

CHALLENGES IN THE PROCESS OF MATHEMATICAL STUDY OF ADULTS WITH LOW SCHOOLING

Dilma Fregona (FaMAF, UNC, Argentina)

María Fernanda Delprato (FFy H, UNC,
Argentina)

Pilar Orús (IMAC, UJI, España)

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Proyectos

- *“Rural basic education for youth and adults. Policies, institutions and actors”*, CIFFyH, UNC. Agencia Nacional de Investigación Científica y Tecnológica- FONCYT Convocatoria Proyectos Bicentenario, Temas Abiertos - PICT-2010-0890; SECYT, Res. 214/10.
- *“Professional development of teachers or future teachers in mathematics: inquiries, prospects and challenges in different scenarios”*, FaMAF, UNC, Agencia Nacional de Promoción Científica y Tecnológica (FONCyT- PICT-2011-0857). Período 2012-2015; Secyt, Res. 162 /12

Participants

- Primary level teachers EDJA: Gabriela Aguilar, Adriana Arredondo, Paula Schiapparelli.
- Researchers:
Argentina (UNC): María Fernanda Delprato and Dilma Fregona.
Nicolás Gerez Cuevas joined the project later on.
Foreigners researchers: Brousseau, Nadine y Guy; Destouesse, Christiane; Greslard, Denise; Salin, M. Hélène.
Pilar Orús (CRDM,UJI)

We thank the groups of students to share their jobs.



1. Working conditions

1.1 Teaching work place: CENPA

CENPA (Center of Primary Level for Adults):

Participation in community activities;

...worked on a dinning room of a children's school

Group: mostly women attending irregularly and often with children from 0-4 years.





Group: in 2008 there were between 15 and 20 students of 20-30 years old, this year there are 55 students, most of them are migrant women, mainly Bolivian and Quechua speakers;



Students are divided into **two cycles** and in a **literacy** group in charge of two teachers.

1.1 Teachers' workspace: CAP

CAP (Pedagogical Support Center):

- **Differentiated training proposals**
 - Advanced primary level: attended tutorials resolved remotely;
 - Literacy classes at UNC 's workers (one weekly meeting);N
 - Initial primary level: classes for young children from the Roma community (2 or 3 meetings per week);
 - Free exam to certify the primary level: preparation of study's materials and tutorials.
- Consequently: **multifunctionality of teaching.**

1.2 Area of research: Workshop UNC

- Operating conditions:
fortnightly workshop
started in 09/2008, its
venue changed (the
CENPA first, then at the
University ClFFyH-in or
at FaMAF);



1.2 Area of research: Workshop UNC

- Mode of inquiry:
"Educational workshop" (Achilli, 2008); accompany instructional decisions (before, during and after class); construction and decision analysis in the workshop.



problems and issues: demands of teachers, eg. doubts about the flexibility of curriculum organized by modules (MEPC, 2008).

1.2 Area of research: Workshop UNC

DOCUMENTATION:

- records of their classes (from agreements on ways of systematizing the experience)
- students' output.
- records of the workshops (collectively systematizing discussions and agreements)

Difficulties:

registering and managing a class in a heterogeneous classroom;

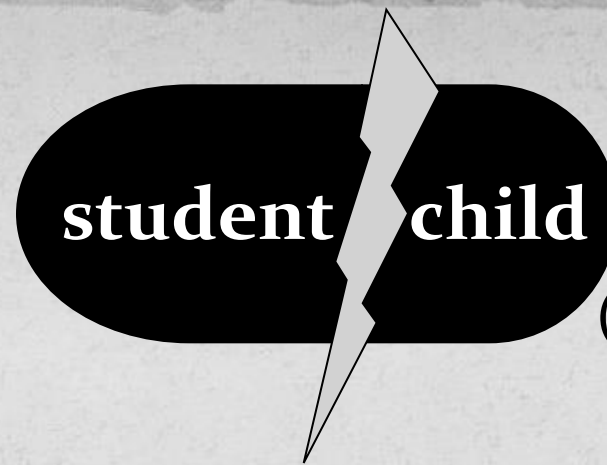
managing and documenting a workshop with a job application.

1.2 Area of research: documentation of CRDM (UJI)

- Documentary resources assigned to UJI Center for Observation and Research in Teaching Mathematics (COREM), laboratory created in 1971 which ran for over 25 years. This center (by agreement between Bordeaux and University School of Talence Michelet) allowed to observe teachers and students in their classroom interactions and deploy teaching experiences under the TSD. (See <http://guy-brousseau.com/le-corem/presentation/>).
- Face to face interaction and / or virtual designers and teachers who made learning experiences within the TSD.

2. Specific issues of the EDJA

Issues



(Oliveira, 2001)

Broader trajectory;
Excluded from school failure,
command the assumptions that
regulate schooling work?
Non-dominant cultural group

low production of
pedagogical knowledge;

Teachers trained to work with
children in graduate school with
some extent of homogeneity

Curriculum change in Córdoba
(MEPC, 2008): work by module
with flexible sequences?

How to recognize it/manage it?
(Campero, 2009)

Knowledge of culture (already
known and different knowledge
(NEL, TAD));

Time of learning and
teaching, and accreditation

3. Issues around the study of multiplication

3.1 Study framework: for the analysis of the teaching situations

Uses of TAD and TDS:

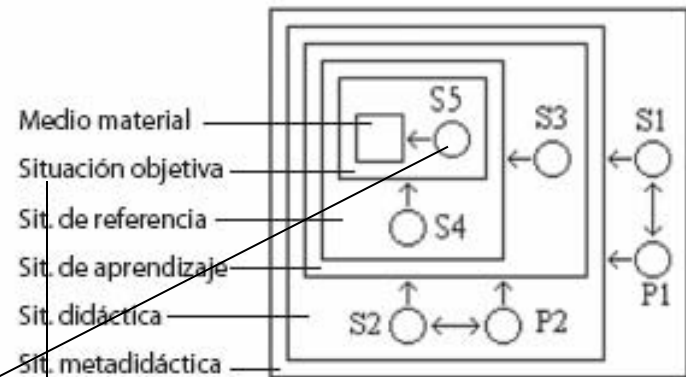
Problem of meaning or "rationale" of knowledge / contextualization / transposition of knowledge between institutions (problems of language and modes of justification in institutions of practice and transmission)

RELEVANCE

HETEROGENEITY

Use of NEL:

Numeracy various practices in different areas; availability and access (Barton and Hamilton, 2004; Baker et. al., 2003; Kalman, 2004)



S5 sujeto objetivo
S4 sujeto que actúa
S3 sujeto del aprendizaje
S2 alumno genérico
S1 sujeto universal
P2 profesor enseñando
P1 profesor que prepara su clase
→ observa o actúa sobre

Didactic variable, means, situation, medium of teacher (Brousseau, 1986 y 2007; Fregona y Orús, 2011)

3.1 Study framework: for the analysis of the formation process

TEACHER WORKSHOP (production conditions of teaching situations):

- Overall framework:

Anthropological approach (Latin American tradition): the educators' workshop to link research and training;

- Teachers knowledge:

TAD: mathematical composition of a work (task, technique, technology and theory)

NEL: teachers' ideas on school mathematical knowledge

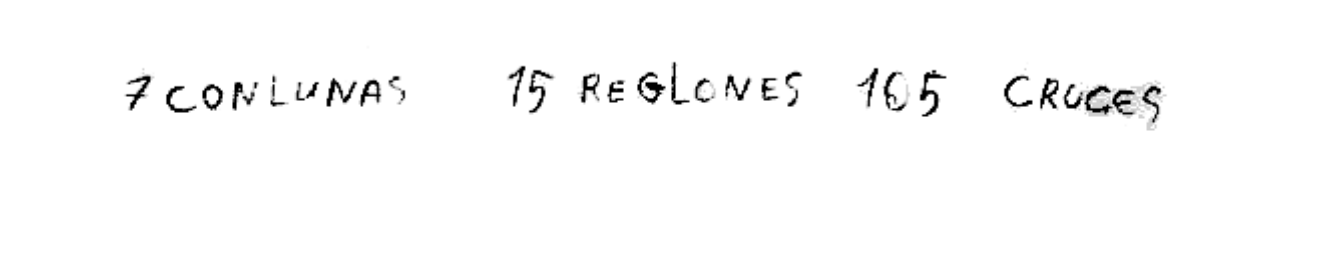
3.2 Study of multiplication and retrieval of fragmented knowledge

How do they go back to the conventional algorithm?

Activity 1: Game of communication of rectangular arrangement

Some of the students' output tell that:

- they count one by one;
- they count the elements of the row;
- they indicate the rectangular arrangement:



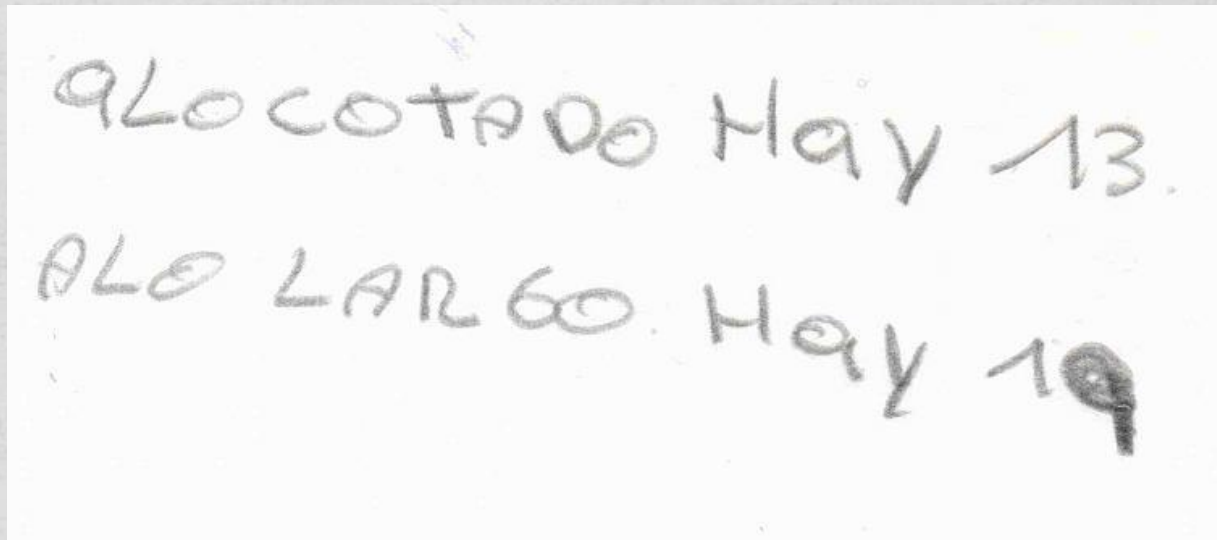
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(27/06/2012) Zulma, Martha y Silveria from the first cycle

3.2 Study of multiplication and retrieval of fragmented knowledge

Activity 1: Game of communication of rectangular arrangement

- They tell the rectangular arrangement



(29/08/2012) Daniel and Isabel, from the second cycle, and Martha, from the first cycle

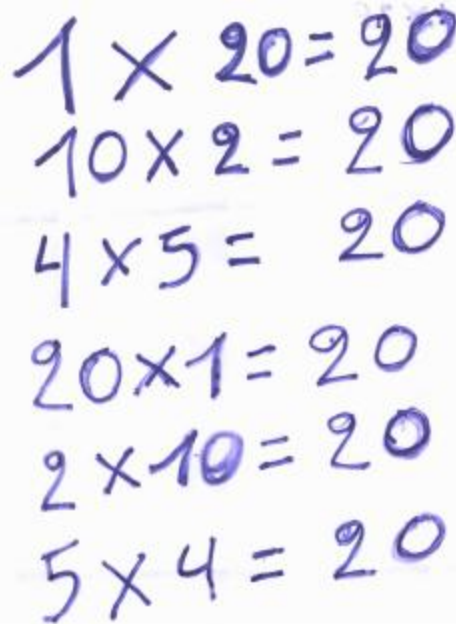
3.2 Study of multiplication and retrieval of fragmented knowledge

Activity 2: What rectangular arrangements can be made with a given number of crosses?

Most students show their rectangular arrangements, telling which number added to arrive at the number of crossings

3.2 Study of multiplication and retrieval of fragmented knowledge

Activity 2: *What rectangular arrangements can be made with a given number of crosses?*



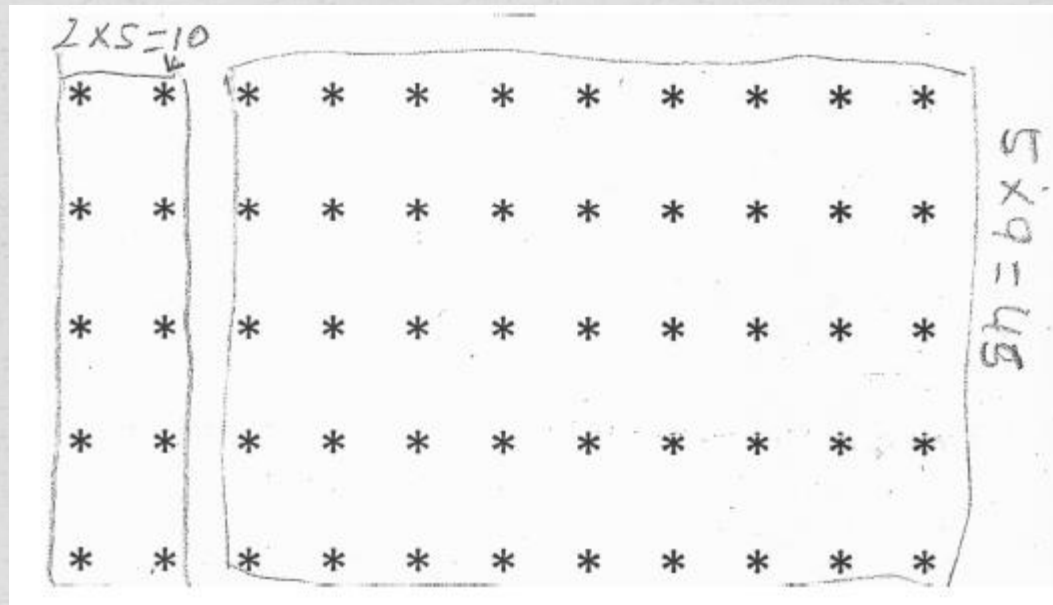
A list of seven handwritten multiplication equations in blue ink, arranged vertically. The equations are: 1 x 20 = 20, 10 x 2 = 20, 4 x 5 = 20, 20 x 1 = 20, 2 x 10 = 20, and 5 x 4 = 20. The equations are written on a white rectangular background.

$$\begin{array}{l} 1 \times 20 = 20 \\ 10 \times 2 = 20 \\ 4 \times 5 = 20 \\ 20 \times 1 = 20 \\ 2 \times 10 = 20 \\ 5 \times 4 = 20 \end{array}$$

(3/12/12) Virginia from the second cycle

3.2 Study of multiplication and retrieval of fragmented knowledge

What is the relationship between these activities and the multiplication tables that some of them know?



(October 2012) Nilda, from the first cycle

3. Final thoughts

With regards the students' knowledge:

- We find a differential performance on numeracy practices,
- How to communicate an amount? With a number, or through an operation,
- Identify positive changes in techniques, in the formulations and symbolization.

They can identify previous knowledge and integrate their experiences with their school-age children.

Regarding the knowledge in the workshop:

- Notions of TAD enable us to discuss ways to move towards the integration of fragmented knowledge available on the subject (technical vocabulary and dissociated from the tasks that give meaning to the mathematical work).
- Need to strengthen teachers' access to technology of knowledge taught as a way to interpret resolution modes or different techniques (for school tasks and the ones developed daily by adults).

Regarding the knowledge in the workshop:

- The potential of the medium organized around rectangular arrays to study the multiplication
- The flexibility in the accompaniment of teachers, according to the demands and conditions that occurred.
- The preparation of a record format of what happened in the classroom, made by teachers, based on the analysis of the document produced in the COREM on teaching division.

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Materiales curriculares:

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