental processes of arithmetic and giving direct attention to speed as well as accuracy. The author, within the answer book that also contained some comments on the philosophy of the series, suggested that the texts weresuitable for individual work and could take most of the labour of marking from the teacher's shoulders; children could mark their own exercises using the answer books provided with the texts.

Within the schools the series, for all its claims, proved to be “rather difficult for children of average mental calibre” (Ballard, 1934). The outcome was the publication of *The London Arithmetic* which were less difficult books intended for less mathematically-minded children.

Meanwhile the second Haddow Report (1931) had given the term ‘mathematics’ respectability but though some textbooks were:

> compiled to meet the requirements of Junior Pupils as indicated in the Recent Report of the Consultative Committee of the Board of Education on the Primary Schools.
>
> (Potter,1933, p.3).

arithmetic remained the dominant feature:

> "From 1,000,000 take the product of 567 x 678
>
> "From 102,010 take 98,765
>
> "865, 943 + 345

(Potter, 1933, Bk 1V)

Disclaimers were to become regular features of textbook commentaries, and no doubt, those to be published in the near future will contain such a disclaimer referenced to the National Curriculum.

The advent of more opportunities for children to go forward into secondary school led to enhanced concern that there should be continuity between the primary and secondary sectors. The Board of Education (1935) claimed that: “the result of the teaching of arithmetic in schools should be to secure that a certain body of knowledge is thoroughly and permanently known” and that “primary school children should be introduced to certain processes and notions which would be further developed in the secondary school”.

The influence of a more liberal approach, together with the outcomes of research into the development of computational skills, combined to bring about a radical change in the both content, style and presentation of textbooks. Even though '*Right From The Start Arithmetic*' (Schonell and Cracknell, 1937) took note of contemporary trends, it focussed on a recurring issue:

> to prevent the development of those weaknesses which careful study of post primary pupils has disclosed.

(Schonell and Cracknell, 1937, **1**, p3).

The series used a contents list to indicate how the “carefully graded material based on a careful consideration of available research into arithmetical processes” was presented throughout the texts.

The use of a textbook enabled the teacher to make the work for the children a little more personal; they could direct children to work individually. However, it was not until the 1930’s that the child was directly addressed by the text and examples of procedure added. This was the start of a trend that we are now so familiar with; textbooks set out to teach directly to the children.

> You already know the multiplication table up to **6** times **12**.
>
> You can therefore multiply by **2**,**3**,**4**,**5**, or **6**.
>
> Now you must learn to multiply by **7**,**8**,**9**,**10**,**11** and **12**

(Ballard, 1934, **2**, p.9)

Examples

	£	s
3)	19	16
	6	12

£**19** ÷ **3** = £**6** + £**1** over

2 0s + **16**s =**36**s
3 6s - **3** =**12**s

Check
£**6** **12**s × **3** = £**19** **16**s

	£	s	d
8)	27	5	4
	3	8	2

£**27** - **8** =£**3** +£**3**

6 0s + **5**s = **65**s
6 5s - **8** = **8**s + **1**s

12d + **4d** =**16d**
1 6d - **8** = **2**d

Check
£**3** **8** **2** × **8** = £**27** **5** **4**

(Ballard, 1934, **2**, p.34)

Acknowledging that the child was the person reading the book and in addition making use of the book as a teaching medium were features that Schonell and Cracknell took a considerable stage further. In book two, for example, two pages devoted to writing numerical values for numbers up to 10,000 written in words, are immediately preceded by three pages of exposition. These pages, which are intended to be directly led by the teacher, used diagrams and explanations linked to the appropriate vocabulary and notation in an attempt to foster the child's understanding of place value. Additionally, the series also introduced new ideas without reference to the teacher.

If the move was gradually towards the textbook as a teaching medium, Fleming (1939) in the teacher's book published with *Beacon Arithmetic,* cautioned that:

> No series of books intended for pupils use can take the place of the teacher whose mind is alert to the needs of every pupil. No series of books can crowd between its covers those wider experiences which should be drawn from the pupils' everyday surroundings to bring added interest and meaning to the arithmetic work.
>
> (Fleming, 1939(iii))

Beacon Arithmetic made considerable use of relevant research to categorise the development of numerical skill. and presented a mathematics curriculum which included spatial work and an introduction to graphs. Language development was also a feature of the texts; a 'Number Reader' was included with the series and so too were books for infants - 'The Beacon Number Books'.

To achieve its aim of helping the teacher to 'lay a firm foundation for the mastery of the basic combinations of addition , subtraction, multiplication and division" (Fleming,1939(iii)), the series made use of research to introduce 390 basic number combinations in each of the two parts of Books One and the first part of Book Two. These included addition and subtraction facts to twenty and the multiplication and division facts up to 9 x 9.

The teacher's books, now becoming much more than simple answer books, provided an appendix which indicated the order of presentation of types in each process. The seventeen different stages for addition of up to 3 four-digit numbers pales into insignificance when considered alongside the forty-nine stages for division. Graphical work was introduced in a very abstract form in book three.

TYPE OF EXAMPLE	
72)496	The trial divisor is to be thought of as one larger than the first figure of the divisor. The trial quotient is the true quotient. One figure in quotient.
28)212	As above. Two figures in quotient.
39)2526	The apparent trial quotient is one less than the true quotient.
13)103	More than one trial is necessary.
61)26292	Three figure in quotient.
51)11232	Zero or zeros at the end of the quotient.
78)8424	Zero in the middle of the quotient.
100)7829	Division by multiples of one hundred.
205)10870	Zero in middle of three figure divisor.
56)15123	Zero at end of three figure divisor.
281)562566	Zero's in various places in quotient. Up to six figures in quotient. Two or three figures in divisor.

(Fleming,1939(iii), p.2

Beacon Arithmetic is first real example of the use of a comp[prehensive teacher's book which contains reinforcement material for teachers. It provides an indication that such a resource could be used for introducing teachers to material they are unfamiliar with.

Both *Beacon Arithmetic* and *Right from the Start Arithmetic* were, for me, influencial text books. The former I used as a child in school. Considering it again for this chapter bought back memories of a class of 50 children seated in paired iron frame desks working from the pages of sums. The teacher seemed so far away as she sat in her pedestal desk. We worked in silence but periodically were called to present our excercise books for marking. I loved ticks by my sums. If there were crosses corrections had to be done in the afternoon when other children played with plasticene.

The latter I used as a student undergoing initial training. Indeed, *Right from the Start Arithmetic* underwent fifteen impressions between 1937 and 1955 and both of these editions gave the following problem:

BILLS

$\frac{1}{2}$ lb. bacon(back) at 1s 4d. per lb.......=

$\frac{1}{4}$ lb. coffee at 2s. per lb ....=

6 new laid eggs at 2s. a dozen............=

2 lbs. granulated sugar at $2\frac{1}{2}$ d. per lb..=

(Schonell 1937,**2**,60)

By the late nineteen fifties inflation was beginning to play havoc with other publications. '*Alpha Junior Arithmetic*' (Goddard and Grattidge, 1957) indicated that prices for the similar items had increased at least two-fold. In 1985 *Nuffield Mathematics* was suggesting that children obtained the cost of such items from home. No doubt expediency was one of the factors behind this suggestion; it indicates that there is a perceived need for ‘reality’ to prevail in the presentation of problems.

Attempts to provide suitable problems to illustrate the application of the arithmetical skills that children have learned is an issue that can tax the imagination of textbook writers. Resolution of the difficulty up to the end of the nineteen-thirties centred upon what children were expected to do with the arithmetical skills they had acquired. The guiding principle was not the reality of the child as child but the reality of the child as future adult; boys were expected to enter employment in the industrial or building industries whilst girls entered the service industries or required a course in “household arithmetic’. Both required the ‘arithmetic of citizenship’. The production of pictures in textbooks provided an additional complication. Whose reality would be displayed - the child’s or the textbok writers? It was the comfortable middle class world of the latter that dominated. Although the focus of learning was moving towards the child, the focus of ‘reality’ remained in the adult world.

Both in the gradual expansion of the mathematics curriculum, with its move towards the child as the focus, and in the development of the textbook, the nineteen-thirties had seen considerable development. There may have been further gradual progression over the next two decades had not the constraints of the war years and the immediate post-war years led to a period of developmental stagnation.

Expansion, when it did come, gained momentum slowly in the fifties and and in the sixties drastically changed our view of primary mathematics. It underwent rationalisation in the seventies, was questioned in the eighties and leaves us in a sense of deep foreboding that in the nineties we may be turning back to proscribed content and its allied problems, not least of which is the possibility that it will become the primary mathematics curriculum.

The 1955 Mathematics Association Report provoked unprecedented interest in the teaching of mathematics of all types and urged the teaching of mathematics in the Primary School as opposed to simply arithmetic.

> At first sight the word mathematics may seem pretentious when used in the Primary School. The words number and arithmetic .....are equally so, and they have the disadvantage of suggesting limitations in aspect rather than elementary treatment. (M.A.1955, p.vii).

The Report’s compilers believed that the main aim of primary mathematics teaching was to lay the foundation of the child’s mathematical thinking and it recommended that the syllabus should be extended to include more spatial work, not the formal geometry of Haddow, but spatial relationships such as symmetry and tessellations, angle relationships, nets of common solids and natural curves.

A very popular series of the period was *Alpha Junior Arithmetic* (Goddard and Grattidge, 1957) which carried forward the tradition of the texts of the late nineteen-thirties.

As its title was meant to convey, within the Teacher's Handbook the authors indicated that the series was intended "for children of good average or above average ability" (op cit., p.5). The concern of Goddard and Grattidge was that most books on arithmetic, although comprehensive in their aim of supplying a variety of examples on each topic, tended to devote much of the content to the "special needs of the backward and the retarded" (op cit., p.5) with the consequence that the syllabus tended to be limited and prescribed. The authors recognised, even in 1957, the extraordinary progress that was being made by our overseas business competitors and that the nation was becoming more and more dependent on scientists and skilled technicians.

> The arithmetic that is taught has an eye on the future and has a broad enough base on which further building is possible. (op cit., p.7).

The texts, again responding to widespread dissatisfaction with the current position regarding the teaching of mathematics, claimed to interweave the old and the new and their motto was summarised as "REVISION,REVISION,REVISION"(op cit., p. 13)

Later, the authors produced the *Beta Junior Arithmetic* which, following the pattern of *The London Arithmetic,* was intended for the average and below average children. Beta contained the same material presented at a slower pace taking five books instead of the Alpha's four; there was very little content differentiation between the two series. However, it was not unusual to see whole schools adopting <u>either</u> the Alpha series <u>or</u> the Beta series without really considering who the texts were designed for. In one never-to-be-forgotten experience, I once visited a school where all of the children worked first through Beta Book 1, then Alpha Book 1, then Beta Book 2 and so on. Nobody had seemed to noticed that Alpha 1 and Beta 2 were almost the same books.

By the start of the 1960's, the primary school curriculum in arithmetic had been honed to the point where there was a general agreement about its structure. Its modification with the move towards decimalisation of currency and measures during the 1970's involved greater emphasis on understanding the base-ten numeration system but it was anticipated that up to a year could be saved on 'delivery'. Consequently, may schools had the time to focus on a broader mathematics curriculum which had been consolidated within two publications: *Mathematics in the Primary School* (1965) and the *Nuffield Mathematics Project* (1967, etc.).

Mathematics in the Primary School recommended that children's understanding of mathematics should be broadened so that it became embedded in the relationships underpinning the processes that children use. To this end, it was suggested that bases other than ten be considered and the vocabulary of 'sets' be introduced. The latter was presented for teacher discussion and it was indicated that introduction of such vocabulary depended on the interest, the enthusiasm and the willingness of the teacher. Rejecting earlier caution from the Mathematics association about graphical work, the book gave a sound outline of the work that may be covered in the primary school and which, in fact, children had taken to with ease.

The movement to focus on the child's mathematical thinking had the effect that considerable change became apparent within the curriculum and mathematics now became referred to as 'modern mathematics'.

Initially, textbook writers responded to the new trends in such a way that the new material was simply tacked onto existing work. Certainly this was the case with the Alpha and Beta series. In a new edition, published in 1969, separate chapters on 'Sets' and 'Venn Diagrams' were added. However, they could hardly be identified as a unifying factor for mathematics. Many other other new texts presented 'base work' without any effort to extract the generalisations.

Of course, there was another cost in expanding the mathematical content in a text; add something in and we must take something out. There was a noticeable decline in numerical examples that may be used for practice and consolidation of skills. It is also obvious that many of the textbooks published immediately after the legitimisation of the new content were produced before the implications of the suggestions had had time to be considered.

Although colourful and attempting to have child appeal many lacked what may be called a sense of urgency.

The watershed created by *Mathematics in the Primary School* and the *Nuffield Mathematics Project* was not fully realised within the classroom until a text which attempted to embrace their philosophy and wider content was developed. This vacuum was filled by *Mathematics For Schools* (Fletcher, 1972), which is a fine example of how the role of the textbook was again being modified. Textbooks were now taking on some of the responsibility for teaching new ideas that teachers were not familiar with.

The series was designed to provide a structured and sequential development of mathematics for children aged from 5-13, with a philosophy based upon a recognition that mathematics is a universal language of communication. Six strands of mathematics were integrated into an on-going structured course: numeration, pattern, algebraic relations, pictorial representation and statistics, measurement and shape. Five of these strands are now easily recognisable as major components within the National Curriculum for Mathematics.

Perhaps because of its enhanced style, teachers began to use the series for ‘individualised learning’ but, of course, it was not designed for this: no textbook is. This use, together with the extensive inclusion of new mathematical language, invoked heavy criticism to which Ruth Walker, a co-editor, responded against in 1977.

> *Mathematics for Schools* does not, and can not, relieve the teacher from teaching, and in the case of the non-mathematicians, from learning. Nor does it remove the children from memorising number bonds and tables at the appropriate stage. (Walker,1977)

The H.M.I. publication '*Mathematics 5 - 11*' (1979) gave respectability to, and provided a structure for, most of the topics now advocated for the primary school whilst *Mathematics Counts* (DES, 1982) pulled together the philosophy for mathematics teaching within schools.

Many textbook publishers immediately after this period were quick to identify their publications with *Mathematics Counts* in particular:

> The Cockroft Report states, ‘Practical Work is essential throughout the Primary Years...’, and emphasises that practical work can only be truly effective and worthwhile if it is ‘properly structured with a wide variety of experience and clear stages of progression, and is followed up by the teacher by means of questions and discussion.’
>
> Ginn Mathematics gives the same emphasis to practical work.
> (Publishers Presentation, Ginn Mathematics, circa 1983)

> The Cockcroft Report supports fully the philosophy on which Nuffiekd Maths was based.
> (Publishers Presentation, Nuffield Mathematics, circa 1983)

The strength of *Mathematics Counts* was not that it produced much that was new, but rather it pulled together contemporary thinking based upon the best of earlier recommendations. Problem solving and investigations were areas of primary mathematics which have received considerable attention since.The former had received recognition in textbooks published in the nineteen-thirties and we find that a recently-published text inherited similar treatment.

Beacon Arithmetic 1939

An adult approach to problems is by general analysis of the following type:

1. What does the question mean?
2. What are we told?
3. What are we asked to find out?
4. How can we find the answer?
5. What is the answer likely to be?

Flemming,1939(iii),21

Ginn Mathematics 1983

Remember:

A. Read the problem and find the question?
B.What are the facts?
C. Decide what to do.
D. Answer the question.
E. Does the answer seem right

Ginn Mathematics 1983,30

The impetus for publication of primary mathematics texts has now largely moved from the mathematician or the mathematics educator like Ballard and Flemming, into the hands of private Foundations e.g. Nuffield, S.M.P, or publishers e.g. Ginn, Macmillan. However, a commercially- produced mathematics scheme is no longer simply a mathematics text containing problems. Teachers books, enrichment cards, investigations, assessment packages, mathematics profiles, and computer tapes or discs may now all be part of the general package. Commercial workcards and workbooks make up the complete scene available to teachers. The quality of pictures, graphs and drawings is a vast improvement on that of previous decades, but has also gained considerable momentum in the last decade. Not for the first time has the printing industry effected an influence on mathematics. This, of course, will be beneficial in development of one aspect of the curriculum - the more we see graphs and pictures the more we will think in terms of graphs and pictures.

In the field of Primary Mathematics textbooks, the 1980's saw schools spoiled for choice but perhaps it was the availability of choice which created the potential for divergence in the primary mathematics curriculum. Whilst some texts remained closely allied to more traditional aspects of primary mathematics others were innovatory. I believe that *Mathematics for Schools* was one of the latter. Adopting such a series required a change in many teacher's thinking about mathematics. The school's freedom to choose its mathematics texts could result in two different mathematical experiences for children; a longitudinal development which followed the arithmetical philosophy of practice, speed and accuracy with numbers, or the lateral development which involved the best of what *Mathematics in School* was attempting to do. Of course, there were many shades of development in between, but the extremes of curriculum led to an artificial dichotomy which meant that in the long term something like a National Curriculum for Mathematics was inevitable.

Future textbook writers now have a proscribed curriculum to guide their deliberations. Given the structure and development of the levels within the mathematics Attainment Targets, I suspect that the numerical and graphical elements of the new books will receive rigourous treatment whilst that given to Shape and Space will continue to be fragmentary. In the first instance, the algebraic components may well receive treatment similar to that given to sets and base work in the late 1960's. It is all going to depend upon interpretation because there are aspects of the mathematics National Curriculum Attainment Targets which structurally are unsound, indicate piecemeal compilation and, no doubt, will be subject to revision sooner rather than later.

In the future, I doubt whether there will be a move towards a textbook overtly being identified as the National Primary Mathematics Textbook. This does not mean to say that, almost by default, a textbook will not take on this role. The impetus for the publication of new primary mathematics textbooks now largely comes from publishers. Content reliability is obtained by appointing chief editors and advisory editors drawn from amongst mathematics educators and local authority advisors. Validity for the development of the text and the examples used is often achieved through involving teachers in the writing and piloting versions of the textbook series in schools prior to final publication. There is a possible scenario were a Mathematics Education establishment or some national foundation will place appropriate bids and receive funding from publishers to produce a 'definitive' national curriculum textbook. Should any designers of the Mathematics National Curriculum or the people experienced in the design of mathematics assessment packages be available for the roles of chief editor or advisory editors such a series will claim a credibility that is going to be hard for teachers to ignore. Truly such a textbook may well believe its own disclaimer that it will:

> take forward more quickly and more comprehensively the achievement of high standards and be an effective way of ensuring that good curriculum practice is more widely used.
>
> (NCC,1988,3)

However, the final transmission of the perceived view of the subject matter that is important is the responsibility of the teacher. In that sense, very little has changed. The content of the primary mathematics curriculum has been influenced by concern with standards, a need for expansion, and a wider understanding of the ways in which children learn mathematics. The use of a textbook can secure, through reflection on priorities and the needs of the child, the professional integrity of the teacher. On the other hand, the textbook can be used as a prop for the teacher's lack of knowledge. Almost by default, textbooks have taken on their role as intermediary - currently neither local authorities nor schools have had sufficient resources to provide either extensive longer-term in-service training for all teachers or the time for teachers to reflect upon measured responses to the new initiatives. Within to-day's climate, given all of the tasks that the busy teacher has to accomplish, it is an answer to the question "What do I do in Maths this afternoon?" which is paramount. The primary mathematics textbook is available to provide an answer. The danger signals inherent in both question and answer should be obvious. Only when teachers are confident with the material they have to teach and have a deeper awareness of how children learn, will they look beyond the gloss within textbooks and consider the mathematics and the variety of ways they may interact with textbooks.

Textbooks are not individualised learning programmes and neither do they attempt to provide material for what may be described as distance learning techniques. Fleming's reminder about the teacher's position within the classroom is as relevant now as it was fifty years ago. So too are Ruth Walker's comments. We may allow the textbook to take on some of the responsibility for disseminating a perceived view of the primary mathematics curriculum to the teacher, but it is overstating its value for us to believe that it can take on the responsibility for teaching. I have yet to meet a child who, left to work individually, takes any note of the teaching points within a textbook. Not only are most superfluous, but they cannot possibly go much beyond a schematic development of process. Within the confines of books intended for children, writers cannot be expected to cater for all of the eventualities within the classroom. Textbooks may provide a structure and a collection of suitable tasks, but their ability make more than passing comment to the qualitatively different ways in which children do mathematics is beyond them. It is only the teacher who can respond to this issue. Unless this is faced there is no doubt that in five, ten years, children's weakness in aspects of mathematics will again become a subject of controversy.

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Problem solving in mathematics instruction is a fundamental means of developing mathematical knowledge at any level, including at primary school. Problem solving is one of the most important, if not the most important, aspect of doing mathematics. Everyone who learn or use mathematics will face any. 1. kind of mathematical problem to be solved.Â As proposed in the 2000 NCTM's Principles and Standards, the standards in the school mathematics curriculum from prekinder-garten through grade 12 consist of contents standards and processes standards. The content standards (the content that students should learn) are: (1) number and operations, (2) algebra, (3) geometry, (4) measurement, and (5) data analysis and probability.