

## Book Review

# Mathematical competitions and classroom collaboration: antonyms or a new direction for research on teacher beliefs?

BHARATH SRIRAMAN AND OLOF STEINTHORSDDOTTIR

Tine Wedege and Jeppe Skott (2006), *Changing views and practices: a study of the KappAbel mathematics competition*. Research report, Norwegian Center for Mathematics Education & Norwegian University of Science and Technology, Trondheim. ISBN 82-471-6040-4

The book under review reports on the 2004–05 KappAbel mathematics competition in Norway and the author's ensuing study of beliefs, views and practices of teachers and their students associated with the competition. Our motivation for reading and reviewing the book stemmed from a cultural interest in understanding the role of mathematics competitions in Scandinavian countries. In particular, given the emphasis on egalitarianism and less emphasis on the individual in the socio political outlook of Scandinavian countries, we were interested in learning about how teachers view the role of mathematics competitions in relation to the issue of equity and equal access for all.

The first chapter describes the history of the KappAbel competition. It may not be well known to the international community about the collaborative nature of the competition and how an entire class of students is counted as one participant. The competition focuses on tasks and projects based on a certain theme for a particular year such as mathematics and music or mathematics and the human body which was the theme for the 2004–05 year. The interested non-Scandinavian reader will find

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**Bharath Sriraman**, The University of Montana

**Olof Steinthorsdottir**, University of North Carolina at Chapel Hill

the structure of the competition quite different from mathematics competitions in North America and Asia, where there is more focus on the individual as opposed to the entire class.

The opening chapter also describes the teachers' role in the competition, sample problems and details on how projects are written, presented and assessed. There are several provocative and deep issues raised by Wedege and Skott, namely whether a mathematics competition can catalyze change in the beliefs and attitudes of students and teachers on the nature, purpose and scope of mathematics? Further, can a competition create institutional change in schooling practices? Several quotes from teachers of mathematics illustrate different conceptions on the role of the competition. While one teacher viewed it as a tool to formatively assess student abilities not apparent in standard classroom exercises and examinations, another teacher viewed it as a means of stimulating and sustaining the interest of students who already had a positive affect towards mathematics.

Reading the opening chapter makes it clear that the onus of the competition rests largely on the shoulders of the teacher, who has to plan and manage her class at all stages of the competition. Since this chore is largely voluntary and extremely time consuming, among the questions that came to our mind is to learn motivational factors that lead certain teachers to participate and those that deter other teachers from participation. Chapter 2 summarizes the canonical literature on affect, and which can be skipped by those already familiar with this genre of research. It may be helpful to read the last section (2.4) in which the Wedege and Skott conceptualize their perception of if/how change occurs within the classroom under the influence of the competition. Again, the authors bluntly point out that the collaborative emphasis of the projects goes against the standard norms and practices of most classrooms, which naturally brings to light both the purpose and the interesting implications of this study for teacher education. So while the hope is that competitions like these will initiate long-term and systemic change in classroom norms, it could also well be the fact that changes observed might be temporal, attributable to localized effects of participation.

Chapter 3 presents in detail the research design of the study; the methodological challenges and difficulties; particularly operationalizing theoretical constructs from the literature; and the difficulties in handling the different types of data generated by the design of the study. The relevant writings of Ernest, Pehkonen and Törner, and Bourdieu are referred to, leading to the authors adopting a blend of post positivist, constructive and transformative research paradigms with the caveat that their epistemological viewpoint is transformative. The data consisted of:

- a questionnaire administered to teachers of 2856 grade 9 mathematics classes in Norway,
- a short questionnaire to 351 teachers via e-mail. These teachers classes took part in the first two round of the competition; another questionnaire to a subset of 15 teachers from this group who expressed interest in continuing with the project work irrespective of the outcome of the first two rounds,
- interviews with 5 teachers and 3 groups of students at the semi-final stage and follow up interviews with 2 teachers and 2 groups of students, and
- artifacts in the form of reports and log books from seven classes of students who were among those interviewed and observed. (p.47)

Needless to say, the variety of data sources, quantitative and qualitative, and the researcher's attention to triangulating their data sources and ensuing interpretations and conclusions attest to the high standards of validity and reliability of the study. Again, in spite of the careful attention to questionnaire design, collecting copious amounts of data, and addressing limitations of the study, in the last section of chapter 3, Wedege and Skott take a rather pragmatic view of the results they hope to find from their ambitious study.

Chapters 4, 5 and 6 allow the reader to progressively focus on the participants of the study and the results. It begins with Chapter 4 giving the reader a macroscopic view of the sample of teachers, namely an overview of their background, experience, their school mathematical priorities and their representativity within the study. This is followed by Chapter 5 in which readers are presented tabular questionnaire data from the smaller sample of teachers who participated in KappAbel. The chapter is well organized and gives the reader at a glance teachers views on various affective issues (characteristics of a good student, a good teacher, reasons for participation, etc). To us, the section on gender equity was of particular interest, given the rule that the finalist teams of 4 should have equal gender representation. The reader will find teacher's views on gender differences in mathematical abilities quite interesting. The authors report that in general teachers viewed boys as being more self confident in their knowledge and skills in comparison to the girls. In general teachers also tended to agree with "mathematics as a male domain". It would be of interest to the community to know these teachers' self reports on whether this "self confidence" actually translated to higher achievement on assessments (Steinhorsdottir & Sriraman, 2007). The interview excerpts with

six teachers narrated in the form of case studies (pp. 122–167) gives a very nuanced and interesting picture on the background of the teachers, and their associated views on teaching/learning mathematics and the Kapp-Abel competition. We write that the excerpts are nuanced because it reveals heterogeneity of reasons for participating in the competition and divergent views on the benefits of collaborative work. One commonality noted was most of these teachers liked mathematics, viewed themselves as being adept at it, and emphasized creativity in thinking mathematically. In several excerpts was that projects contributed to changing the dominant view of mathematics as an isolated subject and sowed the seeds of a more interdisciplinary outlook. Six follow up interviews with the teachers and their students are reported in section 5.5. In this section, many student views on KappAbel projects indicated willingness to learning something "new", i.e. something outside the standard mathematics curricula, and viewing mathematics as being a fun activity. Again there was a wide heterogeneity in teacher's reports on the benefits of the competition for the students. Finally, Chapter 6 gives a particular case study of mathematics teaching at a lower secondary school in the southern part of Norway. The school was chosen a site because one of its classes had made it to the semi-finals of the KappAbel competition. The case study is built on a four day stay observing a teacher (Kristin) and her students. The classroom practices of Kristin are reported in considerable length in episodes, which allow an interested reader a good view into the teacher's lesson structure and norms of classroom discourse.

The concluding chapter 7 reports on: who participates in KappAbel? And, who does not?, as well as reasons based on the study for these two questions. It would be unfair to reveal the findings of the authors because the book does a good job in building up the tension in the reader to find out whether this competition has a positive or a negative effect on classroom norms and practices. The one thing we will reveal is that Wedege and Skott's data analysis refuted the hypothesis that teachers reasons for participating in KappAbel was confirmative – and in our opinion this finding is very heartening for the community. The authors present several critical implications for researchers on the impact of KappAbel.

Overall, the book reports on a long and ambitious research study on the effects of a major mathematics competition in Scandinavia on the beliefs and practices of teachers, given the collaborative, project based nature of the competition. Although Wedege and Skott are modest in the implications of their findings, we believe there is a major lesson to be learned for researchers working in teacher development in other countries that have mathematical competitions. It seems that something significantly new can be found out about the affective drives of teachers to

do something extra-curricular (within mathematics) in the context of competitions. It is of great interest to the community if similar research initiatives were taken and reported on in other regions of the world. Both Wedege and Skott and their team are to be commended for their initiative to conduct this large research study and their well structured and balanced presentation of the findings. We hope that both Scandinavians and others will take an interest in this book.

## References

- Steinhorsdottir, O. & Sriraman, B. (2007). Iceland and rural/urban girls – PISA 2003 examined from an emancipatory viewpoint. In B. Sriraman (Ed). *International perspectives on social justice in mathematics education. The Montana Mathematics Enthusiast, Monograph 1* (pp. 169–178). University of Montana Press.

