



**JURE SIG 17 2024**

**27 June 2024**

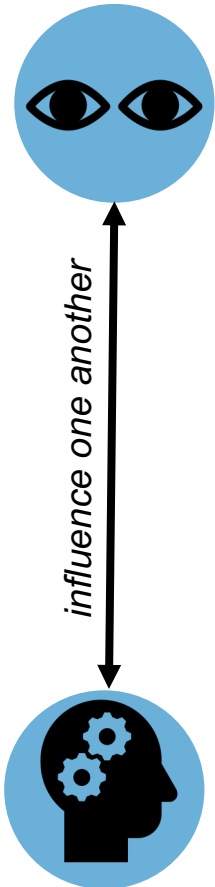
**Eye tracking in a teaching context: Comparative study of the professional vision of university supervisor trainers and pre-service teachers in initial training for secondary education.**



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# Professional vision

As Van Es & Sherin (2008)



## ▪ OBSERVING = TO NOTICE

- Professional competence (Vifquin & Frenay, 2018)
- Teachers' ability to direct their attention to relevant events in the classroom (Sherin, 2007; Van Es & Sherin, 2008)

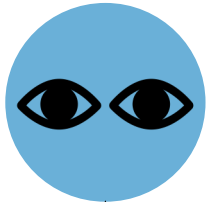
-> Selective attention is influenced by a series of parameters (Vifquin & Frenay, 2018; Huang et al. 2018), including expertise (Keskin et al. 2024).

## ▪ REFLECTING = INTERPRETATION OF OBSERVATIONS

- Based on Van Es & Sherin (2008) and Vifquain & Frenay (2018):

- 1) Accurate description of the scene (Van Es & Sherin, 2008)
- 2) Interpretation, judgement and justification (Van Es & Sherin, 2008)
- 3) Prediction of consequences (Van Es & Sherin, 2008) and remedies (Vifquin & Frenay, 2018)

# Professional vision



influence one another

## ■ OBSERVING = TO NOTICE

- Professional competence
- Teachers' ability to direct their attention in the classroom (Sherin, 2007; Van Es & Sherin, 2008)

-> Selective attention (Sherin, 2007; Van Es & Sherin, 2008) and parameters (Vifquain & Frenay, 2018; Vifquain & Frenay, 2024).

- Not innate (e.g. Stürmer et al., 2017)
- > -> to study professional vision

## ■ INTERPRETATION OF OBSERVATIONS

(Van Es & Sherin, 2008 and Vifquain & Frenay (2018):

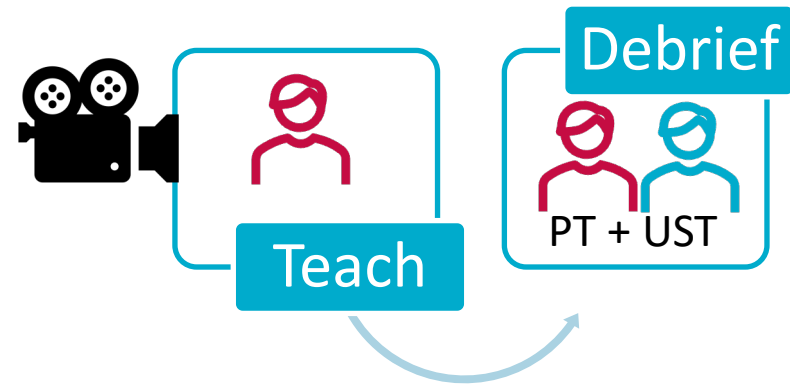
- 1) Accurate description of the scene (Van Es & Sherin, 2008)
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# Statement

- **BASED ON OUR LITERATURE REVIEW (see Duvivier et al. 2024)**
- PV of expert teachers has been studied
- PV of pre-service teachers (**PT**) has already been studied.
- PV of trainers, including academics (**UST**), is little explored (Duvivier et al. 2024).

-> UST practices less opaque in term of PV

- In our department (INAS): Training system for vocational teaching techniques based on micro-teaching (see Bocquillon, 2020).
- For secondary education (AESS)



- During the debriefing, PT and UST are involved in the same process: that of observing and commenting on the extract .

## Differences or similarities in the PV of PT vs. UST?

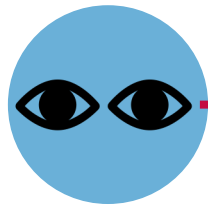
# Methodology

## Eye tracking and TAP

OBSERVING

REFLECTING

A MIX APPROACH



**EYETRACKING**

(*Gazepoint GP3HD*)  
(e.g. Jarodzka et al., 2021)

-> Identify the centre of attention by following the eye movements (Wang, 2022) of a teacher observing a teaching situation.



**VERBAL PROTOCOLS**

(e.g. Ericsson, 2018)

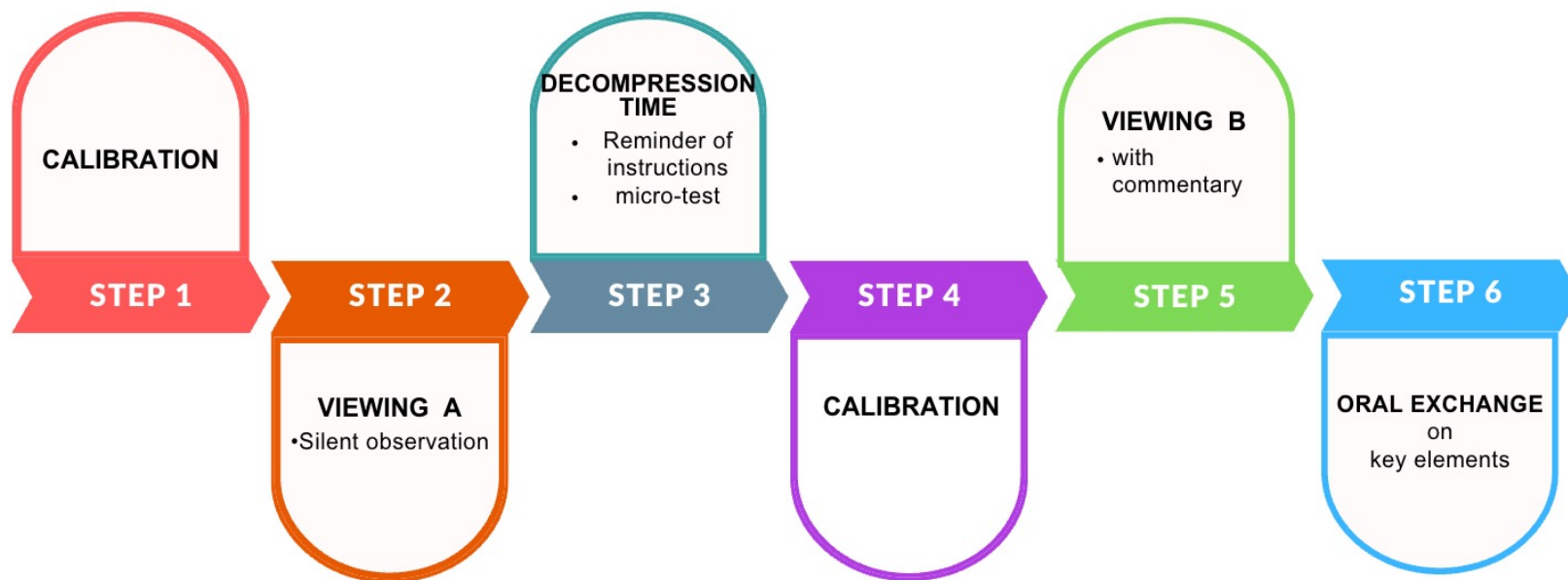
-> Understand the reasons that guided the observation  
-> As Roussel (2017): during the observation

# Sample

- 19 PT enrolled in the micro-teaching training system of AESS program - academic year 2022-2023 (group 1)
  - 16 valid eye-tracking data for PT
    - > number of gaze exits and blinks ( + 1,5  $\sigma$ ; - + 1,5  $\sigma$  )
    - > Only if 70% of data were OK (as Chauduri et al. 2021)
  - 19 valid verbal data for PT
- 6 UST involved in the debriefing process (secondary education) by the INAS (group 2)
  - Average experience ranged 16 years
  - 2 PH/D and 4 PH in Education Sciences
  - Valid data : OK



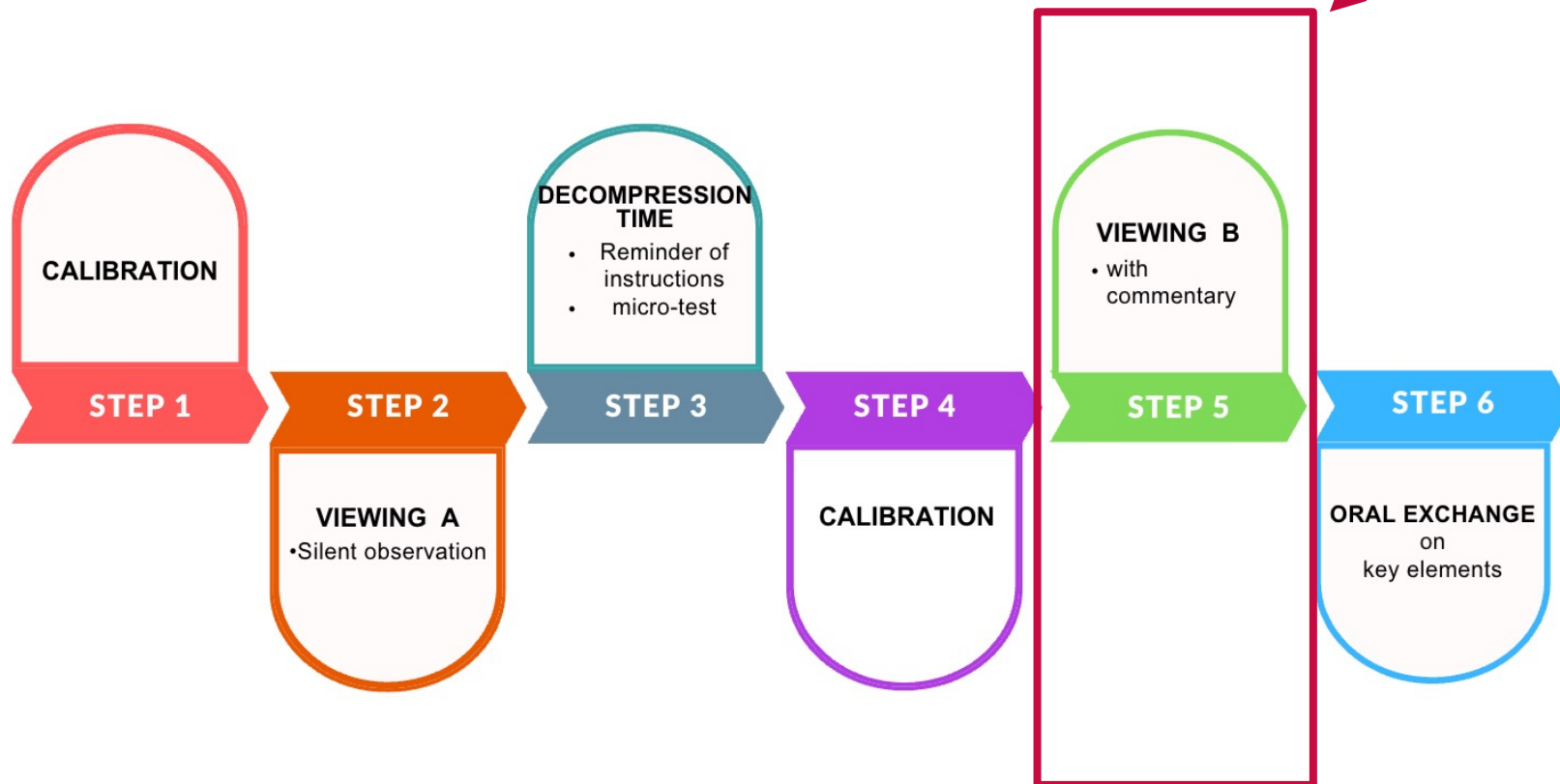
# Methodology



*Stages of the experiment  
from Duvivier et al. 2024*

# Methodology

For this presentation



*Stages of the experiment  
from Duvivier et al. 2024*



# Methodology



- 7 minutes
- A trainee teacher
- Start of a lesson
- The trainee teacher makes a planning error
- Pupil in or off-task

# Methodology

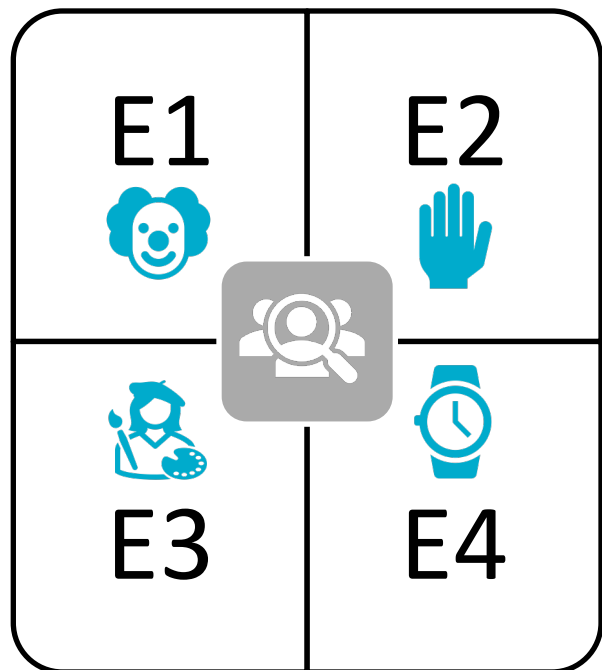
## Eyetracking 's Data

- Area of interest on
  - Group
  - Trainee teacher



# Methodology

- Aera of interest on target pupil in and off-task

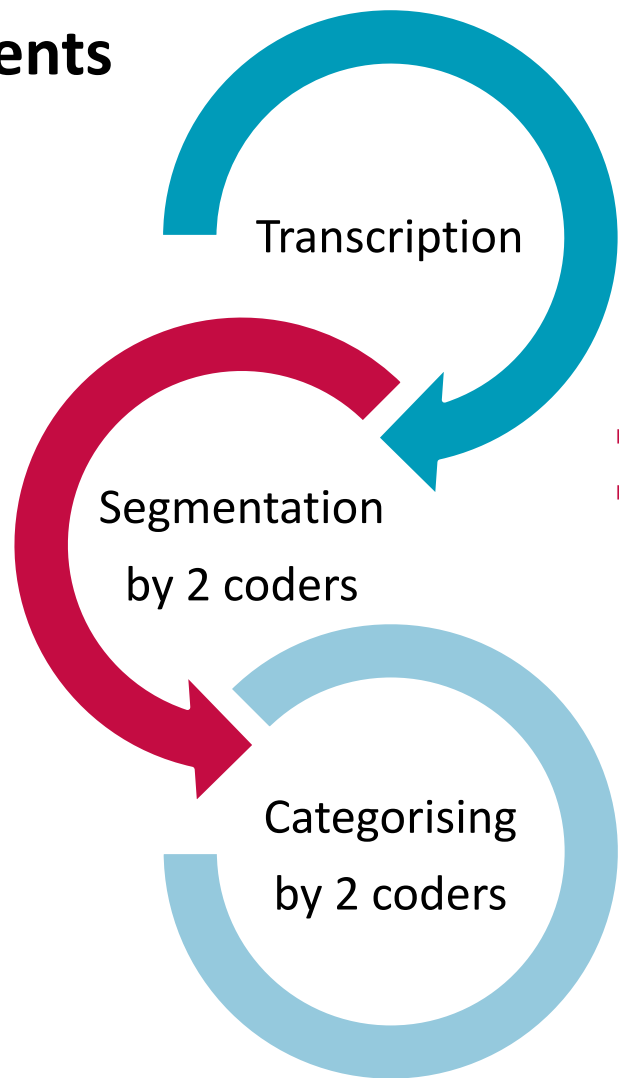


Target pupil reports from 3 independent observers

# Methodology

## Verbal 's comments

PT= 1437 segments  
UST = 379 segments



- cfr Paillé & Muchellini (2007)
- validated if 80% between the coders (Miles & Huberman, 2003) (average : 93,46% )
- N-vivo-12
- 2 coders : Cohen's kappa values (mean): PT = 0.807; UST = 0.806

# Some questions and hypotheses

## OBSERVING

### **RQ 1: Individual being observed?**

H: Attention is more restricted in PT ; UST to observe a larger number of individual (eg. Yamamoto & Imai-Matsumura, 2013; Cortina et al., 2015).

-> fixed and moving AOI are used to identify group of pupils and trainee teacher.

-> Indicators: 1st view, fixation, (Re-)view

### **QR 2: visual strategies employed by UST and PT ?**

H: UST eye scanning capabilities are more dynamic than PT (van den Bogert et al. 2014).

-> fixed and moving AOI are used to identify target pupils.

-> Indicators: 1st view, fixation, (Re-)view

# Some questions and hypotheses

## REFLECTING

(adapted from Vifquain & Frenay, 2018)

### **RQ.3: Objects spontaneously formulated?**

H: PT focus on device for learning and pupils (Vifquain & Frenay, 2018) and UST focus on teacher

-> Classification based on « teaching-learning model » (Derobertmeasure & Dehon, 2015) : objective; teacher; pupils; learning topic; device for learning + context

### **RQ.4. Type of reasoning process formulated?**

H: Description and interpretation by the PT (Vifquain & Frenay, 2018) and evaluation by the UST (Cohen et al. 2013)

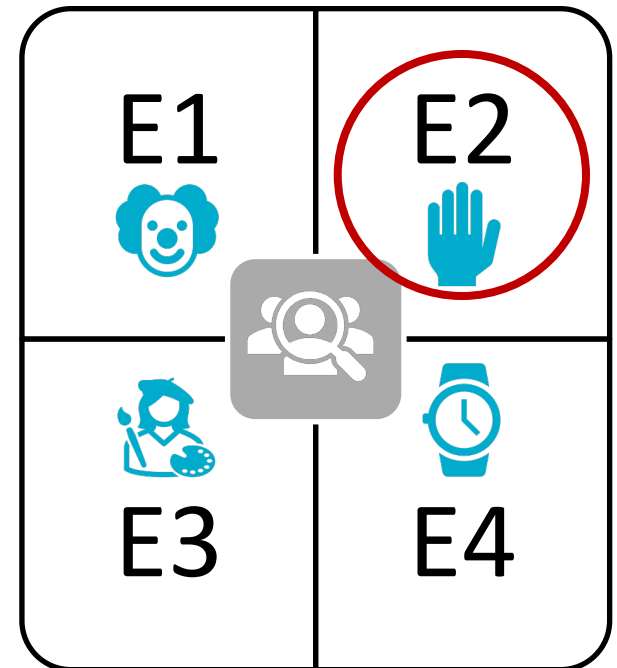
-> Classification based on Sherin & van Es (2008), Seidel & Stürmer (2014) and Vifquain (2015): description; question; evaluation; interpretation; prediction

- **Cross-referencing** (as Vifquain & Frenay, 2018)
- **Inter- and intra-coder** (Landis & Cock, 1977)

# Results: observing

## QR1. Individual being observed?

- The fixation scores between the participants in the study, namely the students and the trainee, are **comparable**.
- > E.g. : Focus on teacher
- PT = 33, 9% (fixation)
  - UST= 39% (fixation)
- **Significant difference** of target pupil
    - PT= focus on pupil E2
    - UST= focus on pupil E1 and E3



# Results: observing

## QR1. Individual being observed?

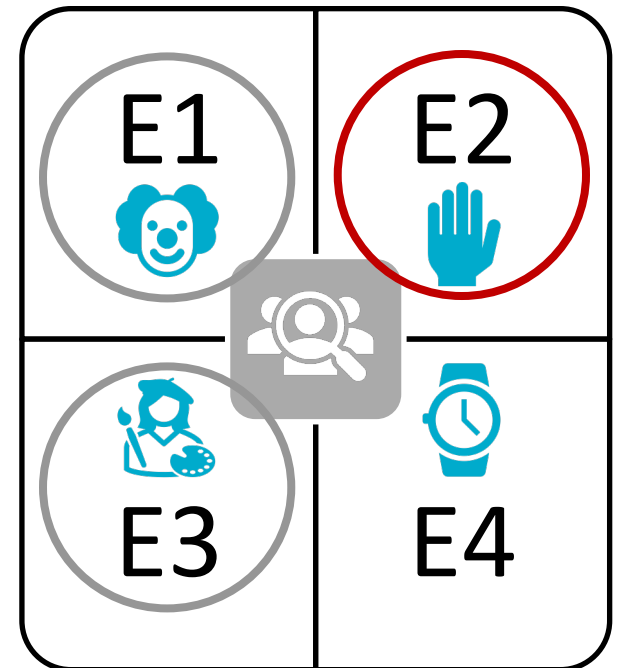
- **No** significant differences in the mean and dispersion between PT and UST, regardless of the individuals (pupil vs. trainee teacher).

-> E.g. : Focus on teacher

- PT = 33, 9%
- UST= 39%

- **Significant difference** of target pupil

- PT= focus on pupil E2
- UST= focus on pupil E1 and E3





# Results: observing

## QR 2: visual strategies employed by UST and PT ?

- Fixation
- First view
- Revisit

Revisits in E1	Revisits in E2
T= 5.965	T= 1.2
$p = <.001$	$p = 0.244$
Df=20	Df=20
<p>E1 revisite</p> <p>30</p> <p>0</p> <p>1 2</p> <p>Groupe</p>	<p>E2 revisite</p> <p>70</p> <p>10</p> <p>1 2</p> <p>Groupe</p>
Revisits in E3	Revisits in E4
T= 2.395	T=1.735
$p =0.027$	$p =0.098$
Df=20	Df=20
<p>E3 revisite</p> <p>25</p> <p>0</p> <p>1 2</p> <p>Groupe</p>	<p>E4 revisite</p> <p>30</p> <p>-5</p> <p>1 2</p> <p>Groupe</p>

Cohen's kappa values  
(mean):  
PT = 0.807; UST = 0.806

# Results: reflecting

## RQ.3: Objects spontaneously formulated?

PT	Objective	Trainee Teacher	Pupil	Learning topic	Device for learning	Context	Other	Total
Description	0,7	1	21,3	0,68	26,5	4,7	0	54,88
Question	0	2,5	0,99	0	3,1	0,3	0	6,89
Evaluation	0	0	2	0	6,7	0,99	0	9,69
Interpretation	0	0	9,9	0	9,86	4,3	0	24,06
Prediction	0	0	0	1	3,1	0,4	0	4,5
Other	0	0	0	0	0	0	0	0
Total	0,7	3,5	34,19	1,68	49,26	10,69	0	100

UST	Objective	Trainee Teacher	Pupil	Learning topic	Device for learning	Context	Other	Total
Description	3,11	21,5	25,1	0,3	4,28	6,23	0	60,52
Question	0	1,36	0,76	0,5	1,56	1,17	0	5,35
Evaluation	1,56	9,92	3,11	0,5	6,23	6,81	0	28,13
Interpretation	0,19	0,76	1,17	0	2,72	0,58	0	5,42
Prediction	0	0	0	0	0	0,58	0	0,58
Other	0	0	0	0	0	0	0	0
Total	4,86	33,54	30,14	1,3	14,79	15,37	0	100

Percentages by group of participants. One table = 100%.

# Results: reflecting

## RQ.4. Type of reasoning process formulated?

PT	Objective	Teacher	Pupill	Learning topic	Device for learning	Context	Other	Total
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<b>Interpretation</b>	0	0	9,9	0	9,86	4,3	0	24,06
Prediction	0	0	0	1	3,1	0,4	0	4,5
Other	0	0	0	0	0	0	0	0
<b>Total</b>	0,7	3,5	34,19	1,68	49,26	10,69	0	100

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<b>Total</b>	4,86	33,54	30,14	1,3	14,79	15,37	0	100

Percentages by group of participants. One table = 100%.

# Conclusions

QR	Hypothesis	Answer
RQ. 1: individual	PT: less individual in the video UST: more individual in the video	No
	PT: focused on the participatory pupils UST: Focus on off-task pupils	Yes
<b>PT vs UST</b>		
<ul style="list-style-type: none"> <li>▪ Difficulties in concentrating on less relevant elements (= Keskin et al. 2024) vs UST</li> <li>▪ Difficulties in identifying critical incidents in the classroom (= van den Bogert et al., 2014; Wolff et al., 2016; Yamamoto &amp; Imai-Matsumura, 2013) vs UST</li> <li>▪ Centred on the participative pupil (= Shinoda et al. 2021) vs UST</li> </ul>		

# Conclusions

QR	Hypothesis	Answer
RQ.2. Visual strategy	Difference between PT and UST in fixations, first views and revisits	Only revisits (significant)
<ul style="list-style-type: none"><li>▪ UST : immediate strategies (= Wolff et al., 2016; Stürmer et al., 2017; Kosel et al., 2023; Yamamoto &amp; Imai-Matsumura, 2013) -&gt; <b>revisit</b> -&gt; <b>glance</b></li><li>▪ No more even appearance (fixation) between PT and UST (<math>\neq</math> Keskin et al. 2024)</li></ul>		

# Conclusions

QR	Hypothesis	Answer
QR.3. Verbalised objects	PT= Pupil and system  UST: Teacher	Yes (motivation of the pupils, involvement of the pupils in the required tasks)  Yes+ pupil

- UST made **17 times more** comments about trainee teacher on screen than PT  
**!! Fixation on trainee teacher !!**
  - PT = 33, 9%
  - UST= 39%
- Discrepancy between what PT see on the screen and what they were thinking about at the same time?
- A reluctance on the part of the PT to express their thoughts clearly about the observed teaching practice of the trainee teacher « like us »?

# Conclusions

QR	Hypothesis	Answer
QR.4. Process	PT: description and interpretation UST: evaluation and interpretation	yes No-> description and evaluation
<ul style="list-style-type: none"><li>■ PT<ul style="list-style-type: none"><li>■ Evaluation with few nuances: OK / KO</li><li>■ Interpreting based on very few theoretical elements: « pupil seem motivated » (= Derobertmeasure, 2012)</li></ul></li><li>■ UST<ul style="list-style-type: none"><li>■ evaluate and propose alternative</li><li>■ Main functions of UST: observe and evaluate through feedback (= Cohen et al. 2013)</li></ul></li></ul>		

-> VP's PT and their UST: different results and some similarities

-> VP's trainer is close to the 'expert VP' described in the litterature

# Limits and perspectives

- AOI: size, duration of evenement
- View B data : some differences with view A when PT and UST discover the video
  - E2 percentage of fixations is 4 times higher in view B than A by both PT and UST
  - E1: ignored by PT and UST in view A, then fixated in view B
- Specificity of certain UST
  - UST\_1: 17 times more interpretative statements than other UST.
  - UST\_6: Eye movement more dynamic than the others, with more eye exits.
- MultiMatch method (cf. Jarodska et al. 2010; Dewhurst et al. 2012) should be employed to examine the visual strategies of PT and UST when the trainee teacher makes a planning error.



# Thank you !

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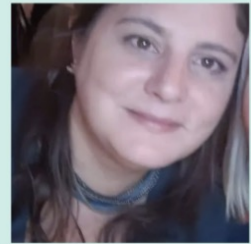
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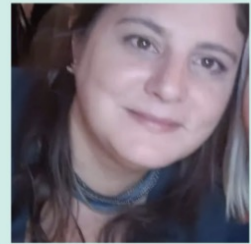
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