

# Expanding Room for Tacit Knowledge in Mathematics Education

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Lecture Proposal for the ACDC strand

## ABSTRACT

Knowledge is present in two forms: explicit and tacit. Explicit knowledge is codified, precisely and formally articulated. Tacit knowledge is exclusively stored in human brains. It is subconsciously understood or applied, developed from direct action and experience, shared through conversation, story-telling etc. As precision and exactness are “obvious” attributes of Mathematics, its education predominantly concentrates on the consolidation of explicit knowledge.

Substantial portions of explicit knowledge are now stored in the tools like Computer Algebra Systems and Dynamic Geometry Systems. For their proper application, understanding “*what to do and why*” becomes more important than “*how*”. The presence of tacit knowledge (understanding of context, ability to foresee the consequences, evaluation of validity of outcomes, etc.) becomes critical. Teaching Mathematics must concentrate on additional faces of knowledge transfer. The social context of mathematics must start playing a substantial role in its education otherwise these advanced tools will be applied in an incorrect and/or misleading way.

Our proposed lecture is based on the most popular model of knowledge transfer – Nonaka-Takeuchi’s SECI model (Socialization, Externalization, Combination, and Internalization). As *Combination* is the core of the current courses, three remaining components deserve our special attention. In our lecture, we will indicate how they can be included into the current content by solving problems that require formal thinking and reasoning. The method was successfully tested in our database courses, in their core formal section – query creation. A pedagogical experiment has been executed. Its statistically proved results show that our (less formal) approach speeds up the query formation, preserves the correctness of outcomes and the students feel more comfortably with their work.

Now, another experiment with financial mathematics is under preparation. In the time of the conference, its first outcomes should be known and demonstrated.

## Keywords

Tacit knowledge, explicit knowledge, SECI model, social aspects of education, less-formal approach to exact problems.