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World Association of Lesson Studies International Conference 2015
Lesson Study for Improvement of Classroom Quality
November 23-27, 2015 Khon Kaen University, Thailand

Lesson Study in Mathematics in Chile: professional development and academic research

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About Chile



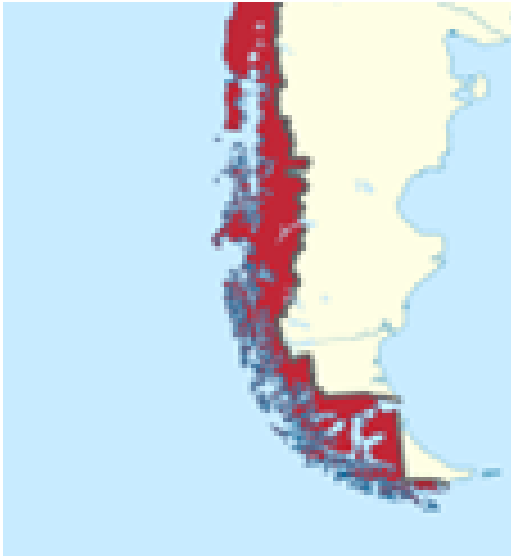
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≠ 3400km long
≠ 200km average width

Los Andes mountain range, East limit
Coastal mountain range, close to the sea

16 million inhabitants



Southern part: difficult access

Carretera Austral (Austral highway)

A mayor and recent enterprise
(in general terms, scarce populated region)



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Big earthquakes
Tsunamis
(Valparaiso: big fire)


In Chile, each university offers

its own curriculum for teachers' training

Teachers overloaded:
about 40 lessons a week

(a mayor strike this year)

PISA Standings, roughly

Level		1	2	3	4	5	6
%	22	30	27	15	6	1	0.1

(Steadily improving;
best in Latin America)

2004

OECD's report: *Revision of educational policies. Chile.*

Pedagogical curricula: outdated & lacking pertinence

Faculties of education:

- should improve
- should get in contact with other faculties in Chile
- should get in touch with faculties of education abroad

2004

OECD's report: *Revision of educational policies. Chile.*

Teachers' training is split:

in Mathematics, e. g.,
mathematicians in charge of the discipline,
and faculties of education in charge of pedagogical issues;

to integrate both aspects would be
the student's responsibility.

Study said they did not, they could not.

2004

OECD's report: *Revision of educational policies. Chile.*

On 7th and 8th grades:

“Most students learn Mathematics and Sciences with teachers who not only do not know the subject, but also that lack confidence in their own knowledge”.

2004

OECD's report: *Revision of educational policies. Chile.*

Induction of novel teachers
frustrates their innovation purposes
because of quite conservative (in the wrong way)
uses at schools

MINEDUC, Ministry of Education

Started *postítulos*

(14 months diploma, non-graduate program)
for teachers serving in 7th and 8th grades,
especially in Mathematics.

MINEDUC gives Terms of Reference;
universities prepare their own programs and apply

Japan-Chile
agreement on Mathematics Education

November 2005

Global Forum on Education in Santiago, Chile

Immediately after,

Minister of Education of Chile, Sergio Bitar, and
Representative of JICA in Chile, Mr. Toshiyuki Ezuka,
signed an agreement for a 2005-2008 Project on
Improvement of Mathematics Education in Chile.

Project Japan-Chile

Aim of the project

"To improve the quality and skill in teaching,
of Mathematics university professors involved in the area
of in-service Continuing Education Program for Teachers (postítulos)"

Project Japan-Chile

JICA would provide assistance.

In charge:

Dr. Masami Isoda

Center for Research on International Cooperation in Educational Development,
CRICED, University of Tsukuba.

Administration on the Chilean side,

MINEDUC, Ministry of Education,

CPEIP: Center for Pedagogical Improving, Experimentation and Research

Project Japan-Chile

3 yearly intensive 40-days internships in Japan
for different 12-people teams each year:
10 public university lecturers
& 2 CPEIP professionals.

Participants should understand Japanese pedagogical methods

Project Japan-Chile

On returning to Chile, there would be:

Seminars to study and dissemination of topics of the internships.

An improvement in the proposals and in the implementation
of postítulos in Math Education of the universities involved;

An improvement in the terms of reference of the postítulos.



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Participant universities' whereabouts



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Internships in Tsukuba (and Tokyo)

University	2006	2007	2008
U de Antofagasta		2	
U de la Serena	2		
U Católica de Valparaíso	2		2
U de Santiago	2		2
U de Chile		2	
U Metr. Ciencias Educación		2	1
U Católica del Maule		2	1
U del Bío Bío			2
U de Concepción	2		1
U Católica de Temuco	2		1
U de La Frontera		2	
(CPEIP)	2	2	2

} North

} Capital

} South

Capital

The internships (roughly)

Getting acquainted with Japanese (culture and) educational system:

- examining and being lectured on
aims, procedures, textbooks preparation and use;
- visiting elementary and secondary schools;
- discussing with Japanese specialists from
MEXT, Ministry of Education, Culture, Sports and Technology of Japan
CRICED, The University of Tsukuba and Attached Schools
NIER, National Institute for Educational Policy Research

The internships (roughly)

Getting acquainted with Japanese (culture and) educational system:

- attending to demonstration classes, at the U of Tsukuba's Attached Elementary School, and others.

Kouzou Tsubota
Yasuhiro Hosomizu
Hiroshi Tanaka
Takao Seiyama
Yoshikazu Yamamoto
Satoshi Natsusaka

On returning, each group of interneers
(added to the preceding(s) groups and) engaged in:

- Working on postítulos' proposals and implementation
- Discussion of Lesson Study methodology at their own institutions
- Diffusion of Lesson Study in neighbor schools (variable)

What did the universities do

As an example

2006 (first group):

February 10th to March 10th, internship

April, First seminar of study and dissemination

May, Meetings within the university community

May to June, Preparation of terms of reference

(Remote Internet meetings with Dr. Isoda)

There were a number of Demonstration classes

given by Japanese teachers to Chilean students
in different regions of Chile (north, central and south).

Several universities in the project got involved on it.



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There were other activities,
that some of the participant institutions engaged in

The following list is given as a way of example:

CPEIP

2007

17 communes

Lesson Study in Math, Language and Communication

2008

183 schools in 56 districts (Social and Natural Sciences added)

Universidad de Chile (University of Chile)

2006-2008

In postítulos, special units of:

- Teaching Problem Solving Strategies
- Use of the whiteboard
- The importance of the error in the textbooks

For pedagogy students, special units of:

- Lesson Study as a strategy for professional development and support for the integration of ICT in the classroom

Universidad de Chile (University of Chile)

2006-2008

For in-service teachers:

- Lesson Study as a strategy to improve Math lessons
20 teachers in a school in Santiago, then,
70 teachers in Paine (rural Santiago)

For Master's Program in Social Sciences Education Faculty:

- Using activities and problems included in Japanese textbooks

Universidad Católica de Temuco, UCT

(Catholic University of Temuco; southern part of Chile)

2007-2008

University (internal) Project.

Lesson Study: a proposal to critically analyze teaching

University (internal) Project.

Improving teaching and learning of Math in first elementary cycle.

Universidad Católica de Temuco, UCT

(Catholic University of Temuco; southern part of Chile)

2007-2008

Project: Lesson Study

Aimed at improving the teaching and learning of Math
in (2) junior basic schools, through three core ideas:

- Lesson Study, according to the Japanese experience.
- The class focused on problem solving
- Effective use of time in 45 minutes lessons.

Universidad Santo Tomás

Private university;
wasn't among the selected for Japan-Chile project;
learned Lesson Study from us;
(One instructor: Master's degree
on Didactics of Mathematics at PUCV)

Universidad Santo Tomás

Private university;
wasn't among the selected for Japan-Chile project;
learned Lesson Study from us;
(One instructor: Master's degree
on Didactics of Mathematics at PUCV)

- Lesson Study in Mathematics pedagogy students curriculum
- Yearly workshops for instructors (thrice)
- Presentations at SOCHIEM, CIBEM
- Publications at RECHIEM (SOCHIEM's journal)
- UST funded research project

Universidad Católica del Maule, UCM
(South-central part of the country)

2008-2012

Masters' degree on Didactics of Mathematics:

- Incorporating Lesson Study methodology
- Using the methodology for study lessons
- Design of lesson plans based on
Lesson Study and the Open Approach

Universidad Católica del Maule, UCM
(South-central part of the country)

2008-2012

Mathematics department:

- Organization of National Meetings on Lesson Study

(Nowadays sponsored by Chilean Society for Mathematics Education, SOCHIEM)

SOCHIEM, Chilean Society for Mathematis Education

Increasing presence of Lesson Study

(since 2006)

November, 2012, SOCHIEM annual meeting:

Masami Isoda. Plenary Address

(Following day: demonstration class)

Pontificia Universidad Católica de Valparaíso, PUCV

(Pontifical Catholic University of Valparaíso,
central part of the country, principal port)

(The University offers

a Master's program in Didactics of Mathematics and
a Doctorate's program in Didactics of Mathematics, unique in the country)

Pontificia Universidad Católica de Valparaíso, PUCV

(Pontifical Catholic University of Valparaíso,
central part of the country, principal port)

Engaged in all the the tasks referred above

Other than that:

Pontificia Universidad Católica de Valparaíso, PUCV

Lesson Study in (part of) Government's Project LEM
(Reading, Writing and Mathematics) in Valparaíso

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- SOCHIEM, Sociedad Chilena de Educación Matemática
(Chilean Society for Mathematics Education)
(PUCV, UCM)
- SOMACHI, Sociedad Matemática de Chile
(Chilean Mathematics Society)
(PUCV, UCM)

[This coming Saturday, in Annual Meeting:
Special session on Lesson Study]

Pontificia Universidad Católica de Valparaíso, PUCV

(With UCM) Active participation on congresses:

- Congreso Matemático Capricornio
(Capricorn Mathematics Congress; Northern region)
(PUCV)
- Mathematics' week
(Yearly, Valparaíso)
(PUCV)
- (Chilean Meetings on Lesson Studies)
(PUCV, UCM)

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- ICME11 Monterrey (UCM, PUCV)
- ICME12 Seoul (PUCV)
- Iberoamerican Conference of University Teaching
Porto, Portugal
- Oberseminar zu Didaktik der Mathematik,
University of Augsburg, German

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- CIBEM, *Congreso Iberoamericano de Educación Matemática*
(quadrennial)
Ibero-American Congress of Mathematics Education
- RELME, *Reunión Latinoamericana de Matemática Educativa*
(yearly)
Latin American Meeting of Mathematics Education

Pontificia Universidad Católica de Valparaíso, PUCV

Several books, with Dr. **Masami Isoda**
(Visiting University of Tsukuba, Dr. Isoda's grants)

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Several books, with Dr. **Masami Isoda**
(Visiting University of Tsukuba, Dr. Isoda's grants)

Publishers: Ediciones Universitarias de Valparaíso.

Available on-line at <http://ima.ucv.cl/academicos/>

(<http://math-info.cried.tsukuba.ac.jp/>)

Pontificia Universidad Católica de Valparaíso, PUCV

Several books, with Dr. **Masami Isoda**
(Visiting University of Tsukuba, Dr. Isoda's grants)

Isoda, M.; Arcavi, A. & Mena, A. eds. (2008, 2010, 2012).

El Estudio de Clases japonés en Matemáticas.

(The Japanese **Lesson Study** in Mathematics)

Publishers: Ediciones Universitarias de Valparaíso.
Available on-line at <http://ima.ucv.cl/academicos/>



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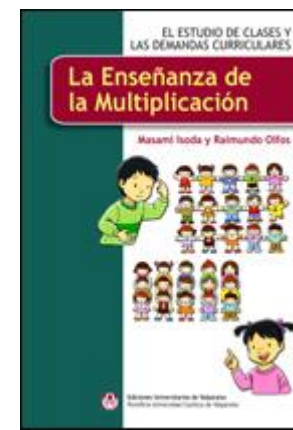
Several books, with Dr. **Masami Isoda**
(Visiting University of Tsukuba, Dr. Isoda's grants)

Isoda M. y Olfos R. (2009).

El **Estudio de Clases** y las demandas curriculares:
La Enseñanza de la Multiplicación

(**Lesson Study** and curricular demands:
The teaching of Multiplication)

Publishers: Ediciones Universitarias de Valparaíso.
Avalaible on-line at <http://ima.ucv.cl/academicos/>



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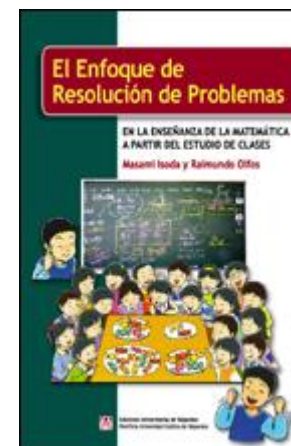
Several books, with Dr. **Masami Isoda**
(Visiting University of Tsukuba, Dr. Isoda's grants)

Isoda, M. y Olfos R. (2009).

El enfoque de **Resolución de Problemas**
en la enseñanza de la matemática a partir del **Estudio de Clases**.

(The **Problem solving approach**
in Mathematics teaching starting from **Lesson Study**).

Publishers: Ediciones Universitarias de Valparaíso.
Avalaible on-line at <http://ima.ucv.cl/academicos/>



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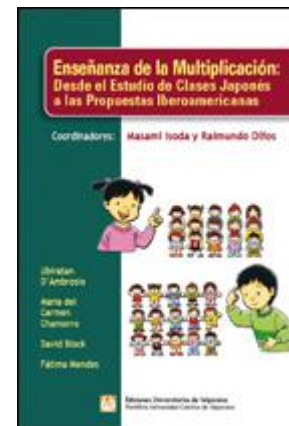
Several books, with Dr. **Masami Isoda**
(Visiting University of Tsukuba, Dr. Isoda's grants)

Isoda, M.; Olfos, R.; D'Ambrosio, U.; Chamorro, C.; Block, D.; & Mendes, F. (2011)

Enseñanza de la **multiplicación**:
desde el **Estudio de Clases** japonés a las propuestas Iberoamericanas.

(The teaching of **multiplication**:
from Japanese **Lesson Study** to Ibero-american proposals)

Publishers: Ediciones Universitarias de Valparaíso.
Available on-line at <http://ima.ucv.cl/academicos/>





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Pontificia Universidad Católica de Valparaíso, PUCV

A number of books:

Masami Isoda, Raimundo Olfos, Arturo Mena

Also,

- several chapters of books
- several articles in Journals
(RECHIEM: Journal of the
Chilean Society for Mathematics Education, etc.)

Pontificia Universidad Católica de Valparaíso, PUCV

Research grants

- 3 funded by CONICYT:
National Commission of Scientific and Technological Research
- 2 funded by CIAE
Center for Advanced Research in Mathematics Education

Pontificia Universidad Católica de Valparaíso, PUCV

Research PUCV grants

- Professional practices for Mathematics teaching students
- In-service teachers' professional development

Pontificia Universidad Católica de Valparaíso, PUCV

In-service teachers training

- Postítulos
- 30 hours diploma in Lesson Study, in some communes

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In-service teachers training

A number of demonstration classes

with Chilean teachers and students



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Pausado

Pontificia Universidad Católica de Valparaíso, PUCV

Invited lectures on Lesson Study

In Chile:

- at 15 universities
- at SOCHIEM, Chilean Society for Mathematics Education
- at Mathematics Teachers Students Association
- at the National Council of Dean of Sciences

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Invited lectures on Lesson Study

Abroad:

- Argentina
- Colombia
- Perú (Lima, Piura, Arequipa)
- Costa Rica

Pontificia Universidad Católica de Valparaíso, PUCV

- Lesson Study groups in several schools in Valparaíso
- Lesson Study groups for PUCV's lecturers

Pontificia Universidad Católica de Valparaíso, PUCV

Lesson Study at the Mathematics Institute:

- for professional practices of
Mathematics pedagogy students
(Also, UCM, UST)
- a number of Master's theses in Didactics of Mathematics
- three doctoral theses in Didactics of Mathematics
(1 finished, 2 in process)

Pontificia Universidad Católica de Valparaíso, PUCV

Participating (by invitation) in:

APEC Human Resource Development Working Group projects
overseen by

CRICED, Center for Research on International Cooperation
in Educational Development, University of Tsukuba, Japan

&

Faculty of Education at Khon Kaen University:

- (2007-2009). *Lesson Study Project on Mathematics;
a collaborative study on innovations for teaching and learning
Mathematics in different cultures among the APEC member economies*
- (2010-2014). *Emergency Preparedness Education:
Learning from Experience, Science of Disasters, and Preparing for the Future.*

Pontificia Universidad Católica de Valparaíso, PUCV

Participating (by invitation) in:

APEC-Tsukuba International Conference

Innovation of Classroom Teaching and Learning through Lesson Study

III (2007). *Focusing on Mathematical Communication*

IV (2010). *Connection between Assessment and Subject Matter*

Pontificia Universidad Católica de Valparaíso, PUCV

Participating (by invitation) in:

APEC-Tsukuba International Conference

Innovation of Classroom Teaching and Learning through Lesson Study

VI (2012). *Challenges to Mathematics Education to Emergency Preparedness Education
Learning from Experience, Science of Disasters, and Preparing for the Future (II)
Focusing on Earthquake and Tsunami*

VII (2013). *Challenges to Mathematics Education to Emergency Preparedness Education
Learning from Experience, Science of Disasters, and Preparing for the Future (II)
Focusing on Flood and Typhoon*

VIII. (2014). *Challenges to Mathematics Education to Emergency Preparedness Education
Learning from Experience, Science of Disasters, and Preparing for the Future (III)
Focusing on Fire and Volcanic Eruption*

Pontificia Universidad Católica de Valparaíso, PUCV

Communal workshops with CPEIP funding

Two-year project.

“Teachers of teachers” (from North to South)
were trained in Lesson Study methodology.

There were three meetings of the whole team, in Santiago and Valparaíso.

In turn, they would lead the introduction of
Lesson Study and Problem Solving Approach
in their respective communes.



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(in situ visits to teachers)

Pontificia Universidad Católica de Valparaíso, PUCV

Communal workshops

with CPEIP funding

Three important things

manifested as such by participant teachers:

- Learning content
- Learning methodologies
- Learning collaborative work
- Acquiring confidence

(Very much as a response to OECD's report)

Pontificia Universidad Católica de Valparaíso, PUCV

Communal workshops

with CPEIP funding

Three important things

manifested as such by participant teachers:

- Learning content
- Learning methodologies
- Learning collaborative work
- Acquiring confidence

(Very much as a response to OECD's report)

The Government changed;
officials were, to some extent, replaced.

We keep trying.

So, now that the country is raising investment in Education
(2005-2012: from 0.45% to 0.9% of GDP)

we asked Government officials to consider
3 hours a week to implement the Communal Workshops at large.



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Why Lesson Study
is important to Chile

There are many well known reasons

In the specific case of Chile:

- Many initiatives have failed, teachers lack confidence in them (Singapur's approach: different)
- Teachers do not know enough Mathematics, but they are offered courses in methodology (at large), evaluation and the like
- There are a number of Math courses for teachers; it is not clear what is the benefit achieved.

- Chilean teachers keep working in an isolated way

- Mathematicians are getting involved in Mathematics education.

Some of them (...) study the subject, get involved in classroom activity.

They have elaborate textbooks that are mathematically clean
(texts used to have huge mistakes),
but they are still somehow remote from teachers.

These mathematicians are important actors in Math Education in Chile.

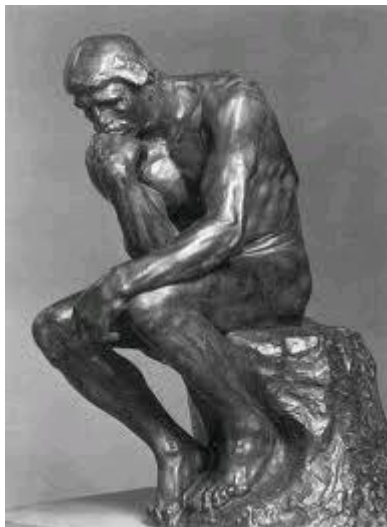
In the specific case of Chile:

- Institutions that have worked better in Lesson Study (PUCV, UCM) offer graduate programs in Didactics of Mathematics.

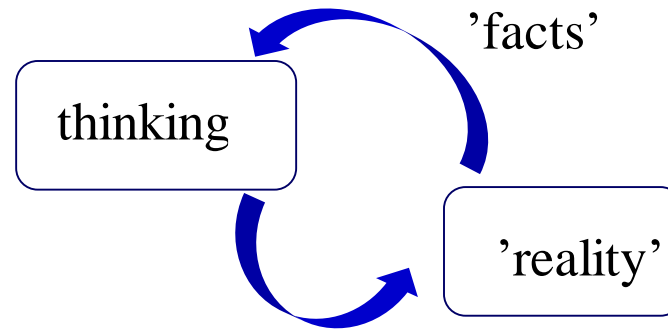
They have also approached Lesson Study from a theoretical perspective.

This is a good way for mathematicians-mathematics educators' fruitful discussion.

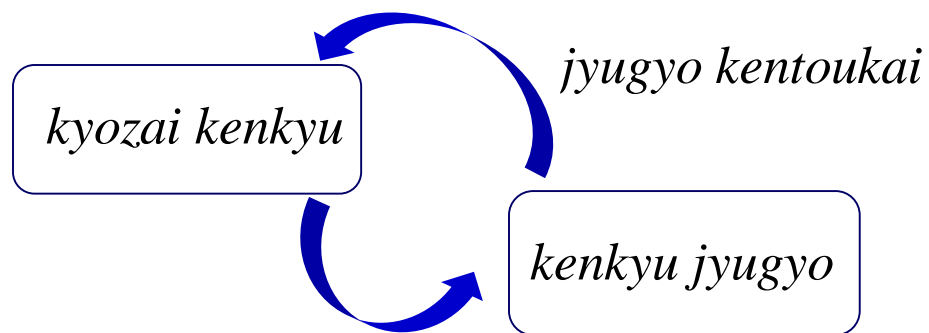
(The open approach is, of course, a very good starting point for that).



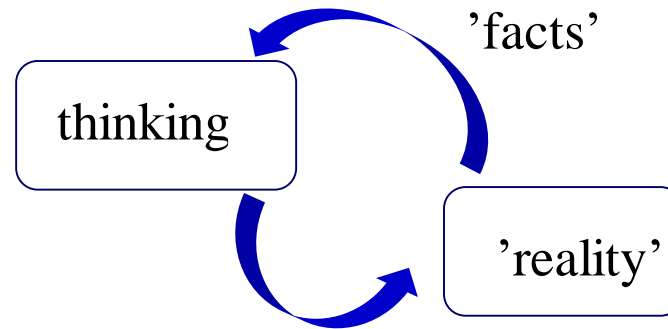
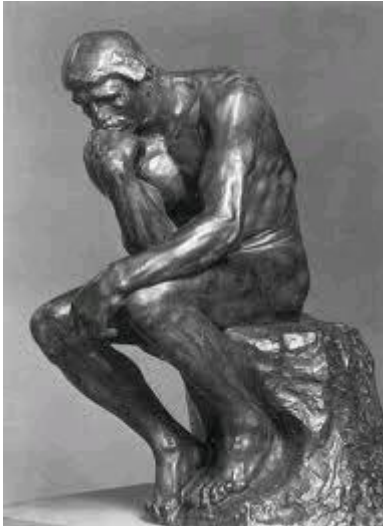
In Chile (...) many people tend to think
that (Math) education is just a matter of thinking



epistemic vigilance, or watchfulness
(science: XIII century on)

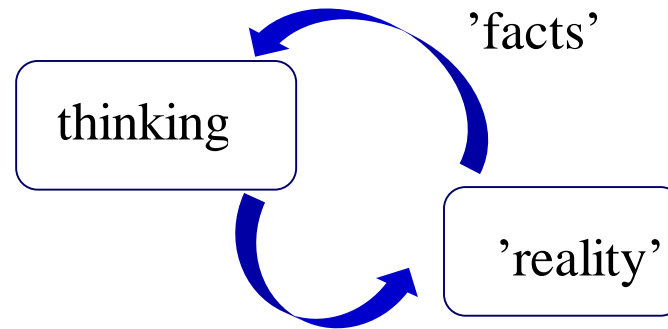


Lesson study
jugyo kenkyu

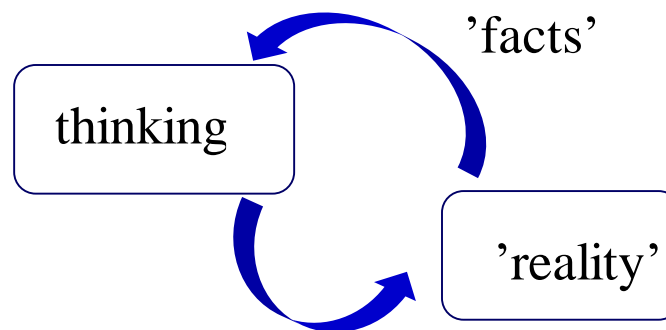


There are other didactical methodologies and theories that make explicit a similar epistemic vigilance:

North American *APOS theory*,
French Didactic Engineering (*ingénierie didactique*)...

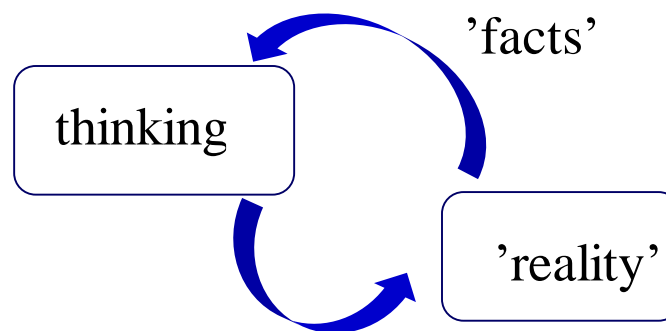


A research topic is how to 'articulate' them,
given that this has some interest



PUCV.

Lesson Study and Didactic Engineering.
Comparison and use:



PUCV.

Lesson Study and Didactic Engineering.

Comparison and use:

In-service and pre-service teachers
are given elements of
French Didactics of Mathematics
and the Lesson Study Methodology

They benefit from both sources

Our understanding

Chilean teachers that have gotten involved in Lesson Study
are well aware of several things:

- They can learn Mathematics, methodology, and to know their own students
- It is a collaborative way of working. Responsibility is shared.
- It offers room for (continuous) improvement

Chilean teachers that have gotten involved in Lesson Study
are well aware of several things:

- It is easy to comprehend, and it takes some time to manage it:
you have to learn from it
- It is not something that comes from above (up down),
but something that you (and your group) can build
- You can think as a researcher;
you can offer your results to the community

For Chilean teachers, Lesson Study offers a possibility of:

- working collaboratively
 - as pairs
 - sharing their knowledge
 - sharing the responsibility
- looking with a researcher's view
- being a professional,
(as opposed to being a functionary, an official)

For Chilean teachers, Lesson Study offers a possibility of:

- working collaboratively
 - as pairs
 - sharing their knowledge
 - sharing the responsibility
- looking with a researcher's view
- being a professional,
(as opposed to being a functionary, an official)
- maintaining aspirations

Lesson Study offers a way of dealing with two aspects
that are often considered as antagonistic:

the general objectives of education at large
and Mathematics learning

In Chile, Lesson Study offers a possibility of:

- Responding to educational system's diagnosis

(OECD's, and others's)



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What know

In Chile, Lesson Study needs funding

(We have some groups that are self-generated by alumni of PUCV,
not funded

Instituto Superior de Comercio, very active)

In Chile, Lesson Study needs funding

Teachers are overloaded, overwhelmed

They have 2 weekly ours for academic discussion
But that time is spent in administrative meetings
(Grading is done at home, on evenings and weekends)

So far, we cannot say that we have been successful;

but, in the current state of affairs,

We visualize a couple of opportunities:

We visualize a couple of opportunities:

1. *Ley de Subvención Escolar Preferencial*
Preferential School Subsidy Act

Funding for improving teaching in less-than-average schools
(especially, where there are many children at risk)

Schools use to apply for special funding for improving teaching and learning
Now they will have to have a 4-year planning, have a strategy
(Not just to accumulate a unrelated improvement courses and the like)

We visualize a couple of opportunities:

2. Chile is a quite centralized country

MINEDUC has regional Secretaries
but so far most decisions are made in the Capital

Now, there will be a decentralization process

We think that it will be easier to convince regional authorities

ขอบคุณมาก

どうもありがとうございました

Muchas gracias



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Addendum

Thus,

Lesson Study is a great opportunity for us

Lesson Study is also a responsibility – of sharing it.

In Chile, educational system as a whole
not only is highly socially discriminatory
but also enhances discrimination

Lesson study offers a possibility of:

- Responding to educational system's diagnosis

(OECD's, and others's)



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80% of population



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80% of population
February 27th, 2010, 03:34

8.8 magnitude earthquake

3 min 25 secs \approx 6 min



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PONTIFICIA UNIVERSIDAD
CATOLICA
DE VALPARAISO

February 27th, 2010, 03:34

369 people died

500,000 houses
severely damaged





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3 min 25 secs \approx 6 min
(two earthquakes)





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178 times more energy
than in Haiti's earthquake
(the preceding month)



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February 27th, 2010, 0.4:09
(35 minutes later)

tsunami





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February 27th, 2010, 0.4:09
(35 minutes later)

tsunami

156 people died, 25 missing

(people run to the hills,
but were told to come back:
there would be no risk)





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CATOLICA
DE VALPARAISO

Juan Fernández islands
600 km off coast
(quite minor earthquake)





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DE VALPARAISO

Juan Fernández islands
600 km off coast
(quite minor earthquake)

12 yr old Martina Maturana
grandfather told her of
earthquake in continental Chile





PONTIFICIA UNIVERSIDAD
CATOLICA
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Juan Fernández islands
600 km off coast
(quite minor earthquake)

12 yr old Martina Maturana
grandfather told her of
earthquake in continental Chile
she noticed boats
crashing among them
she activated the fire alarm





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DE VALPARAISO

Juan Fernández islands
600 km off coast
(quite minor earthquake)

12 yr old Martina Maturana
grandfather told her of
earthquake in continental Chile
she noticed boats
crashing among them
she activated the fire alarm
waves 300 meters in land
town destroyed
no houses left
hundreds saved





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Date	Magnitude	Location
1570	8.8	Concepción
1575	8.5	Valdivia
1751	8.5	Concepción
1835	8.5	Concepción
1960	9.5	Valdivia
2012	8.8	Concepción



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 tsunamis



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DE VALPARAISO



National
Congress



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CATOLICA
DE VALPARAISO



Thursday, March 11th, 2010
(earthquake: February 27th, 2010)



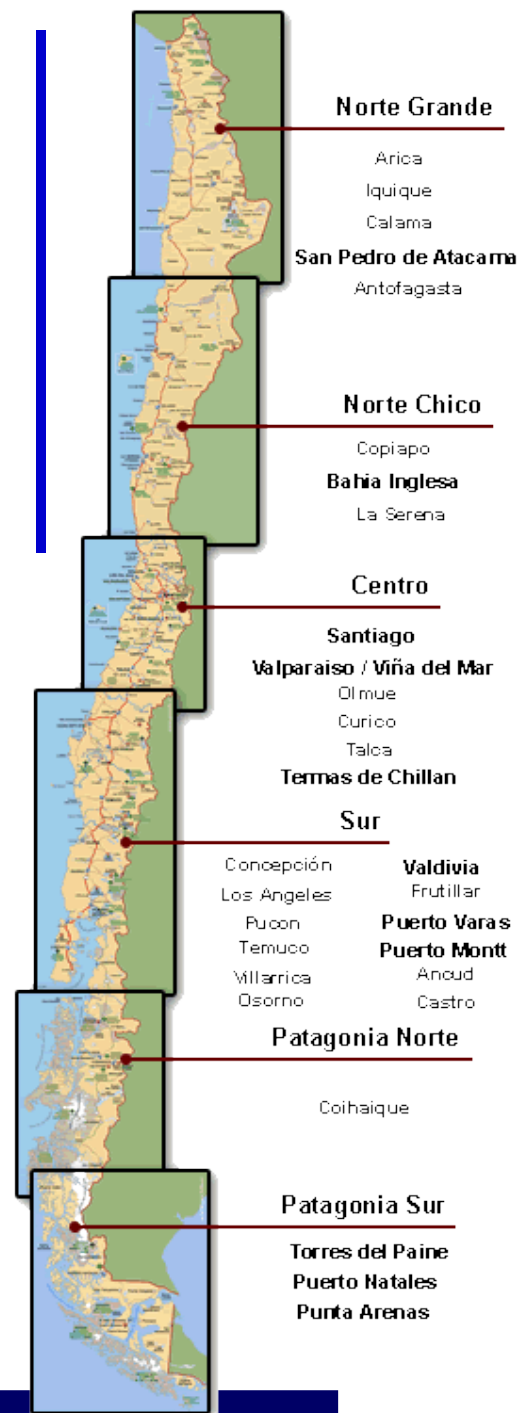
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DE VALPARAISO





≠ 8.4 earthquake expected

September 16th, 2015: 8,3



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CATOLICA
DE VALPARAISO

Arica



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DE VALPARAISO

A piece of the *Wateree*





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CATOLICA
DE VALPARAISO

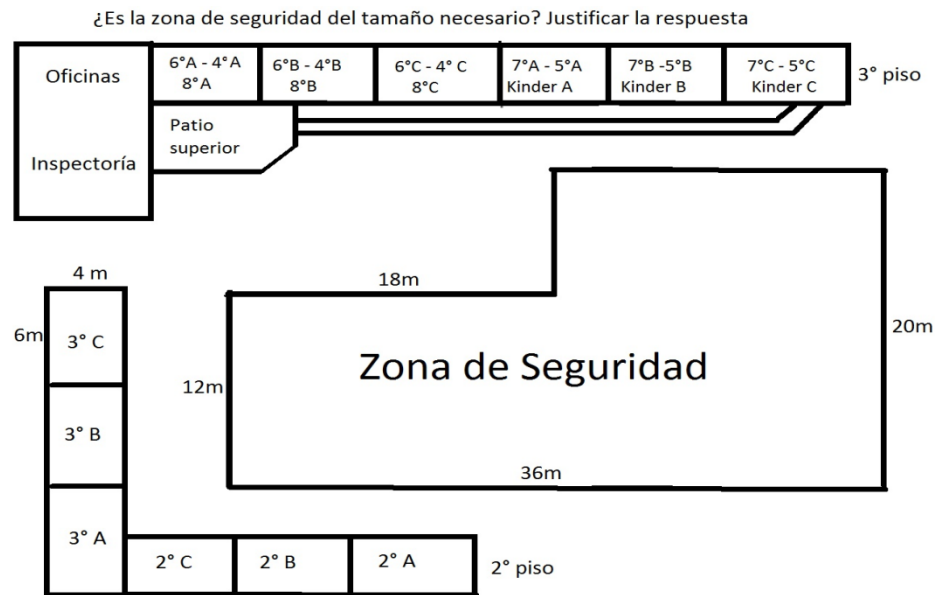




A piece of the *Wateree*



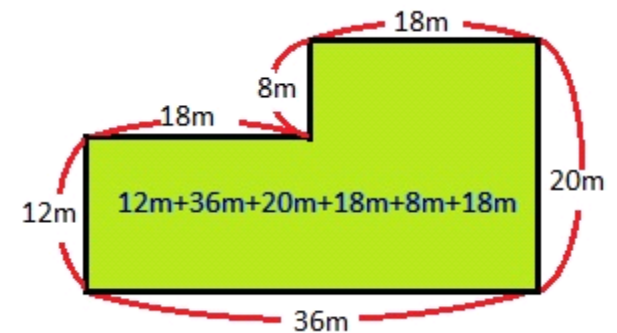
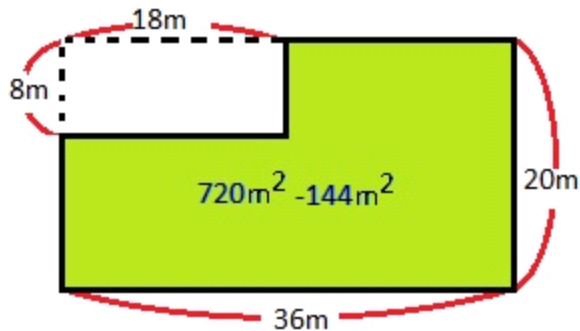
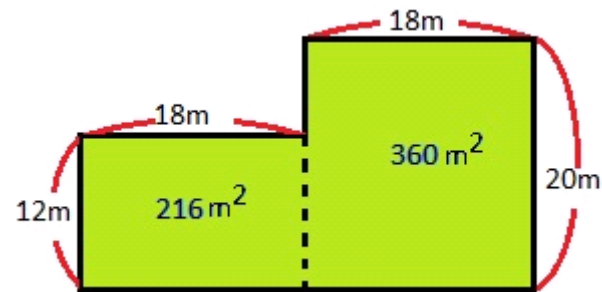
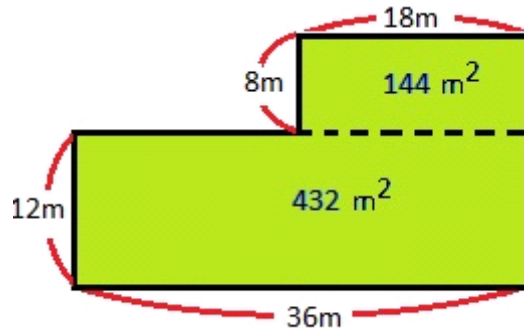
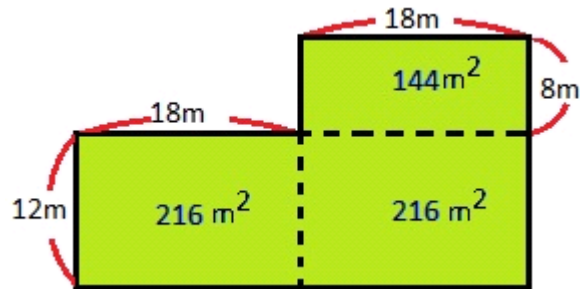
¿Does the new security zone have the appropriate size?



(Not every kid new what a security zone is)



Strategies expected





Date	Lesson's question				
Unity	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Closing
Objective					
Abstract of the preceding lesson					

We have been interesting ONEMI
(National Emergency Office,
headquarters in Santiago)

We have an offering from a company,
but no engagement so far

ขอบคุณมาก

どうもありがとうございました

Muchas gracias