



Teachers resources and documents

A documentational approach of didactics

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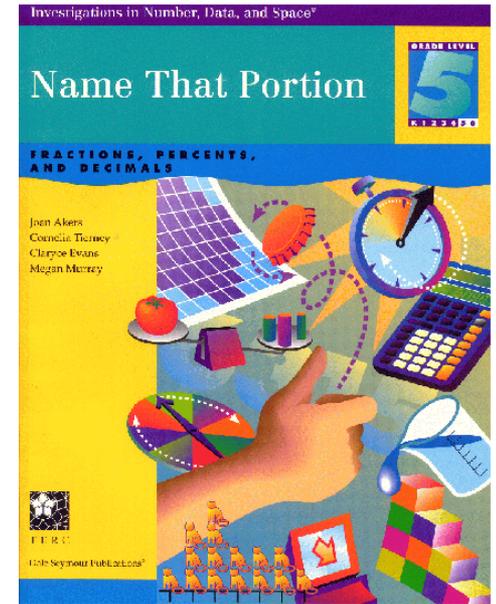
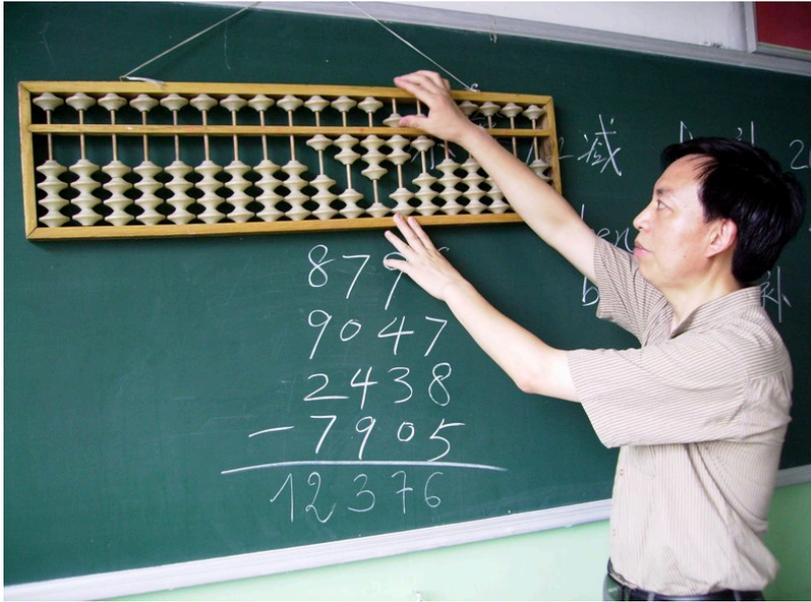
French-Chinese Laboratory for Comparing Curricula in Science Education
C2SE seminar, 12-15 November 2013, ENS de Lyon

Outline

- 1) Mathematics teachers resources
- 2) The documental approach
- 3) Studying documentation: which methodologies ?
(example of Vera)
- 4) Results obtained (example of Vera)

Mathematics teachers resources

Resources for doing, teaching, learning mathematics



Mathematical artefacts (tools, texts...)

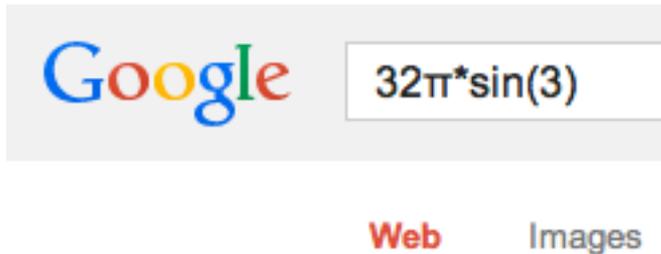
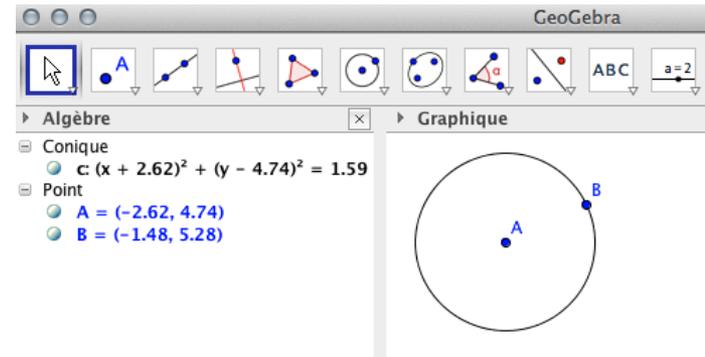
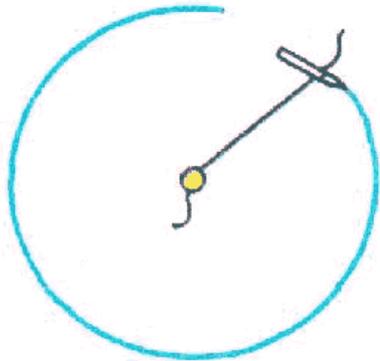
Always present in scholars work, school... and society

Designed for teaching (or not: abacus, CAS), used by teachers (or not...)
(Maschietto & Trouche 2010)

Mathematics vs experimental sciences, tools and representations

Mathematics teachers resources

Resources for *teaching* mathematics



Evolving artefacts, sets of artefacts

Abundance of resources on Internet, and many manners to orchestrate them

Mathematics teachers resources

Beyond material resources...



Mathematics contents and structure of knowledge

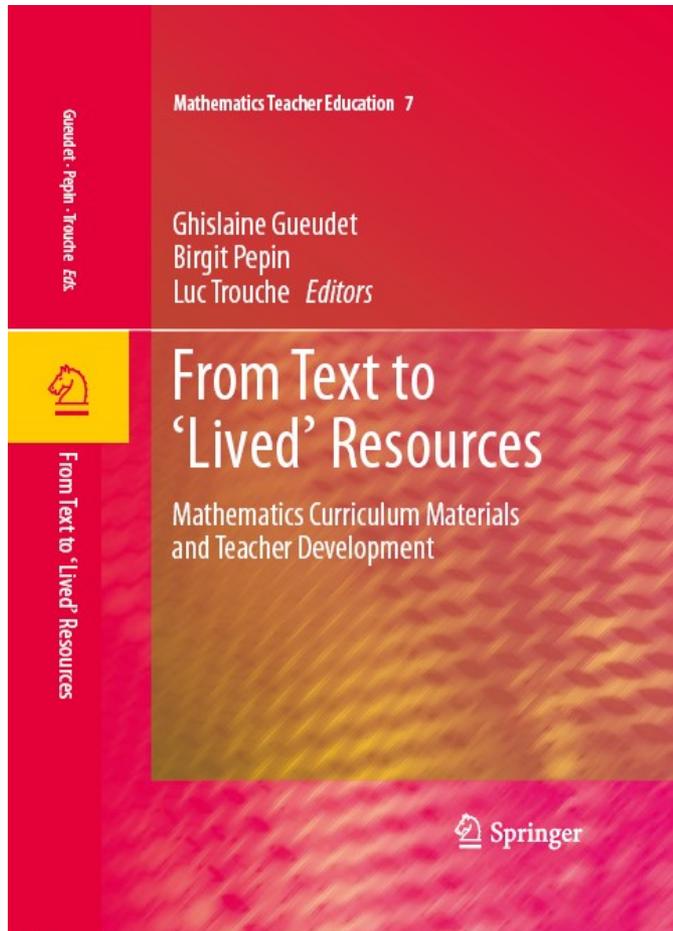
Curriculum organisation and dynamics

Institution and collective choices, cultural habits

Teachers activity system and resource systems

Mathematics teachers resources

From Text to “Lived” Resources...



Edited by Ghislaine Gueudet, Birgit Pepin, & Luc Trouche

- Section 1: Teacher resources
- Section 2: Text and Curriculum resources
- Section 3: Use of resources
- Section 4: Collaborative use

Mathematics teachers resources

Different research fields...



Studies about textbooks, curriculum material (Pepin, 2009; Remillard, 2005)

Studies about educational technologies, ICT

Towards a holistic point of view

Conceptualisation of resources as anything *re-sourcing* the teacher's practice (Adler 2000); material and socio-cultural resources

Mathematics teachers resources

Towards a more collective point of view...

A change in the design modes (resources designed for teaching):

From top-down to more bottom up processes?

Teachers groups, associations, designing online resources for the teaching and learning of mathematics



Mathematics for everybody

Working together, supporting one another, communicating

The documental approach

Theoretical dynamics... (see Birgit's opening lecture)

Research about students working with technology, the instrumental approach (Rabardel 1995, Guin *et al.* 2005)

An artefact: an outcome of human activity, designed for a specific aim.

An instrument: developed by a subject from the artefact, in a goal-oriented activity.

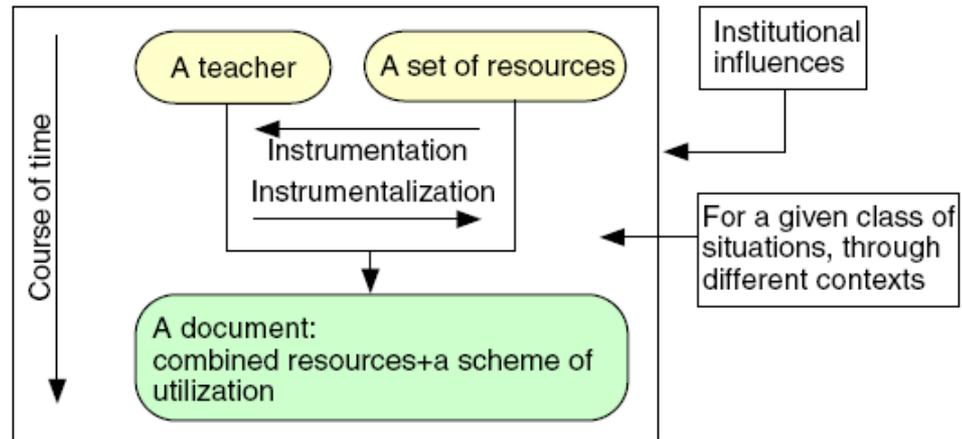
Instrument = artefact + scheme of utilisation

Scheme : a cognitive construct, comprising rules of action and structured by operational invariants

Extension of the approach: development of a documental approach (Gueudet & Trouche 2009)

The documentational approach

Principles



Documentational genesis:

- a teacher develops a document from a set of resources
- the document associates resources, and a scheme of utilization, in particular professional knowledge
- a double *instrumentalization/instrumentation* movement: the teacher shapes the resources, and the resources frame the teacher's choices and knowledge

The documental approach

Documentational geneses and professional development

- Geneses develop across different contexts for the same objective; they are on going processes: a given document yields resources that can be engaged in further documentation work.
- Teachers develop coherent and structured resources systems and documentation systems
- Documentational geneses are central in teachers' professional development

Studying documentation: which methodologies?

Related to C2SE objectives

Following teacher documentation, teaching and assessment practice (French propositions, seminar February 2013)

Choose and follow teachers, teaching this content. One teacher in France (in nutrition resp. in statistics) and one teacher in China

Elaboration of a common methodology. We will take into account all his/her work (preparing a lesson - discussing its implementation), all his/her resources (textbooks – web-based resources), his/her interactions with colleagues in his/her school, or other communities of teachers, his/her way for assessing students work.

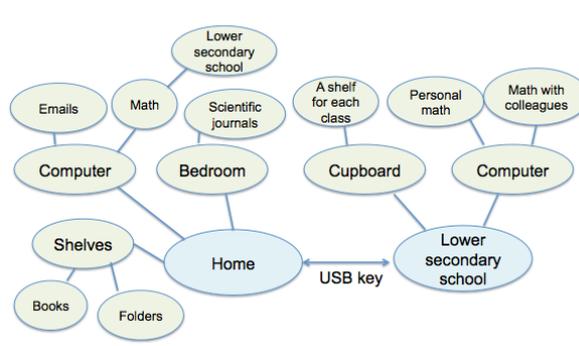
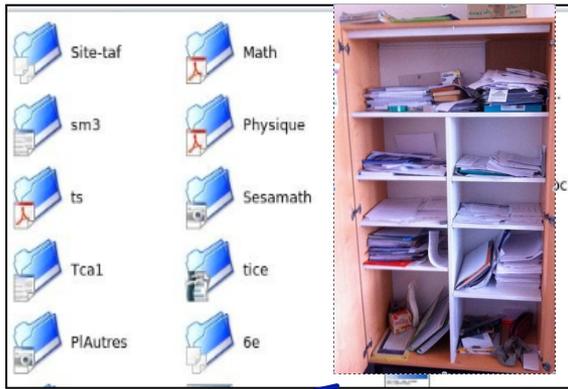
Making short videos (5mn each) illustrating the case studies (with english subtitles).

Studying documentation: which methodologies?

Principles (cf. Mei's talk)

Following teachers professional development, through geneses

- Need for a long-term observation
- In-class and out-of-class
- Collecting teachers resources, following their evolutions
- The teacher him/herself collects data (logbook)



Schematic Representation of Resource system

First appointment
Discussion of methodological tools and agenda of the follow up

Guided visit of the resources
"Instruction to the double"
SRRS

Observation of a lesson
(videotaped)
Interview just before and after

Auto-confrontation with the video
Back to resources and SRRS

Week 1

Week 2

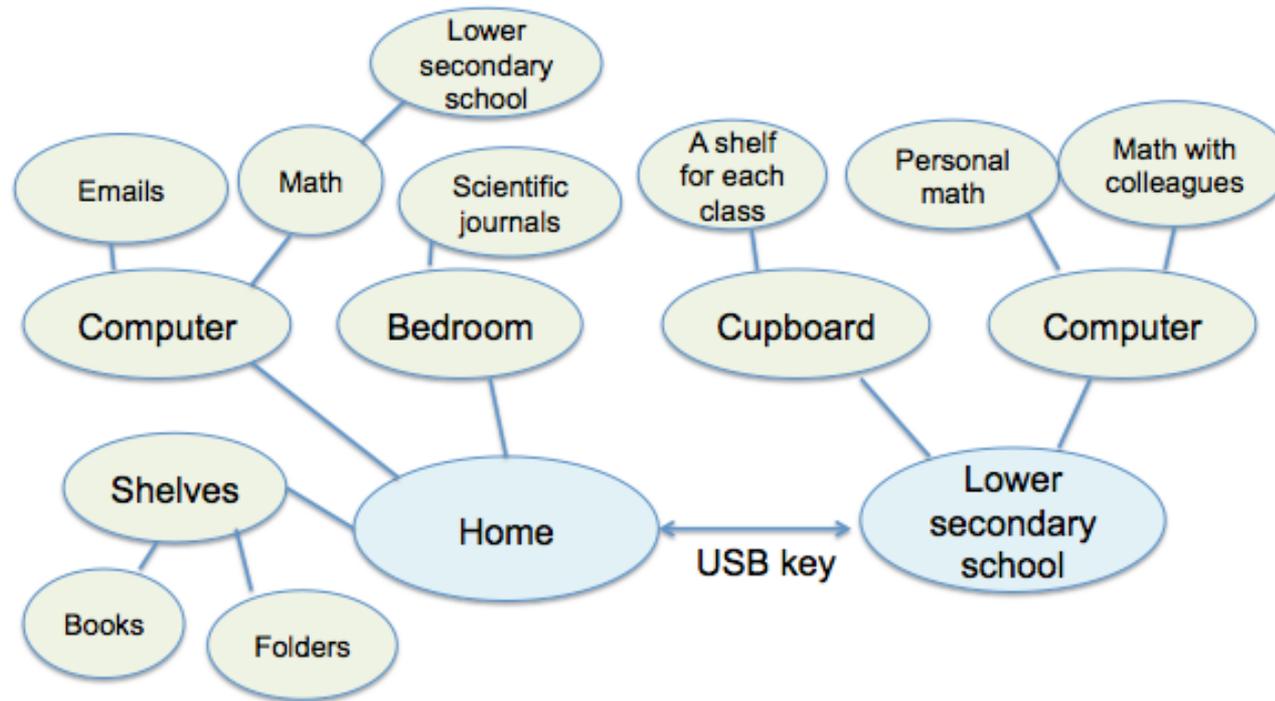
Week 3



Date	Place	Actors	Objectives	Resources used	Resources produced	Storage, reorganisation

Studying documentation: which methodologies?

SRRS



The schematic representation of the resource system, as a crucial methodological element

ANDANT : doc pédagogique - EDUSCOL.

- discussion entre collègues.

- cahiers pédagogiques → biblia IUFM.
- référentiel.
- site collègues.

- Sisamelta
 - (pour utilisation en préparation de cours.
 - utilisation directe.
- ressources laine
 - "finance"
 - "activité mentale"

COLLEGE

Triangle (services de élèves).

lignes.

Cle USB
(Coordinateur
personnel)

Cours.

- programmation
- projets.
- activités photocopies.
- lien sisamelta.
- contrôle.
- DEVOIR.

EDUSCOL

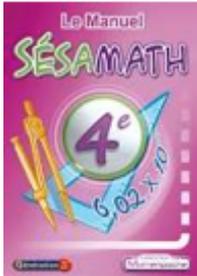
CARONEP
réimprimable seule
commun.

UPSTREAM

pedagogical documents: - EDUSCOL (Ministry website)

- Pedagogical journal → Teacher education institute Library
- curriculum document
- colleagues websites

discussions
between colleagues



Sésamath

- For preparing lessons
- For direct usages in classrooms

Book resources

AT SCHOOL

- « finance » (and associated website)
- « mental activity »

USB key (and personal computer)

COURSES

- Progression
- Courses on slides
- Photocopied activities
- links to Sésamath
- tests
- HOMEWORK



Students' textbook
(for exercises)



Other
textbooks

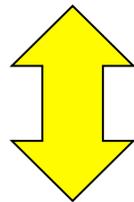
EDUSCOL

LABOMEF (Sésamath): remediation, common core

Studying documentation: which methodologies?

Logbook: to be or not to be?

“Natural” data: teacher preparation, journal on line, blog...

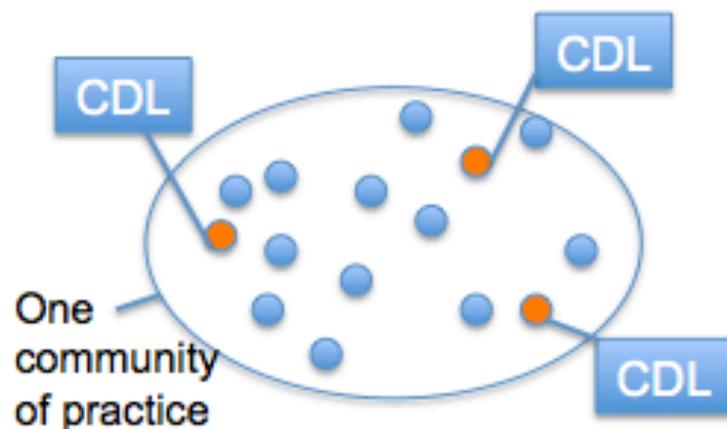


Data for research (logbook, journal of incidents, journal of interactions...)

Essential analysis for combination...

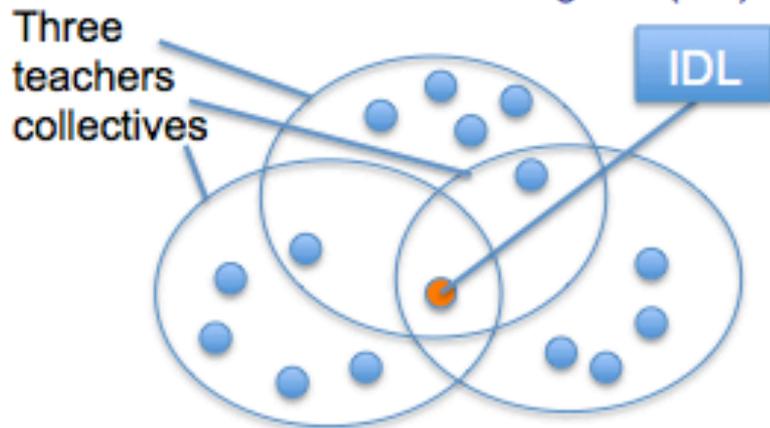
Collective questions...

Community Documentation Logbook (CDL)



Follow up of the design of an online textbook by a Sesamath working group, analysis of the interactions between individual and collective documentation work (Sabra & Trouche)

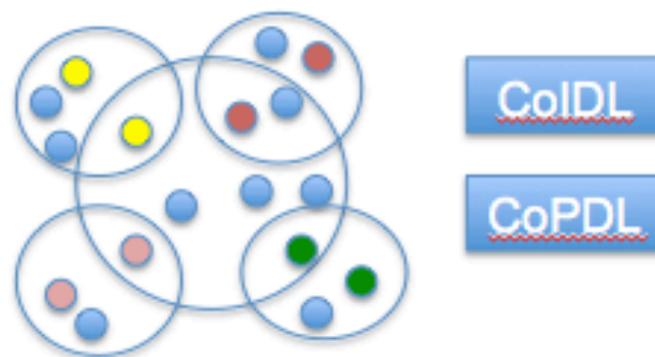
Interaction Documentation Logbook (IDL)



Effects of teacher interactions with collectives on her documentation (Hammoud *et al.* 2010), *boundaries?*

Following one Col fed by several CoP ???

1 Col
and
4 CoP



New situation, new tools to be conceived

The case of Vera: first results

About her use of resources

Vera's resource system has two parts: one in school, one at home. They are connected via her USB key.

The textbooks are very important in her resource system. She uses the Sesamath textbook, in particular to present exercises un class with the video projector. But she articulates it with other textbooks.

For grade 6, she uses “Helix”, a textbook with a “spiral progression”, and follows its progression.

Her students have “memory notebooks” which follow them from grade 6 to 10.

Vera considers her computer as a “crucial resource”.

The case of Vera: first results

About collective work with her colleagues

Vera would like more collective work with her colleagues, in and out of her school. She is sometimes involved in distant communication with authors of Internet resources

She has very good memories about her vocational school, where the teachers were working together with the same book “their bible”

She is disappointed, about the collaboration at middle school, and thinks that she does not share her colleagues views on mathematics.

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