Dutch Lesson Study — Examples of Teacher Learning

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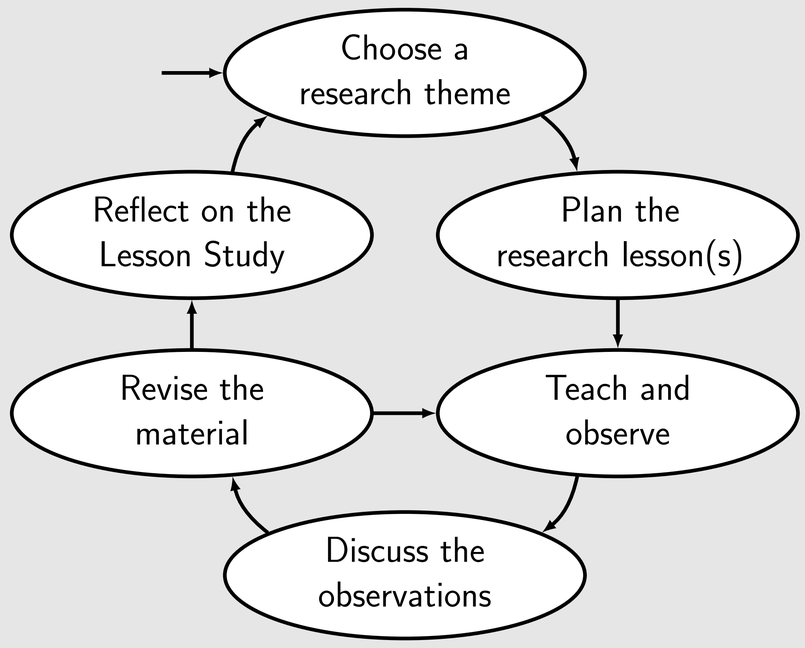
1. Lesson study

Lesson Study increases teachers' understanding of student learning by collaboratively
- Planning one or more lessons about a difficult topic;
- Observing one or more students live during these lessons in an actual class;
- Discussing the observations about student learning;
- Revising the material based on the observations.

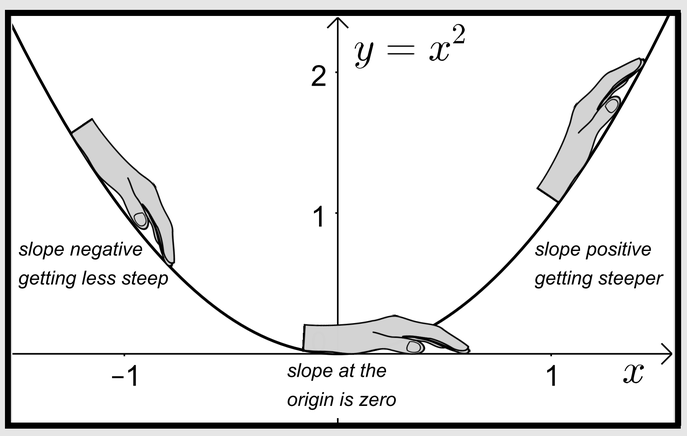
Our Lesson Study goal: contribute to teachers' professional development through
- Focus on subject matter and student learning (not on the teacher);
- Collaborative learning;
- Active involvement in curriculum design and development.

Our research goal: investigating the effects of Lesson Study on mathematics teachers' professional development.



Adapted from Stepanek et al. (2007).

2. Lesson Study example: the derivative



Adapted from Tall (2010).

Motivation:
- The derivative is very important in science and technology, but
- Students tend to use symbolic operations without conceptual understanding.

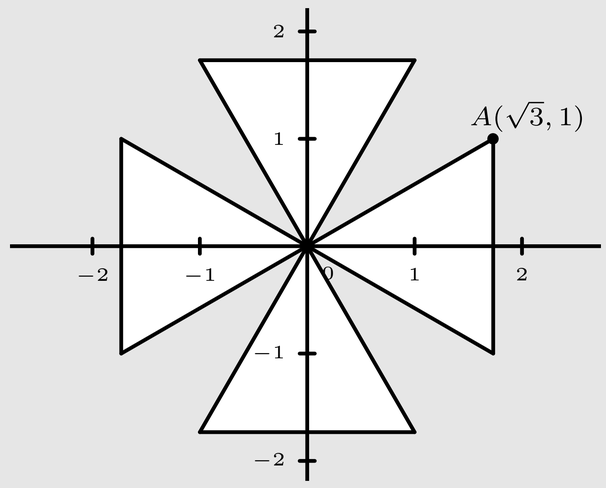
Findings:
- Tracing a graph using the teacher's hand gives the students a good conceptual understanding of slope.
- Zooming in on a graph (using GeoGebra) to show its "local straightness" is helpful for students' understanding of the derivative.

Verhoef, N.C., Coenders, F.G.M., Van Smaalen, D., Pieters, J.M., & Tall, D.O. (2015). *Professional development through lesson study: teaching the derivative using GeoGebra*. Professional Development in Education, 41(1).

3. Lesson Study example: trigonometric functions

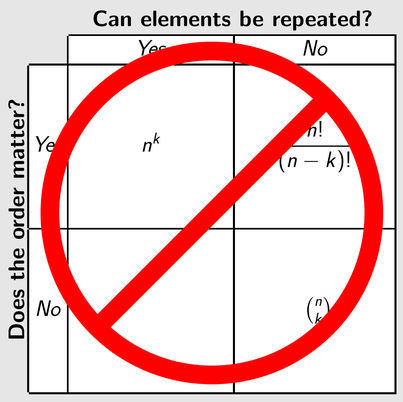
Motivation:
- The transition from angle calculations in triangles to the use of trigonometric functions easily confuses students.
- The teachers wanted the students to really understand the symmetric properties of sine and cosine.

Findings:
- The use of icons (windmill blades or a water wheel) elicits the use of symmetry, but care should be taken that students do not restrict their thinking to filling out coordinates.



Verhoef, N.C., & Timmer, M. (2013). *Lesson Study, deel 3 — ervaringen bij de introductie van periodieke bewegingen*. Euclides, 87(5).

4. Lesson Study example: combinatorial reasoning



Motivation: students often have great difficulties choosing between the use of combinations, permutations and powers when solving combinatorial problems.

Findings:
- Students really need to visualise each situation. Acting out a problem proved to provide more insight than the use of pictures.
- Coaching students to use their common sense and building up their confidence can be even more valuable for them than theoretical insight – this requires active and involved teaching.

Coenen T.J.M., Hof, F., & Verhoef, N.C. (2016). *Combinatorial reasoning to solve problems*. ICME 2016, Hamburg, Germany.
Timmer, M., & Verhoef, N.C. (2014). *Combinatoriek: meer dan trucjes*. Euclides, 90(3).