CHALLENGES IN TEACHING PRAXIS WHEN CAS IS USED IN UPPER SECONDARY MATHEMATICS

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Short description of the Discussion Group: aims and underlying ideas

Being unequivocally mathematical and having transformative impact on mathematics itself characterize CAS. This prompts a new dialectic relationship between tool and discipline to be instigated. We address this from the angle of teaching, i.e. CAS focus on mathematic didactics within the frame that CAS is an augmentation of mathematics, and from the angle of professionalization, i.e. teachers operating within the transformed conditions. CAS has been an important means to meet the systemic call for targeting the teaching of mathematics at giving a large number of students authentic skills, while still being an instrument for sorting students to different higher educational levels. Which challenges do teachers face within the educational system? Teachers are often caught in a choice between sound use of CAS in mathematical thinking and merely letting CAS serve as a tool to surpass cumbersome problem solving. How can we support teachers to be robust operators? What standards should a communal language of a didactical discourse possess, and what experience is there to support teachers in obtaining these skills and aid them in developing their own teaching in order to meet these demands?

Planned structure:

Tuesday, 16.30–18.00:	Theme: *Impact by use of CAS on **teaching** in Upper Secondary Math; challenges and opportunities for design.*	Material / Working format / presenter
16.30–16.35	Introduction to DG	Presentation/CMU – University of Copenhagen
16.35 – 16.45	*What is or what might be the benefit of CAS concerning a better understanding of some topics in mathematics.*	Presentation/Hans-Georg Weigand – Universität Würzburg
16.45 – 17.00(±)	Discussion based on presentation by Hans-Georg Weigand	All
17.00(±) – 17.10	*How do CAS tools change the nature of mathematics?*	Presentation/Chris Sangwin – University of Edinburgh

. 17.10 – 17.25(±)	Discussion based on presentation by Chris Sangwin	All
17.25(±) – 17.35(±)	*Mathematical understanding for teaching secondary mathematics with CAS*	Presentation/Kathleen Heid – Penn State University
17.35(±) – 17.55(+)	Discussion based on presentation by Kathleen Heid	All
17.55(+) – 18.00	Recapitulation of Day 1	CMU

Friday, 16.30-18.00:	Theme: *Impact by use of CAS on **teachers** in Upper Secondary Math; in-service training, didactical discourse, **…**.*	Material / Working format / presenter
16.30 – 16.35	Summary of discussion and resulting themes from Day 1	Summary e-mailed to participants/Presentation/CMU
16.35 – 16.45	*In-service training: Experiences with coaching and community building.*	Presentation/CMU
16.45 – 17.00(±)	Discussion based on CMU-presentation	All
17:00(±) – 17:10	*Growing a critical mass of teachers and schools to integrate technology into their teaching practices*	Presentation/Zsolt Lavicza – Johannes Kepler University, University of Cambridge, Budapest Metropolitan University
17:10 – 17.25(±)	Discussion based on presentation by Zsolt Lavicza	All
17.25(±) – 17.35(±)	*Chaining tools: embedding CAS in a learning and assessment environment for mathematics*	Presentation/Paul Drijvers – Utrecht University, Cito
17.35(±) – 17.55(–)	Discussion based on presentation by Paul Drijvers	All
17.55(–) – 18.00	Conclusion of DG	CMU, all

References

Heid, K. M., Wilson, P. S., & Blume G. S. (Eds.) (2015). *Mathematical Understanding for Secondary Teaching: A Framework and Classroom-Based Situations*, Information Age Publishing, Charlotte NC.

Stoutemyer, D. R. (1991). Crimes and misdemeanors in the computer algebra trade. Notices of the American Mathematical Society, 38(7), 778-785.

Weigand, H.-G. (2014). Looking back and ahead - Didactical implications for the use of digital technologies in the next decade. *Teaching Mathematics and its Application* 33, 3-15.