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The forgotten technology. Teachers use of mini white-boards to engage students

Thomas F. Eidissen¹, Karen Bjerkeli², and Ove Gunnar Drageset³

¹UiT, The Arctic University of Norway, Norway; thomas.f.eidissen@uit.no

²Norwegian University of Science and Technology, Norway; karen.bjerkli@gmail.com

³UiT, The Arctic University of Norway, Norway; ove.gunnar.drageset@uit.no

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This day and age, the focus in education is for the most part on how we can use technology to make it easier for children to learn. While there is a lot of amazing technology that aims at this, we want to make the case that we should not throw away all the tools that are not part of the new wave. This poster focuses on the use of mini white-boards to engage students in their learning of mathematics. There might be things to learn from this forgotten technology when designing and implementing new technology into mathematics. This project arose from observations of an exceptionally talented teacher. The observation focused primarily on discourse, structure, and tools used. We were intrigued by the way this relatively young teacher utilized an old tool in the lessons to a seemingly great effect.

The structured use of mini white-boards

Gathering the students

The teacher gathered the students around the Smartboard at the beginning of the class. Here, the students sit tightly together on benches without desks, where they spend most of a typical lesson. The teacher uses a PowerPoint presentation on the Smartboard, where definitions, assignments, videos, and students answer to homework assignments are presented for discussion. A main tool in these gatherings was the mini white-board, where they solved tasks and shared methods and thoughts. Hiebert & Grouws (2007) writes that the way a teacher chooses to organize their students, and in what way time is prioritized, plays a role in the students' opportunity to learn. By gathering the students around the Smartboard, the teacher signals that conversation is a priority. According to Lee (2006), such organizing will make the students more included in the conversation and increases the probability of conversation. By using a substantial part of the lesson for a gathering, the teacher prioritizes conversation and sharing of methods.

The mini white-boards

This mini white-board was a simple A4 sized white-board, which the students were handed at the beginning of the lesson. The students were given one to three minutes to solve the different tasks the teacher presented on the Smartboard. For example, the students could be asked to find the volume of different figures shown on the Smartboard, where the solution method was the teacher's primary goal. The teacher made it clear to the students that they had to write down their answers and how they came by them. They could also be asked to write their own definition of mathematical terms or

more open tasks such as drawing three-dimensional shapes. Whichever task the students were given, the white-boards gave them the opportunity to work by themselves for a short time, which in turn gave them the time to consider the given task. This method is henceforth called *individual work time*. The typical tasks were to do calculations, write definitions and draw explanations.

In one instance, the teacher told the students to write the answer right after the task was given, for then to show their answer to the rest of the group immediately. This direct approach makes the students give an answer fast, without time to think and without checking it against other students' answers. Making this approach is what Wiliam (2007) calls an *all-student response system*, as opposed to a *single student response system*, which gives the teacher an overview over which of the students got it right and which did not. This method is henceforth called *direct use* and might be used to fast check fluency and understanding of concepts.

After *individual time* and *direct use*, the white-boards were used in three different ways, which all started with the students showing their solutions or explanations. One way was to ask a student to explain their own method. A second way was to ask a student to explain another student's method. A third way was that the teacher selected a solution and explained the method. All this means that the teacher orchestrated the conversation by selecting student work and then constantly probing and pressing for information. The result is a practice with a strong focus on sharing and understanding

Individual use		Plenary use		
Work time	Direct use	Students explain their own method	Students explain another's method	The teacher explains a student's method

student thinking.

Table 1: The use of mini white-boards

The way forward

This work is part of a project (SUM) which purpose is to look at how inquiry-based learning can contribute to coherence in the students' motivation for and learning of mathematics at the transitions in the system of mathematics education. By utilizing these mini white-boards together with tasks where there is more time for inquiry, maybe we can involve the students more fully in the tasks given in the lessons in SUM. The findings in this poster will be used together with teachers to take a closer look at how this forgotten technology can help improve learning and understanding in mathematics. In addition, we have a long-term goal of using the insights from this forgotten technology to make our mathematics teaching with ICT more productive.

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