Pre-service teachers' eye movements while observing children's calculation process

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Introduction

· It is important for teachers to observe students and predict their errors

· Pre-service teachers learn about students' common errors

· Pre-service teachers and ordinary university students would differ in terms of the way they observe students' answering process

Purpose :
To examine the differences in eye movements between pre-service teachers and ordinary university students while observing video clips of children's calculation process during a written division task

Discussion

Distance of eye movements

Group	Total distance	Difference b/w correct and incorrect pattern
Pre-service teacher	Shorter	Similar
Ordinary student	Longer	Incorrect pattern : longer

➡Pre-service teachers' eye movements did not increase even after errors because predicting it with knowledge.
Having knowledge made eye fixation points selective.

Experiment

Participant:

Pre-servive teacher group : 6 pre-service teachers
（male 3, female 3, mean age 22.5 ）

Ordinary student group : 6 ordinary univ. students
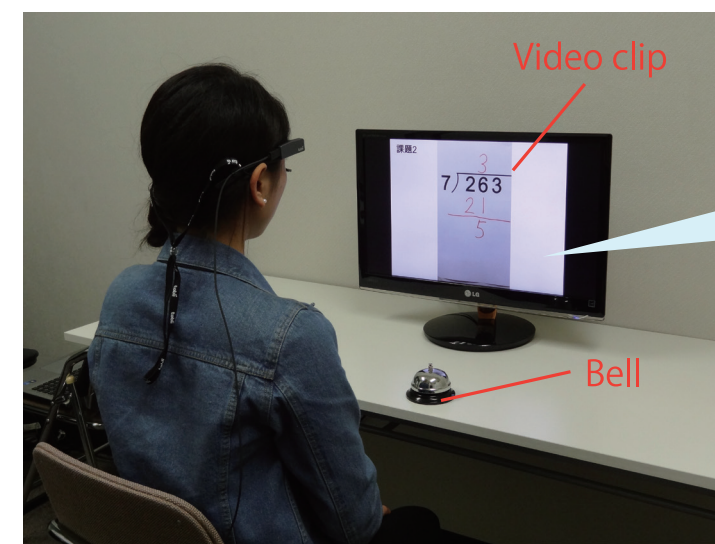（female 6, mean age 21.0 ）

Eye tracking system, Analysis software:

System : Tobii Pro Glasses 2 <50Hz>

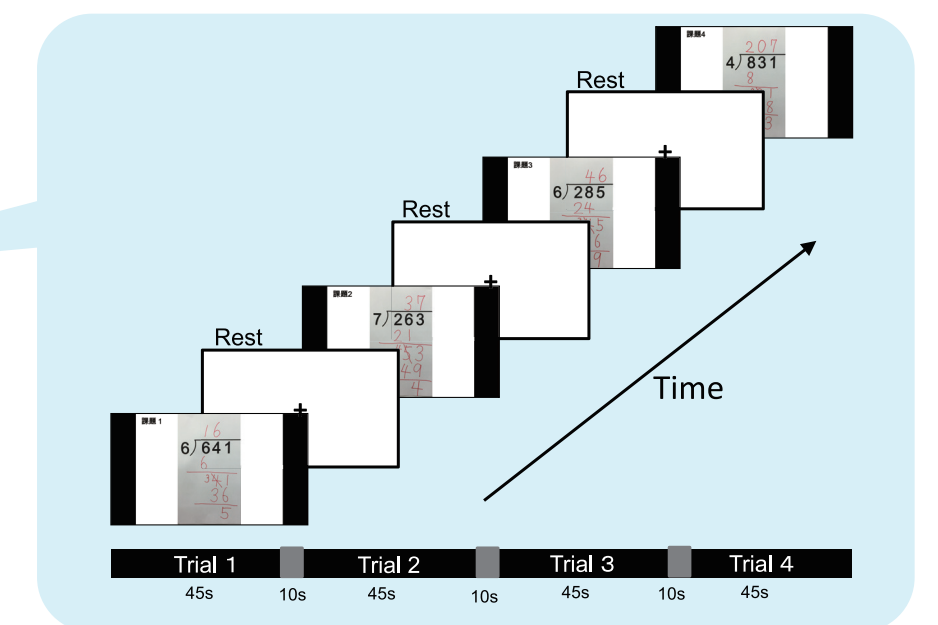**Software** : Tobii Pro lab. analyzer
（Tobii technology AB）

☝Tobii Pro Glasses 2

Task:
· To identify errors by observing the video clips as teachers
· To ring a bell when identifying it (not stop playback of video clips)
· To answer a questionnaire on detail of errors after experiment

☝Experimental setting

Results

Error type

Error type (i) : "Zero" is missing		Error type (ii) : Value is small	
Correct answer	Incorrect answer	Correct answer	Incorrect answer
	Correct answer: 106 (Zero is missing.)		Correct answer: 47 (Value is small.)

◆All participants : rang bells with the correct timing and answered error types correctly
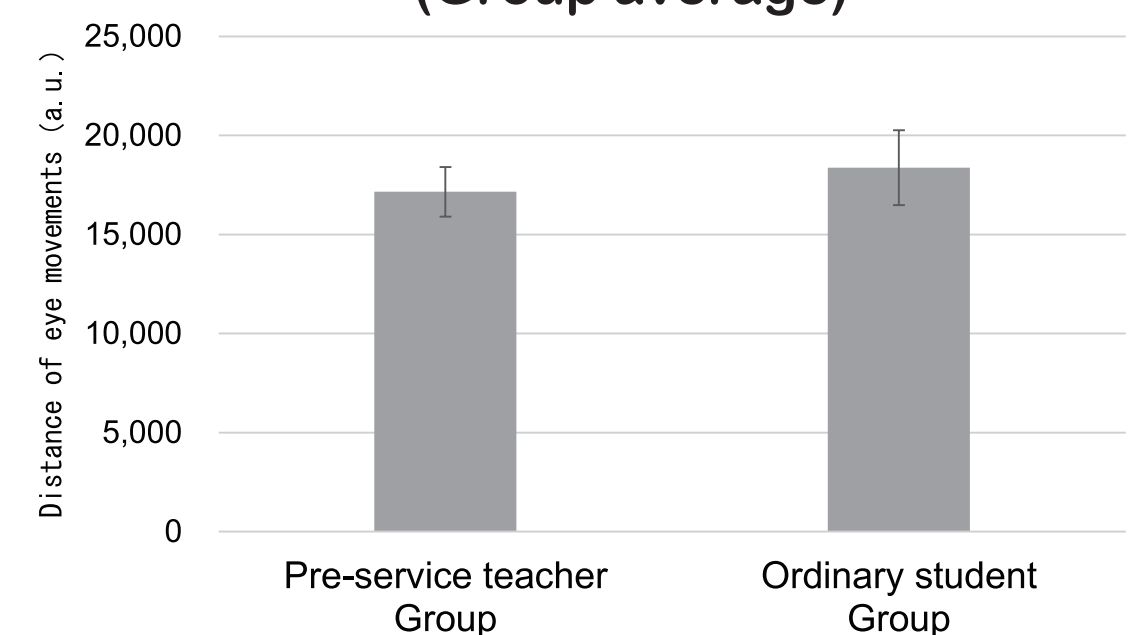
Analysis I : Distance of eye movements -comparison b/w groups-

How to analyze data

課題 1
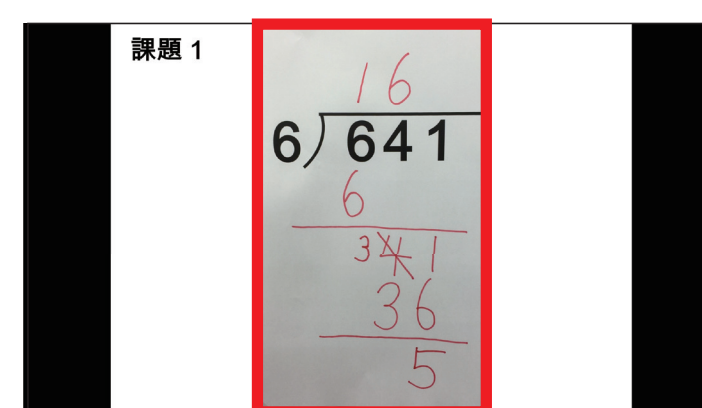
· During video clips （45s）
· Mapping eye fixation points within red square
· Calculate total distance of between fixation points (=distance of eye movements)

Distance of eye movements per trial (Group average)

◆ Pre-service teacher G ＜ Ordinary student G
⇒ Knowledge made distance short.

Analysis II : Distance of eye movements -comparison b/w correct and incorrect pattern-

Distance of eye movements by correct and incorrect pattern (Group average)

Pre-service teacher Group

Ordinary student Group

p=0. 056
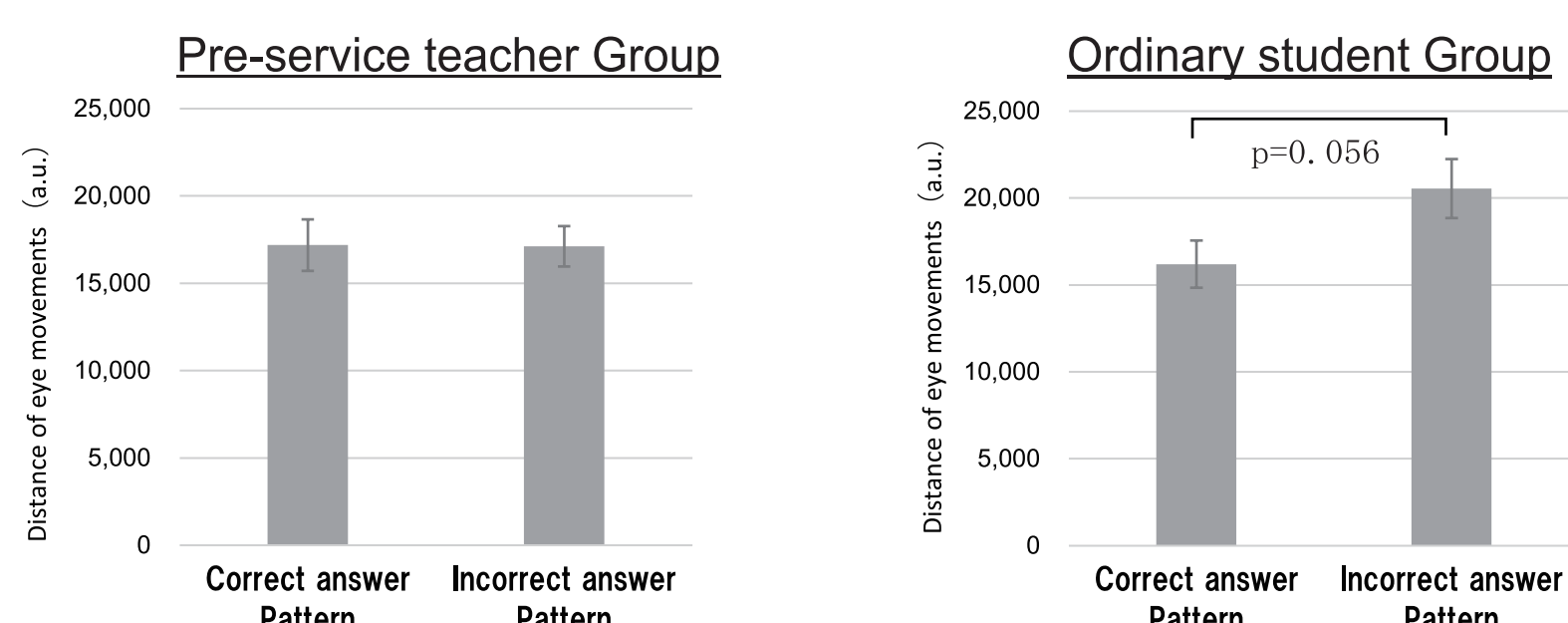
◆ Pre-service teacher G: correct answer pattern was similar to incorrect one.
◆ Ordinary student G : incorrect answer pattern was longer.
⇒Increase eye movements after errors

Heat-map of eye fixation's duration in incorrect trial

Pre-service teacher Group

Ordinary student Group

Overlay display of each participant heat-map data

Short ←→ Long

N=6

N=6

· Have knowledge of students' typical errors
· Could predict errors

· Have NO knowledge of students' typical errors
· Could NOT predict errors

Fixation points : Selective ←→ Wide
Fixation in error areas : Short ←→ long