How can technology support effectively formative assessment practices?

A preliminary study

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Context of the research

Ongoing research within a wider European project 

Improving progress for lower achievers in Science and Mathematics through **formative assessment** with the **support of technology**

Definition of **formative assessment**

"Evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers, to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have taken in the absence of the evidence that was elicited" (Black & Wiliam, 2009)

Hypothesis concerning the **role of technology**

It amplifies the quality of the evidence elicited about students' achievement.

Context of the study

Grade 9 **tablet classroom** (school project): one tablet to each student who is responsible for it during school hours and uses it for all the subjects.

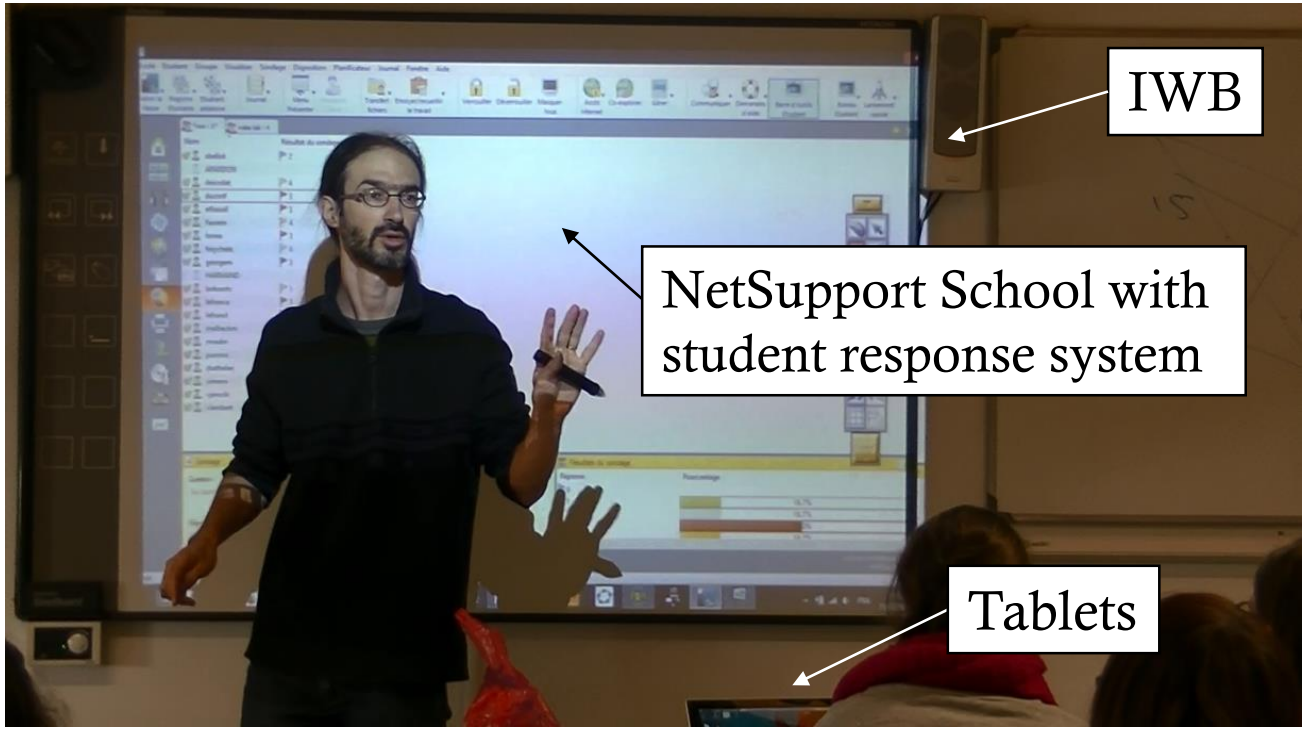
NetSupport School :
used for connecting tablets to teacher's computer/tablet and for communicating with students.

IWB :
can be used for projecting, sharing, commenting students' works.

Focus and questions of the preliminary study

"*In the emerging world of a tablet classroom the **teacher** is likely to be a principal learning designer*"
(Walling, 2014, pp. 26-27)

- Several **technical** competences are needed
- Adaptation, redesign and new possibilities of exploitation of **didactic** activities

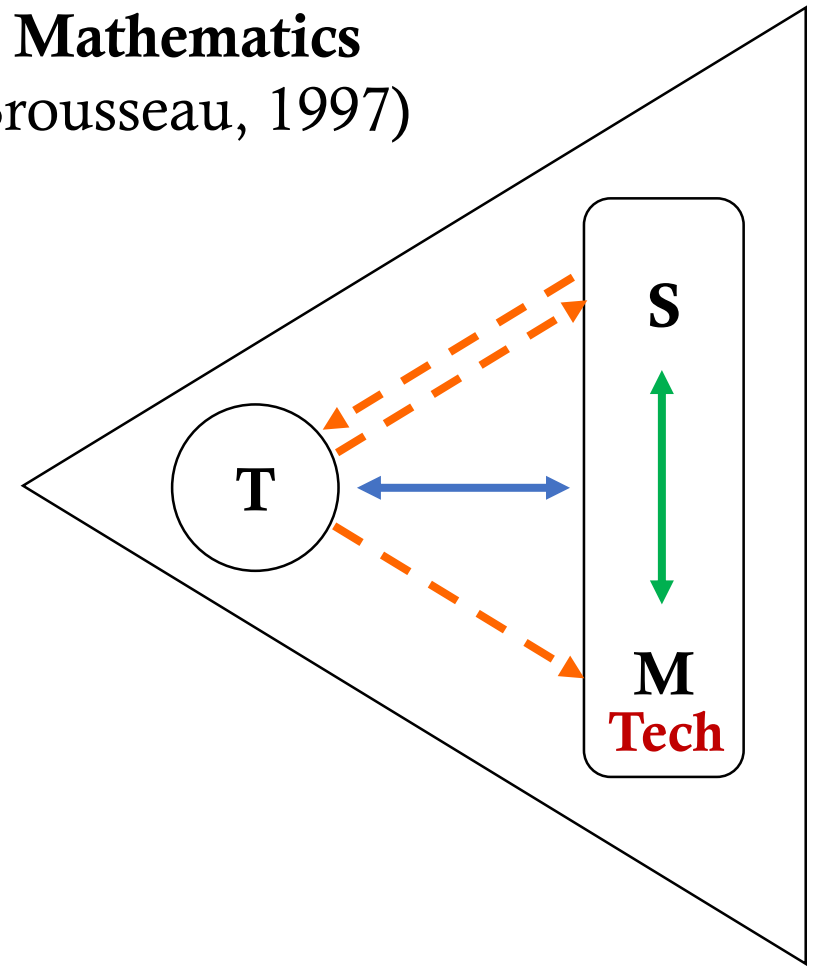


Which **formative assessment practices** involving technology could be efficiently proposed?

How does the teacher
- process data from students using technology?
- use them to inform his teaching?

Theoretical framework

Theory of Didactic Situation in Mathematics
(Brousseau, 1997)



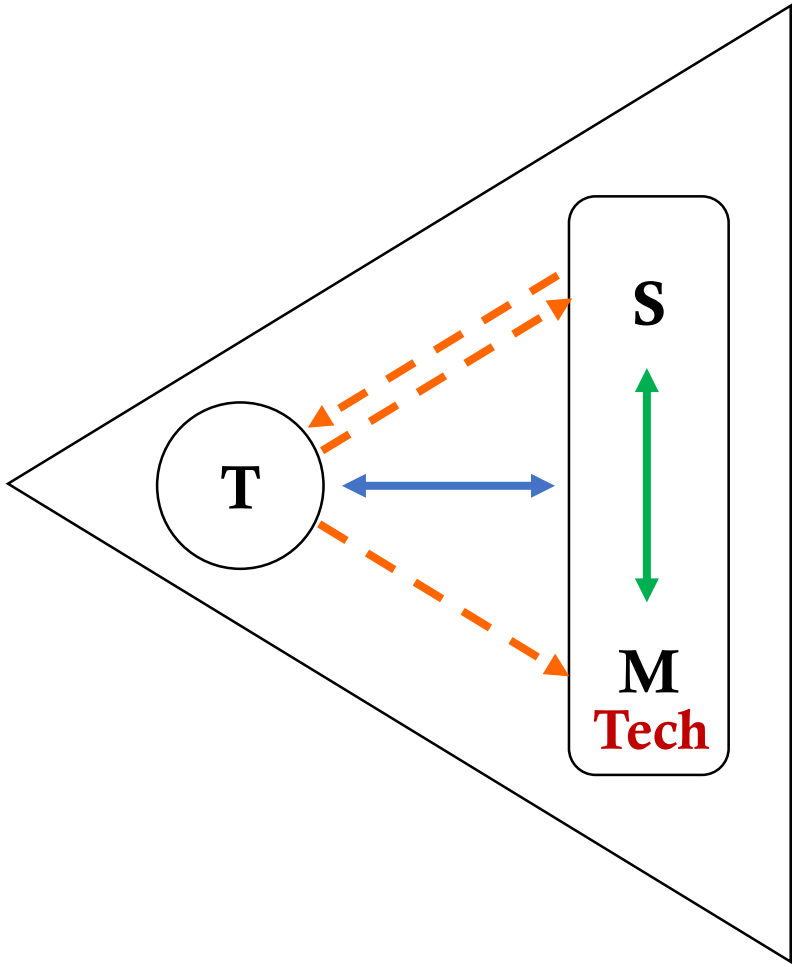
The teacher creates a *milieu* for the student and modifies it depending on the student-*milieu* interaction.

Technology as part of the *milieu* plays a fundamental role in informing the student.

Instrumental genesis (Rabardel, 1995) as the teacher appropriates CCT the student appropriates the tablet and its applets, they adapt the digital tools to their needs.

Instrumental orchestration (Trouche, 2004) as the teacher coordinates students' individual/collaborative/collective work.

Theoretical framework



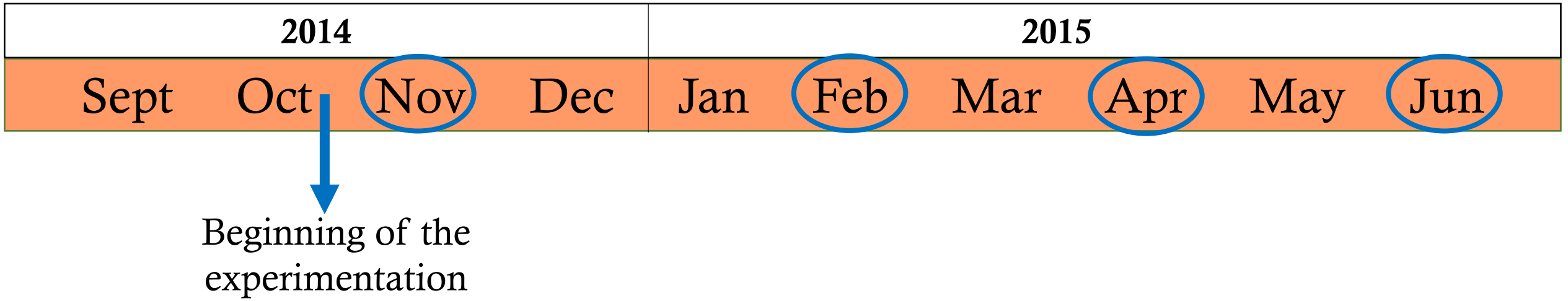
Feedback coming from technology is useful for

- the student to improve her performance or to change her strategy.
- the teacher to have a class overview, to identify problematic notions and students in difficulty, and to adapt her didactic strategy.

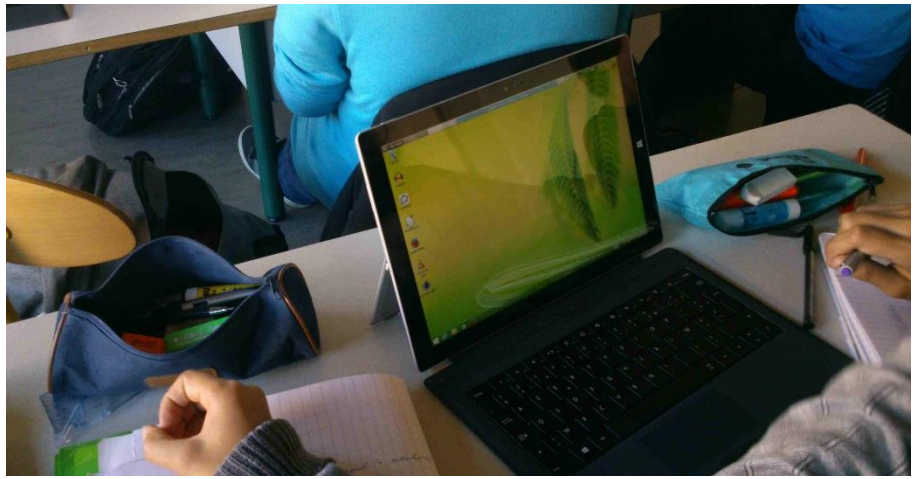
Assessment becomes actually **formative** and can efficiently contribute to the students' learning.

Methodology of observation and data collection

- **Logbook** : document filled in by the tablet classroom's teachers
- **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



First observation: November 2014

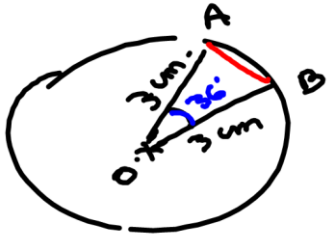


***T*'s orchestration choice:**

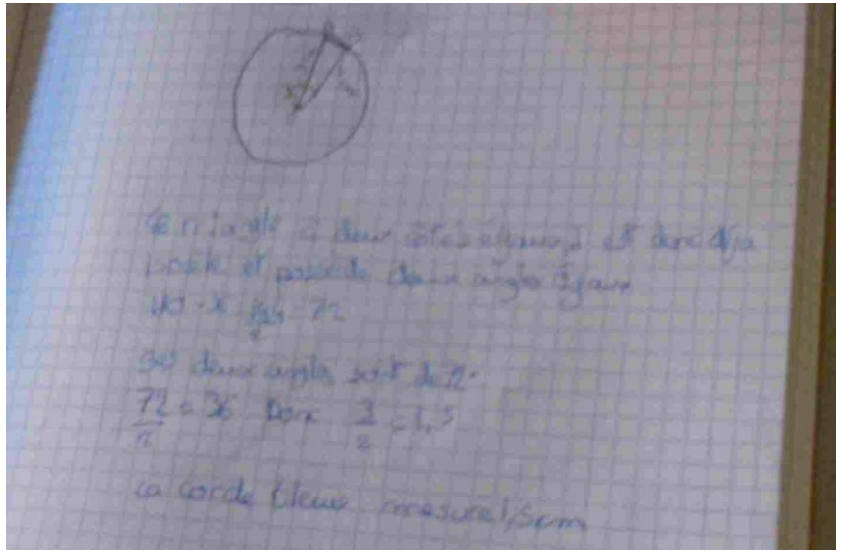
"You have many possibilities: you can draw the figures by hand in real dimensions, you can do some calculation [...] you can also draw the figure in real dimensions with GeoGebra if you want. Do whatever you want. [...]

Students use the tablet mainly as a mean of communication to send their answers.

First observation: November 2014



Quelle est la mesure de [AB] ?



Proposition de Stévan :

Les 2 autres angles des triangles mesurent 72°
36° c'est moitié de 72°
Donc [AB] mesure la moitié de [OB]

il suppose une proportionnalité entre les angles et les longueurs.

***T*'s orchestration choice: comparing students' proposals.**

"I'm going to take S1, then you [S2] will tell me the way you concluded".

T copies S1's proposal at the IWB for sharing it with the classroom.

"What mathematical property is he using?".

***T*'s orchestration choice: making a survey.**

"I'm going to ask you the question on the tablet, you will answer on the tablet"

accompanied by an oral survey for interpreting students' answers via tablet.

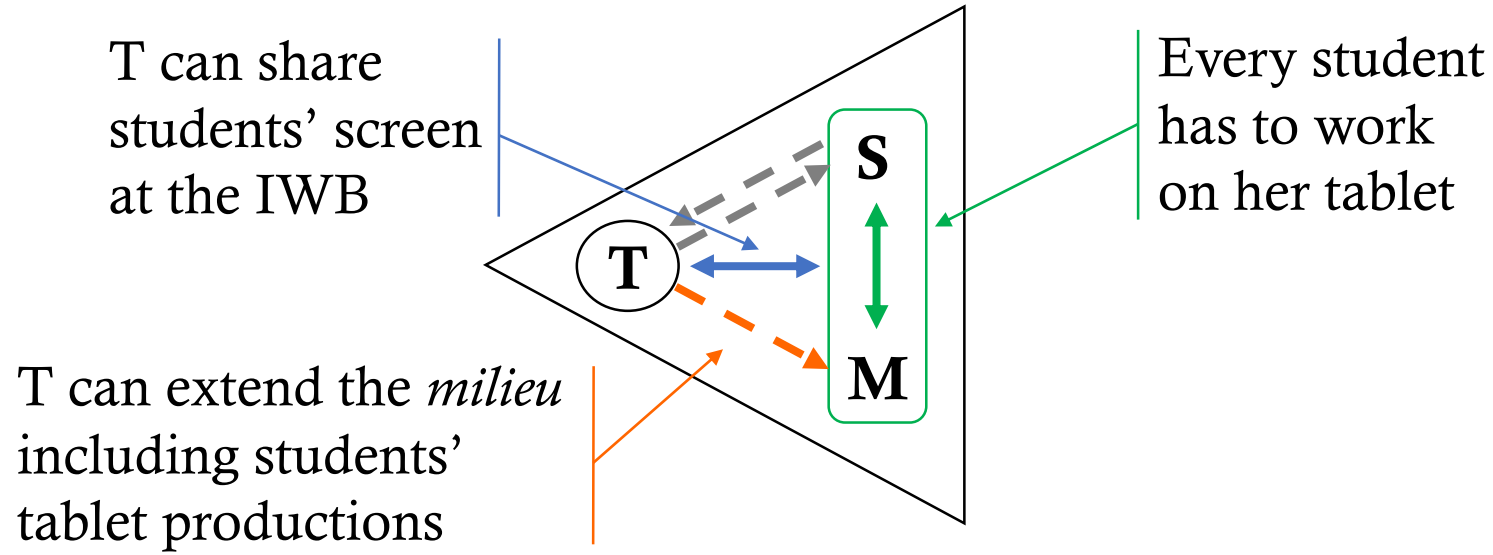
First observation: November 2014

T ’s potential techniques to foster formative assessment:

1. Discussion about a student’s proposal
2. Survey in the classroom

Evidences about students’ achievement are **elicited** and **interpreted**, but exploiting them is complicated and time demanding

How using technology to be more effective?

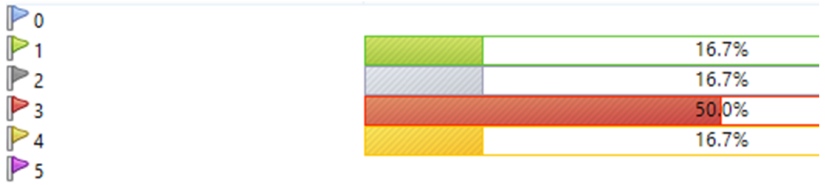


Second observation: February 2015

Jeu : Différence de 2 dés à six faces.

On peut parier sur : 0 ; 1 ; 2 ; 3 ; 4 ; 5.

Je parie sur :

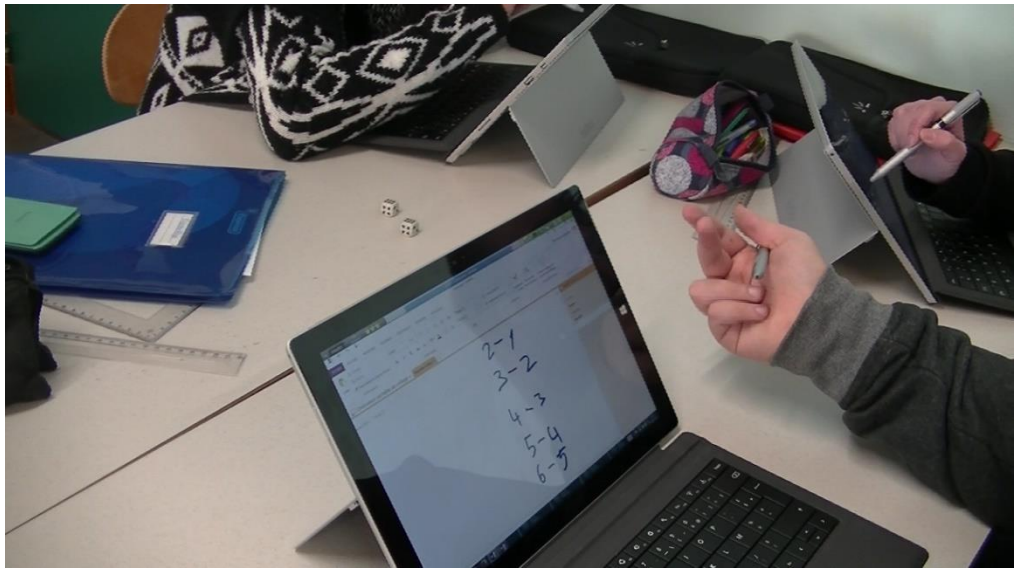


***T*'s orchestration choice:**

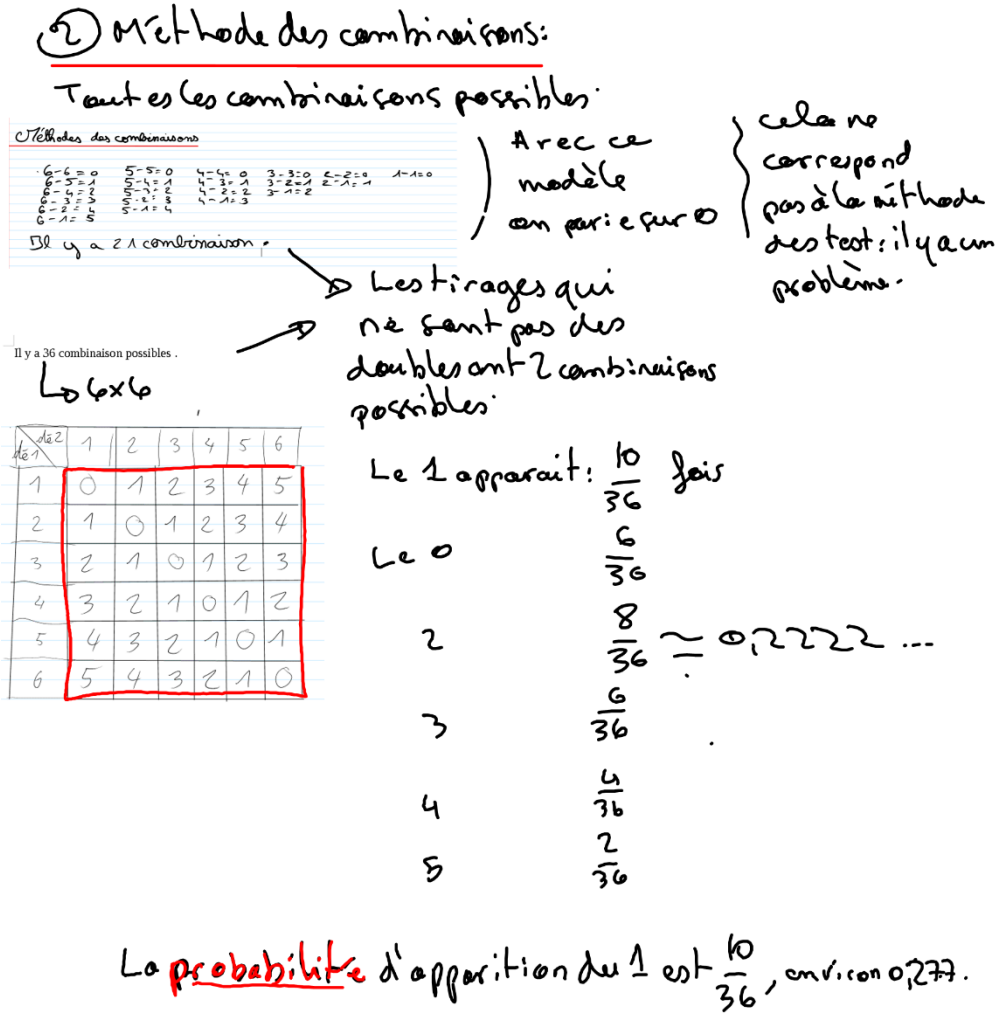
"Everyone writes what he wants of the group, it has to be the same idea for each group, but everyone on her tablet, on OneNote."

***T*'s orchestration choice:**

Making a survey via tablet to collect the initial perceptions of students.



Second observation: February 2015



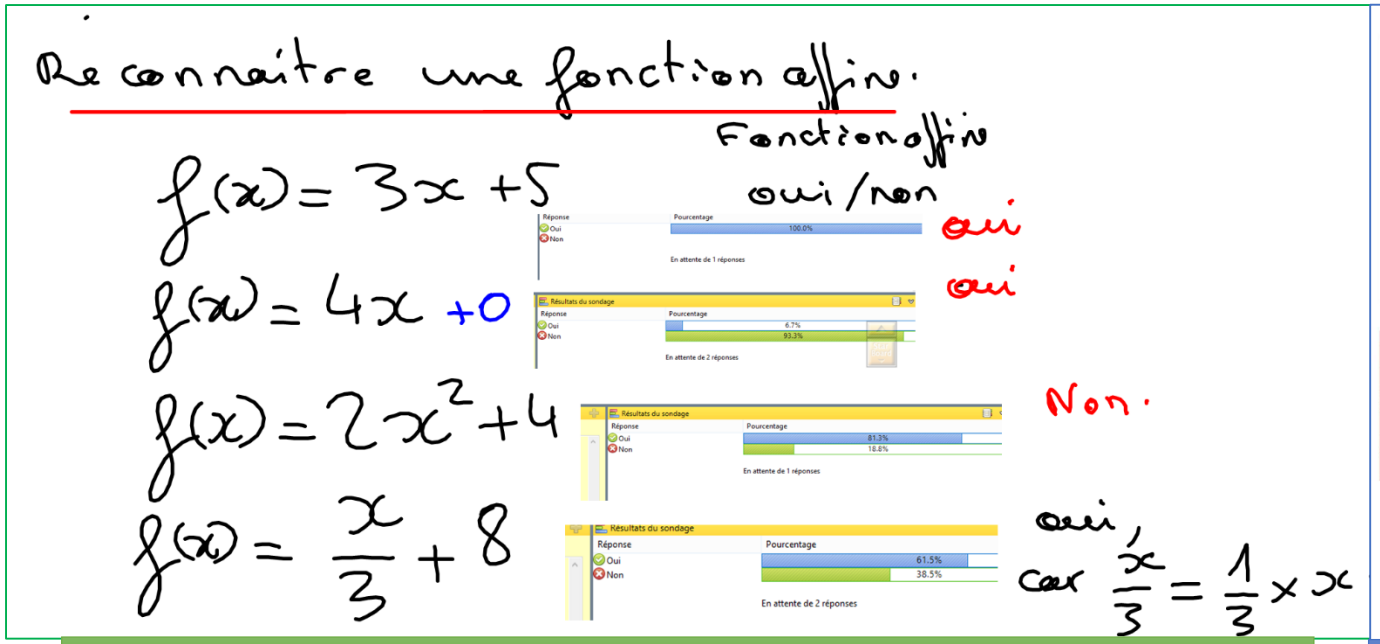
T's orchestration choices:

- collecting one production for each group through tablet screen shots
- showing different proposals at the IWB
- discussing and commenting them with the classroom, while tablets are blocked
- integrating them in the lesson notes

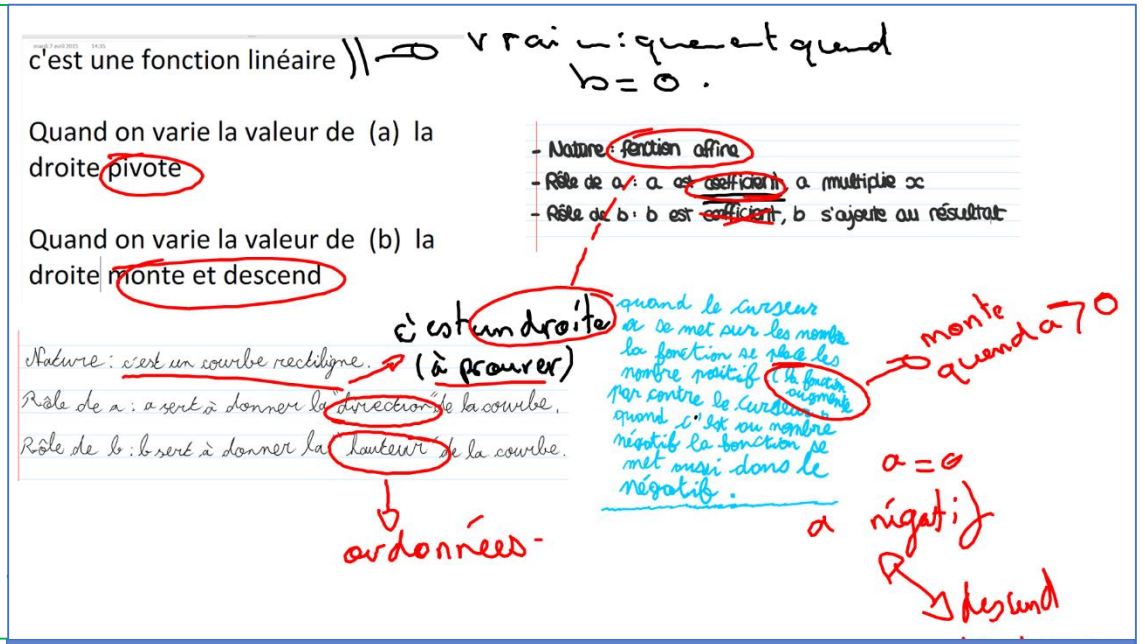
Signs of evolution

In the teacher's **appropriation** of the CCTs: new orchestration skills

In the teacher's **didactic practices** with CCTs, especially the formative assessment ones



Use of the survey data (April 2015)



Proposals sharing and discussion (April 2015)

How can technology support formative assessment practices?

CCT are integrated in ***T*** 's didactic techniques to foster formative assessment:

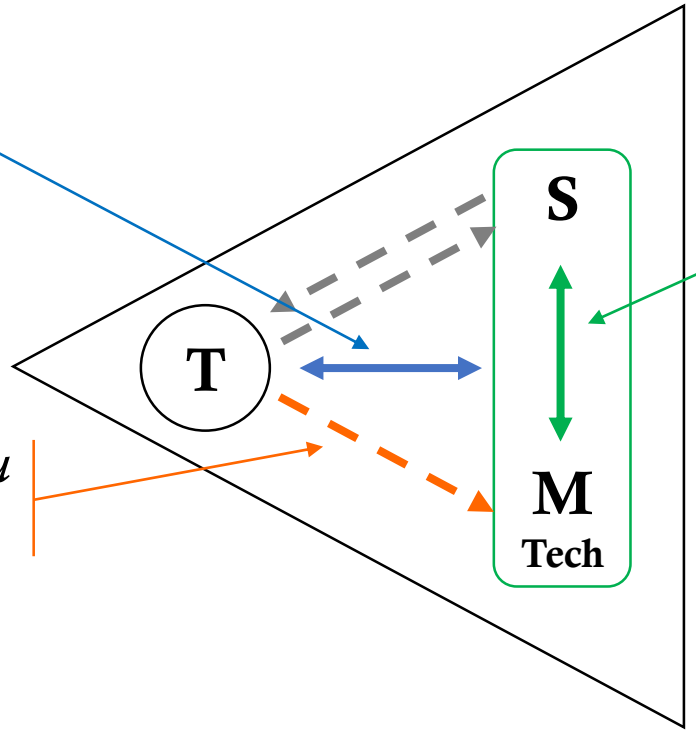
1. Discussion about a student's proposal
2. Survey in the classroom

Technology supports the process of **collection-interpretation-exploitation** of students' achievement evidences

T 's orchestration skill of sharing tablet screenshots at the IWB

allows to **compare** and **discuss** students' ideas

in order to **enrich** the *milieu* with students' proposals



T 's orchestration choice of making each student work on her own tablet

facilitates **collection** and personalised **intervention**

Each student can position herself with respect to classmates' productions and in her learning path

THANK YOU!

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https://ife.ens-lyon.fr/fasmed

FaSMEd "toolkit":
https://toolkitfasmed.wordpress.com

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