

MEP Primary Demonstration Project
Report for the 4th Consultative Meeting

15 November 2000

Summary of the Main Findings

The main points of this report are:

- Pupils in Cohort 1 (Year 1 in 1998/9, Year 2 in 1999/2000) obtained substantial gains in Key Stage 1 tests compare with national data. Using a linear scoring system:
Levels W, 1, 2c, 2b, 2a, 3 scoring 1, 2, 3, 4, 5 and 6 points respectively
we are able to show that *MEP* pupils gained on average 8% more points than the previous cohort, while the national gain was on average 6%.
- The gains in Cohort 1 were uniform across all levels.
- For pupils in Cohort 2 (Year 1 in 1999/2000), value-added scores on international tests were compared with those of a control group. In the *MEP* cohort, 11 out of 14 classes showed gains, 8 of them being significant,
- The Cohort 2 gains were across all levels, but particularly high for low ability pupils. This is in line with the *MEP* teaching philosophy, which encourages full participation by all pupils, but concentrates on building a sound mathematical foundation rather than moving on too quickly.
- Two of the key recommendations in *MEP* have gained more widespread support: seating and lesson structure. Seating configuration suitable for whole class interactive teaching is now being openly discussed by other researchers and OFSTED commented in its report on the first year of *The National Numeracy Strategy* that,

'More teachers are choosing to keep the class together for the main teaching activity, setting short tasks with time limits and reviewing progress before moving on.'

This is exactly what *MEP* recommends.
- Our future emphasis will be on the training of new *MEP* teachers, with the development of partly on-line modules (including video clips of good practice) to support the *MEP* style of teaching.

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1. Introduction

This report both updates the report made to the 3rd Consultative Committee and takes a wider view of the first two years of this extension of the *Mathematics Enhancement Programme (MEP)* from secondary to primary schools.

1.1 MEP

Following research findings in the Kassel Project, the CIMT team were keen to implement the strategies for teaching mathematics which had been observed in mathematically high performing countries such as Hungary and Poland. This was the basis of *MEP* and since 1996 we have been working with over 70 secondary schools to implement these strategies, firstly with Years 10 and 11 and currently with Years 7–9. The evaluation of Y10 and Y11 was very positive and in a recent comparison of the progress from KS3 to GCSE made by project schools with national data provide by QCA, project schools averaged an increase of 0.3 of a grade, with a rise to 0.5 of a grade in schools which we know through lesson observations to be implementing the *MEP* recommendations very effectively.

After this initial work in secondary schools we were very keen to extend the programme to primary schools. Although many primary recommendations were similar to those for secondary (see **Appendix 1**), it should be noted that some key advice was seen as being very controversial at the time and included:

- seating arrangements which enabled all pupils to see the teacher easily and which facilitated access to and from the board (with no encouragement for sitting pupils on the floor);
- use of extensive board space at an appropriate level for pupils to write on easily;
- encouragement of differentiation through outcome rather than by task;
- emphasis on a strong mathematical foundation (as opposed to numeracy) and on using correct language, layout and notation from the beginning.

1.2 Aims

One of the aims of this extension of *MEP* to primary was for secondary schools to work closely with partner primary schools in implementing *MEP*, so that eventually there would be an integrated Y1–11 scheme of work with common methods, language, notation and, most importantly, teaching philosophy.

This implementation would be on a year-by-year basis and would be supported by:

- videos of good practice,
- detailed lesson plans, copy masters and pupil practice books,
- additional resources such as number, sign and shape cards, number lines
- posters to encourage whole-class teaching and creative oral work.

Initial inservice would be provided for schools and it was expected that teachers in each cluster group, with help from the secondary coordinator, would form self-help groups

where they would share problems and discuss solutions. CIMT personnel would also visit schools to observe teaching and provide feedback for teachers.

The implementation would be evaluated through

- Key Stages 1 and 2 results
- yearly cumulative tests as part of the *International Project on Mathematical Attainment (IPMA)*
- lesson observations
- teacher questionnaires

and resources would be made freely available over the internet.

1.3 Objectives

The objectives for this initiative were to:

- improve understanding of basic concepts in mathematics;
- make mathematics fun for pupils and teachers;
- raise teachers' expectations of what pupils can achieve;
- instil pace and rigour into lessons, with correct mathematical layout, notation and language used at all times;
- improve results in national and international tests;
- encourage creative thought and use of logical strategies;
- implement an integrated Y1–11 scheme of work for mathematics, enabling secondary and primary schools to work more closely together and to understand and recognise the value of what each could contribute;

but ultimately to demonstrate that the teaching strategies used in mathematically high performing countries in Europe could also enhance mathematics teaching and learning in schools in the UK.

2. Progress

2.1 Cohort 1, Year 1 (1998/9)

MEP was first implemented in about 40 primary schools (including seven in Scotland), which were mainly in 10 clusters linked to partner *MEP* secondary schools.

In addition to practice books and resources for Year 1 pupils, a teacher resource book was provided for Reception teachers, based on the Hungarian kindergarten. Schools were asked to implement the *IPMA Test 0* with their Year 1 pupils at the beginning of the year as a baseline evaluation and *Test 1* at the end of the academic year. However, this aspect was not stressed enough and in retrospect we found that many schools were under the impression that the testing was optional.

Visits were made to most of the schools during the year and group meetings took place in many of the clusters. However, a number of problems occurred, including:

- teachers were reluctant to change their classroom seating from group configuration,
- secondary schools did not have time to give the support needed,
- how to cope with SEN pupils
- how to manage mixed age classes
- the content was seen initially as being too difficult, the type and writing spaces in the practice books too small, and the lesson plans too long.

However, there were also many successes, particularly in classes where teachers followed the lesson plans closely. We were often surprised by the depth of understanding of pupils, by occasional sparks of creative thinking and by the fact that both pupils and teachers were thoroughly enjoying their mathematics lessons, despite the challenges.

However, our main disappointment was that almost half of the schools withdrew from the project at the end of the first year for a number of reasons:

- a few teachers were either unwilling or unable to implement the lesson plans and made little use of the practice books¹, they did not persevere with mastery of the teaching style and were unable to cope with the pace, language, notation and concepts;
- Heads were worried that *MEP* was not compatible with the forthcoming *National Numeracy Strategy (NNS)*, despite the director's efforts to assure them that *MEP* was an allowable way of implementing the *NNS*;
- there was pressure from local numeracy consultants to dissuade schools from continuing with *MEP*;
- *MEP* was seen as inappropriate for mixed age classes and SEN pupils, in comparison with the mainstream *NNS* which encouraged differentiated group work;
- there was little support from some secondary coordinators and the central team at CIMT were unaware of this until well through the year.

It was also unfortunate that only a minority of schools undertook *Test 0*, whereas others (not, alas, the same schools) took only *Test 1*.

2.2 Cohort 2, Year 1 and Cohort 1, Year 2 (1999/2000)

To take the place of the schools which had withdrawn, and in view of the difficulties that were occurring with numeracy consultants, we introduced clusters of primary schools in Southend and Middlesbrough, where *MEP* was being promoted by the local *Education Action Zone (EAZ)*. We also gained feeder primary schools linked to two *MEP* secondary schools in Blackburn.

For these schools, the importance of taking *Test 0* and *Test 1* was stressed. As before, inservice was given to all teachers and self-help groups were formed. Throughout the year they held regular meetings, sometimes with CIMT personnel present and usually with I.e.a. staff in attendance. Reception and Year 1 resources for pupils and teachers were provided for all these new schools.

The Year 2 resources were sent to all Cohort 1 schools continuing into the 2nd year of the project and were supplemented by a revision pack in the second term to help pupils prepare for the Key Stage 1 tests. Schools were encouraged to implement *Test 2* at the end of the academic year with their Year 2 pupils.

Visits were made to many schools during the year but unfortunately some schools, for a variety of reasons, received a number of visits while others were not visited at all.

As in the first year, there were a variety of problems including the following:

- most Year 2 teachers were new to *MEP* and experienced the same difficulties as the new Year 1 teachers;

¹ We did make it clear that as long as schools accepted the broad thrust of our recommendations they could continue to participate but, in practice, schools which were not fully implementing the recommendations were reluctant to continue.

- in some schools, Year 2 classes were made up from reorganised Year 1 classes, resulting in a mixture of *MEP* and non-*MEP* pupils in the same class and thus causing even greater difficulties for the teachers concerned;
- mixed age classes and SEN pupils.

There were also some notable successes, with a few teachers continuing into Year 2 with their Year 1 class and some new teachers succeeding in implementing *MEP* very effectively in Year 2, resulting in enhanced Key Stage 1 results (see *Section 3.2*).

2.3 Cohort 3, Year 1, Cohort 2, Year 2 and Cohort 1, Year 3 (2000/2001)

Despite the success that some schools had at Key Stage 1, again there were withdrawals, leaving only 25 schools in total. The *NNS* seemed to be the major concern and even a school which had enhanced Key Stage 1 results and was keen to continue with *MEP* reluctantly decided to withdraw because of pressure from the I.e.a. numeracy consultant.

As before, inservice was provided for new Year 2 teachers in Cohort 2 (mainly in Middlesbrough and Southend) and Year 3 resources were sent to continuing Cohort 1 schools.

Several new problems have been encountered thus far, some out of our control:

- because of reorganisation, effective *MEP* teachers have been moved to other (non-*MEP*) year groups;
- supply cover (which seems to be more prevalent than in any other year) has had difficulty coping with the *MEP* teaching style;
- there has been a huge turnover of staff, with the appointment of new heads and/or mathematics coordinators who know nothing about *MEP* but have been trained to implement the mainstream *NNS*;
- project schools have not inducted new *MEP* teachers effectively and this problem we must address.

However, the availability of the resources on the internet² continues to influence others, both nationally and internationally (see *Section 4*).

3. Evaluation Data

As explained earlier, we do not have complete data for each cohort but we do have sufficient, in combination with lesson observations, to provide at least initial evidence that *MEP* in primary schools can be effective in enhancing learning.

3.1 Cohort 1, Year 1

Although we did receive some data, results were very patchy. We have already reported on some of the *Test 1* data at the end of Year 1. For example, the best performing school (which we will call *School A*) had the following scores out of 20 marks available:

| Class | No. of pupils | Test 1 | (<i>s.d.</i>) |
|-------|---------------|--------|-----------------|
| 1 | 19 | 16.8 | 2.6 |
| 2 | 18 | 17.4 | 1.5 |

2 The CIMT website now averages 17 000 hits per day, with *MEP* resources by far the most popular part of the site.

Note that Class 2 was taught entirely in the *MEP* style and shows some success, not only with the mean score achieved but also with the very small standard deviation. *School A* is in an attractive village where pupils have strong parental support, so the pupils would likely have had a high initial score on *Test 0*. Nonetheless, it is interesting to note that this school was ahead of both Singapore's and China's mean *Test 1* results!

These are the *Test 1* results of 16 schools:

| Cohort 1, Year 1 | | |
|-------------------------|--------|--------|
| No of pupils | Test 1 | (s.d.) |
| 423 | 14.0 | 5.0 |

but it should be noted that not all of these schools had been following the *MEP* strategies closely. Only four schools provided *Test 0* and *Test 1* data which are summarised below.

| Cohort 1, Year 1 | | | | | | | |
|-------------------------|--------|--------|--------|--------|-----------------|-------------|---------------|
| School | Test 0 | (s.d.) | Test 1 | (s.d.) | Mean Difference | Value added | No. of pupils |
| B | 5.9 | 2.6 | 12.0 | 4.2 | 6.1 | - 2.2 | 27 |
| C | 7.2 | 1.7 | 14.2 | 3.6 | 7.0 | - 0.8 | 13 |
| D | 6.8 | 2.2 | 14.3 | 5.7 | 7.5 | 0.0 | 35 |
| E | 2.2 | 1.9 | 14.2 | 5.3 | 12.0 | 2.1 | 27 |

The value-added score is based on using the average increase from *Test 0* to *Test 1* (\bar{T}) of pupils with similar initial scores and then using the formula:

$$\text{Value-added} = 10 \times \left[\frac{(T_1 - T_0)}{\bar{T}} - 1 \right]$$

for each pupil, where T_0 and T_1 are their test scores. In this way, the initial test score is used as the baseline for the value-added score.

School B only cherry picked from *MEP* and, despite several visits from CIMT and support from the partner secondary school, did not really embrace the *MEP* teaching style, preferring to heed the advice of its i.e.a. numeracy consultant (who, although knowing little about the project, was unsympathetic towards *MEP*). The school has now withdrawn from the project.

School E, which has the highest value-added score, is in a northern town and has a very large number of pupils for whom English is a second language and many other pupils who have problematic home backgrounds. Despite this, the class has done very well from a low baseline and, from lesson observations, the teacher of this class demonstrated a very effective implementation of the *MEP* teaching philosophy.

3.2 Cohort 2, Year 1

We do have more data for Cohort 2, although we are still waiting for some schools to send us their *Test 1* scores. We are also testing a group of non-*MEP* schools as a 'control'; these schools will also be sent teacher questionnaires at the end of each academic year but otherwise will have no contact with CIMT. (Of course, we cannot prevent them from accessing our web site!)

The table below summarises the current situation, using the control group as the database for the value-added scores.

Cohort 2, Year 1

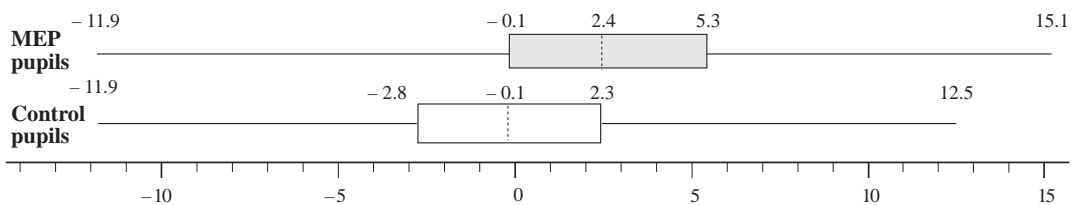
| Schools | Test 0 | (s.d.) | Test 1 | (s.d.) | Mean Difference | Value added | No. of pupils |
|------------|--------|--------|--------|--------|-----------------|-------------|---------------|
| <i>MEP</i> | 2.80 | (2.59) | 14.19 | (4.81) | 11.39 | 2.89 | 297 |
| Control | 4.01 | (2.47) | 13.48 | (4.70) | 9.47 | -0.04* | 208 |

The data provides limited but significant evidence for the success of *MEP*. The value added scores in *MEP* classes and *Control* classes are given below in increasing order.

C2, Y1 Class Value Added Scores

| <u><i>MEP</i> Classes</u> | <u><i>Control</i> Classes</u> |
|---------------------------|-------------------------------|
| -1.26 | -2.09 |
| -1.00 | -1.47 |
| -0.23 | -1.10 |
| 0.16 | -1.09 |
| 0.35 | -0.73 |
| 0.49 | -0.37 |
| 1.39 | -0.35 |
| 3.07 | -0.05 |
| 3.44 | 0.41 |
| 3.96 | 1.15 |
| 4.21 | 1.16 |
| 4.76 | 1.23 |
| 6.07 | 1.81 |
| 7.10 | |

The differences between the two groups can also be considered at pupil level and a summary of the pupil value-added scores is illustrated in this box and whiskers plot.

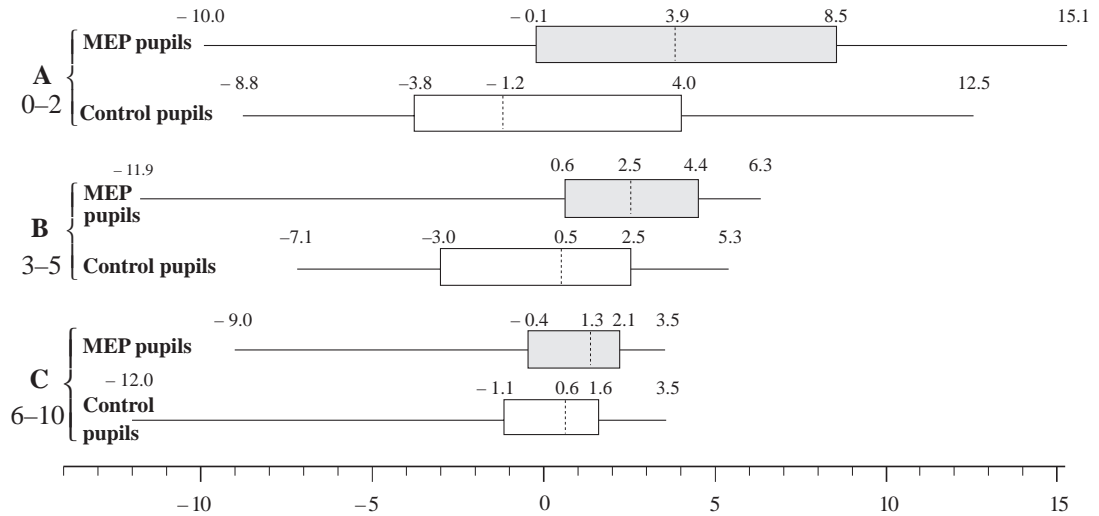
C2, Y1 Pupil Value Added Scores

Again, the data illustrates the enhanced value-added scores of *MEP* pupils, with the majority having significantly higher value-added than the Control Group, although the outliers are very similar.

It is of interest to see whether these enhanced value-added scores occur across the attainment range. Using ranges of scores in *Test 0* of 0–2, 3–5 and 6–10, the pupils in both groups can be divided into 3 equal stratospheres, A B and C. The value-added data for these three ability groups is again illustrated with box and whisker plots.

* This would be expected to be zero but smoothing at the edges results in its value not being exactly zero.

C2, Y1 Pupil Value Added Scores across 3 ranges of scores on *Test 0*



Notice that in each, the *MEP* box has been moved up significantly, although the increase at the top end is not so great. This is in line with the teaching philosophy, which aims to put in place a sound foundation without initially moving on too quickly.

It should also be noted that the *Control* schools volunteered to participate in the project, so we would expect teachers in these schools to be keen and enthusiastic, although we have no evidence to confirm this. A true control group might have made less progress.

Finally in this section it is of interest to note when the percentage obtaining correct answers changes significantly between *Test 0* and *Test 1* in the *MEP* and *Control* groups. For most questions, the responses are remarkably similar and only in the questions:

- Calculate $4 + \square = 9$ and $8 - \square = 3$
- Join $4 + 10$ to the correct point on the number line.
- Write the next number in the sequence: 3, 6, 9, 12, ...

did *MEP* pupils score, on average, significantly more than the *Control* group. There were just two questions where the reverse was true, although the difference was not so significant. These questions are:

- Write the numbers 12, 7, 15, 4, 1, 10, 8 in increasing order.
- Circle the odd numbers.

We must try to find out the reason for this, as both ordering numbers and identifying odd numbers are greatly emphasised during Year 1 of *MEP*.

3.3 Cohort 1, Year 2

We now have some *Test 2* results for Cohort 1 pupils now in Year 3, but the data are by no means complete. We also have Key Stage 1 results from some schools and can compare the levels of *MEP* pupils with the previous (non-*MEP*) cohort.

Key Stage 1 results are given as levels, which we have converted to a point score:

| <u>NC Level</u> | <u>Point Score</u> |
|-----------------------------|--------------------|
| W (working towards Level 1) | 1 |
| 1 | 2 |
| 2c | 3 |
| 2b | 4 |
| 2a | 5 |
| 3 | 6 |

This is to enable us to assess any differences between cohorts. For each of the cohorts, we found the average score per pupil and then calculated the % change. The table below compares the results of *MEP* Cohort 1 pupils with Cohort 0 (non-*MEP*) pupils.

Key Stage 1: 1999 to 2000

| <u>School</u> | <u>Increase/decrease</u> |
|---------------|--------------------------|
| A | 9% |
| B | 0% |
| C | 7% |
| D | 14% |
| E | 9% |
| F | 11% |

These are all schools which have followed *MEP* closely, although it is thought that *School B* did not follow *MEP* as closely in Year 2 (this was gleaned from the responses of the class teacher in the Teacher Questionnaire). All the other schools have, as far as we know, followed *MEP* closely throughout the first two years of primary school.

We can also compare these results with national results. Because of the implementation of the *National Numeracy Strategy*, gains would be expected and these are shown in the national summary table below.

Key State 1: National Data

(% of pupils achieving each level)

| <u>Level</u> | <u>1999</u> | <u>2000</u> |
|--------------|-------------|-------------|
| W | 3 | 2 |
| 1 | 10 | 7 |
| 2c | 23 | 17 |
| 2b | 22 | 23 |
| 2a | 20 | 25 |
| 3 | 21 | 25 |

Following the same point score analysis gives a national improvement of 6.4%.

Returning to the *MEP* schools, including one school (*School B*) which had not been following *MEP* closely, we see that our schools achieved an average increase of about 8%.

We are pleased that a full implementation of *MEP* has not only matched national gains but significantly exceeded them. We had not anticipated this early success as *MEP* stresses a strong mathematical foundation which we expected would be reflected more in Key Stage 2 results.

3.3 Teacher Questionnaires

At the end of each academic year, we have asked teachers to complete questionnaires in order to give us feedback; in Cohort 2 we also provided a modified questionnaire for teachers in the 'control' schools, replacing *MEP* with *NNS* where appropriate.

As with the testing, the response has been patchy but, nevertheless, enough have been returned to give us an idea of the impact of *MEP*, which in the main has been very positive. Typical responses circled for the question about 'general reaction to *MEP*' are

Rewarding Exciting Fun Enthusiasm

but also often circled are

Hard work Exhausting.

Interestingly, similar responses were circled in an equivalent question about the *NNS* in the questionnaire for control schools.

There were occasional negative responses from teachers but mainly from teachers who had been having problems implementing *MEP*. Comments included the difficulties of coping with SEN pupils and also with mixed aged classes but again, these comments were also present in the questionnaires for control schools.

Most *MEP* teachers agreed that the project had raised their expectations of what both they and their pupils could do, as well as raising attainment and understanding but a few teachers from the control schools also said this about the *NNS*. The biggest differences in responses between *MEP* and non-*MEP* teachers were on the questions about:

- *seating arrangements* (*MEP* teachers have changed to sitting pupils either in pairs facing the board or in a U-shape, whereas non-*MEP* teachers have pupils either sitting on the floor or grouped around tables);
- *how often pupils worked at the board or flip chart* (all *MEP* teachers circled 'every lesson', but the responses from non-*MEP* teachers ranged from 'regularly' to 'never');
- *how often individual mistakes were used as teaching points with the whole class* (again most *MEP* teachers circled 'every lesson' but non-*MEP* teachers circled 'rarely' or 'never').

Two questionnaires stood out. One was from a new Year 2 teacher who clearly had difficulties implementing *MEP*. She thought it was 'boring' and thought that all pupils working from the same practice book was 'uninspiring'. She actually abandoned *MEP* part of the way through the year and changed back to mainstream *NNS*. Interestingly, her pupils (who had scored particularly well on *Test 1* at the end of Year 1) did not do so well on *Test 2*, nor indeed at Key Stage 1.

The other questionnaire comes from a teacher in one of the schools which has done well but has now withdrawn. She states that:

'parents think that it is brilliant and challenging for the children.'

and

'My pupils enjoy it and complain when we don't do it, which is not very often.'

and her final comment is:

'We would have liked to continue using *MEP*. It is a real shame for the children that we are powerless to fight against the Curriculum Management Committee and the local maths adviser.'

4. Influences

Despite some of the setbacks already outlined, we have learned much during the first two years of implementation and have managed to influence some of the initiatives in the UK and also, through the internet, practice in other countries.

- (1) Our emphasis on whole class teaching (with no significant group work) has influenced the *NNS*, whose latest advert in the *TES* stresses that:

'you do not have to teach in groups in the main phase of the lesson but can continue with whole class interactive teaching'

and the latest set of sample lesson plans published by the *NNS* are more in line with *MEP* lessons and have little differentiated group work, which is a major change on their part. This is a quote from the report on the first year of the *National Numeracy Strategy*:

'More teachers are choosing to keep the class together for the main teaching activity, setting short tasks with time limits and reviewing progress before moving on.'

- (2) After struggling to persuade teachers for the past two years to adopt suitable seating arrangements for whole class teaching, we are pleased to see a move in this direction by other researchers (see **Appendix 2** for details of the work by researchers at Nottingham Trent University).
- (3) On the international stage, many teachers and academics in other countries have clearly appreciated our web site (**Appendix 3** gives some email contacts) and many organisations in other countries have now put in links to the *MEP* web site (see **Appendix 4**). Of particular significance is contact with Finland, where the National Board for Education is currently negotiating with CIMT for a Finnish version (on the internet) of our *MEP* primary resources.

5. Future Direction of the Project

Despite a variety of problems, we have been able to show that, provided the conditions are suitable (i.e. no mixed age classes, confident and capable teachers, stable staff, support from school management and i.e.a. personnel, etc.), *MEP* strategies do enhance mathematics teaching and, even at Key Stage 1, show a significant increase in attainment beyond that obtained through the mainstream *NNS*.

Our next priority is to find further ways of supporting teachers and schools in difficult circumstances and of providing a mechanism to enable teachers in non-*MEP* schools to implement the teaching strategies effectively.

One way is to provide not only the resources on the internet (as we currently do) but also video clips to illustrate the teaching philosophy and link them to the lesson plans. This would also provide suitable training material for mainstream teacher training which we need to influence as a matter of priority.

We hope that we will be able to continue the yearly development of *MEP* to produce an integrated Y1–11 course, internet based and ideally with an interactive version which could be used for extra practice and revision, or when pupils have been absent.

In summary, we are pleased to have evidence for the success of *MEP* beyond the mainstream *NNS*, particularly as we have been concerned at this stage in laying down a solid mathematical foundation on which to build in future years.

Appendix 1 – *MEP Teaching Philosophy*

General

- Clearly specified schemes of work
- Planned combination of interactive, whole class teaching and individual work
- Teaching with pace, enthusiasm and humour, continuously monitoring the progress of all pupils
- Clear, precise description of topic or concept being taught
- High quality interaction with whole class ethos, pupils working at the board and all pupils kept on task
- Mathematics correct and precise at all times, whether spoken or written
- Mistakes used as teaching points for the whole class
- Emphasis on mental work, particularly in the early years
- Limited calculator use, and only when pupils have gained competence in basic numeracy
- Applications and meaningful investigations used only when appropriate

but above all,

- putting the teacher back as the orchestrator of the learning throughout the lesson.

MEP Strategies for Primary

- Seating at desks in pairs facing the front if possible, or similar arrangement which facilitates whole-class interactive teaching and allows easy access to the board
- Lessons well prepared; board prepared; relevant teacher resources close at hand; pupil resources on desks
- Pupils encouraged to build up own box of resources, e.g. ice-cream carton containing collected items (buttons, shells, beads, stones, etc.) as well as counters, cubes, number/sign/shape cards and number lines
- **All** pupils involved and on task; individual work thoroughly monitored
- Number lines, not 'washing lines', used, leading to natural positioning of fractions and decimals
- Class number line positioned so that pupils can see and touch it easily
- Number and sign cards used for early work when pupils do not have writing skills, or for quick feedback
- Demonstrate when necessary; relate to pupils' own experiences and to real life whenever possible; use names of pupils in class in context problems.
- Encourage pupils to work at board in front of class and class to agree/disagree, point out errors or offer alternative methods of solution
- Emphasise mental and oral work, encourage pupils to read out the questions in practice books and repeat problems in their own words
- Low ability pupils given extra lessons where possible; use enlarged copy masters or practice book pages
- Addition (up to 20) and multiplication (up to 10×10) facts learned by heart and practised regularly
- Spoken and written maths **always** correct and logical: equations balancing, whole equation stated, even for simple sums,
- Praise generously when deserved; be encouraging and supportive about misunderstandings;
- Make lessons fun!

Appendix 2 - TES article

“Secret is in the Seating”: David Budge

Times Education Supplement, 29 September 2000. Pages 26-27

The report in the TES was based on a paper presented at the British Educational Research Association Conference in Cardiff on 7th September. The paper, entitled “Space for Learning in Primary Classrooms: bridging the gaps” can be accessed at :

<http://www.leeds.ac.uk/educol/documents/00001532.htm>

The project which it describes is to be reported in a book to be published in 2001 by Open University Press.

A full review of the research evidence on which this project builds was published in 1996

Hastings, N. Schwieso, J. & Wheldall, K. (1996) ‘A Place for Learning’ in Croll, P and Hastings, N. (Eds) **Effective Primary Teaching: research-based strategies**. David Fulton Publishers: London.

If further information would be helpful, please let us know:

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Appendix 3 – Internet links

From: admin.vlc@sfeu.demon.co.uk

The Scottish Further Education Unit is currently developing the Virtual Learning Centre. In this we have created an Information Gateway which contains links to Internet and CD-ROM resources. These have been evaluated to set criteria, reviewed and mapped to the Scottish vocational education and training curriculum. We would like your permission to include your site in this Information Gateway.

From: Per-Daniel Liljegren <edin.liljegren@mbox200.swipnet.se>

Subject: Translation, quotations and links

Thank you for an interesting site (which I have not explored fully yet) but that I would like to share with other Swedish K-12 students. Would it be possible to use some of the material from your site? I will definitely link to it but I would be glad to quote some of it directly and even translate various parts to Swedish.

From: "Humphrey Moynihan" <greenmt@iol.ie>

Greetings from Ireland. I represent the Irish National Centre for Technology in Education. We are working with the Department of Education in Ireland and Intel Corporation in developing a national education portal, which will be titled ScoilNet2000 (Scoil is the Irish for school). It is hoped that your website can be featured on the new site. Should you grant us permission to link to your site, your content will be framed within the ScoilNet portal navigation.

From: Susan Gibson <susan.gibson@rdiu.anglia.ac.uk>

We at mPowerNet, part of Anglia Polytechnic University, are NOF funded training providers in ICT skills to cross curriculum teachers throughout the UK. Our web site is

www.mpowernet.anglia.ac.uk.

We are in the process of constructing training materials and would like to Hyperlink to your Web site as a learning resource, in some cases using a screen shot of your Web site as the link. This e-mail is requesting permission for the above, we look forward to receiving a reply.

From: Ann Joy Hodges<user@agribank.com>

I would like to inquire if I might have permission to link to your site. I am a librarian for the Information Services Group at AgriBank in Saint Paul, Minnesota. We are an agricultural mortgage company headquartered in Saint Paul with smaller offices in several states. I am working on a library Intranet information/reference site. I am trying to organize information and I see your site as one that would be useful to lead persons to in a direct manner. Please let me know if this would be acceptable.

From: "Jones, Mark9" <Mark9.Jones@uwe.ac.uk>

An excellent site. Is it OK to link to it from a new site for schools I am developing for the University of the West of England?

From: =?ISO-8859-1?Q?Bj=F8rn_Smestad?=<bjorns@saturn.hifm.no>

Høgskolen i Finnmark (Finnmark College) is about to create a website with problems and activities for use by Norwegian teachers. I have seen your webpage, and would like to translate some of the problems and activities and include them on our site. (It would be nice for Norwegian teachers not to have to translate them themselves). Would it be possible to obtain permission to do this? Høgskolen i Finnmark is government-funded, and will not have a profit. (From this site all contents will be free for everyone).

From: Barbara Bolko <BarbaraB@mcintoshcollege.com>

I am working on web site that will support students in our two-year college system. Please tell me how to get permission to link to your excellent site.

From: Sara@OpenHere.com

Your site was recently submitted to OpenHere.com. We have reviewed your site and decided to include it. OpenHere is one of the 10 largest index and search sites on the Internet and is specifically focused on creating resources for the family.

Appendix 4 – Internet Contacts

From: "**Geoff Pumford**" <pentrebr@btinternet.com>

I have just come across the university's page of resources for maths. Being a classroom teacher I find this page to be excellent.

From: "**Mircea Mitrofan**" <mircea.mitrofan@londonbiblecollege.ac.uk>

Hi. I think that what you are doing with this program and web site is great! Thank you.
Mircea Mitrofan, Foreign student (Romania)

From: "**Leonardo Felin**" <nt-admin@conex.com.br>

I've found your page very useful, clear, interesting and neat. Thanks for the help you provided!
Leonardo Farenzena Felin, Microsoft Certified Professional, Administrador de Rede,
IFX do Brasil - Porto Alegre

From: **Kenneth Eichenberger** <eichenbe@jfcom.mil>

One of the Best websites I have ever been to. I was impressed. I hope this stays on the web.

From: "**k**" <kristansanderson@hotmail.com>

This is a brilliant site. Very teacher friendly and perfect resources that are ready to use. Well Done.
Catherine Hall, Katharine Lady Berkeley's School

From: "**Waite, Matthew**" <Matthew.Waite@granadamedia.com>

Super site!! That's all I wanted to say.

From: **Ricardo Bernardes** <ricardo@cppsul.embrapa.br>

Your site is very useful! Thanks and Congratulations from Brasil!

From: **KrPercy@aol.com**

My name is Keith Percy of Temecula CA. I'm currently enrolled in AP Chem at t.v.h.s (Temecula Vally High School) . Your web page is so powerful in helping me do my work that I felt it was needed to thank you. Once again thank you and keep up the good work

From: **TGPilgrim@aol.com**

I just located the site. What a valuable tool with school age children! Needless to say, the site has been added to my list of favorite sites. Thanks for the great work.

From: **JBU Student** <student@jbu.edu>

I am studying mathematics and science and have found this site to be of the most importance so far. It extremely helpful. Thank you. Gina Patterson

From: "**Dhr Vles**" <bugatti@zeelandnet.nl> Congratulations on a brilliant site! hans vles

From: "José Andrés Morales C." <joseamc@prodigy.net.mx>

Los felicito por su pagina en la red, es de lo más interesante que hemos encontrado en internet. Congratulations, José Andrés Morales Caballero.

From: **LISALuvmaine@aol.com**

Your program sounds wonderful. I teach sixth grade in an inner city school and believe this could be exactly what I am looking for, but I can't find the 4th, 5th, and 6th grade work. Can I find them on line?

From: "**lontours**" <gerry@lontours.netlineuk.net>

Maths teacher in Derbyshire - just discovered this site - amazing - the most exciting thing I've found on the net so far. Your MEP development project is amazing in the way it has been thought out. I am hoping to persuade the dept to adopt it next term. It is the best thing I've seen in 27 years of teaching.
Gerry Johnson