

# Children as Arithmetic Book Authors

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This article explores the idea of letting young children — first graders, for example — make an arithmetic book for the children who will be entering first grade the following year. The idea is an example of the “free art of arithmetic”: “free” because the children can bring up all sorts of personal experiences: “art” because the children are invited to create their own arithmetic.

Children as arithmetic book authors? The idea raises many questions

- Are children motivated by the idea of writing down their knowledge for others?
- Should the book be written at the end of the school year or developed bit by bit throughout the year?
- Should the arithmetic lessons given by the teacher have a place in the book?
- Will different books be created by children coming from different types of school?
- Is this a good form of individualisation?
- Will writing the book make children look back on their own arithmetic procedures?
- Will the book really be useable the following year?
- Will the book give a picture of the arithmetical knowledge of the writers?

In the light of my experiences during the experiment, I feel confident that each question can be answered positively.

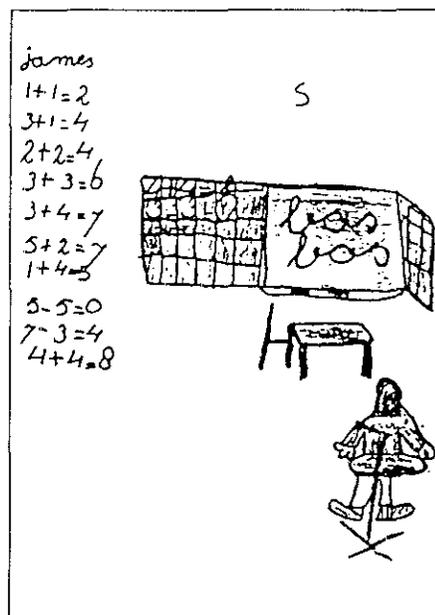
## The beginning

In March 1983 I proposed the following idea to children in two different schools. “I’d like to make an arithmetic book full of sums thought up by children,” I told them. “Everyone should make one page for the book. The page can contain all sorts of sums and drawings. Next year maybe we can use the book in first grade when you are all in second grade.”

The children, whether strong or weak in arithmetic, were immediately enthusiastic about making an arithmetic book for “the lesser gods.” The task of making up sums, for instance, now became meaningful. No longer were

these invented sums seen as a waste of effort; they were going to be used for something.

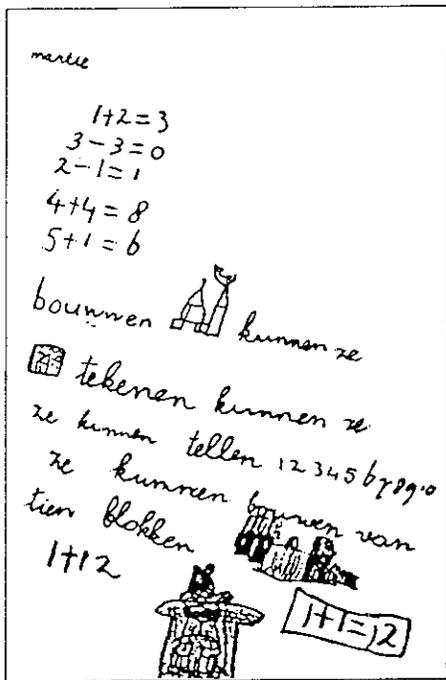
Compared with official textbooks, the children came up with some novel ideas. In addition to page fillers which are only meant to illustrate the sums and which are common in the regular texts, some children also sketched the classroom situation which is rarely shown in arithmetic texts.



James draws the class situation — in perspective!

Figure 1

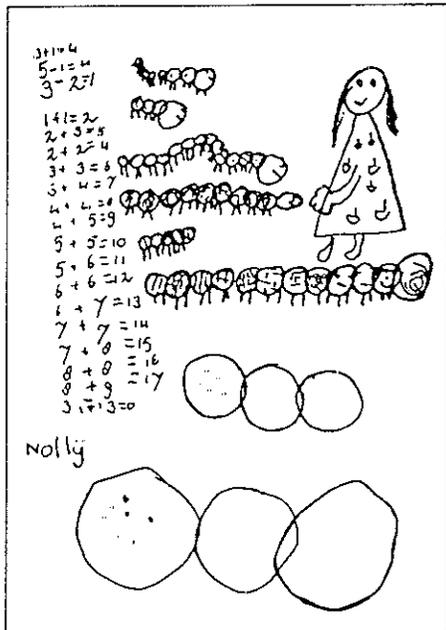
One student wrote down all the skills that kindergarteners already possess (building, drawing, counting to ten) and adapted the sums to these skills.



Martie writes down the skills the kindergarteners have already mastered

Figure 2

“Counting caterpillars” were designed and linked to counting tasks. The kindergarteners were encouraged to draw their own caterpillars!



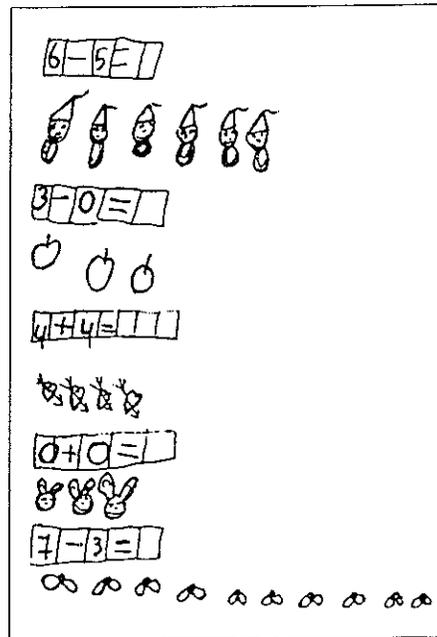
Nolly's own design: counting caterpillars, many sums, and caterpillars to be filled in

Figure 3

**Christmas pages**

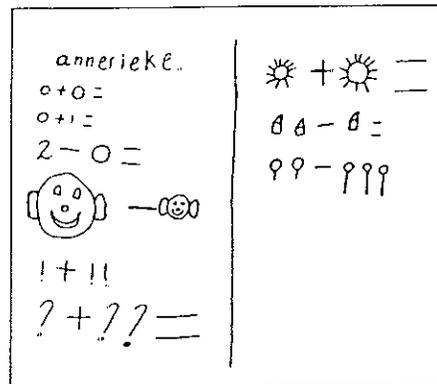
Encouraged by these reactions, we returned to the class arithmetic book in April and again in May. I now asked the children to make a first page for the book and a page of sums that would be suitable for around Christmas. The latter tasks in particular revealed the differences in educational methods used at the two schools taking part in the experiment.

At one school there was a considerable amount of “neat notation and illustrated sums.” Objects and operational signs were mixed together. This showed up in the class arithmetic book



Neat notation of illustrated sums

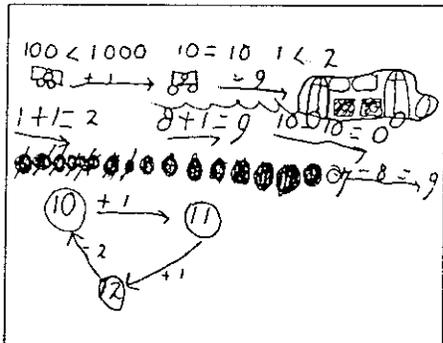
Figure 4



Does she mean  $0 + 0 (= 0)$  or object + object (= object)?  
Is II-III intentional?

Figure 5

At the second school the main subject just after Christmas was arrow-sums, although previous subjects (such as the "greater than" sign) and later subjects (such as numbers like 100 and 1000) were also used in the class arithmetic books.



Inequations, bus arrows, arrow-is-sum, 3-cycles

Figure 6

### Games

Towards the end of the school year, at the beginning of June, I asked the children to think up games to put into the class arithmetic book. They were to invent games which they thought would be useful in learning arithmetic

The differences in educational methods at the two schools emerged again. At one school the children drew only "arithmetic" games: lotto, arithmetic-kit, stamp-box, and suchlike

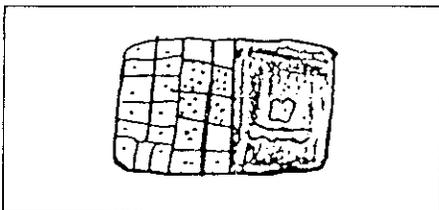
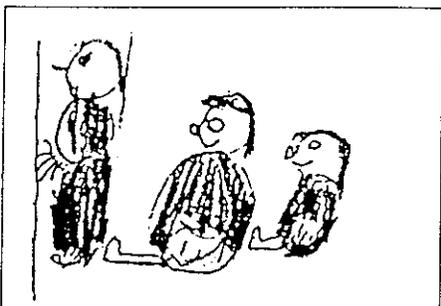


Figure 7

The children at the other school thought that kindergarteners should also use games from outside school: jump-rope, marbles, hopscotch and suchlike.



How many people are sitting behind me?

Figure 8

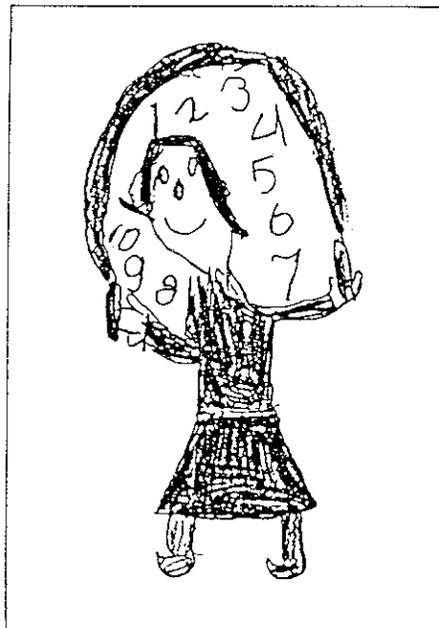


Figure 9

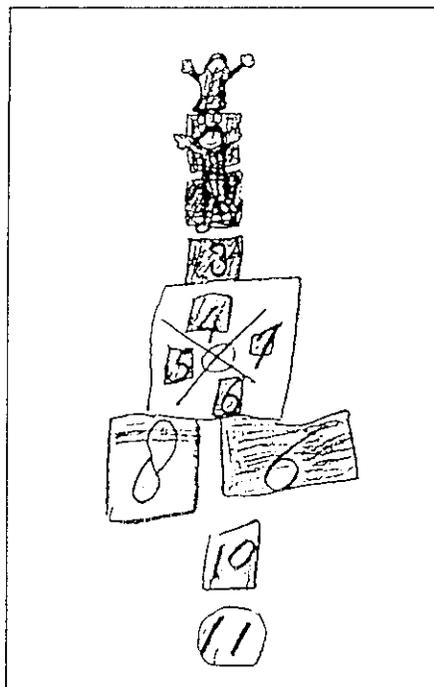


Figure 10

The last task was to think up a final page. And, at the end of June, the order of all the pages was discussed. The books were examined from a large number of points of view: the size of the numbers used, correct and incorrect sums, applications, illustrations, types of sum, etc.

### General remarks

What struck me most was the strength of the motivation that seemed to come from writing something to be used by other children

The arithmetic books were particularly suited to individualisation: they reveal the level of each student-author in various areas and stimulate better achievement spontaneously. Some children quickly introduced large numbers, varying them in various problems and applications. Other children's pages were much more uniform and monotonous.

### *Larger numbers*

Between March and July the children used increasingly larger numbers in the problems. This happened spontaneously and was their own choice. They chose to construct increasingly more difficult sums.

### *No mistakes*

Almost no mistakes appeared in the arithmetic book pages. This is quite understandable: the books are to be used by other children for learning arithmetic and should not contain errors.

These two features together make the class arithmetic book a good means of individualisation.

### *Applicable knowledge*

A striking aspect of the books was that arithmetic as applicable knowledge only appeared in the class book when it had been learned that way. Education which limits itself to teaching so-called abstract (or "bare") arithmetical procedures does not suffice for producing applicable procedures. Applicable situations must be deliberately searched for inside, and especially outside, the school. Only by this means does arithmetic become arithmetic for living

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You can see that my world is that of literacy. I am at home only on the island of the alphabet. I share this world with many who can neither read nor write but whose mind-set, like mine, is fundamentally literate. And they are threatened, as I am, by the betrayal of those clerics who dissolve the words of the book into just one communication mode.

Ivan Illich

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