

Implementing a website for the distance training of primary school teachers.

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An on-line training has been implemented for four years by a team of researchers from Creteil Teacher Training College and Paris V University under the direction of Prof. Bentolila, giving both theoretical and pedagogical assistance to primary educators about the teaching of reading.

Since 2003 Marie-Christine Marillier and I joined this team in order to develop a similar training about mathematics. To-day, the team consists in five teacher trainers headed by Roland Charnay, maths expert for the recent change of primary curriculum.

Presently, the website provides data about basic mathematics topics to be taught in elementary schools, mainly concerning natural, decimal and rational numbers, connected with suitable pedagogical advices, together with activity charts and commented upon video-clips. Similar resources will soon be available about problem solving.

Priority was given to these topics because they are the very points the teaching of which proves to be the poorest in elementary classes. Besides, low level achievement in junior high schools is often linked with a deficient acquisition of these basic concepts. Lessons were filmed in ordinary classes with teachers simply willing to improve their teaching habits. In no means should they be considered as THE way each of these topics should be taught: we simply wished to show pupils really involved in a mathematics class, and teachers eager to help their pupils complete the learning objectives. This lead us to a close work with the teachers whose classes were filmed, in order to adjust the chosen activities in each sequence.

Few themes have been implemented because we decided to cover full sequences on each topic, thus meeting novice teachers demand, since what they find most difficult is to conceive a sequence, to adapt the lessons according to pupils difficulties as soon as they occur, and to organise syntheses at the end of group activities.

Each filmed lesson was split into short (two to four minutes long) clips so that loading should not be too costly, and also to avoid boring our spectators. Any superfluous part was skipped, only the key steps were kept, which are crucial to successfully complete the sequence. We mainly aimed at stressing appropriate teachers responses to pupils right or wrong answers, and added specific commentaries to this effect in each clip.

These clips allow teachers, and specifically beginners, to view how to implement the suggested activities, how to carry them out, and how an experienced teacher can attain the curriculum objects. This is most valuable since presently, pre-service teacher-training in mathematics is extremely brief, about sixty hours, during

which theoretical and practical elements have to be given about the teaching of mathematics from pre-school (2- to 5-year old pupils) to the end of primary education (11 year old pupils). Besides, in Paris area as well as in the north of France most primary teachers graduated in the humanities before training for primary teaching.

For instance, here is a question about numbers in Grade 1 (“Cours préparatoire”, 6 year old pupils), the answer and the connected activity chart.

Why and how to have pupils swap 10 units for 1 ten in Grade 1?

Understanding the role of number ten is a long-range knowledge in Grade

1. The abacus: a suitable tool from the beginning of the year.

Before coming to swapping ten units for one ten, pupils need practising other rates as 3 for 1 or 5 for 1. Counters with different colours or shapes can be used. First graders can deal with a 10 for 1 rate as soon as they are familiar with the needed pre-requisites (generally middle of the first term), that is :

- mastering quantities up to 10;
- understanding what swapping is;
- comparing two numbers.

Forming things into groups of 10 often is a *per se* activity in First Grade. But pupils need to learn further in order to build the related concept. Indeed, putting together ten elements is not enough to understand what a ten is. Swapping, which is a correlative concept to grouping, is requisite to understand the place value of each digit in a number.

When working on swapping 10 for 1, counters with different colours or shapes should be forsaken in favour of an abacus. In abaci or counting frames, like those traditionally in use in countries as China, Japan, Russia, all beads have the same size and the same colour. The value of any bead differs only according to its place on the abacus. For this reason the abacus proves a particularly effective tool to practise swapping 10 for 1 (through substituting 10 beads for a single identical bead simply placed at the next stage) and to make sense as far as writing numbers with digits is concerned.

The **bank game** is another way to build this concept.

CERQUETTI-ABERKANE Françoise, MARILLIER Marie-Christine (2004)

Activity chart

Sequence on the bank game in order to understand ten in First and Second Grades (6 to 7 years old pupils)

(1) note

The **bank game** should be played at least during 4 consecutive weeks, about three times per week, in order to help pupils get familiar with the rules and the meaning.

We hereafter sketch the 8 steps that have to be passed through, the 9th step being a final assessment stage. Several lessons are generally needed to get pupils to the next step, though it may sometimes be possible to pass through several steps during one lesson. Before modifying the swapping rule, teachers should assess each pupil individually.

Step # 1: play swapping 3 for 1 and tell who won the game.

BANK GAME

Groups of 4 pupils: 2 players, a bank keeper and a secretary

Counters with various colours but the same size and a common die.

A constant swapping rule.

Laws of the game:

A constant swapping rule is given (e.g.):

3 red counters for a yellow counter

3 yellow counters for a green counter

3 green counters for a blue counter etc.

Two pupils play, a bank keeper gives the counters, and a secretary writes down the drawing of lots and the swaps.

Each player casts the die each one in his/her turn and each time gets from the bank keeper as many red counters as shown on the die. He/she must swap his/her red counters for yellow ones, and so on, as soon as possible.

After several throws, pupils are asked who won.

Step # 2: compare any score with the 3 for1 rule

Pupils work on **fanciful games** raising specific problems, for instance: having more counters but not winning, having the same amount of counters with a given colour, etc.

(Assessment)

Step # 3: play swapping 5 for1 and tell who won the game.

Same scheme and similar law of game as in step 1.

Problem to be solved: Who won? (pupil has to explain his or her answer).

Step # 4: compare any score with the 5 for1 rule

Same scheme as in step 2

Use **fanciful games** again.

(Assessment)

Step # 5 (2): find how the square counter abacus works, with a 10 for 1 rule.



Step # 6: use the abacus with a 10 for 1 rule and tell who won the game.

2 pupils play side by side with a judge between them, two three-columns abaci, counters with the same size and the same colour. Now the value of a counter is no longer connected with its colour but with its place.

10 counters of a column are swapped for 1 totally identical counter, which is put in the column located immediately on the left. Changing the place of the counter modifies its value.

Step # 7: compare any score with the 10 for 1 rule.

Fanciful games are used again, with an empty column for example or with any other puzzling situation like those in step 2.

Use digits to write the number of counters in each column, without necessarily reading the number in the usual way.

Step # 8: for any score, tell how many counters one had before swapping 10 for 1 (decoding).

Find out how many counters one had before swapping, in simple cases (not too many counters) and check who won, both before and after decoding.

Step # 9: Final assessment:

- Complete swaps which were not brought to their end (base ten only).
- Tell who won and explain how you know.
- Find out the number of counters before any swapping.
- Are pupils able to apply the 10 for 1 rule to the next column (base ten only)?

Refer to commented clips for the lessons: "Understanding ten: the 10 for 1 bank game with secretary" and "Understanding ten: the 10 for 1 bank game without secretary".

(1) INRP ERMEL " *apprentissages numériques CP* " page 308; Paris, Hatier, September 1994)

(2) F. CERQUETTI-ABERKANE " *Enseigner les mathématiques à l'école* " p 33; Paris, Hachette Education 2003

Several countries already signed draft-agreements with Paris V University in order to use this website for pre- and in-service training. It is the case of Morocco, Madagascar and the French schools of San Francisco bay, Los Angeles and Texas. Several other French-speaking countries expressed their interest.

During the 2004-2005 school year, teachers from two groups of pre-service training and of several groups of in-service training evidenced the efficiency of this site for teachers to carry such activities into effect. Indeed, looking at the commented video novice as well as experienced teachers become aware of obstacles pupils have to overcome as well as of their often unsuspected capabilities. Thanks to TFM site, several students ventured to implement the suggested sequences during their probation period. Moreover, as we visited these students, we noticed that maths activities were

much better implemented than what could be seen during the years before, when we could not rely on such a reference. Students themselves stressed the important role played by the viewing of the commented clips and the activities charts for their implementation of the sequences. They often wished that the site should already be more widely provided.

In the coming years, activities related to other parts of the mathematics curriculum for elementary schools will be available. Such training could prove a great help in regions and countries where it is not possible to gather teachers in a specific training centre.

The website will not supersede training but can be an important help which teacher trainers can rely on. The already implemented connections follow-up shows that, though the site is not yet widely provided, it is steadily visited.

A training map for mathematics will also be set up, allowing students who do not feel comfortable in this field to mend their knowledge and to assess their progress. Such a device already exists for French and gives good results.

We wish that using the TFM site will help novice teachers undertake activities which otherwise they would never think of trying.

Site URL: www.uvp5.univ-paris5.fr/TFM

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