

THEY ARE DOING THE LESSON, BUT WHAT MATHEMATICS ARE THEY LEARNING?

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One way to attempt to understand students' learning of mathematics is to consider the dialectics in which they engage, as proposed by Brousseau (1997). Brousseau's theoretical framing suggests that students' engagement in dialectics of action, formulation and validation are all necessary for mathematical learning to occur. Additionally, it is important to consider whether, and how, students' activity moves between the pragmatic/empirical and mathematical/systematic fields (Noss et al., 1997) and, although there are occasions when all three of Brousseau's dialectics may be observable, if activity primarily remains, for example, in the pragmatic/empirical field, mathematical learning will be limited.

The Centres for Excellence in Maths research trial, in England, investigates the impact of adopting a specific teaching approach with students who have not achieved a 'pass' grade at in exams at age 16. Eighty teachers teach seven carefully designed lessons, which provide multiple opportunities for students, working in pairs, to engage in dialectics of action, formulation and validation and to move between the pragmatic/empirical and mathematical/systematic fields. The question at the heart of the sub-strand of the project that we report on here is 'What can we say about the mathematical learning of the students as they work on the tasks within the lessons?'. Answering this question is important not only for the implementation and process evaluation of the trial, but also to inform the design and teaching of future lessons.

For each of the lessons, two pairs of students, with different teachers, were closely observed. Their work was photographed and their discussions audio recorded. The analysis of their activity is ongoing, but preliminary results suggest that while students generally did engage in all of Brousseau's dialectics, dialectics of validation were more likely to occur in discussion with the teacher than with peers, and were frequently linked with movement between the pragmatic/empirical and mathematical/systematic fields. In the presentation, the work of two pairs of students is used to exemplify the approach and the findings; and design implications are discussed.

References

- Brousseau, G. (1997). *Theory of didactical situations in mathematics: Didactique des mathematiques, 1970-1990*. Kluwer Academic Publishers.
- Noss, R., Healy, L., & Hoyles, C. (1997). The construction of mathematical meanings: Connecting the visual with the symbolic. *Educational Studies in Mathematics*, 33(2), 203-233.