TEMPLATE WORKSHOP

THE FELIX KLEIN PROJECT – VIGNETTES IN PRACTICE

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Short description of the Workshop Groups: organizers, aims and underlying ideas

The organizers: The organizers build since 10 years the "Design Team" of the Klein Project (see https://www.mathunion.org/icmi/activities/klein-project - this homepage will be updated at the moment!). The members of this team are quite well-known in mathematics education. Hans-Georg Weigand and Bill McCallum are the editors of the book "The Legacy of Felix Klein" (2019). Hans-Georg Weigand is the organizer of the CERME Topic conference about digital technologies, Bill McCallum is the lead writer of the "Common Core Standards" in the USA. Michelle Artigue got the Felix Klein Medal of the ICMI in 2013 and she has been vice-president of the ICMI. Ferdinando Arzarello has been president of ICMI (2013-2016). Yuriko Baldin is a member-at-large of the ICMI Executive Committee. Samuel Bengmark is a member of the Education Committee at The Royal Swedish Academy of Science. All the members have done enormous contributions to further development of mathematics education.

The project: The Klein Project aims to present contemporary mathematics for secondary school teachers. The idea of the project is to transfer the ideas of the legendary books of Felix Klein: "Elementary Mathematics from a Higher Standpoint", written in the beginning of the 20th century, into the present. A collection of *Klein Vignettes* is found on the website (http://blog.kleinproject.org) in different languages: English, French, German, Spanish, Italian, Portuguese, Chinese, Khmer and Arabian. A *Klein Vignette* is a short article about a single mathematical topic. Vignettes are intended to give teachers a sense of connectedness between the mathematics of the teachers' world and contemporary research and applications in the mathematical sciences. Modern mathematics could be shown in different ways. E.g. if digital technologies give new possibilities in presenting some kind of "old" mathematics – geometry, algebra, calculus – then this could be the basis of a Klein Vignette.

Aims and ideas: Klein Vignettes are for teachers, but we also want to motivate them to bring ideas presented in the vignettes to the classroom. In some years of experience, we noticed that
   a) the ideas of the vignettes have to be supported by activities in the frame of professional development, and
   b) teachers had difficulties with the transfer of the Klein-ideas into the classroom, they had difficulties in creating adequate classroom materials.

This workshop pursues three aims:
   a) We want to give best practice examples how the idea of the vignettes could be integrated into the professional development of secondary school teachers;
   b) We want to motivate mathematicians to contribute to the Klein project with a new vignette;
   c) We want to motivate especially mathematics educators to think about *Bridging-Vignettes* which bridge the gap between the mathematics explained in a classical vignette and its use in the classroom.

Planned structure of the workshop.

Planned timeline	Planned activity	Working format /Responsible person
10 minutes	Introduction to the ideas of the Klein Project	Presentation/ *Hans-Georg Weigand*
20 minutes	Creating vignettes and exploiting them with teachers and students: the case of a vignette on entrelacs	Presentation of the vignette on Entrelacs, its story and associated resources. Practical work of design of entrelacs from some selected graphs. *Michèle Artigue, Christian Mercat* (France)
20 minutes	Working with Klein Vignettes as teaching strategies in actual classrooms – issues and possibilities. Material for professional development and designing innovating didactical sequences.	Slide presentation / Report and interactive group discussion on given examples/ *Yuriko Yamamoto Baldin* (Brazil)
20 minutes	From a Klein Vignette to a concrete material for the classroom: the secret message game. Contribution from a work done with Italian teachers.	Slides presentation/ using a software (PARI-GP) for illustrating the game/ short discussion with the ground *Ferdinando Arzarello* (Italy)
20 minutes	Klein vignettes and problem-based instruction.	We will give an example of how a Klein vignette can be adapted into materials for a workshop for teachers on problem-based instruction. *Bill McCallum* (USA)

References

Klein, F. (2016). *Elementary Mathematics from a Higher Standpoint*. Volume I, II, III. Heidelberg: Springer.

Weigand, H.-G., McCallum, B., Menghini, M., Neubrand, M., Schubring, G. (2019) (Hrsg.). *The Legacy of Felix Klein*. Cham, Switzerland: Springer