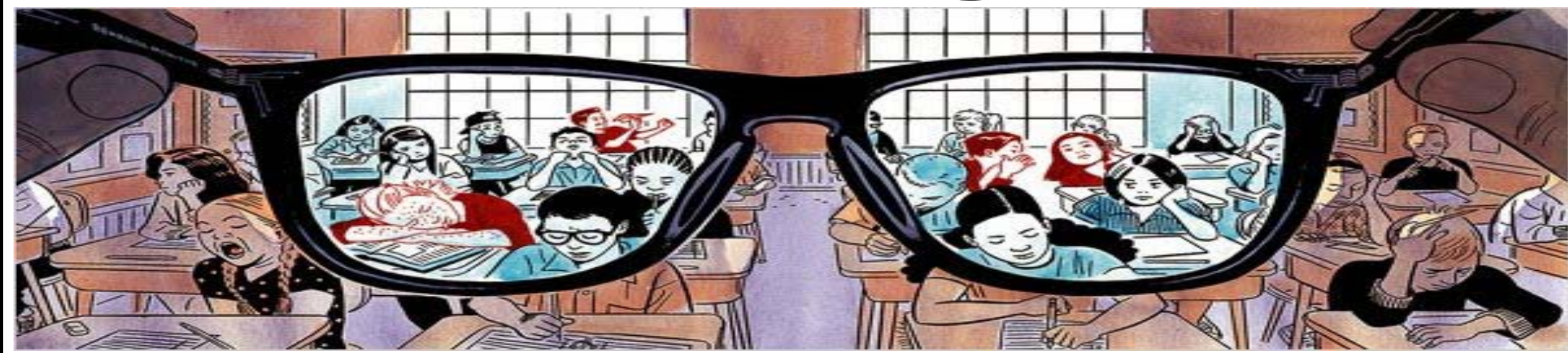Open Universiteit

Seeing what teachers see: Exploring the use of eye tracking in teacher expertise studies

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Objectives:

▪ test the usability of a **stationary, remote eye tracker** for reviewing recorded classroom lessons and a **mobile, head-mounted eye tracker** in a classroom setting
▪ establish the effectiveness of each eye tracker at capturing and measuring cogntive processing, escpecially visual perception
▪ determine how to compare data from different expertise groups (student teachers vs. mentor teachers) in order to create distinctions between expertise levels

Key Research Question:

What are the advantages and challenges of using an eye tracker during a classroom lesson or when viewing a recorded classroom lesson to investigate the covert processes of teachers?
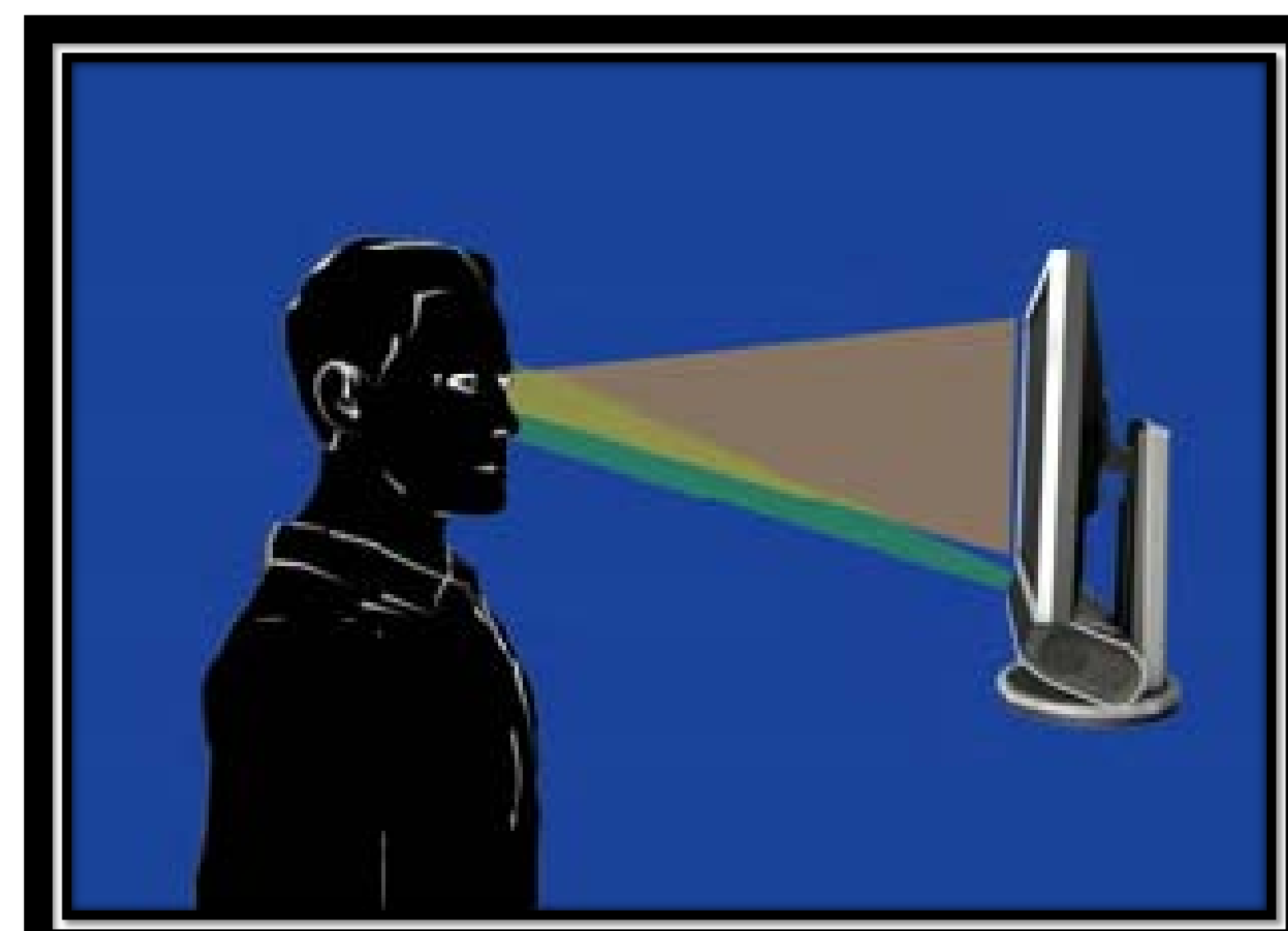
↗ SMI RED 250Hz: a stationary eye tracker

↗ SMI HED50Hz: a mobile, head-mounted eye tracker

Materials & Methods:

<u>Participants</u>: 3 mentor teachers & 3 student teachers from 3 different primary schools
<u>Equipment</u>: SMI RED250 & HED50 eye trackers; BeGaze analysis software; pre-recorded classroom video fragment; digital voice recorder
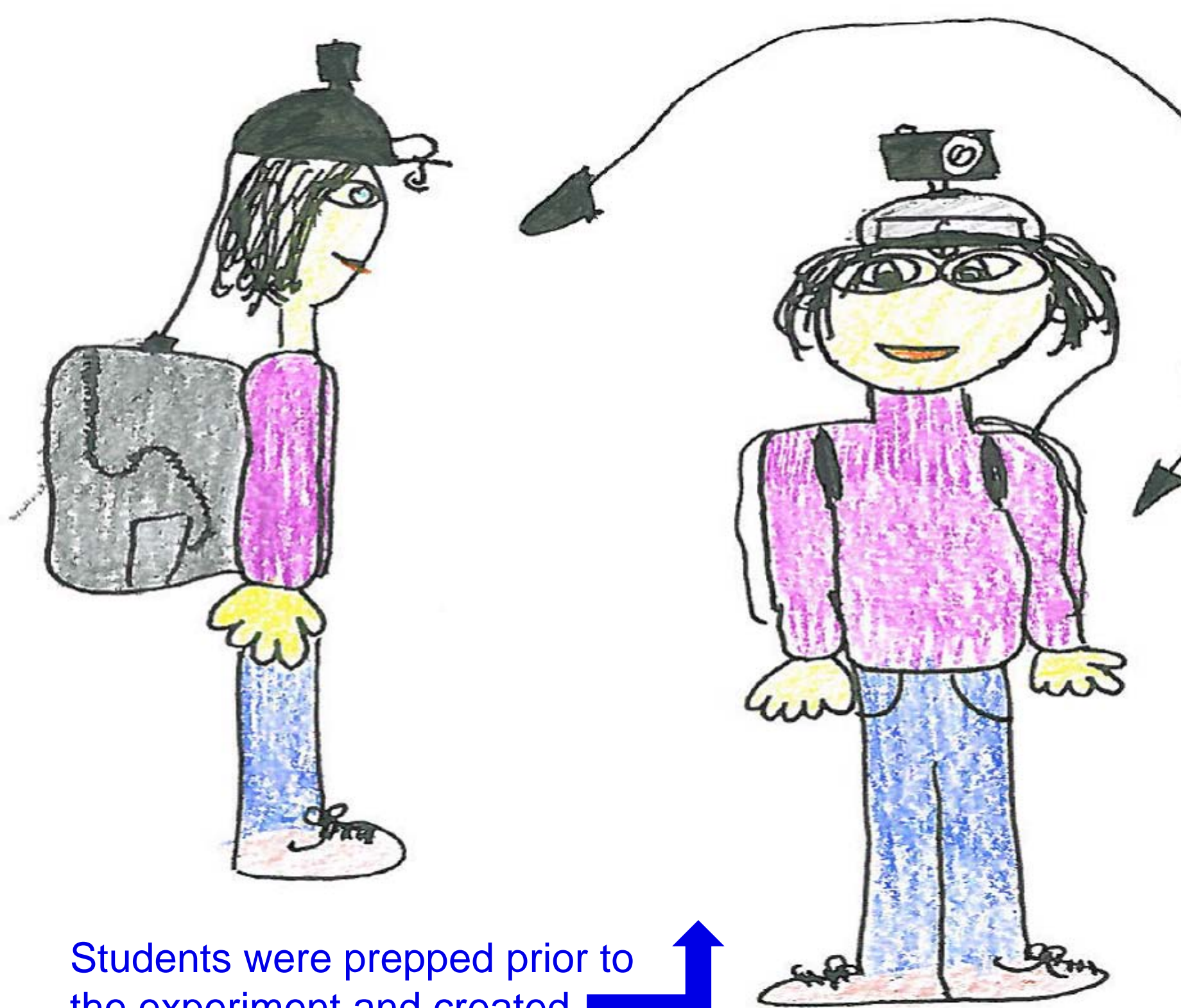
<u>Stationary eye tracker:</u> Video-cued concurrent think aloud was used to simultaneously record teacher's eye movements and verbalized thought processing about classroom managment concerns while observing another teacher's class.

<u>Mobile eye tracker:</u> A video recording was made during an actual classroom lesson which recorded the teacher's eye movements while recording the lesson from the teachers's visual perspective. The scene video was later used for video-cued retrospective think aloud about classroom management concerns while observing their own lesson.

<u>Questionnaires</u>: Separate post-experiment questionnaires were administered for both eye trackers.

Students were prepped prior to the experiment and created drawings of what they thought the mobile eye tracker would look like on their teacher (example above).

Analysis

▪ Verbal protocol from concurrent and retrospective think alouds coded for depth of cognitive processing expressed
▪ Eye movement measurements (fixation duration, dispersion, scan paths, etc.) to be analyzed in order to determine how well attention allocation can be inferred
▪ Questionnaire responses catgorized to evaluate usability and improve future experimental designs

Excerpts from questionnaire

•Similiarity of experimental set-up to a typical classroom teaching situation
"This scenario could find a place in any class. I recognize the whole situation and the attitude of some of the children. This comes straight out of a real moment in the classroom."
–student teacher response to RED eye tracker

•Advantages and disadvantages to using eye trackers
"The RED is more passive: you sit still, you just look at a situation. The HED is more active, and comes closer to normal teaching. The camera position is really different (between the two). The HED is obviously more from your own perspective, with the RED you're more of an outsider."
–mentor teacher response to both eye trackers

•Effect of eye tracker on delivering insturction
"You are a little more aware that you are doing research and think a bit differently than normal; I haven't noticed any other real differences to my way of teaching."
–student teacher response to HED eye tracker
•**"I'm used to walking around a lot in class. That was more difficult. The rest of my teaching was not affected."** *–mentor teacher response to HED eye tracker*

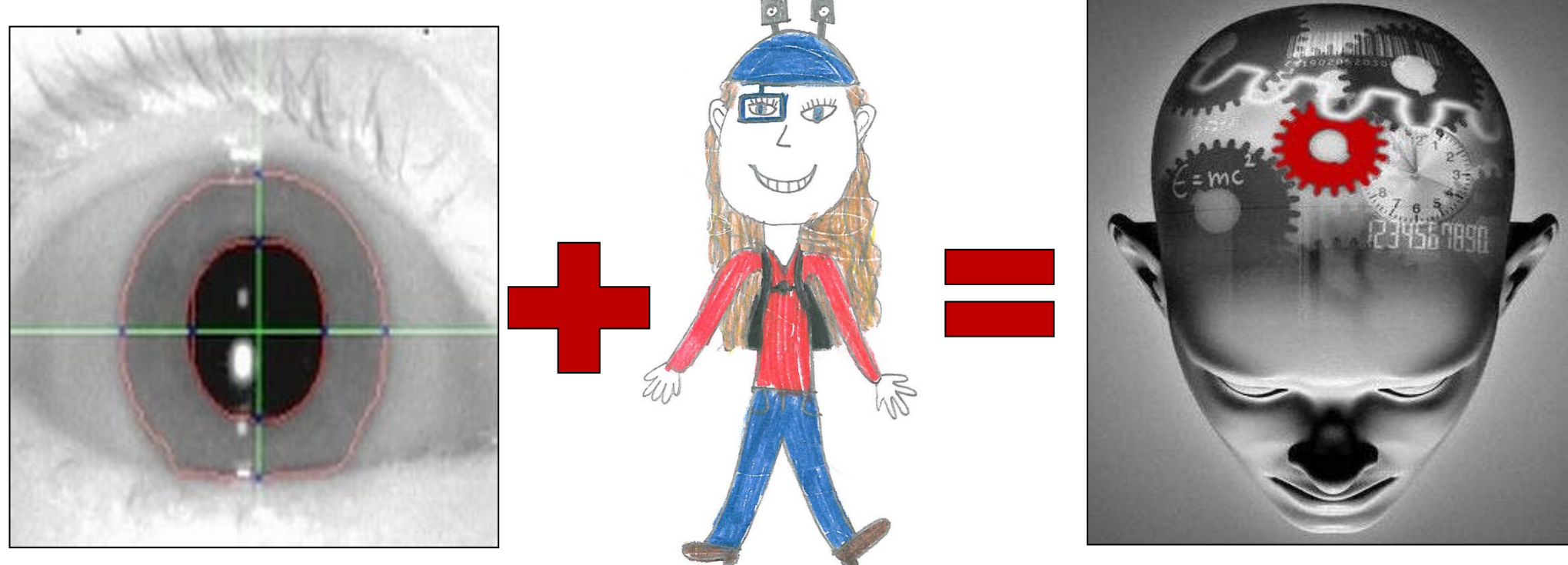•Effect of eye tracker on student attention and behavior
"I have the impression that it had little influence. Because the students were well prepared, they only had a few questions that needed answering. There wasn't much laughter, students did just what they do every day." *–mentor teacher response to HED eye tracker*

• Supporting lesson evaluation and reflection
"With the RED, you could express what your thoughts are, but not with the HED. The advantage of the RED is that you can easily evaluate classes on the basis of the video images. The RED shows a single perspective, but the HED moves with you so you can see more. In both systems, you can get evaluate yourself, but the RED image does not let you see your entire class, while the HED does." *–mentor teacher response to both eye trackers*

Additional reseach:

▪ the stationary (RED) eye tracker was used in a larger (n=67) study investigating differences in the visual and cogntive processing of beginner and experienced teachers when evaluating and interpreting classroom management concerns
▪ the mobile (HED) eye tracker offers potential for future studies investigating how teachers describe and process their own classroom management videos
▪ results from these studies can inform efforts to practically apply the use of eye tracking data in teacher training programs

Image from SMI RED250Hz showing eye movements and visual fixations while viewing the lesson.

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