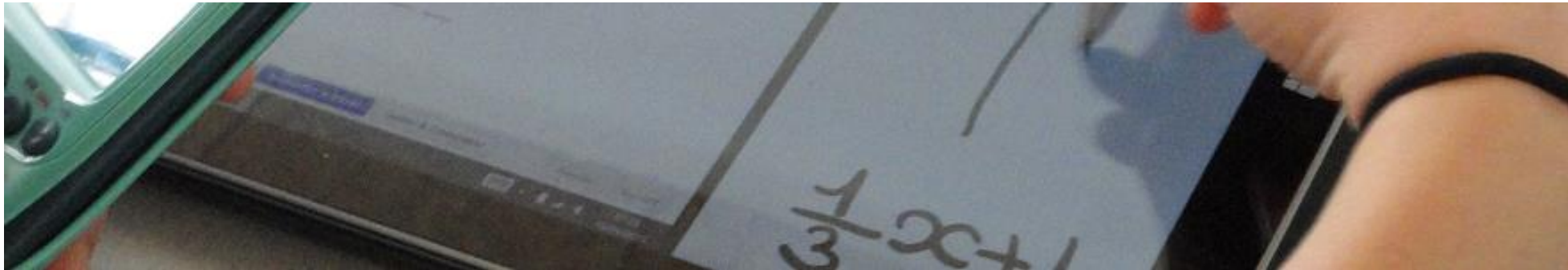




# FaSMEd case studies from France



Gilles Aldon, Monica Panero

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ECER 2015 – Budapest – September 11, 2015



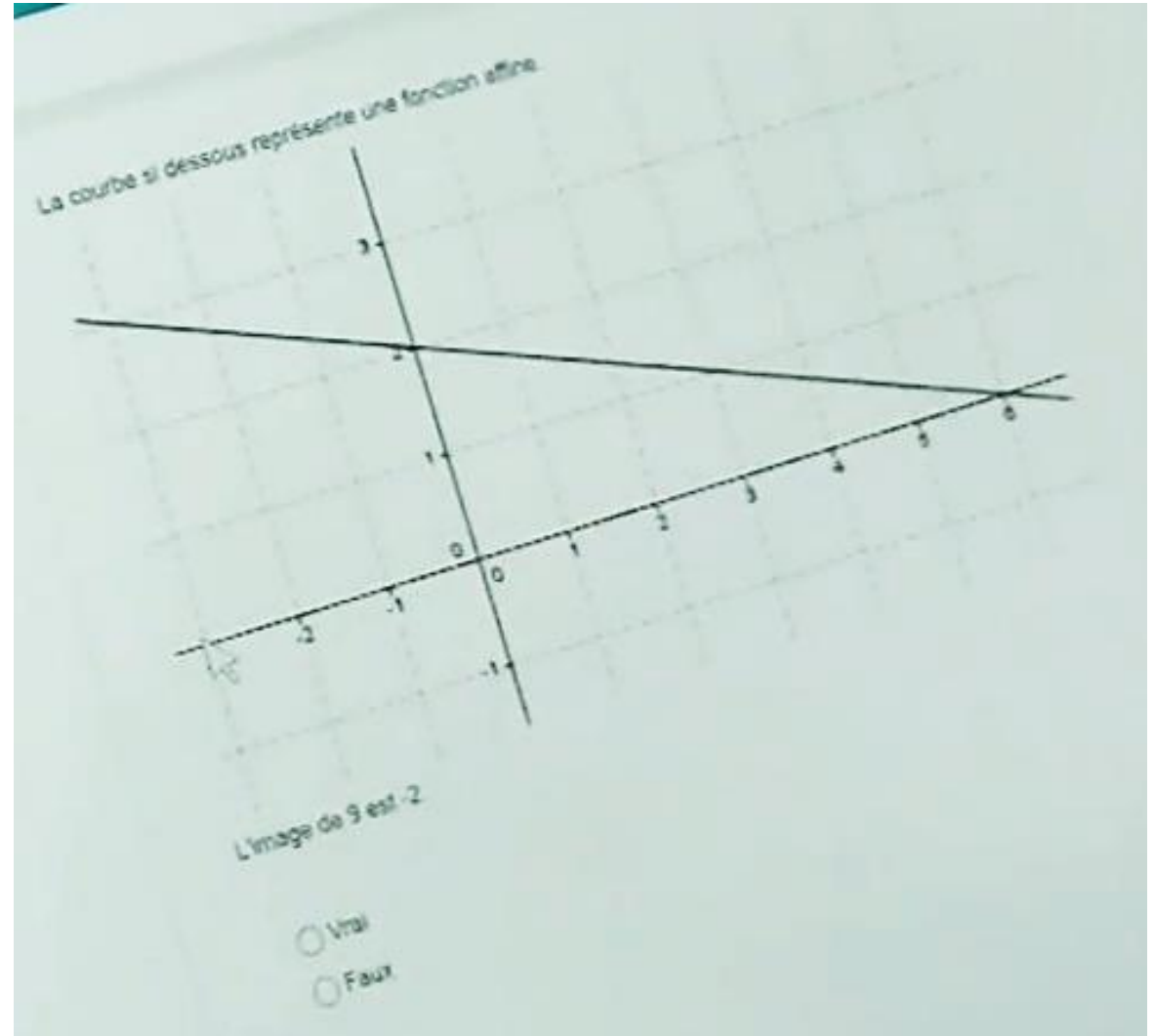
# French context

- Different schools involved from grade 4 to 10
- 5 clusters of schools (17 teachers) in Maths, in Science and in Maths&Science (teachers working together around a common topic, co-animated lessons, ...)
- Connected classroom technologies: tablets, student response system, IWB ...



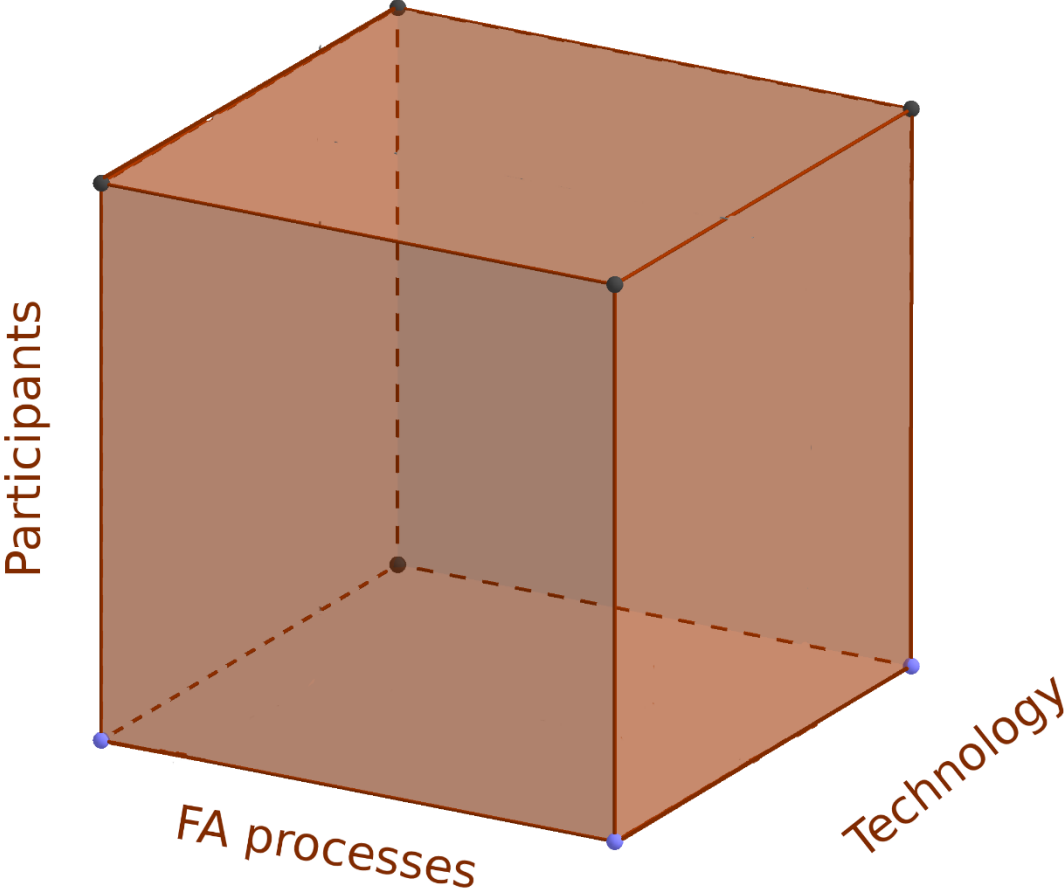
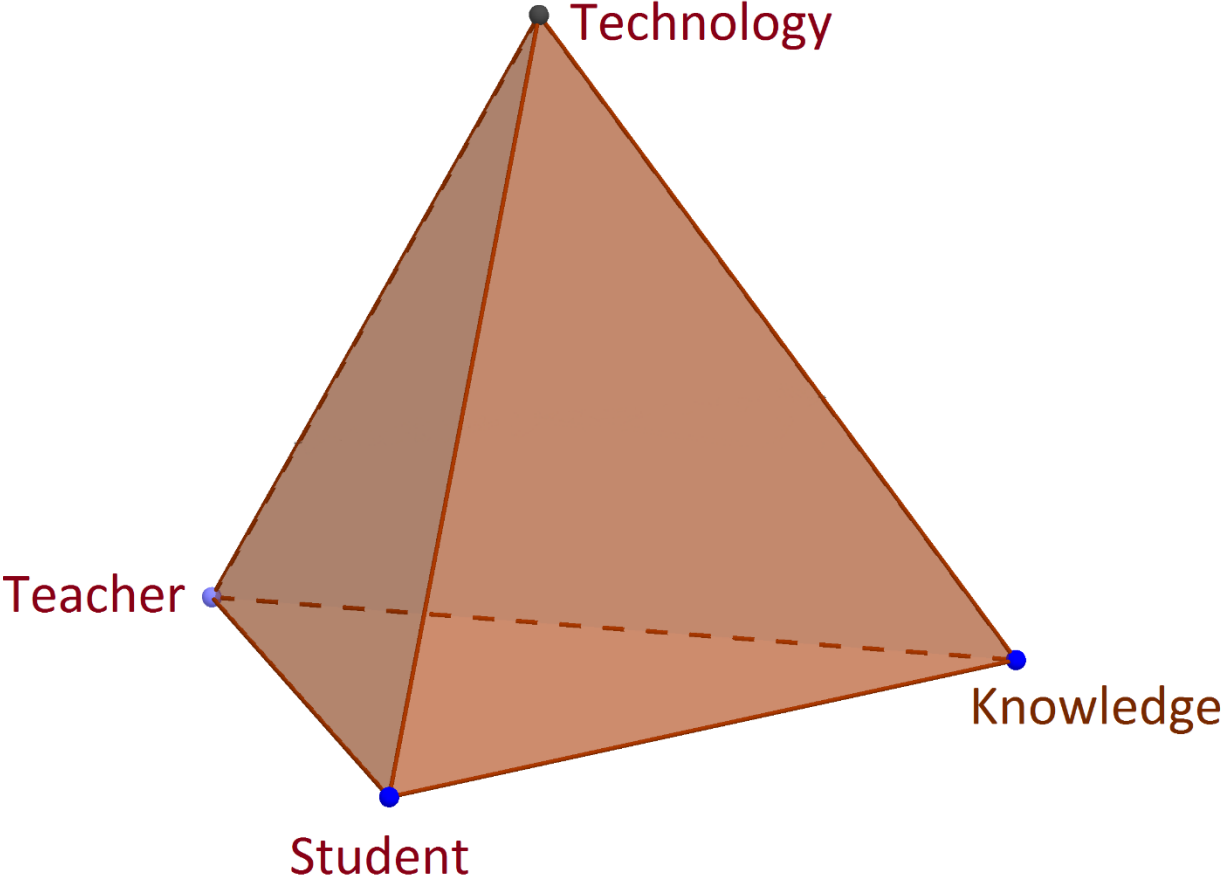
# Case study context

- Upper secondary level
- Grade 9 tablet classroom
- NetSupport School, Maple TA, IWB
- Mathematics sequence on linear functions
- Competences to be acquired:
  - Calculating/detecting images
  - Calculating/detecting inverse images
  - Recognising a linear function
  - Shifting from the graphical frame to the algebraic frame and vice versa
- Moment of the learning sequence:  
third quiz on these competences



# Theoretical framework: Theory of Didactic Situations in Mathematics

Brousseau (2004)

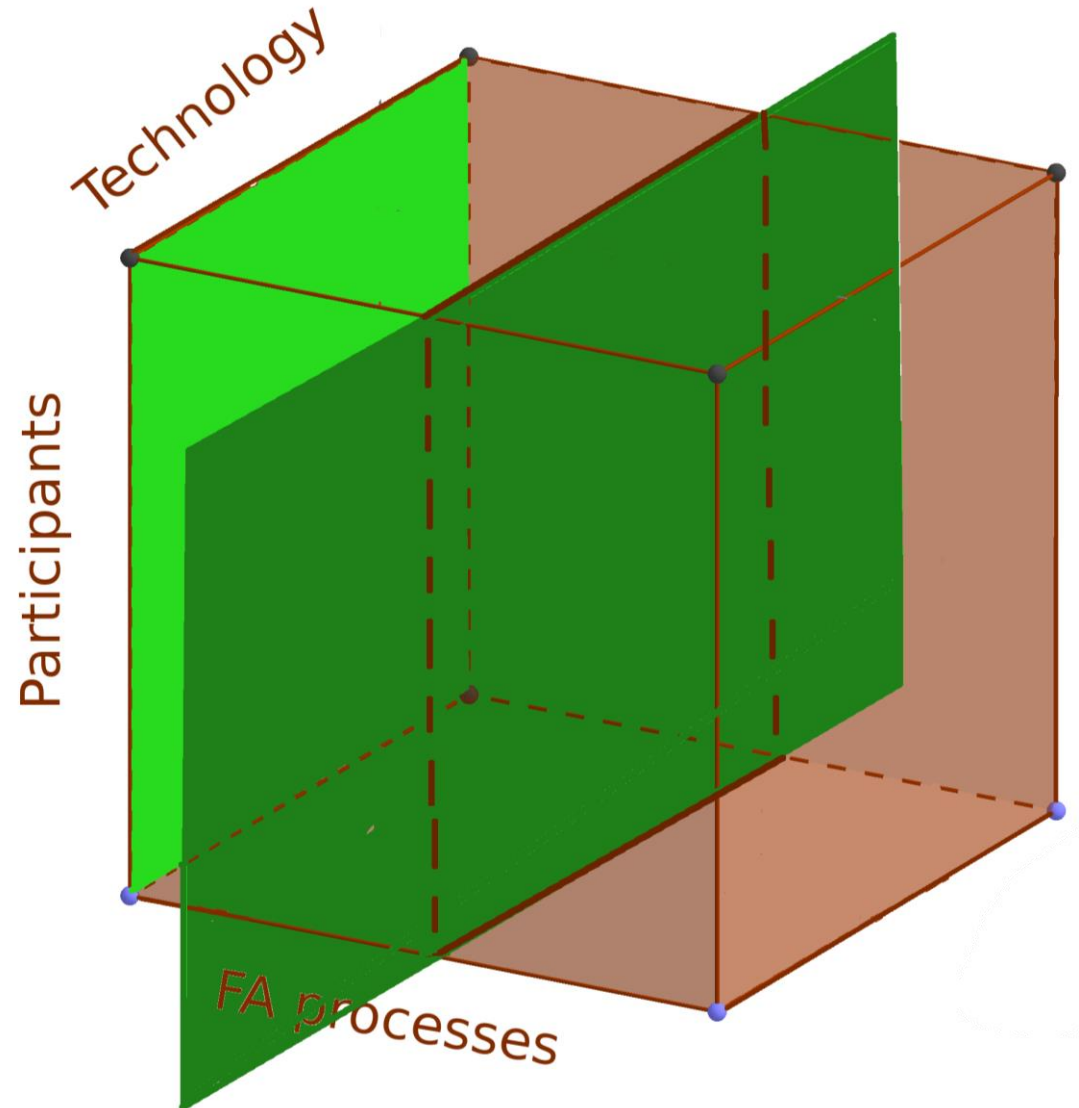


# Theoretical framework: Instrumental Genesis and Orchestration

Trouche (2004)

The term *instrumental orchestration* points out the necessity (for a given institution – a teacher in her/his class, for example) of external steering of students' instrumental genesis.

An *instrumental orchestration* is defined by didactic configurations (i.e., the layout of the artefacts available in the environment, with one layout for each stage of the mathematical treatment) and by exploitation modes of these configurations.



# Methodology and Data collection

- **Logbook:** document filled in by the tablet classroom mathematics teacher all year long

## Suivi d'expérimentation : Tablettes numériques au collège de Fontreyne

Utilisez les liens ci-dessous pour vous déplacer rapidement dans le document (cliquez sur le  
cliquez sur le nouveau lien #bookmark qui apparaît)

[Calendrier \(début\)](#)

[Calendrier \(fin\)](#)

[Pédagogie \(début\)](#)

[Pédagogie \(fin\)](#) (aller ici pour décrire vos séances, déposer vos observ

[Technique \(début\)](#)

[Technique \(fin\)](#)

<a href="#">Calendrier</a>		
<b>date</b>	<b>évènement</b>	<b>Observations</b>
<a href="#">juin 2014</a>	préparation rentrée	cours regroupés géographiquement l'établissement tablettes demeurent au collège
18/09	<a href="#">réception tablettes</a>	
25/09	comité numérique	
29/09	réunion groupe pilotage tablettes	
30/09	réception et installation borne wifi (3 jours de travail)	
02/10	activation des tablettes	
03/10	installation version d'essai de <a href="#">netsupport manager</a>	
06/10	test en classe sans élèves	

# Methodology and Data collection

- **Logbook:** document filled in by the tablet classroom mathematics teacher all year long
- **Observation grid:** important points to reflect upon before and after the observation

## FaSMEd observation grid

If the lesson is part of a learning sequence, write what happened before and what is planned after.

Before the lesson, a short *a priori* analysis:

- Prerequisites.
- Objective(s).
- Class organisation (tools, technology, individual or collective work, ...).
- Expected difficulties for students, regarding the scientific content at stake and the particular class organisation.
  - How to identify students with any difficulties?
  - What is planned to overcome these difficulties?

After the lesson:

- Short comment on the lesson.
- Write down unexpected events
  - According to you, what was the cause?
  - How did you react?
  - Do you plan to come back on these difficulties in the next lessons?

# Methodology and Data collection

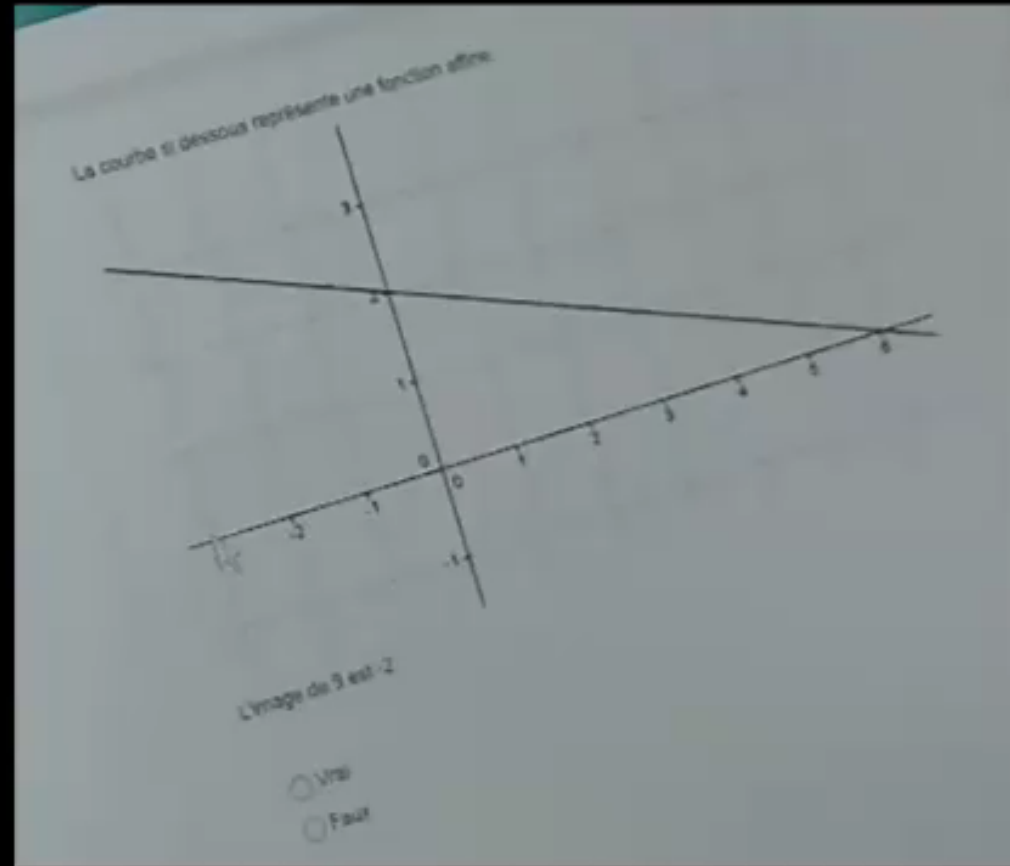
- **Logbook:** document filled in by the tablet classroom mathematics teacher all year long
- **Observation grid:** important points to reflect upon before and after the observation
- **Classroom observations:** videos, photos, audios, teacher's report and notes
- **Discussions and meetings**
- **Interviews** with teacher and students



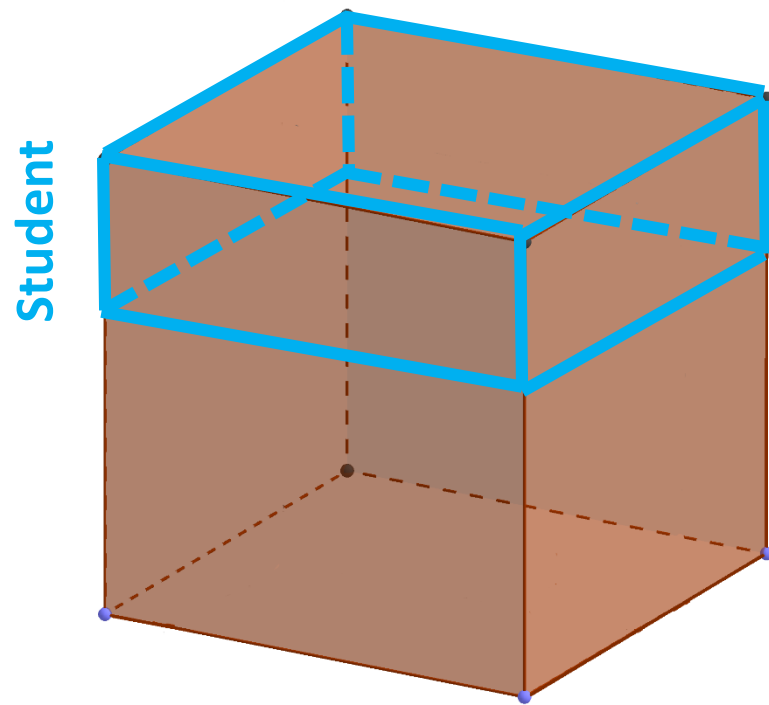


# A short excerpt

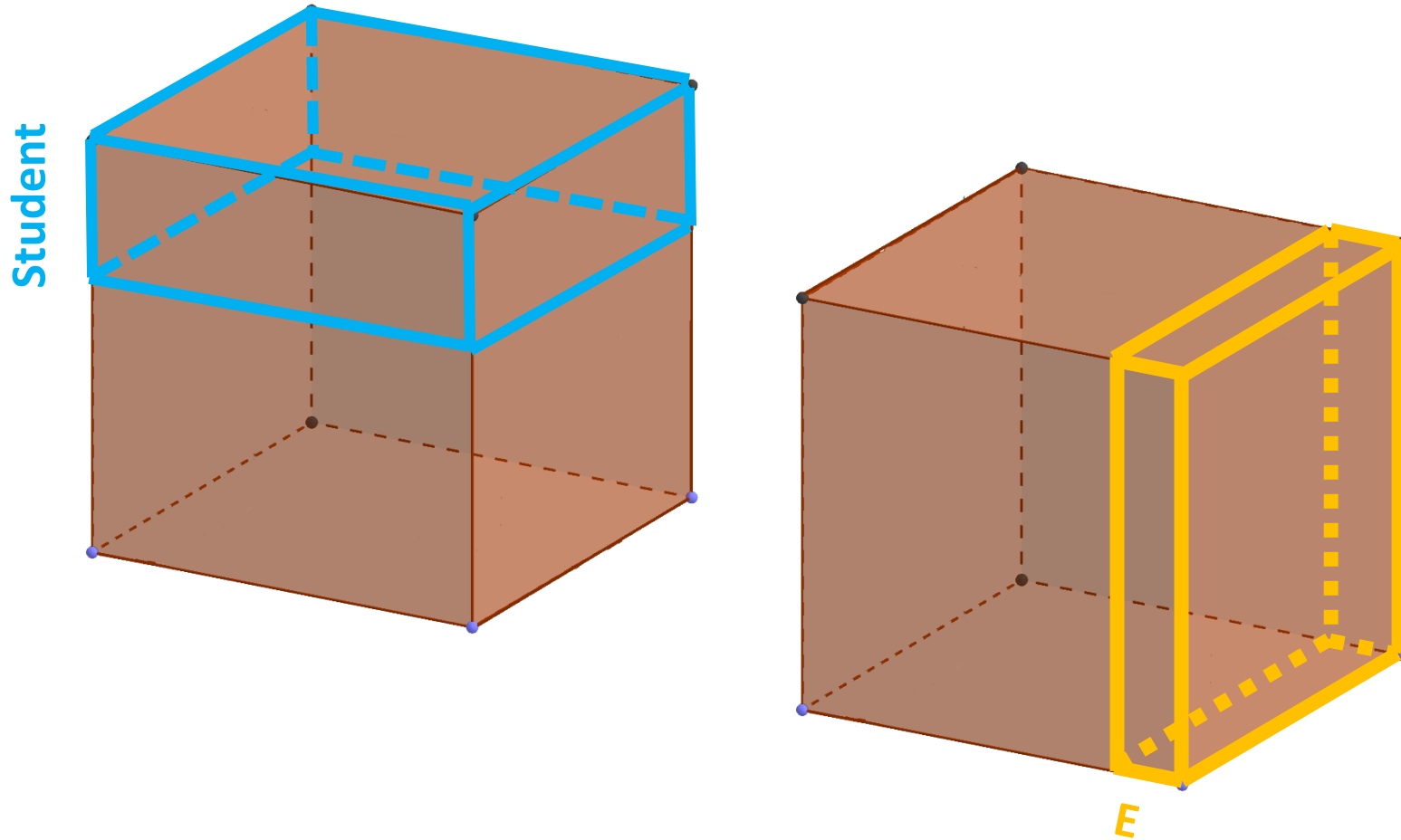
A low achiever  
working on the  
question:  
*The curve below  
represents a linear  
function.  
The image of 9 is -2.  
True or false?*



# Analysis at the student's level

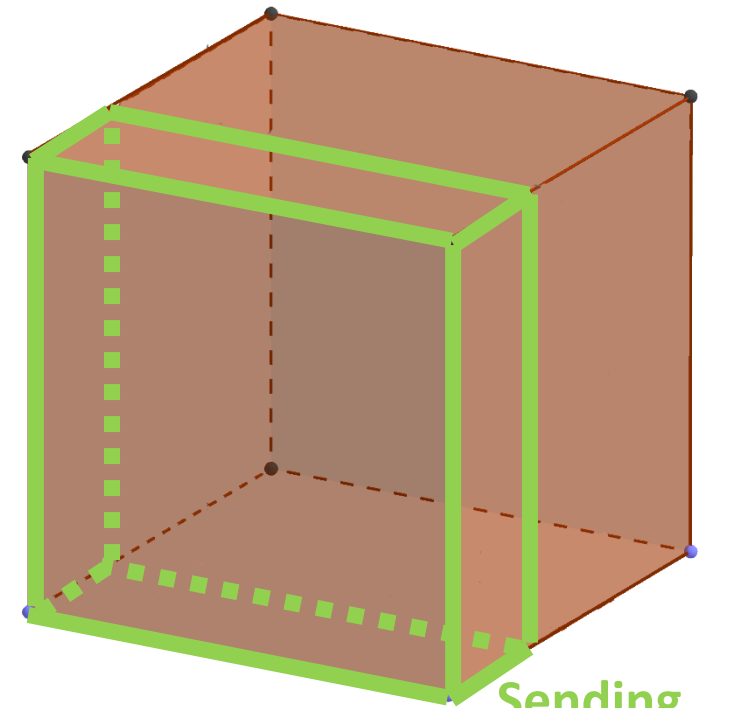
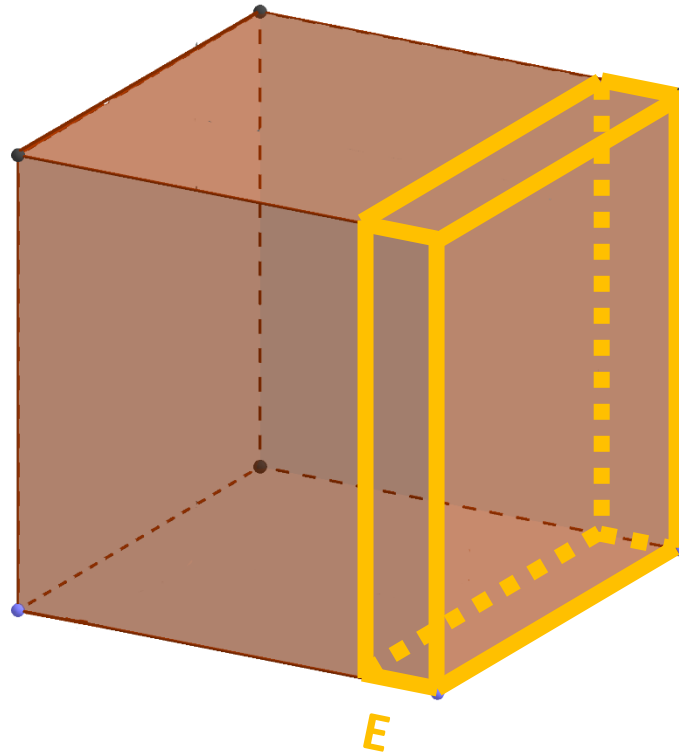
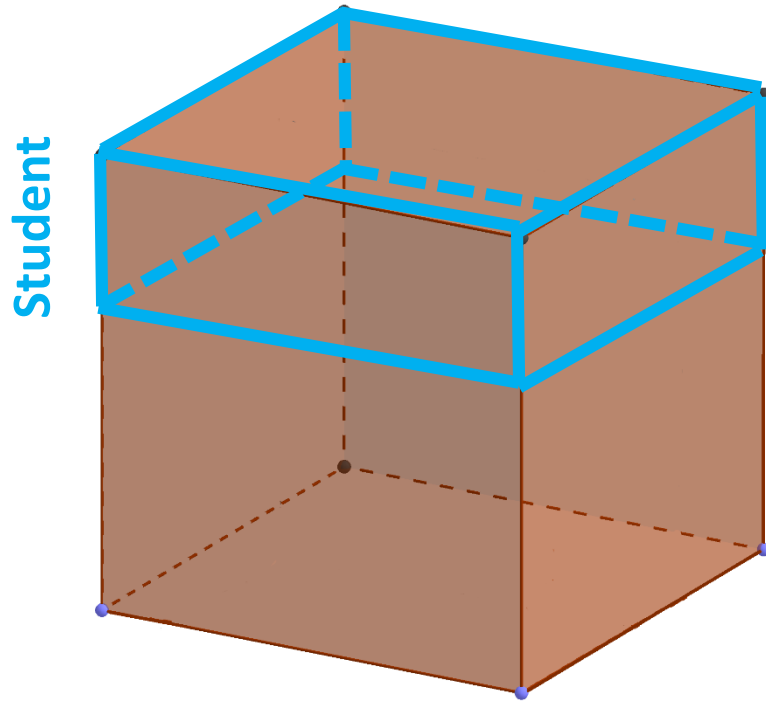


# Analysis at the student's level



**E** : Activating student as the owner of his own learning

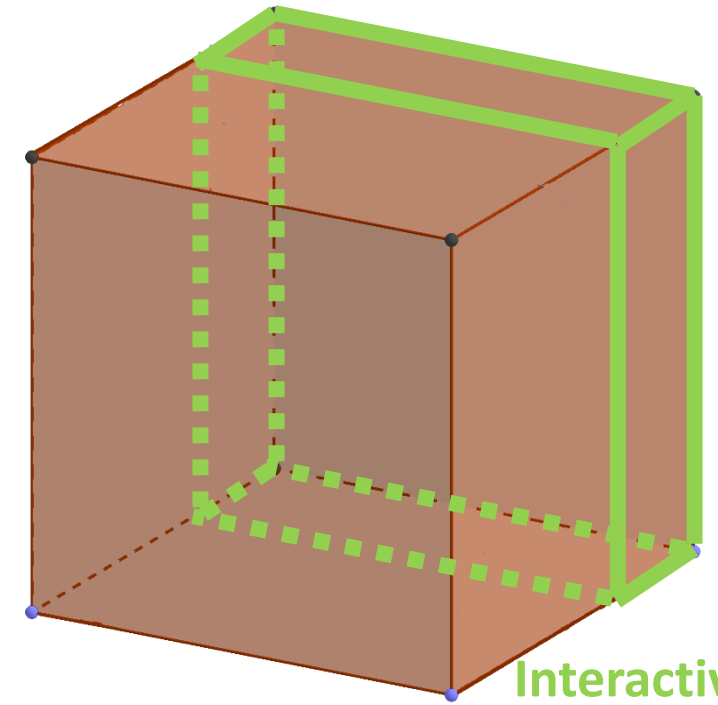
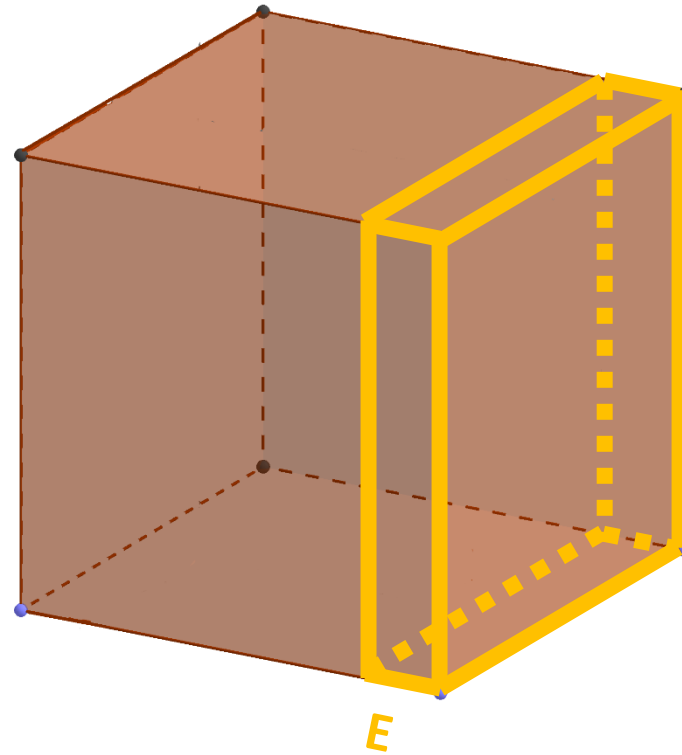
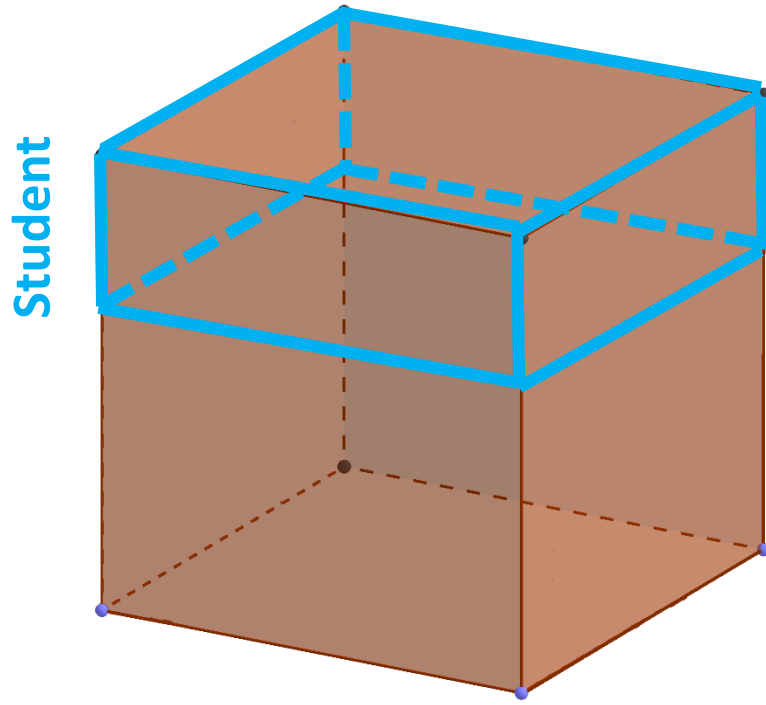
# Analysis at the student's level



**E** : Activating student as the owner of his own learning

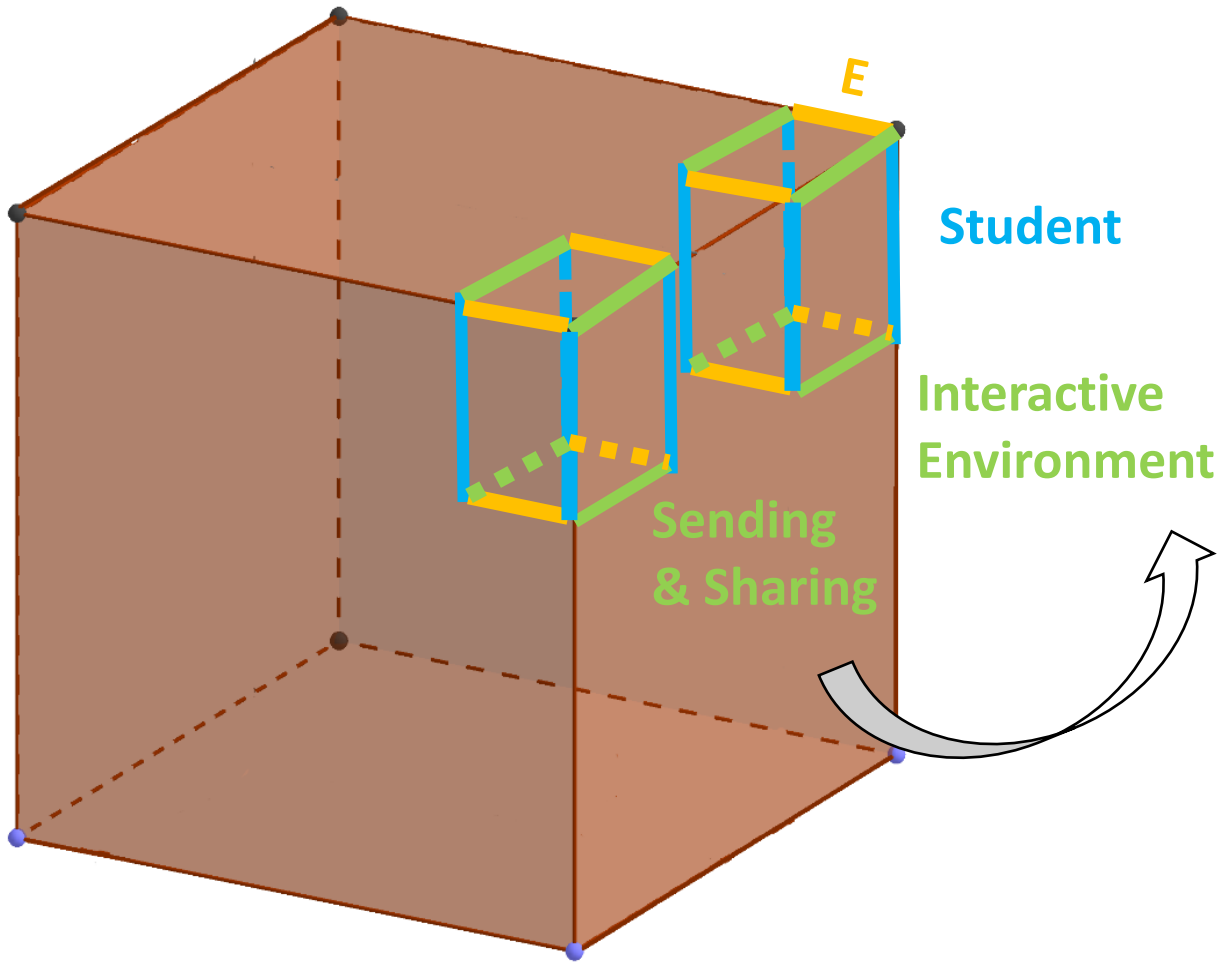
**Sending  
& Sharing**

# Analysis at the student's level



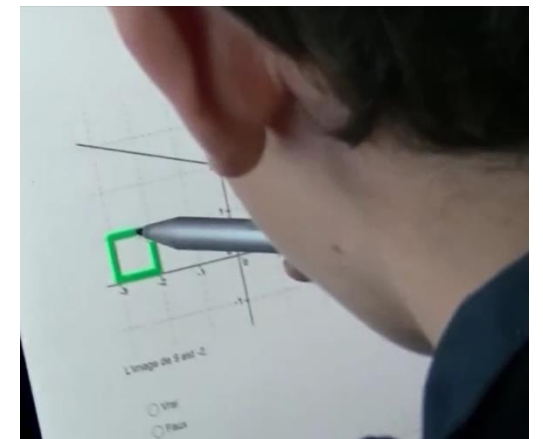
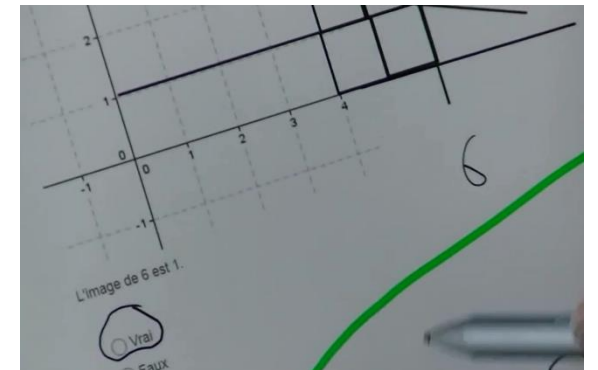
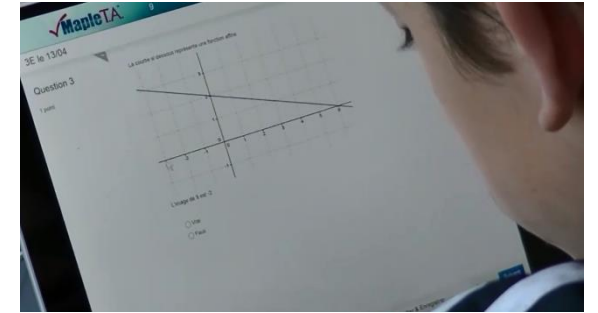
E : Activating student as the owner of his own learning

# Analysis at the student's level

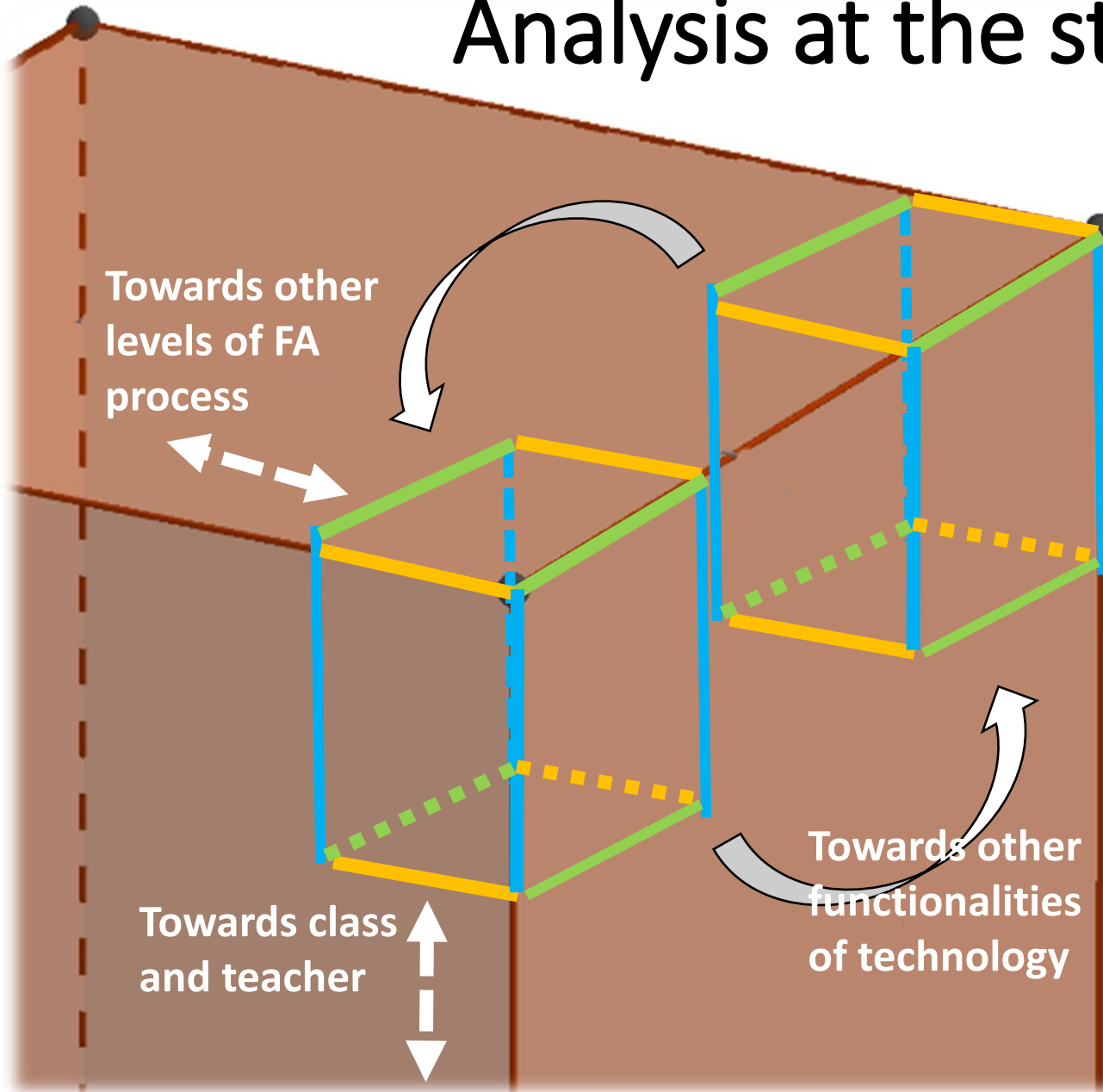


Devolution is at the base of this dynamics

Confronted to his material *milieu* (given by the teacher) the student reflects on the mathematical situation thanks to the knowledge and the technology at his disposal.

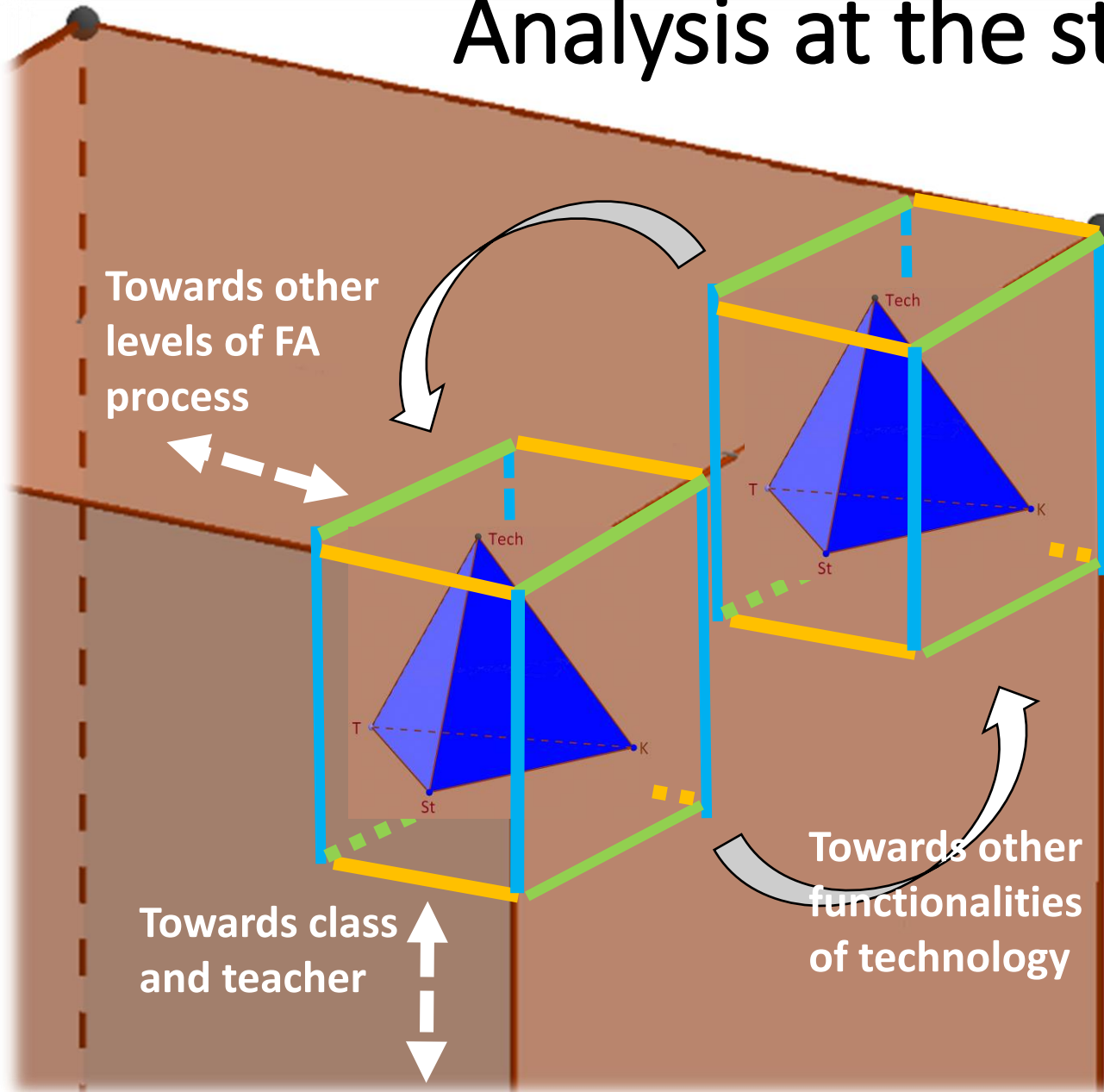


# Analysis at the student's level



**Dynamics within the cube**  
determinates the FA process  
with technology

# Analysis at the student's level

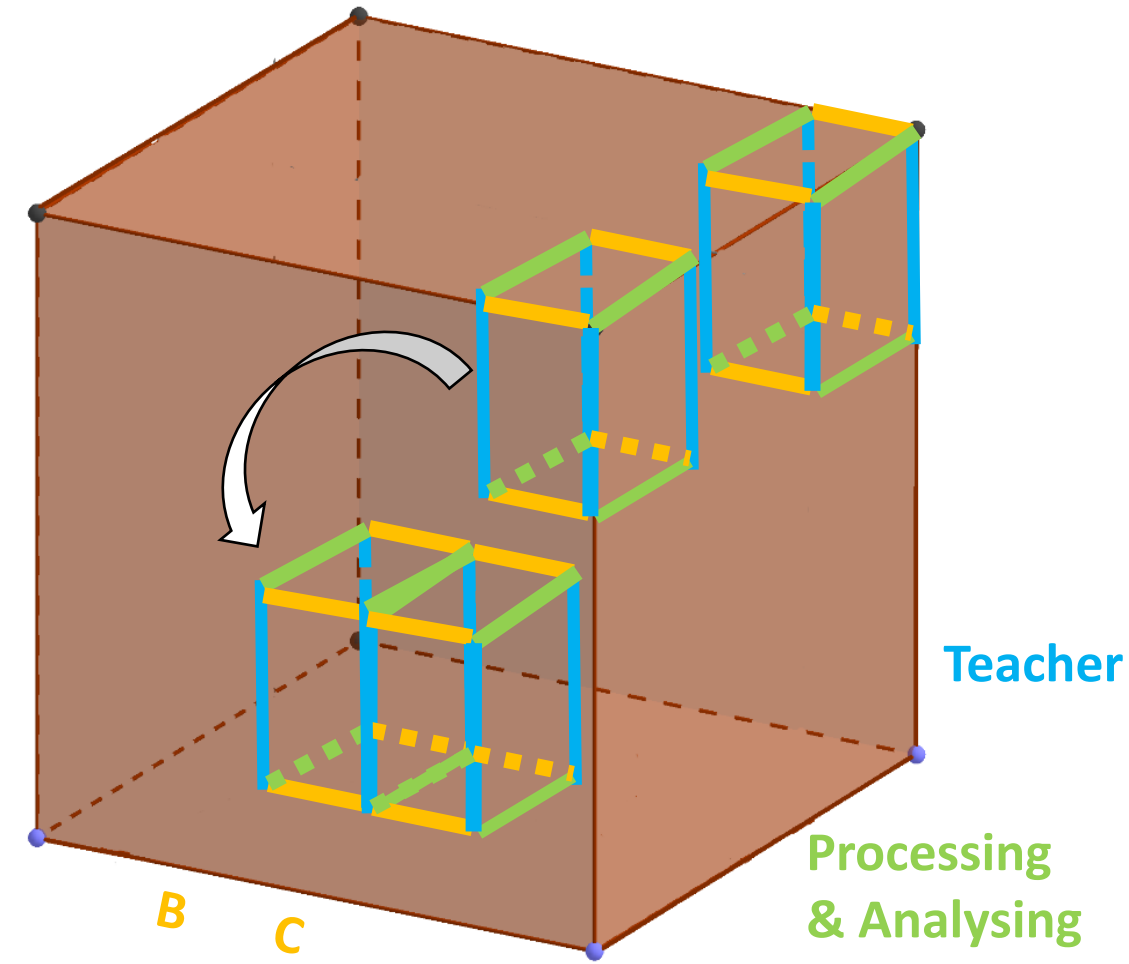


**Dynamics within the cube**  
determinates the FA process  
with technology

**Within each cuboid**  
Didactic situations can be  
analysed according to the  
mutual relationships between  
knowledge, student, teacher  
and technology



# Analysis at the teacher's level



## Dynamics toward the teacher's plane

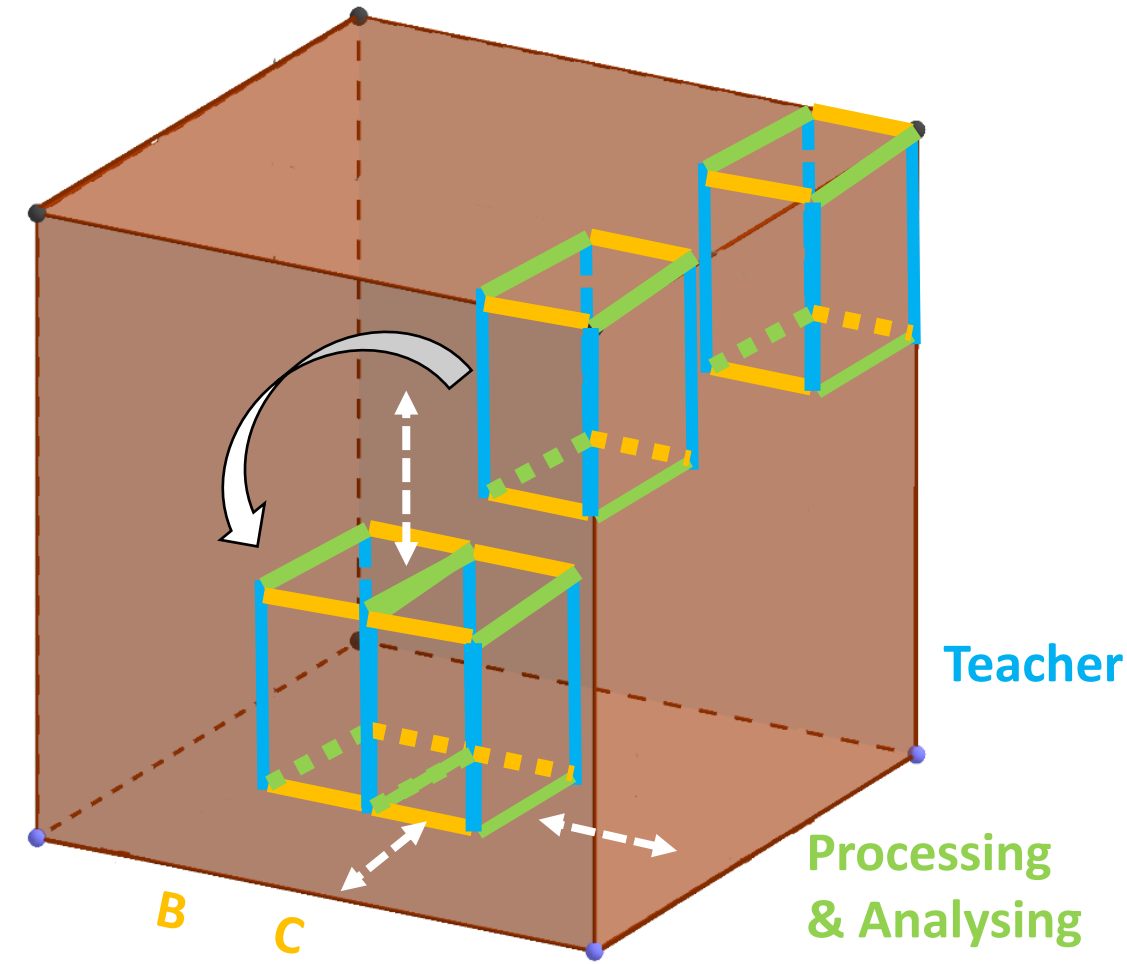
Depending on the students' performance, teacher may adapt his teaching and provide feedback to students

*T: I don't know, if I'm going to take it into account or not. The idea is that I would like to mark it. If I realise that it doesn't work... I don't know... I'm going to see what's going on.... At least I'll know that you don't succeed here. You can skip it if you don't know what to do.*

**B** : Engineering effective classroom discussions and other learning tasks

**C** : Providing feedback that moves learners forward

# Analysis at the teacher's level



## Dynamics toward the teacher's plane

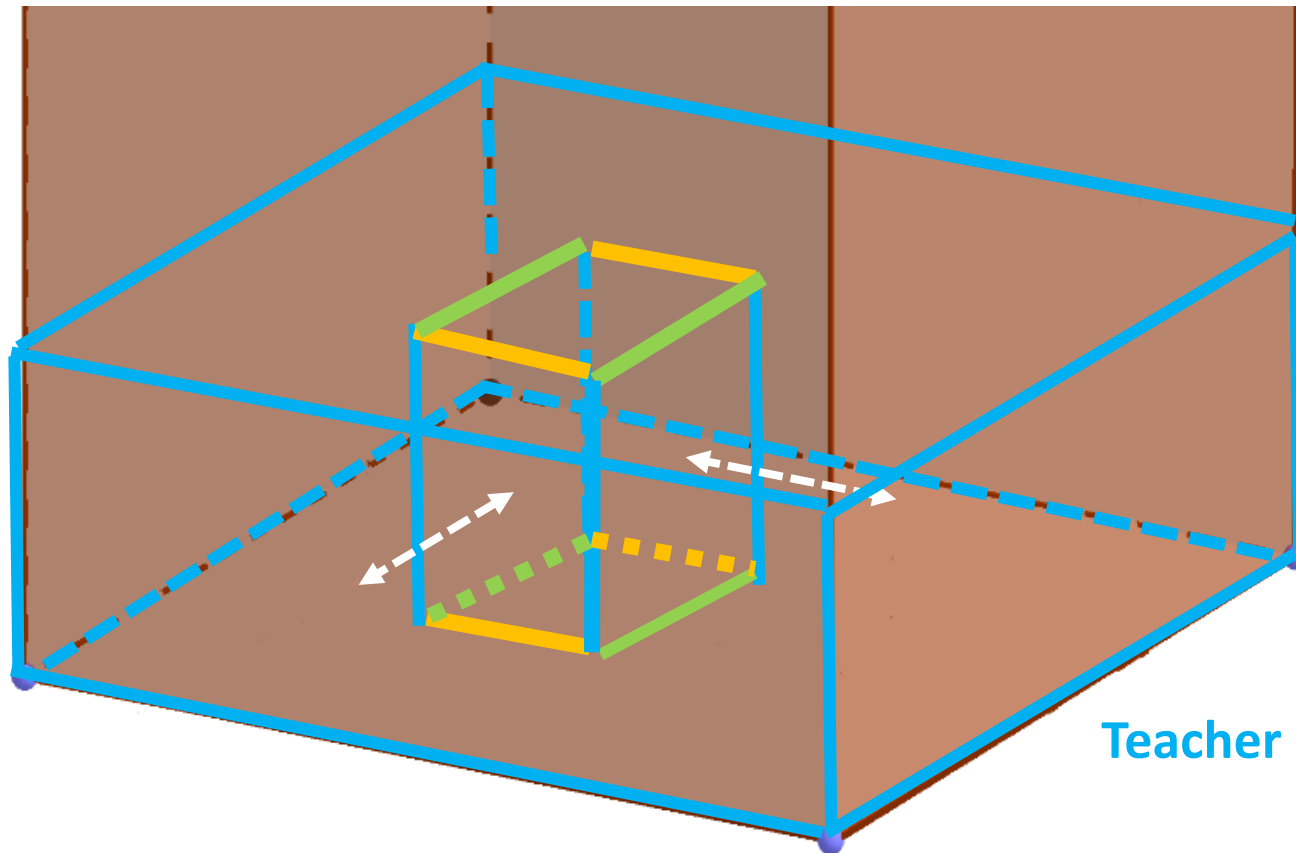
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**B** : Engineering effective classroom discussions and other learning tasks

**C** : Providing feedback that moves learners forward

# Analysis at the teacher's level



## Dynamics within the teacher's plane

Teacher can adapt technology relatively to the FA levels and goals.

- Net Support School + IWB: Sending & Sharing
- Maple TA: Processing & Analysing
- Providing students with interactive environments

# Final remarks

From the short excerpt analysis...

Analysis at the micro-level shows that

- The cube gives pictures of the classroom landscape at a certain moment
- The **study of the dynamics** within the cube describes the process of FA with technology

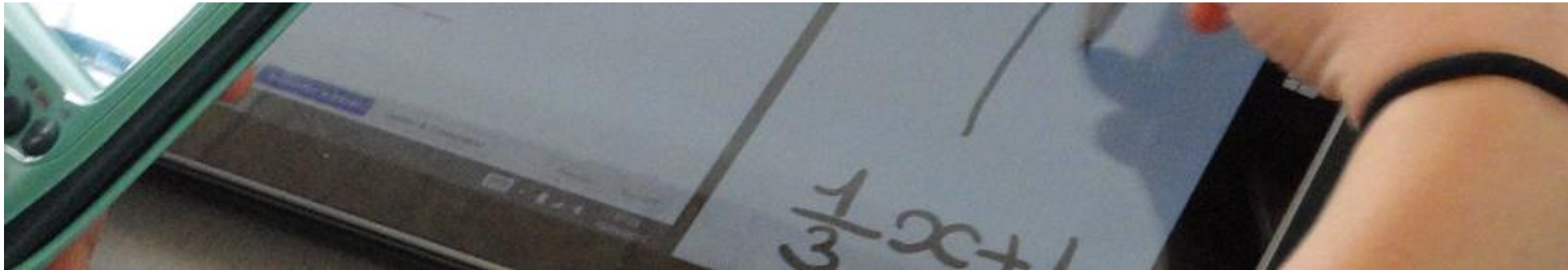
From a more complete case studies analysis...

Analysis at the macro-level can be also done in relation with teachers' **professional development**

- Within teachers-researchers team
- Following the FA development over time in the classrooms
- FA can be formative also for teachers
- Necessitating a new framework, for us **Meta-Didactical Transposition** model (Arzarello *et al.*, 2014; Aldon *et al.*, 2013)



THANKS! KÖSZÖNÖM! MERCI!



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