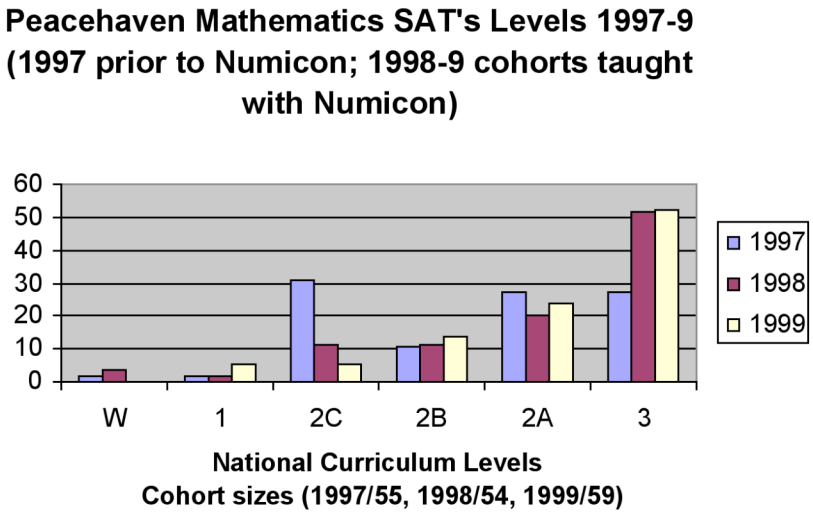
Gathering Evidence for Numicon (1997-2007)

Evidence for the effectiveness of the Numicon approach has been accumulating since an original Teacher Training Agency (TTA) funded research project began in 1996.

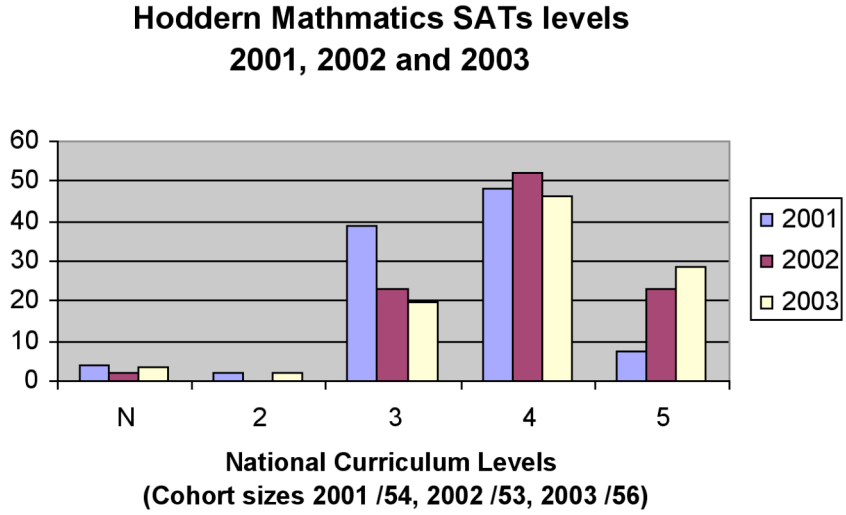
Original TTA Teacher Research Projects (1996-8)

The Numicon approach first began to be developed in 1996 by practising teachers in mainstream infant schools with university support, funded by a TTA grant. It was designed as an approach that would support children of all ages and abilities learning mental arithmetic, and the initial success of the first year led to a second TTA grant being awarded to Peacehaven Infant School and the University of Brighton, to continue with the project. The success of this work was evident in significantly improved KS1 SATs scores at Peacehaven across the whole ability range, as can be seen from the graph below:



The 1997 cohort results, prior to Numicon being introduced, show the typical 'long tail of under-achievement' reflected in the national picture of the time; subsequent cohorts taught with Numicon show a dramatically improved profile.

Further significant evidence appeared four years later as the majority of the children involved in the infant school project took their KS2 SATs papers in the local Hoddern Junior School, see below:



The Hoddern results for children gaining the crucial Level 4 or above show consistent improvement from around 56% prior to the first Numicon taught cohort to a consistent achievement of around 75%

for children who had been taught with Numicon during their KS1 years. Since the Hoddern KS2 teaching at the time did not involve Numicon, these results support an observation that the use of Numicon during KS1 produces demonstrably lasting benefits.

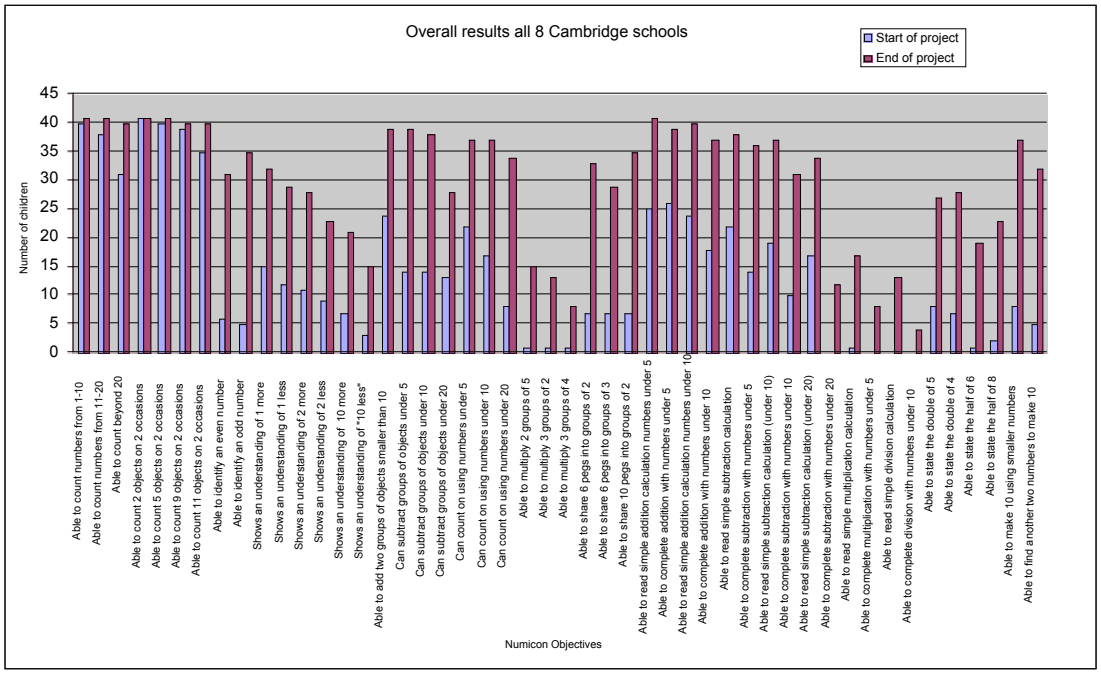
Devon Local Authority's Primary Maths Team undertook their own research project into the use of Numicon with all children during 2003-4, and based upon the success of their findings now purchase Numicon materials on behalf of all Devon primary schools and publish a booklet of guidance on the use of Numicon at primary level (available from Devon Curriculum Services).

Apart from this original work with children of all abilities and levels of attainment, several local authorities (LAs) have seen a particular advantage in using Numicon to support children with a range of special educational needs, and have undertaken their own research to test whether the approach really can help children who are finding number work especially difficult.

Evidence from Wave 3 interventions with Numicon

Between 2001 and 2006, supported by their educational psychology services, **Leeds** (with their Primary National Strategy team), and **Brighton and Hove** LAs have independently undertaken teaching programmes based upon the Numicon approach for children who were not succeeding with their school mathematics (typically, 'Wave 3' interventions). Using standard psychological tests to measure results, these studies showed notable improvements in both children's scores and also very importantly in children's personal confidence and attitudes to number work. Detailed reports from both Leeds and from Brighton and Hove LAs are available from the authorities themselves.

During 2006-7 **Cambridge** LA have been trialling the use of Numicon in Wave 3 interventions using typically three to five 25 minute teaching sessions a week over a period of a term and a half, and their reported results again show notable progress for the vast majority together with greatly improved mathematical self-confidence in the children (report available from Cambridge Access to Learning Specialist Teaching Team). Their Numeracy Strategy coordinator reports gains of up to one whole NC level (e.g. 1c to 2c) by some children, and very significant gains from P7/8 to 1c and 1b respectively by Year 3/4 children at the lowest levels. Cambridge results by objective are given below:



It should be noted from the above that striking gains are being made in fundamental aspects of calculation by children who had hitherto come to regard themselves as failures. The combination of a new self-confidence and an understanding of very basic number ideas is providing these children with the best possible platform for future success.

Currently **Doncaster** LA are also trialling the Numicon approach with children with special educational needs, and report informally very encouraging initial feedback (including again, significantly increased personal confidence in children). At the time of writing **Bury** and **Thurrock** authorities are also undertaking work with Numicon in order to improve their results.

Numicon and children with Down Syndrome

In a **Wiltshire** project of 2001 the Numicon approach was used to support specifically children with Down Syndrome, and the reporting educational psychologists found,

"..results to be extremely pleasing in view of the fact that (these) children do not normally make one month's progress per month, yet the average gain exceeds this, and many individuals have improved their skills at a much faster rate than the average." (Ewan and Mair, 2002)

The Down Syndrome Educational Trust (DownsEd) has been working with the Numicon approach since 2000, and references to discussion of Numicon in their publications are attached, together with further reporting about Numicon in the national journal of the Association of Teachers of Mathematics, *Mathematics Teaching*.

In one of the latest DownsEd publications, Dr Joanna Nye (2006) reported on a carefully conducted research project undertaken with 16 children with Down Syndrome in Portsmouth, UK. The detailed results from the first year of this project show that all children following the Numicon approach made better progress than other children with Down Syndrome not using the system, whilst some children made considerably more progress than their counterparts who were not using the Numicon approach. Other conclusions were that,

"(Numicon) enables teaching staff to 'see' what the child is thinking, which is important for identifying both successes and confusions in the child's understanding" (Nye, 2006 p3), and

"Children are motivated to engage with the materials as they are so attractive, and they develop confidence in maths work as they can succeed with the materials" (Ibid)

Summary

The foregoing studies all report on the notable successes of practising teachers using Numicon with children in contemporary mainstream schooling. Much further and deeper research needs to be done in order to clarify which aspects of the current approach are most effective, and why, and also into developing the approach itself more fully. However even at this early stage it is possible to note that an increasing body of evidence from schools is showing children with Numicon developing genuine understandings of basic calculation together with a strong mathematical self-confidence. Together these two achievements will both allow them access to increasingly advanced ideas, and then, most importantly lend them the courage and persistence to succeed.

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