Spreadsheet mathematics for five year olds

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Introduction

Technology for mathematics teaching is mainly used in secondary schools where it supports background knowledge. Here we suggest ideas where spreadsheets may be used with primary children to open the discussion of ideas in mathematics before they know what mathematics really is.

Key Stage 1 Project: Growing and Changing

In the first two years of primary school in England and Wales the children study core curriculum subjects within a framework of numeracy and literacy hours each day. In addition they have projects combining knowledge with reading, writing and mathematical skills, this work following strict government guidelines. Within this particular Growing and Changing topic the subjects studied were language, science, geography, religious education (*RE*), history, mathematics, art, technology (design) and information technology (*IT*).

The project lasted for one half term, February to April, and included as an example of each subject:

Language - changes of feeling/mood through expression.

Science - seasonal changes, changes in human, animal, plant growth

e.g. plants from seeds, hatching chicks from eggs.

Geography - recycling.

RE - changes of feelings/relationships (parable of the Prodigal Son).

History - ageing (visits from a mother with a new baby and an elderly person).

Mathematics - sequencing, birthdays (data handling).

Art - printing/painting seasonal pictures.

Technology - design and make a baby's toy.

IT - ?

Except for simple word processing, the School's *IT* laboratory had not been used with this age group of children.

Preparation before laboratory work

This particular school is an independent, selective, girls' school and has children from 5 to 18 years old. All pupils enter *via* a series of tests and interviews. The children could all read well and had a sound, basic knowledge of number work.

Data collection

The class spent some time collecting data:

- From home they brought in their height, in centimetres, at birth.
- They measured each other's height at that time (at six years old).
- Girls of ages 11/12 and 18 years from other classes came into the class. Each six-year-old chose those older girls they believed would be the height they would grow to. (Shorter six-years-olds chose shorter 12- and 18-year-olds *etc*.)

All measurements were tabulated in centimetres.

Our personal notes

The children needed to understand standard units of measurement; this would have been done earlier in the school year.

They found it very difficult to make predictions about which girls would be suitable to choose.

Their present heights were measured against the blackboard; they found it difficult to make estimations.

Other ideas at this time could have been:

making a bar chart of all the heights, discussing tallest, shortest, whether there was a general pattern, finding the average.

Spreadsheet co-ordinates

The children had already been introduced to co-ordinates, using a 3 x 3 grid.
Blank spreadsheet pages were printed out and the girls played games, such as

- Picture game: colour cell 3B green, 2D red, *etc.* to make a picture.
- Message game: put words in various cells to make a sentence.

Other pre-laboratory classes involved worksheets about people growing, colouring pictures of growing children, all within the main topic of growing and changing and lasted a number of weeks.

***IT* laboratory class**

The school has a technology laboratory with twelve computers specifically for the junior school and the children have one class there each week. Prior to this class they had used games and a simple word-processing package. The software available was Firewerks.
We took twelve children at a time for forty minutes.

We prepared some pages of notes, including the preparation work, but summarised it into one sheet of instructions for the actual lesson. We let the children watch a complete presentation of the idea of the lesson and then let them have a go individually on a machine, asking for help if they needed.

Very quickly they had entered the basic information, their name and the row and column headings.
Help was often needed when entering the data as they were inclined to place a full stop after each number, which prevents graphs from being completed.

By the end of the lesson each girl had her own individual table of data and a graph showing her predicted growth.

Within the time allowed, with each individual girl, it was possible to discuss what the graph showed, whether it was true to the data (if not, there was time to do it again), and talk about the heights in between those plotted.

Follow-up work

After the second week when the whole class had their individual graphs, follow-up work included :

- Drawing a picture of themselves under the plotted points as they would appear at each age.
- Comparing their plots with those of another girl.
- Filling in a summary sheet using the new words learned in the process of the exercise.

Posters and an information display were made for the end-of-term Parents' Evening and the display was also used for the New Entrant's Parents' Open Day.

Further work

This work was carried out with the young children to show that it is possible and useful to introduce mathematical technology to a young age group. However, it can be extended for use with older children, adapting the mathematical ideas in line with their current development.

We suggest how the work can be used for more ideas with this age group of children or taking it further with older children.

We have nursing charts of the average heights and weights of boys and girls from birth to 18 years.

The average heights of girls at 0, 6, 12 and 18 years can be given to the children in a subsequent laboratory session and entered on the spreadsheet in tabular form, then redrawing the simple scatter-plot showing both sets of data. Discussions can be held either individually or in class to decide whether the children are taller or shorter than average, whether their graphs cross and what this means, and why they are all different.

Bar charts can be drawn showing the class's average height, from which it can be decided how it compares with the average-height chart.

Boys' data can be looked at, to discuss that, if their heights are different from girls' height, when they become different, why they are different, *etc*.

The pupils' weights, with the average-weight charts, can be used in other ways, *e.g.* comparing the average weights over time of humans with similar in animals.

Conclusion

The class with which we worked were very excited with their computer work; it was very different from anything they had done before and it worked well. They understood the instructions and were able to enter the data and plot the graphs with very little help, which obviously gave them a lot of *IT* confidence.

The preparation work was extremely necessary but fitted in well within the topic and the follow-up work certainly gave lots of ideas for discussion.

Evaluation was informal rather than formal. We talked to a variety of people who had experienced the session in one way or another. Besides the children, parents and other teachers were very pleased with our approach and gave us a great deal of encouragement by their comments.

A number of teachers expressed interest in taking the ideas and using them with other groups and with other projects. It was felt that we made a significant contribution to the school's integration of *IT* into the curriculum.