

Multi-sensory approach to the teaching and learning of mathematics.

Pilot project 2005



A joint initiative by the Primary national Strategy Team, the School Support Service and the Psychology and Assessment Service.

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An action group was created in July 2004: Susie Mackenzie (Educational Psychologist), Louise Matthews (Maths Consultant) and Jane Sellers (School Support Service). Helen Wallis (Assistant Educational Psychologist) joined the group in September 2004.

The plan was to develop a Wave 3 programme/package for KS2 and KS3 children, in particular to explore the possibility of using Numicon and other multi-sensory materials as a Wave 3 intervention.

Context:

The project began because the services involved felt there was a lack of materials to support Wave 3 interventions in mathematics. By pooling our knowledge we were aware that there were a number of individuals at KS2 who required something different from and additional to teaching methods and materials delivered in the daily maths lesson following the National Numeracy Strategy.

Summary of main findings:

- Pupils improved their maths skills and visual memory skills (for some this was after a long period not making progress);
- High pupil confidence using the materials, high levels of engagement and enjoyment;
- Participating schools were positive about the approach and materials, and keen to continue using them as Wave 3 group intervention, and with individuals.

Developments:

- All schools involved in the pilot project have kept the materials and continue to use them and develop multi-sensory approaches;
- A number of other schools and SILCs in Leeds are interested in using this approach at Wave 1, 2 and 3. Leeds schools are buying the materials and signing up for training;
- The Action Group have set up a range of training opportunities in using a multi-sensory approach (Foundation to KS3, and in SILCs), and raising awareness within other inclusion support services, such as EY SEN team and VIS;
- Members of the action group are monitoring a new cohort of schools using multi-sensory maths as Wave 3 intervention in 2005/2006.



The project:

In preparation for this initiative members of the action group looked at pilot projects in other areas, e.g. Brighton and Wiltshire (Wing & Tacon, 1999; Ewan & Muir, 2002), conducted research on the internet (Horner, 2004) and engaged in a consultation meeting Romey Tacon (Multi-sensory teaching and Numicon Expert). The Action Group had looked at recent research findings suggesting a relationship between poor visual memory and poor mathematical skills (Kyttälä, Aunio, Lehto, van Huit and Heutamäki, 2003; Mayberry & Do, 2003).

The action group felt that the delivery of the National Numeracy Strategy was not fully meeting the needs of some individual pupils. These pupils were identified as having gaps in their mathematical understanding that would be best addressed by making more use of visual and kinaesthetic senses to develop basic number skills. The group were also aware of pupils in Specialist Inclusive Learning Centres (SILCs) having difficulties making progress with mathematics.

The Action Group felt this could be done through the use of

- Number rich environment
- Number lines
- Visual Memory Games
- Structured apparatus
- Visualising
- Whole body gestures
- A variety of learning styles, including multi-sensory approaches



The 'multi-sensory approach', as the name suggests, makes maximum use of the different senses, in particular integrating hearing, seeing and feeling. The structured apparatus selected for use in this pilot (as seen in the pictures) relates the numbers 1 to 10 to a specific shape (called 'plates') each with a different colour. Children are encouraged to handle the plates and use visual patterns to enable them to develop internal representations of numbers, the number sequence and relationships between numbers. The use of a distinctive 10 plate and 100 board reinforce learning relating to base 10 (such as learning number bonds to ten, relationships between 1 to 10 and 11 to 20). Many of the games used in the teaching activities included specific instructions to learners to visualise shapes, trace them, put them in order, move shapes about etc. and explicitly required learners to visualise patterns or create a visual memory for a plate or pattern. The visual and tactile senses are also addressed through very clear, coloured number lines, creation of a number rich environment (such as themed room/wall displays) and whole body gestures for reinforcing operations (for example placing arms in + and = positions). For some groups of pupils taking part, working at higher levels of the National Curriculum, number tracks and rods were also used to reinforce learning, for example addition and subtraction with two digit numbers, multiplication and division.

Particular schools and individual pupils were selected in September 2004 by the Primary National Strategy team, the School Support Service and the Psychology and Assessment Service (for details see Appendix A).

There were 23 pupils from nine schools. The pupils were in one of the following categories:

- Three Primary Schools KS2 Wave 3 groups (22 pupils)
- 1 Specialist Inclusive Learning Centre at KS3 (2 pupils)
- Individual pupils in five Primary Schools already supported by PAS and SSS and with entrenched difficulties in mathematics at KS2 (5 pupils)

As part of the project Schools were given a budget to provide eight days supply cover. This included funding for non-contact time within school. A programme of training, support, monitoring and group meetings was devised. Each school was provided with a full range of multi-sensory teaching equipment and teaching resources, including Numicon plates, boards, number rods, number lines, spinners, numeral cards, feely bags, wall number line and activity cards.

The Action Group made arrangements to collect data relating to individual pupil progress before and after the pilot, and also was able to provide some baseline psychometric assessments using standardised tests (e.g. British Ability Scales and specific number skills tests) for the five individual pupils in Primary Schools and one KS2 Wave 3 group in a Primary School. Schools were asked to complete ongoing records, which were also used to assess individual progress.

All schools approached were keen to participate. The initial one-day training with Romy Tacon took place in November 2004. This training was provided for one teacher and teaching assistant from each participating school (see photo above). The piloting of new materials was planned for January to May 2005. There were three group meetings after the initial training at intervals during the pilot. At the end of the pilot period there was one further meeting to discuss and evaluate the project. In addition each school was assigned individual support from the Action Group through visits to schools to observe teaching and learning, collect pupils views and discuss issues with staff.



Results

Tables providing details relating to performance and progress can be found in Appendices.

Psychometric data recording baseline and post intervention performance on tests of specific cognitive skills such as quantitative reasoning, visual and auditory memory and speed of processing (from BAS), and mathematical understanding (WOND and BNS) for ten pupils can be found in Appendix B.

Baseline measures showed that pupils selected for this project had significant deficits in quantitative reasoning and visual memory (mean ability scores 50 and 82 respectively, average range being 85-115), but not in processing speed or auditory memory (mean ability scores 90 and 140 respectively, average range 85-115).

For this group of 10 pupils (aged 8 and 9 years) ability scores for quantitative reasoning were significantly below average, with a mean age equivalent score of less than 5 years at the start of the project. Their ability scores improved following the introduction of multi-sensory materials in this pilot (mean ability scores baseline 50 and post-intervention 60), and though still below average, the mean age equivalent score for quantitative reasoning improved to just over 6 years. Performance on the visual memory test, below average at the start of the intervention also improved following the intervention (mean ability scores 82 and 89, age equivalent scores 6:10 and 7:02).

Performance on the Wechsler Operational Number test (WOND) and Basic Number Screening test (BNS) were difficult to interpret due to many of the ten pupils performing at floor levels for both tests, but there were significant improvements in raw scores for both tests (see Appendix B) following the intervention using multi-sensory materials for six months.

Progress for each pupil was also monitored using PIVATS (see Appendix C). Staff provided PIVATS data for the previous year (July 2004), for December 2004, prior to introduction of the materials and for May 2005 following six months using the multi-sensory materials. Many of the pupils in this pilot programme, though aged 8 and 9 years, were operating below National Curriculum Level 1, for example operating at P6, P7 or P8.

In many cases pupils had made no recorded progress in the period from July 2004 to December 2004, or limited progress within a level (such as movement from P8d to P8b).

However, following the intervention using multi-sensory materials from January to May 2005 many pupils were making progress from one P level to the next, or from P levels to National Curriculum Level 1 (see Appendix B).



Summary data for all pupils is provided in Appendix C, mean scores in Table 1 show considerable improvements in PIVATS scores for the groups following the introduction of the multi-sensory maths programme as compared to the progress made in the six months prior to the project.

Table 1: PIVATS scores six months before the programme, at the start and at the end of the programme

N=23	Mean PIVATS scores (NC levels in brackets)		
	Six months before introduction of MSM	Before introduction of MSM	1 term after introduction of MSM
Maths	32.6 (1Ad)	34.7 (1Ab)	40.9 (2Cc)
Number	32.9 (1Ad)	35.1 (1Aa)	43.2 (2Ca)
Shape and space	33.6 (1Ac)	35.2 (1Aa)	42.4 (2Ca)

There was very little progress in relation to the National Curriculum in the six months prior to the introduction of this programme, and this was consistent for all pupils participating in the project (average progress being about 2 PIVATS points or equivalent to moving up two grades within a NC level, e.g. from 1Ad to 1Ab. However, after the introduction of the programme the average increase in National Curriculum levels was equivalent to gaining one grade, e.g. moving from 1Ac to 2C. It was noted that progress was not uniform for all pupils, as discussed below some pupils made massive progress, while some were still making slow progress.

Table 2 : amount of progress (Increases in PIVATS scores) before the intervention and after

N=23	Mean scores (increase in PIVATS score)	
	6 months before MSM	1 term using MSM
Maths	2.1	7.1
Number	2.2	7.1
Shape and space	1.6	7.4

Progress in relation to the National Curriculum after the introduction of multi-sensory maths was considerably faster than had previously been the case, and these differences were tested for significance using related t tests. For basic maths the average progress before the project had been 2.1 PIVATS points, but after one term using a multi-sensory maths programme average progress was 7.1 PIVATS points, $t = 3.67$, $p < 0.001$. For the application of number the average progress before the project had been 2.2 PIVATS points, after the programme it was 7.1 PIVATS points, $t = 4.4$, $p < 0.001$. For shape and space average progress before the programme had been 1.6 PIVATS points, and after following the multi-sensory maths programme progress was 7.4 points, $t = 4.5$, $p < 0.001$.

It should be noted that some pupils made more significant progress than others following the multi-sensory maths programme and further research and investigation could look at why some pupils made extremely rapid progress, while others did not. For example exploring such factors as the quality of delivery of the programme, the extent to which schools were able to create number rich environments, the extent to which the multi-sensory approach become part of the delivery of the daily maths lesson and the extent to which

parents were involved. Only one pupil still struggled to make progress following the programme and factors cited above may have contributed to her lack of progress.

The two pupils attending the Specialist Inclusive Learning Centre (SILC) had not made any discernable progress from July 2004 to December 2004 (PIVATS constant at 1Aa and P8c for Maths and Number), but both made considerable improvements following the introduction of multi-sensory materials and were achieving NC level 2C for Number in May 2005. One of the pupils at the SILC has a visual impairment as well as a severe learning difficulty and her progress and ability to 'feel' shapes and patterns using her fingers was noted early on the intervention. The tactile quality of the materials, and use of shape to reinforce understanding of number and number patterns were clearly beneficial to her and the Action Group have been able to video her using the materials. This video is being used particularly to train school staff introducing the materials to pupils with visual impairments. In the video the teaching assistant can be seen explicitly asking pupils to 'see the shape' in their head, and used mathematical language to reinforce learning during all games.

Some other individuals in Primary Schools also showed significant gains in PIVAT scores following the intervention, after making little progress in 2004. For example one 8 year old (with Cerebral Palsy) had been 'stuck' at P6 from July 2004 to Dec 2004, but had improved to National Curriculum level 1C in May 2005. Again the 'tactile' nature of the materials, and use of visualising and 'feeling' games and activities appeared to help this boy make progress with his understanding and ability to use numbers. As in the example of the SILC pupils, staff in the school showed good understanding of the need for tactile experiences for this boy, and emphasised feeling and visualising shapes in their teaching.



School Evaluations

All schools participating in the pilot were asked to complete a brief questionnaire in June 2005. All schools returned their forms and a summary of all responses is included in Appendix D. Analysis of responses from school staff using the materials and implementing new teaching programmes is summarised below:

- School staff liked the structured teaching activity cards and found them easy to follow;
- Staff were positive about the training and monitoring arrangements, and particularly positive about the initial training day
- All school staff felt there had been a positive impact on pupil motivation and confidence, including in some cases increased confidence in other lessons.

- All school staff were confident about using multi-sensory methods in future and reported that they were likely to use the materials in the future with individuals with deficits in understanding and Wave 3 interventions.
- Staff in some schools were less sure about how to integrate multi-sensory approaches into whole class mathematics lessons.

Teachers and Support Assistants participating in the project were also asked for verbal feedback at the final monitoring meeting, and here are some personal responses:

"It has shown me the need for a multi-sensory approach to teaching mathematics at all levels"

"It filled a gap - we had tried everything"

"It was a life-line"

"...increased confidence and speaking and listening skills"

"confidence improved, skills improved, children love it"

Pupil Evaluations

At all stages of the project pupils were asked about their views regarding learning about numbers, and their responses to the new materials and multi-sensory approach. A sample of ten pupils were given a brief questionnaire before the intervention (December 2004) and after 6 months using the materials (May 2005), in addition to the standardised tests described earlier. All pupils were also asked to comment on the activities during monitoring visits by members of the Action Group.

Even though many of the pupils had made little progress with maths before the intervention and were not performing at the same level as peers many were positive about learning maths at the start of the project, but at the end of the six months using the materials all pupils that answered the questionnaire said that they 'liked learning maths a lot' (see Appendix E). Similarly, some of these pupils were confident at the start of the programme, and they maintained that high level of confidence, but there were two pupils that were not at all confident at the start (see Table 2 in Appendix E), but they increased in confidence during the programme (to 'a little' confident). At the end of the programme six of the 10 pupils surveyed rated themselves as having a lot of confidence in maths lesson

Comments from a range of pupils participating in the project:

"It helps us do odd's and even's"

"It helps us to add up to ten"

"We used to be the rubbish group,

now we sometimes know more

than the rest of the class"

"Now I can see it in my head"

"It's good"



"My favourite is hiding the plate"

"I can do number bonds to ten"

"We like this don't we"

"We like these games"

"There are different colours and

they've all got different shapes"

"We like maths now"
"We like doing 'unicorn' "
"I can see my tens and units"
"I like hiding the pegs"

"Ah that's what you mean"
"I can count in two's now"

Next steps

The project began as a Wave 3 intervention, and this is how it was perceived in some participating schools. The Action Group quickly saw its relevance at Wave 1 and 2, particularly in the foundation stage and through KS1 to KS3. The Action Group made an educational visit to Brighton and West Sussex in 2005. In these authorities a multi-sensory approach is being developed across KS1 and KS2 (including Wave 1 and 2). This visit enabled us to observe whole class and Wave 2 teaching and talk to the teachers involved. As a result of this trip we want to promote the multi-sensory approach not simply as a Wave 3 or 'special needs' intervention as 'additional to' the National Numeracy Strategy, but also to look at how the multi-sensory approach and materials can be incorporated into all maths teaching and learning, and linked to the NNS to enhance learning for all pupils.

The Action Group are encouraging Leeds schools to see multi-sensory materials and approaches as enhancing all teaching and learning of mathematics, starting in the Foundation stage and continuing through KS1 and KS2. We recognise that using the materials and teaching cards are not enough, it is vital that teaching staff have a good understanding of the rationale behind the approach and are trained in how to use multi-sensory materials and equipment effectively.

With this in mind the Action Group have proposed:

- Multi-sensory approach to teaching mathematics will be included in all training delivered by the Primary National Strategy
- Specific joint training for mathematics coordinators and SENCOs on wave 3 provision including multi-sensory teaching
- Training for different departments throughout inclusion services and school improvement, including VIS, PAS, SSS, EY SEN teams
- Workshop for primary mathematics coordinators through the primary mathematics conference 2005
- Workshops for EY SENCOs in November 2005
- Part of the primary leadership programme in 2005
- 23 Primary Schools and another Specialist Inclusive Learning Centre have expressed an interest in being involved in a future project. Training has been offered to these schools in Autumn 2005



Members of the Action Group have been asked to deliver training in neighbouring authorities.

References

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Horner, V. (2004). Numicon Success. The Down Syndrome Educational Trust, www.downsed.org/news/archives/2000/2000-12-10-Numicon-Success 16/09/2004

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Mayberry, M. T. and Do, N. (2003). Relationships between facets of working memory and performance on a curriculum based mathematics test in children. *Educational and Child Psychology*, **20** (3), 77-92.

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Appendix A

Leeds schools involved in the 2005 project

Rayville PS	small group	Year 3
Swinnow PS	small group	Year 3
Victoria PS	small group	Year 3
Grimes Dyke PS	Individual	KS2
Hunslet St Mary's PS	Individual	KS2
Pudsey St Joseph's PS	Individual	KS2
Westerton PS	Individual	KS2
Windmill PS	Individual	KS2
North West SILC (Boston Spa site)	2 pupils	KS3

Pictures drawn by pupils at Windmill Primary School



Appendix B

Pre and post intervention testing

**Multi-Sensory Materials Pilot
Summary Data Dec 04/May 05**

	C.A.(Dec04)
Mean	08:08
range	08:02 to 9:08

N= 10

BAS subtest	mean ability scores		t test	median BAS subtest	age equiv scores	
	Dec-04	May-05			Dec-04	May-05
Quant Reason	50	60	t=1.77	Reason	<5:0	06:02
VIS MEM	82	89	t=0.98	VIS MEM	06:10	07:02
AUD MEM	140	141	n.s	AUD MEM	10:03	10:03
Proc Speed	90	92	n.s	Proc Speed	07:09	07:09

WOND SS	mean scores		n.s	t=2.16	p<0.06
	Dec-04	May-05			
Raw score	17	20			
BNS Raw score	3.3	4.4	t=3.09	p<0.02	

Appendix C Figures relating to progress with the National Curriculum

Table 1

N=23	Mean PIVATS scores (NC level in brackets)		
	Six months before MSM	Before introduction of MSM	1 term after introduction of MSM
Maths	32.6 (1Ad)	34.7 (1Ab)	40.9 (2Cc)
Number	32.9 (1Ad)	35.1 (1Aa)	43.2 (2Ca)
Shape and space	33.6 (1Ac)	35.2 (1Aa)	42.4 (2Ca)

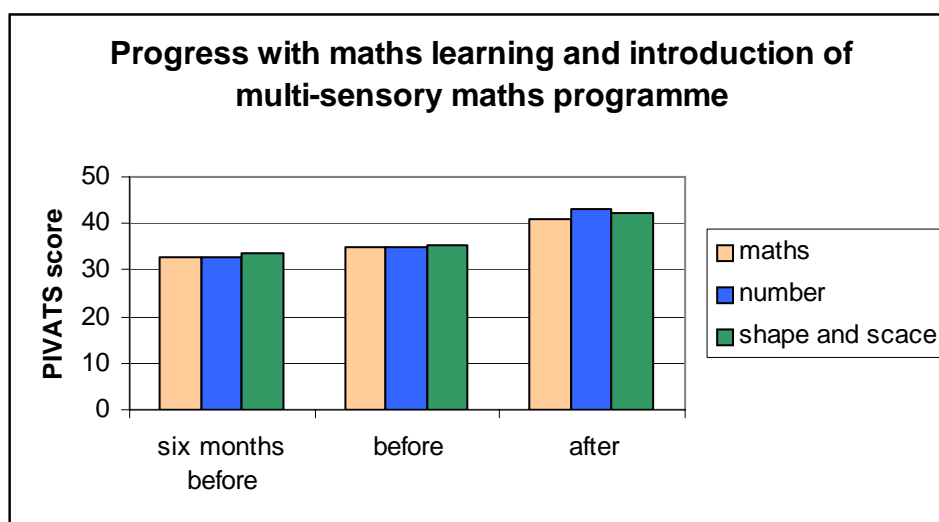
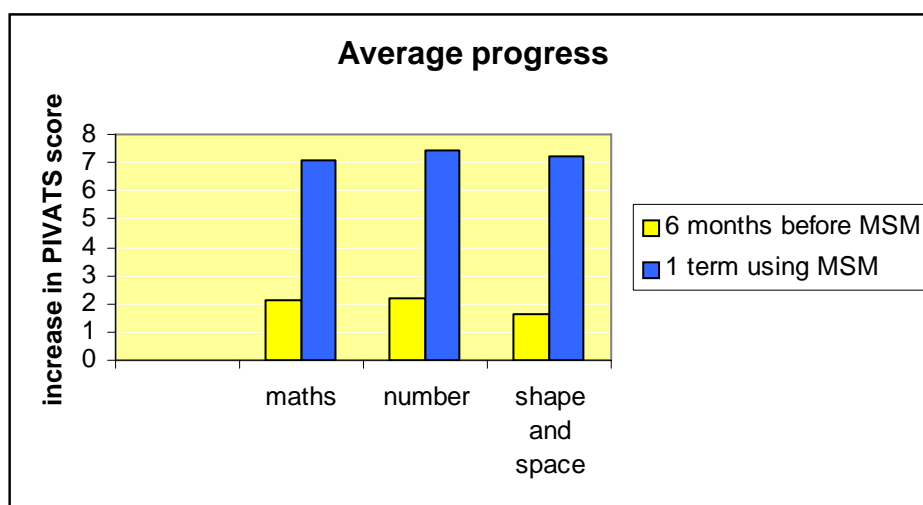


Table 2 : amount of progress before the intervention and after

N=23	increase in PIVATS scores			
	6 months before MSM		1 term using MSM	
	Mean scores	Range	Mean scores	Range
Maths	2.1	-1.6 to 7.5	7.1	0 to 17.5
Number	2.2	0 to 7.5	7.1	-0.4 to 21.5
Shape and space	1.6	0 to 7.5	7.4	-1.6 to 16.5



Appendix C Individual Scores

Progress using PIVATs scores

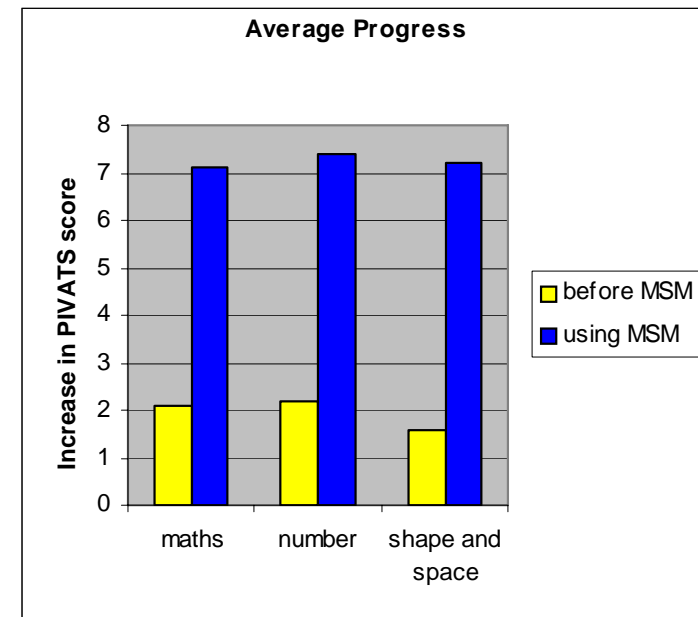
		maths			number			shape and space		
		July 04	Dec 04	May 05	Jul 04	Dec 04	May 05	Jul 04	Dec 04	May 05
NE SILC	A	35	35	35	35	35	39.5	23	23	39.5
	B	18	18	35	18	18	39.5	18	18	25
individuals	GD	23	23	23	28	30	33	28	30	33
	HStM	28	28	35	29	30	34	18	18	24
	PStJ	9.2	7.6	8.4	9.2	9.6	9.2	7.2	7.2	5.6
	West	9.2	9.2	23	9.2	13	23	9.2	9.2	23
	Wind	12	20	34	16	17	29	15	18	29
Wave 3	1	39.5	39.5	39.5	39.5	39.5	56	39.5	47	56
Victoria	2	18	23	33	18	23	33	28	28	33
	3	39.5	47	47	39.5	47	56	39.5	39.5	47
	4	39.5	39.5	39.5	39.5	39.5	47	39.5	39.5	39.5
	5	39.5	39.5	39.5	39.5	39.5	47	39.5	39.5	39.5
	1	42.5	47	50	39.5	47	50	47	56	56
Swinnow	2	47	47	50	47	47	50	56	56	66
	3	47	50	60	47	47	56	56	56	66
	4	33	39.5	44	33	39.5	47	39.5	39.5	47
	5	39.5	39.5	42.5	39.5	39.5	42.5	39.5	39.5	42.5
	6	47	47	56	47	47	56	47	47	56
	7	44	47	50	44	47	50	44	47	50
	8	39.5	39.5	47	39.5	39.5	47	39.5	39.5	47
	1	33	33	47	33	33	47	33	33	47
Raynville	2	33.0	39.5	56.0	33.0	39.5	56.0	33.0	39.5	56.0
	3	33	39.5	47	33	39.5	47	33	39.5	47
	totals	748.9	797.8	941.4	755.9	806.6	994.7	771.9	809.4	974.6
range	bottom	9.2	7.6	8.4	9.2	9.6	9.2	7.2	7.2	5.6
	top	47	47	56	47	47	56	47	47	66
means		32.6	34.7	40.9	32.9	35.1	43.2	33.6	35.2	42.4
NC means		1Ad	1Ab	2Cc	1Ad	1Aa	2Ca	1Ac	1Aa	2Ca

Multi-sensory approach to the teaching and learning of mathematics
Appendix C Individual Progress

Progress using PIVATS scores

		Maths		Number		Shape and Space	
		7/04-12/04	12/04-5/05	7/04-12/04	12/04-5/05	7/04-12/04	12/04-5/05
NE SILC	A	0	0	0	4.5	0	16.5
	B	0	17	0	21.5	0	7
Individuals	GD	0	0	2	3	2	3
	HSt	0	7	1	4	0	6
	M						
	PSt	-1.6	0.8	0.4	-0.4	0	-0.6
	J						
	We st Wind	0	13.8	3.8	10	0	13.8
Victoria	1	0	0	0	7.5	7.5	9
	2	5	10	5	10	0	5
	3	7.5	0	7.5	9	0	7.5
	4	0	0	0	7.5	0	0
	5	0	0	0	7.5	0	0
Swinnow	1	4.5	3	7.5	3	9	0
	2	0	3	0	3	0	10
	3	3	10	0	9	0	10
	4	6.5	4.5	6.5	7.5	0	7.5
	5	0	3	0	3	0	3
	6	0	9	0	9	0	9
	7	3	13	3	3	3	3
	8	0	17.5	0	7.5	0	7.5
Raynville	1	0	14	0	14	0	14
	2	6.5	16.5	6.5	16.5	6.5	16.5
	3	6.5	7.5	6.5	7.5	6.5	7.5
Totals		48.9	163.6	50.7	179.1	37.5	166.2
means		2.1	7.1	2.2	7.4	1.6	7.2

Mean scores for progress using PIVATS figures		
	6 months before using MSM	1 term using MSM
maths	2.1	7.1
number	2.2	7.4
shape and space	1.6	7.2



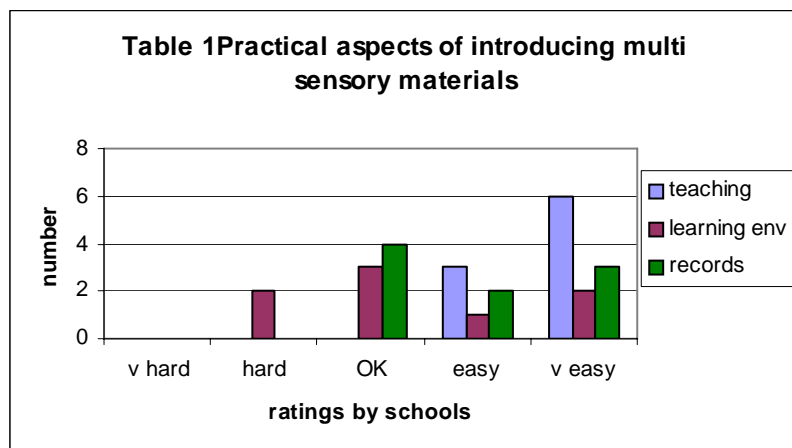
Appendix D

School Evaluations

The nine participating schools were asked to complete a questionnaire at the end of the pilot project (June 2005)

Practical Aspects of the project

Schools were asked to rate three practical aspects of introducing the new materials: using the Numicon teaching activity cards, creating a number rich learning environment and keeping records of Numicon activities.



Other comments about practical aspects of the project:

We needed more boards and templates than were initially provided – this problem was addressed midway through the project

Building work made it more difficult to create a maths environment with the number line etc.

The recording sheets for individuals take up time; often there was nothing to write in the ‘interpretation’ box. We need different way of assessing.

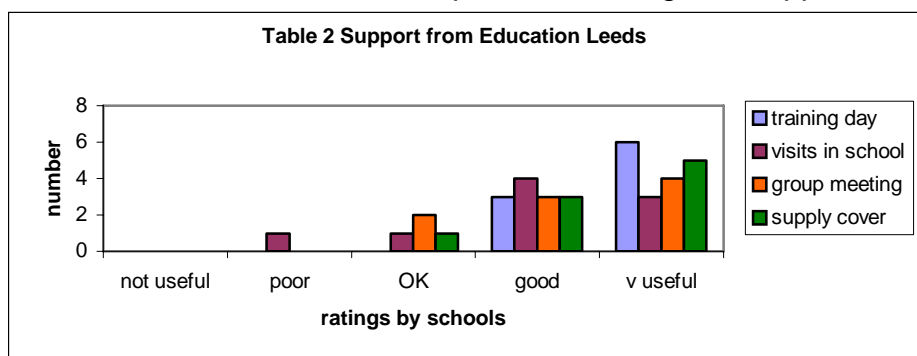
It all went very well the practical side was easy to sort out.

Numicon was given a low emphasis in school – seen as a SEN measure for a few children – greater links with NNS would help.

I found these sessions very easy to manage and both myself and the pupil concerned continue to enjoy the activities.

Support from Education Leeds

Schools were asked to rate different aspects of training and support for the pilot:



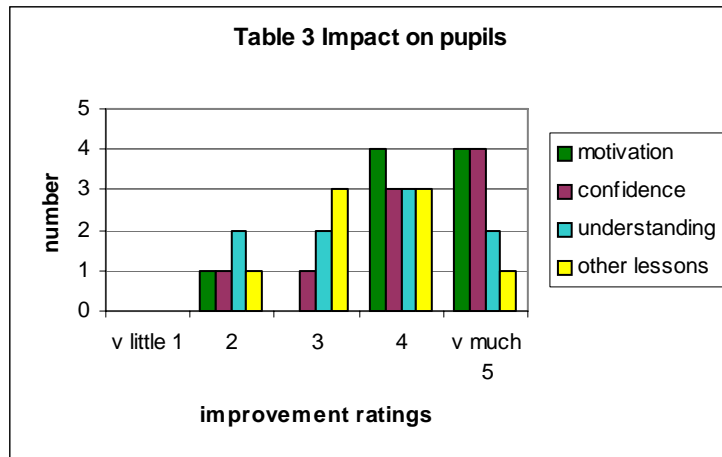
Other comments about support given to schools:

Supply cover for meetings was good, non-contact time in school wasn't always supplied.

Possibly more meetings and monitoring visits would help in the early stages.
 All support was good and very welcome.
 Very good support both from Education Leeds and School.

Impact on pupils

Schools were asked to rate improvements in pupil motivation, confidence and understanding in maths lessons, and confidence in other lessons.

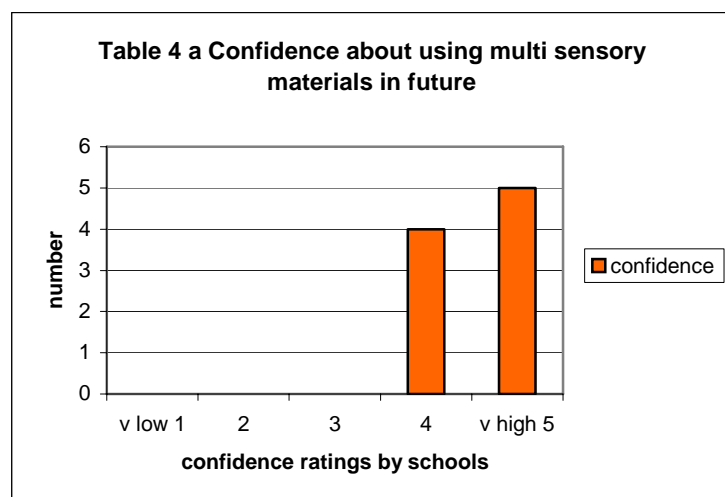


Other comments about how pupils responded to the materials and activities:

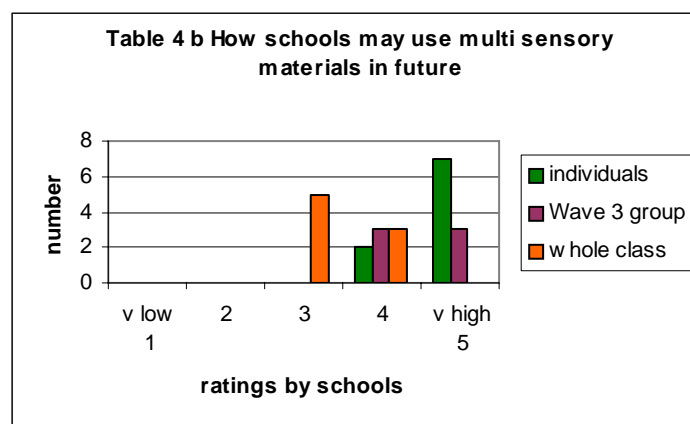
Understanding in maths is still poor because he is still on foundation level activities which don't always relate to the Year 4 curriculum.
 Pupil really enjoys the Numicon sessions, she responds well and is beginning to show signs of progress especially with matching shape to number.
 High level of absences/poor attendance affects results. Marked difference in ability early on (accelerated 1 child).
 Joe really liked using it; other children also liked it and asked to use it more.
 Children responded well to Numicon, loved the shapes and the bright colours.
 Although Paige really benefited from the sessions and she improved, her levels are so poor in comparison to other children she still cannot access whole class session.
 Very motivated. Asking for Numicon!

Using Numicon and multi-sensory materials in future

Schools were asked to rate their confidence in using Multi-sensory materials in future:



Schools were also asked how likely they were to continue using the materials for different pupils and purposes:



Other comments about how you would like to develop support for maths learning in your school:

Providing materials for all areas of school (primary, secondary and tertiary. We have held twilight session for staff and booked session for parents for early in Autumn term '05.

I would like training on how to match Numicon to NNS objectives and extend ideas into the daily maths lesson.

I would have liked to develop it with a group as well and give more time to it.

To help the school develop Numicon from the foundation stage and infants, with children using Numicon at an early age.

Hopefully liaise with maths co-ordinator to use Numicon for lower ability children who need strong support.

The impact of the project as a whole

Will your school change the way pupils are supported in maths lessons?

I think support for children of lower ability will change, and Numicon introduced to them.

Numicon will be implemented further down the school and extra resources will be ordered.

We will be making Numicon available to all class teachers so it can be used to support whole class teaching.

Possibly in KS1.

Yes, hopefully it will be used to boost up all maths.

Yes – using Numicon to support maths in all areas of school.

Interest in Numicon has grown and the Senior Management Team are looking into using it on a larger scale and lower down the school.

2 no comments

What have YOU gained from participation in the project?

A better understanding and appreciation of the need for a multi-sensory approach to maths.

Confidence, knowledge of the pupil's ability.

Explaining concepts, strong focus on multi-sensory approach

Greater understanding of what helps children develop ideas about maths and a sense of achievement.

New approaches to aid understanding of number/number lines.

Confidence in my understanding and support of children in my class who find maths difficult.

I feel more confident including the group in whole class teaching.

A more visual way of learning maths that shows the child actually making progress.

1 no comment.

What has your school gained from participation in the project?

A resource that actually benefited the pupil.

An opportunity to sample the resources and be able to share experiences with the rest of the school.

We will be using Numicon to support more individuals/groups in Ys 3,4, 5 & 6.

Equipment, fresh ideas for lessons.

SEN children have benefited from the project.

They have had the opportunity to use and learn more about Numicon in its developmental stages.

The school have decided to use Numicon after seeing Louise Matthews on the PLP course.

Training in Numicon for 2 members of staff, shared teaching/learning issues across city, new resources that impact strongly on learning.

1 no comment.

What could have been better?

Home kits for each student participating in project.

Sometimes it is difficult to switch between Numicon and numeracy hour – different way of assessing.

Different child chosen for project, possibly a group of younger children would have worked better.

Storage and set up of the Numicon environment in a junior (KS2) classroom.

Interest from school staff.

4 no comment.

Any other comments you would like to make?

The project is really good and has helped the pupil so much.

It has been a delight to see the pupil make progress after such a long time trying numerous resources.

Thank you. Very much appreciated that we were invited to be part of the project.

We have enjoyed taking part in the trial and feel the pilot child from our school has benefited.

5 no comment.

Appendix E Pupil Evaluations

	learning about numbers			confident with numbers	
	Dec-04	May-05		Dec-04	May-05
like a lot	5	7	a lot	5	6
like a little	1	0	a little	1	1
not a lot	1	0	not a lot	0	3
not at all	0	0	not at all	2	0
no answer	3	3	no answer	2	0

