

A sudden interest in math: How teachers can motivate their pupils

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The lack of interest in math or natural sciences is one of the most frequently voiced causes for concern in the debate surrounding education, at least in Germany. It has been seen time and again that pupils lose their enthusiasm for physics, chemistry and math once they reach eighth or ninth grade. But is this inevitable? And if not, how can teachers steer a different course?

Education researchers from TUM have been investigating classroom dialog – the way that [teachers](#) and pupils communicate with each other. "Studies have shown that most math and science teachers use a rigid style of communication to get their subject across," says Prof. Tina Seidel of the TUM School of Education. "Their teaching methods involve closed questions and they hardly ever encourage discussion among the pupils. Furthermore, they rarely give feedback."

Recognizing and correcting these well-established patterns of behavior is extremely difficult for teachers, given the stressful and complex nature of their work. That is why TUM researchers have teamed up with peers from Stanford University to develop a 20-hour further training program that runs over the course of one year. A group of math and physics teachers for eighth and ninth grade pupils of German secondary schools learned how to open up classroom dialog, engaging with as many pupils as possible while also giving them individual attention.

The most important training tool: video recordings of the seminars and of actual class time, which the participants used to analyze their

performance. "By the end of the course, the teachers were comfortable relaxing control, even on difficult topics," continues Seidel. "They were also able to tell pupils during the lesson where they were doing well and the areas they needed to work on."

A control group of teachers attended traditional [professional development](#) training on the same topic at the same time. The pupils of all the participating teachers were interviewed by the researchers. One question explored the pupils' basic interest and perceived strength in each subject at the start and then at the end of the year. The pupils were also asked to comment on how motivated they were at the end of each class and to assess their level of competence.

The research showed that interest in the subject, motivation and perceived competence level all increased in the majority of the pupils whose teachers had participated in the new professional development program. For most of the pupils whose teachers belonged to the control group, however, interest and motivation levels dropped, as is typically the case among school-goers in these grades.

The education researchers now recommend a different format for professional development courses in teaching. "In our view, one of the key success factors was the fact that the group worked together on a topic over a longer period of time and was able to apply their learnings to a concrete classroom situation," comments Seidel. "This was a lot more effective than isolated one-day workshops every couple of months, the content of which is quickly forgotten given the daily pressures of a teaching environment."

The TUM School of Education has already changed its own teacher training: student teachers learn from each other in role plays and analyze their performance by watching video recordings. "Teacher training courses in Germany do not necessarily give students an opportunity to

gain experience in controlled conditions outside of teaching practice," Seidel points out. "This type of microteaching provides student teachers with a lot more feedback to help them hone their skills."

The researchers developed standardized training units to enable student teachers from different disciplines to learn together and compare techniques. In their role as teacher, the students have to teach their fellow participants the game of Monopoly or the details of Munich's transport system. The students playing the role of [pupils](#) adopt different attitudes, from attentive to disinterested. This standardized approach helps the future teachers analyze their own development as they continue their training.

Previously, the [education researchers](#) had devised a test allowing students to regularly check their ability to assess complex situations in the classroom. This is important so that they can correctly apply theory to practice in a real classroom setting. The "Observer" test developed by TUM researchers is now used in teacher training courses at around 25 universities in Germany and Switzerland.

More information: Seidel, T., Gröschner, A., Kiemer, K., Pehmer, A.-K. (2013). The Dialogic Video Cycle as Teacher Professional Development Model to Foster Classroom Dialogue: Conceptualization and Implementation Findings. Manuscript submitted for publication.

Kiemer, K., Gröschner A., Pehmer, A.-K., & Seidel, T. (2013, 27.08.). Teacher learning on classroom dialogue and its impact on student interest and motivation. Paper presentation in symposium "Fostering student thinking and engagement in teacher professional development" at the EARLI conference, Munich, Germany.

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