How to implement a better use of MBL in the science classroom?

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Socrates Comenius project 2005-2008

Effective use of ICT in Science Education

EU-ISE

226382-CP-1-2005-SK-COMENIUS-C21

Comenius multilateral project 2012-2014

The acquisition of science competencies using ICT real time experiments
COMBLAB

517587-LLP-1-2011-ES-COMENIUS-CMP

Education and Culture
Lifelong learning programme
COMENIUS

What is the most effective use of MBL activities?

How do teacher training strategies improve the use of MBL in the classroom?
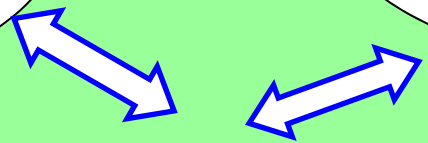
Questions
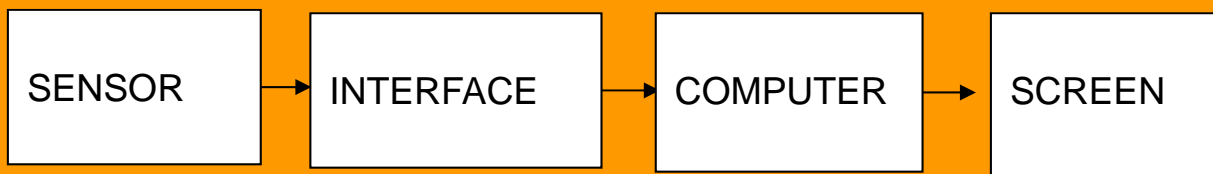
To focus on classroom management

To use video film analysis of teachers who were performing an MBL activity with upper-secondary school students.

In EU-ISE Project

accuracy and quickness of collecting data

data displayed in many different ways

collect data over a very short or very long period of time

Background and framework

⟷

Technical Advantages

Pedagogical approaches

The success of ICT activities is dependent on pedagogical models and teaching strategies

constructivist approach

Inquiry based activities

Department of Education has sent equipment to secondary schools

Teacher training courses were carried out from 2003 to 2007

Background and framework ⟷ **The use of MBL in Catalonia**

emphasis on technical training,

few changes in the classroom.

In some schools equipment has never been used

there has not been a generalized implementation

• The participants share their experiences, observe each other, and reflect on their own performance.

• Creation of a *learning community* between participants to allow confidence to development.

• Activities have to be carried out in small groups

•The teacher trainer has to: be a mentor for participants

Background and framework ⟷ Video analysis

- to collect evidence within the classroom and to analyse the many different aspects involved in classroom management.

- It allows teachers to analyse themselves and, to look for evidence of the teaching and learning processes.

Context and samples

The analysis of MBL activities

6 teachers performed the activity with the sensor of conductivity and complete the video film questionnaire.

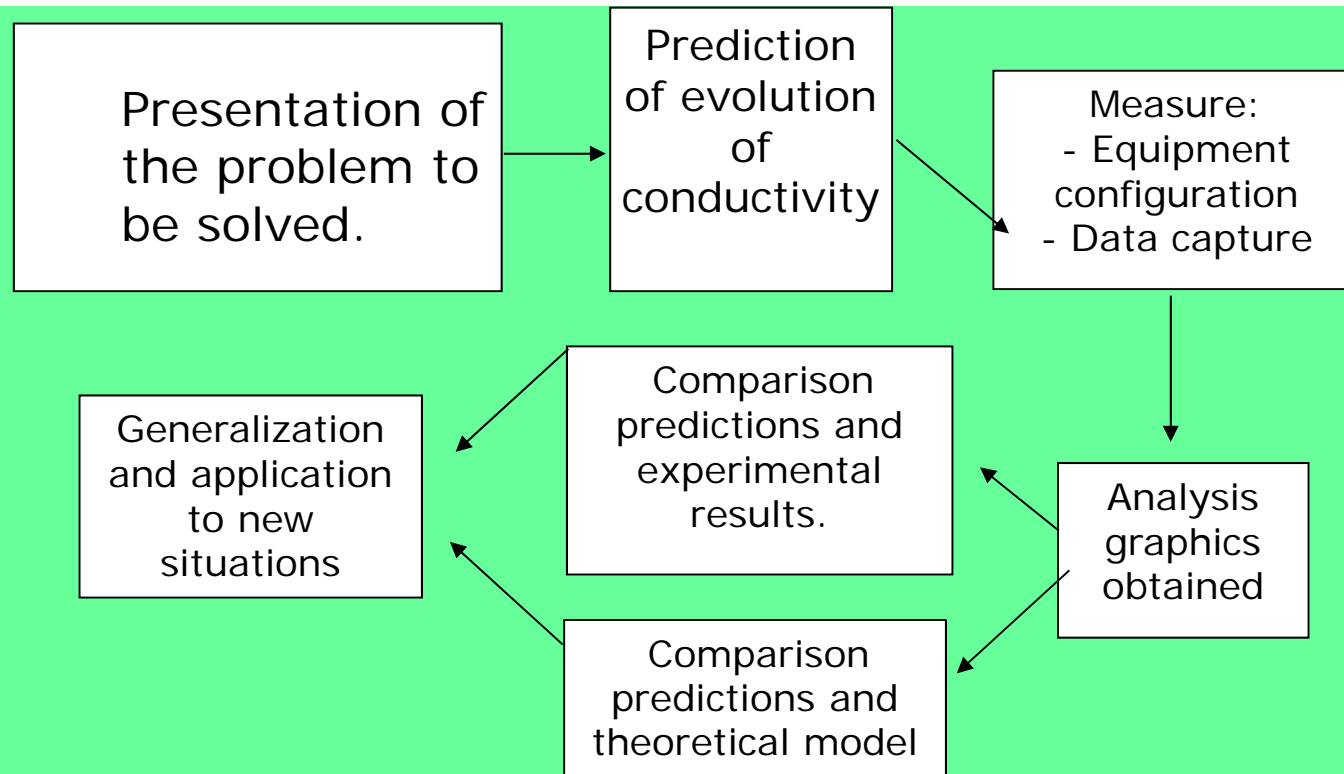## Feedback from the teacher training course

16 teachers of the course saw this video film

The analysis of video films focused on classroom management, but also included questions about the guidelines or laboratory worksheet.

Context and samples — In EU-ISE Project

Rio Tinto, Huelva
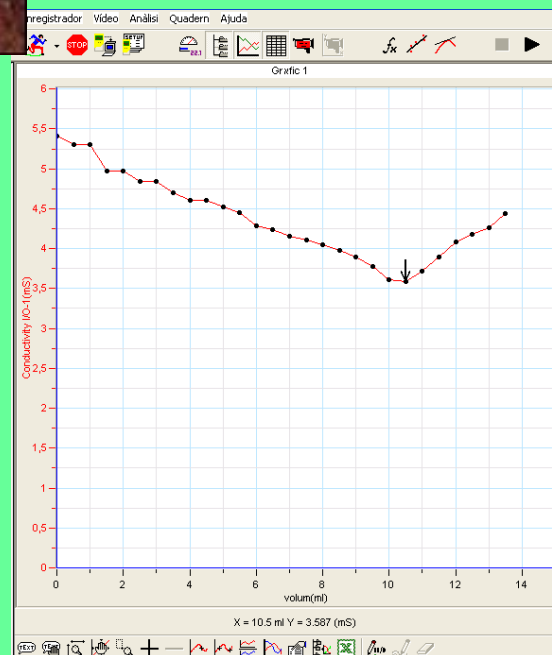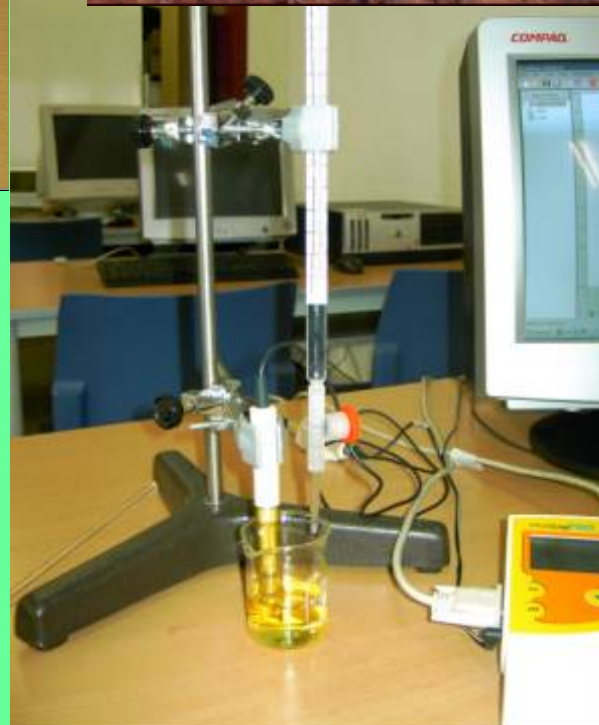
Context and samples

Video film: using the conductivity sensor

Methodology

To analyse the features of MBL practices

To **film a set of MBL** activities in classroom

To **complete questionnaires** about the analysis of guidelines and for the analysis of teaching practice films

To **get feedback from questionnaires**

To **draw conclusions** and suggest recommendations

Methodology

In what specific way has the course helped me?
What parts of this course are relevant to me and can be used in my classroom?
What difficulties do you already have in using ICT?
How and what aspect would you like to keep working on to improve your use of ICT?
What would you like to keep working on to continue to improve and develop your skills with ITC?

Methodology

Equipment, space and time distribution	Is there enough equipment and lab material? Is it suitable? Is the situation of students appropriate? Is there enough space? Is there enough time to perform the activity?
Context	Is it thought-provoking? Does students discuss about it at the begging of the activity? Does it promote students interest?
Aims of the activity	Does the teacher promote discussion about aims of activity?
Relationship with other activities and curricular items	Is it included in a teaching-learning sequence? Do students relate the activity to other activities in the learning sequence?
Use of the equipment	How difficult is the equipment to use? Is it efficient? Are the students able to set it up?

Methodology

Predictions and hypothesis	Are these done by students? Does the teacher promote them? Is there enough time? Do they compare variables?
During the activity	Does the teacher stimulate discussion? Do the groups work efficiently and autonomously?
Results, contrast with hypotheses and conclusions	Do the students discuss results within the group? Do the students compare the results with their predictions? Do the students draw conclusions?
Application to other situations and homework	Does the activity propose to students to use what have they learnt to other situations? Do teacher ask students to create a report of the activity?
Personal feedback	How satisfied did you feel after doing this activity? How satisfied do you think that students feel?

Results

Results of questionnaires of video films of the activity

Ítems	En quina mesura........	poc	molt	Per què? Comentaris de l'analisi fets pels professors que l'analitzen
Organitzacio de l'Aula	La distribucio dels equipaments a l'aula es l'adequada per a l'activitat?		6	
	Els alumnes es disposen de forma adequada per al treball en grup?		6	
Presentacio de l'activitat	El professor presenta de manera clara els objectius de la sessio?		6	Incita amb qüestions per tal que l'alumnat descobreixi la solucio.
	El professor relaciona l'activitat amb alguna altra anterior? (lectura, treball a l'aula...)	6		la majoria diu que no
	L'activitat es presenta en un context determinat o be de forma aïllada?		6	Tothom diu que no, encara que el guio si que fa relacio amb eliminacio de residus miners.
Prediccio i Interaccio entre l'alumnat	Els alumnes han de fer hipotesis i prediccions?		6	En relacio a les grafiques
	Els alumnes discuteixen entre ells aquestes prediccions?	2	4	Algun comentari diu que hi ha interaccio professor-alumne, pero poca entre ells.
	El muntatge de la practica es prou eficient per a poder-lo utilitzar sense dificultat?		6	Hi ha un alumne que porta l'iniciativa, la professora ajuda.
	Els alumnes treballen al llarg de l'activitat de forma autonoma o be necessiten de l'assistencia constant del professor?	2	4	Comentaris variats: Es nota que l'alumnat ha treballat ja amb sensors. Necessita l'ajuda de la professora.
Autonomia i participacio dels alumnes	Els alumnes es veuen implicat en l'activitat?		6	Alguns. Sembla que si
	Tots els membres dels grups participen de forma activa en		5	un comentari diu que no es veu

Results

In what specific way has the course helped me?

The course has helped me:

• To take into account what is necessary **to plan the activity** well and to incorporate them at the most appropriate moment of the **learning cycle**

• To **design and create ICT** activities

• To take into account **hypothesis**, discuss and **communicate results**

• To be able **to find more possibilities for using ICT** equipment, and be less afraid about using sensors with MBL equipment.
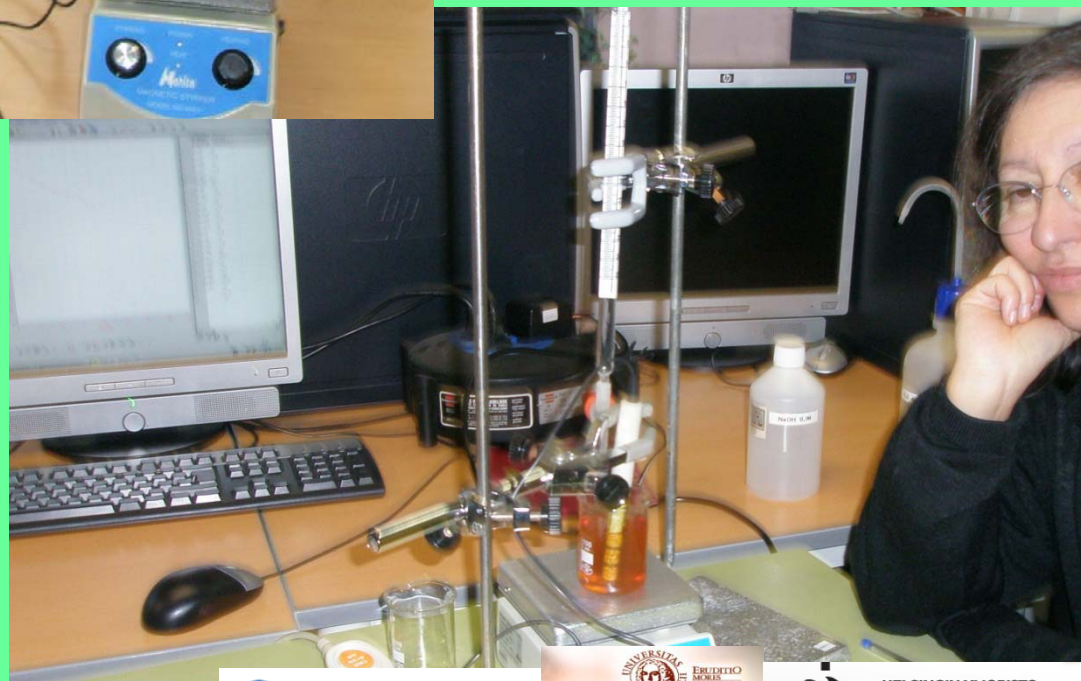
Results

Feedback from the teacher training course.

What parts of this course are relevant to me and can be used in my classroom?

- To **share experiences** with other teachers when group working in this course.

- To achieve with this course…
- A **better technical ability** when using sensors of MBL
- New kinds of **laboratory activities and group working**
- -- Didactic **strategies to plan and to manage** MBL activities in classroom

Results

Feedback from teacher training course

Results

Feedback from the teacher training course.

What difficulties do you already have in using MBL?

•**Technica**l difficulties: there aren't enough resources and not of sufficient quality.

•To find an appropriate **layout for the lab**

•To **choose the most suitable activities**, and time management.

•To use activities that lead students to **think and to build ideas**

How and what aspect would you like to keep working on to improve your use of ICT?

•To keep on learning more **didactic and technical aspects**

• To keep on **group working**, in a similar environment as the course.

# Feedback from the teacher training course

Results

Feedback from the teacher training course.

What would you like to keep working on to continue to improve and develop your skills with ITC?

- More sessions to experiment with **more activities**.
- There was not enough **time** to design activities neither to draw conclusions.
- To perform **another course** of these characteristics to depth and to enlarge knowledge in the use of MBL
- To keep the **ideas and experiences exchange** between teachers and group working and **to keep on working** with the group.

Results
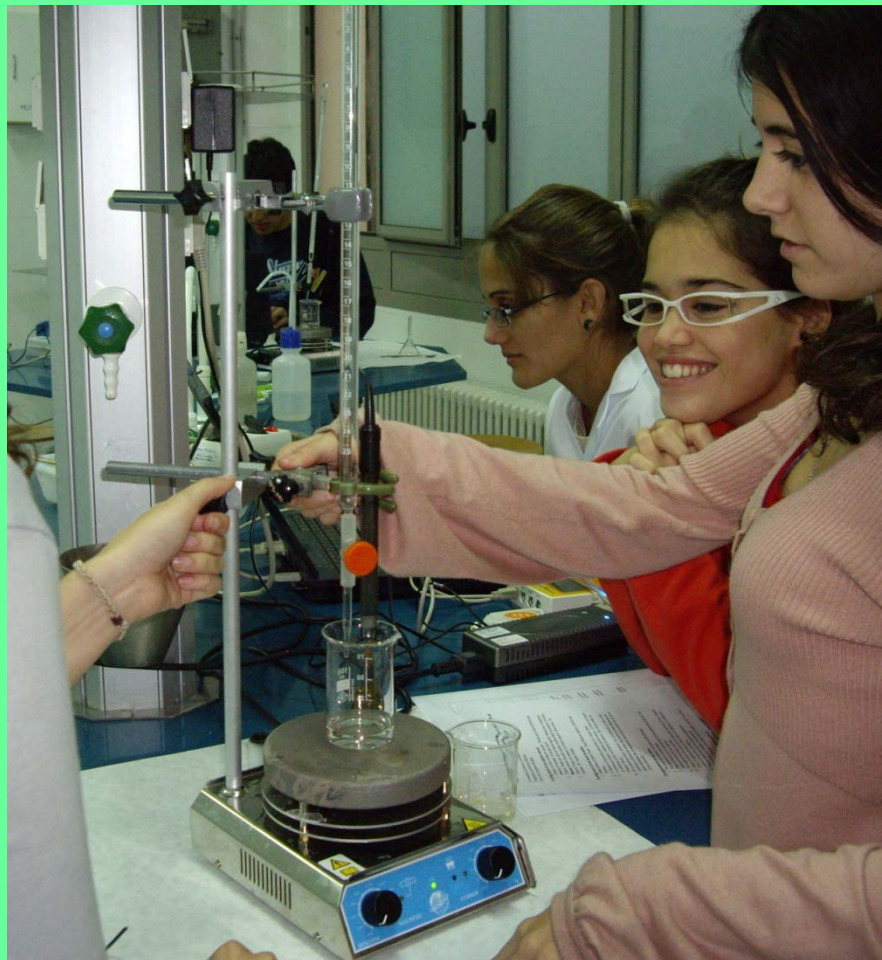
Conclusions

About relevant features of good MBL activities

The **design of student worksheets**
(not so long, in a learning cycle,…)

The **context** in which the activity
is presented to students.

An apropiate
classroom management.

Conclusions

Class management is more effective when:

good distribution of **space** and set up of **equipment**

discussion of the context and problem situation

discussion of the aims of activity and work that students have to do

students **discuss results** within the group

To make **predictions** and discuss them

contrast results with predictions

Interaction between students and student and teacher

group working and in **autonomous** way

communication of results and conclusions

Conclusions

About how do teacher training strategies improve the use of MBL in the classroom

- An important aspect is that the **participants** in the reflexive teacher training course **consider that to watch video films** of activities and the videotaping of their own activities as an **important tool** to learn about how to perform these activities and how to improve their practices.

- The **teacher training model**, based on **reflexive practice**, implemented by the Department of Education, improves the teaching and learning in different curricular areas.
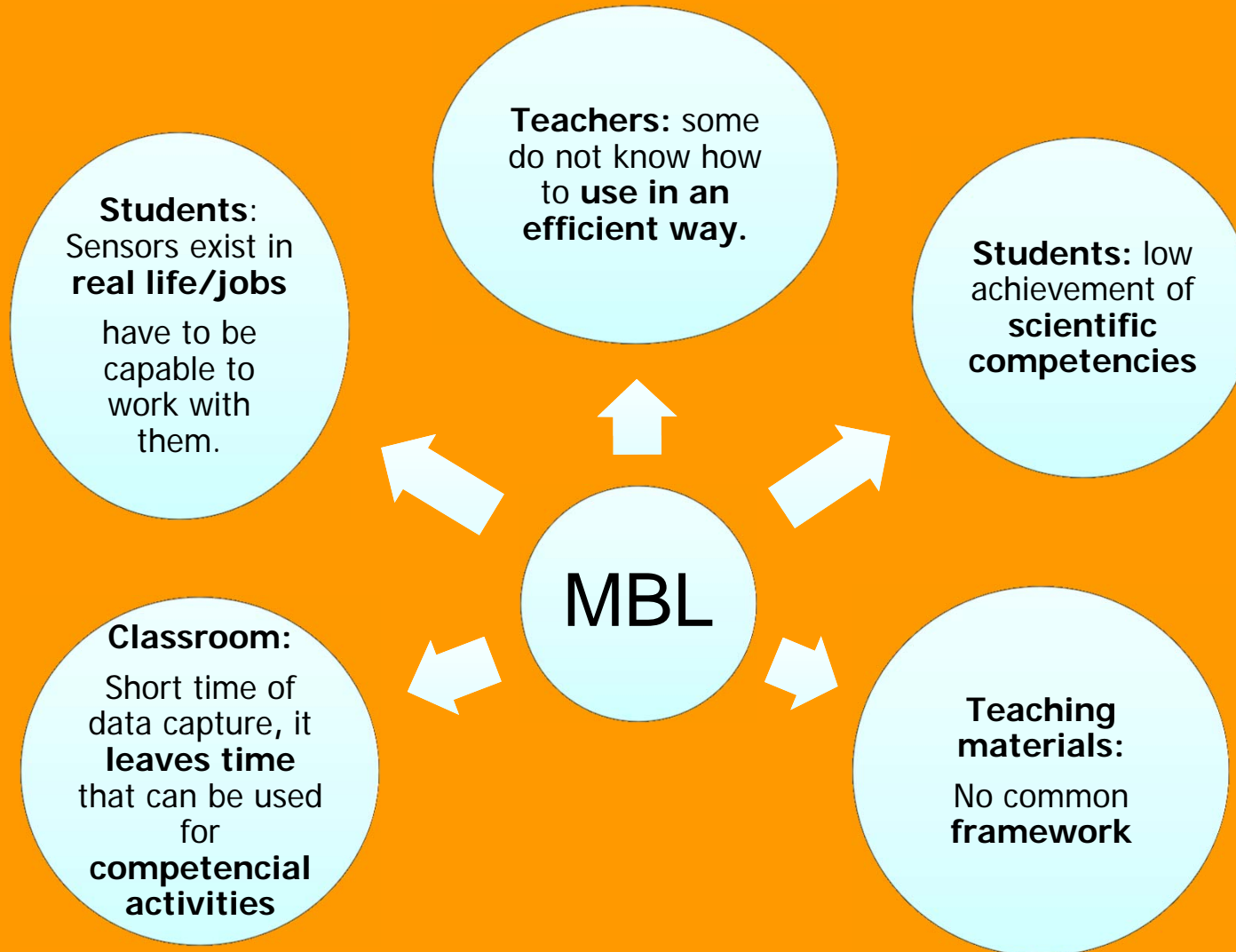
The motivations of COMBLAB

To give tools to science teachers to enhance Scientific, ICT and transversal competencies in secondary school students.

To create synergies between groups of teachers who are working on the topic, researchers and the educational authorities of the participating countries.

COMBLAB
COmpetency
MBL
LABoratory

The specific needs that COMBLAB addresses

Teachers: some do not know how to **use in an efficient way**.

Students: Sensors exist in **real life/jobs** have to be capable to work with them.

Students: low achievement of **scientific competencies**

Classroom: Short time of data capture, it **leaves time** that can be used for **competencial activities**

Teaching materials: No common **framework**

MBL

The objectives of COMBLAB are to...

1) *Obtain research based **teaching materials*** to enhance on students the **acquisition of science competencies trough ICT real time experiments**. There is no an established way of using this technology in science classes, and COMBLAB aims to contribute to create a new framework.

2) *Obtain research based **teacher training materials*** to enhance the mentioned competencies. As ICT real time experiments are a new technology, **few teacher training materials are available**, and in the project we aim to obtain them.

3) Share within the consortium and to *disseminate the outcomes in a **public website*** and in the future in *national and international conferences and journals*.

The objectives of COMBLAB are to...

4) **Create a community** of teachers/researchers from different countries of the consortium **to exchange experiences and good practices in the field**. To be *in contact with existing communities*.

5) *Create* **synergies with national and local education authorities** of each of the countries of the consortium to promote that the use of **the outcomes of the project is taken into account both in initial and continuous teacher training.**

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Thank you very much for your attention