

Summary of the discussion on “Topics for future seminars” at The 18th SEFI Mathematics Working Group Seminar, 27-29 June 2016, Gothenburg, Sweden

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The second group discussion held during the Gothenburg seminar was focused on the mission and future work of SEFI Working Group on Mathematics and Engineering Education. This discussion was held the last day of the conference, and its main aim was to receive fresh feedback from seminar participants and ideas on challenging topics that participant would prefer to deal with during the future seminar in two years.

The following questions were posed as guide for the non-formal discussions in groups.

1. What do you think about the mission of the SEFI Working Group on Mathematics and Engineering Education?

Participants saw the mission of SEFI mathematics working group as very important and useful in many aspects. Answers to this question could be grouped to the following main areas:

- Networking
- Forum to exchange new ideas about future orientation of maths teaching-learning strategies and foreseen challenges
- Sharing experience in solving common problems
- Provide materials and documents giving a basis for a broad discussions on all aspects of mathematics education to engineers
- Bringing the issue of the current general crises in mathematics education to the floor of SEFI (to be discussed at the annual events)
- Presentation of new projects and dissemination platform to inform about achieved results, place to find partners for new projects and form new project teams or discuss with colleagues possible new proposals
- Develop better public relations and contacts between mathematicians and engineers and inform about best practice examples of collaborative ideas
- To follow demands from global industry in education

2. How were your expectations met and what did you gain from this seminar?

Some participants reported our seminar as “The best Maths teaching event ever!” due to its open not pretending atmosphere, honesty about existing overall problems, and enthusiastic community eagerly bringing these forward in long-lasting encouraging discussions about individual efforts how to deal with them.

Many participants claimed that they were able to gain deeper insight to the concept of mathematical competencies, thanks to the great plenary lecture given by Professor Mogens Niss from Roskilde University and following discussions.

Anyhow, there were few comments that more focus could be put to this topic and SEFI curriculum framework document in particular, as some participants were not familiar with this approach at all. Some comments pointed to the missing voice of engineers and engineering students, as we should look at the problems also from their point of view. More people found the programme too busy and tight. To summarize the major gains of individual participants from the seminar we can stress the following items:

- Conversations with minded people who were honest about their work and “success / failures”
- Seeing you are not alone
- Informal discussions like on excursion
- Less theoretical more practical experiences presented
- Networking
- Better understanding of the concept of competence
- Meeting people seriously interested in improvements of Maths education
- Getting new ideas how to improve own teaching methods
- Information about current projects on Maths education

3. What are the most challenging problems of mathematics in engineering education?

In all four discussion groups the proper use of information and communication technologies in the everyday school practise appeared to be the most sound and urgent problem in teaching mathematics to engineering students. The proper balance of traditional learning scenarios and usage of computers and other digital media seems to be a crucial question bothering all teachers of mathematics in engineering study programmes. Issues mentioned in discussions as challenges for the future are:

- How to balance between ICT and “Maths digestion”?
- Do we use ICT in the best or proper way?
- Should we promote reasoning and proofs in engineering mathematics to help students to make their maths learning a coherent body of work rather than a large amount of remembered material?
- Quality versus quantity in current education – can we deliver both? How?
- How to deal with growing heterogeneity of university freshmen?
- How to teach mathematical competencies in an effective way?
- How to motivate students to learn mathematics when they do not want to be taught and do not find any use of mathematical tools?
- Collect good ideas how to motivate engineering students to learn Maths

- Share good practise in a document on SEFI MWG web with instant updates, which can be used to fend off management attempts to proscribe particular teaching methods and facts
- Create a comprehensive document which will outline our shared problems and could be used as a forceful argument to present as a serious warning to management and authorities
- Form a bridging course in maths for refugees to be shared on SEFI MWG webpage in order to deal with refugees crises and their socialization to our community

4. Which topics would you like to be treated at the next seminars?"

Many suggestions were born in the fruitful brainstorming discussions. Some participants would like to attend tutorials during the seminar, some ask for panel discussions, while others prefer more space for discussions in small groups to an overfull programme. Few newcomers see the event as a closed shop due to its rather restrictive title, which, of course, cannot be changed that easily. One suggestion was to pose a set of questions or assertions made about students which might be answered during the next seminar. Here you can find the list of suggested topics of interest posed as questions, answers to which we might find on our future seminars:

- How do we motivate students?
- What is the role of software / programming in engineering mathematics?
- How to handle the lower educated persons (e.g. students from developing countries or refugees) entering university?
- How can we assess understanding and not only proceeding?
- How can we conduct exams done electronically?
- Are traditional exams necessary? What other forms of knowledge assessment can be adopted?
- How to teach large groups of students effectively in a time pressure?
- What is the opinion of our engineering colleagues on continuously decreasing mathematical knowledge of university students?
- How can we support mathematics and stop the reduction of mathematical contents in the curricula of applied sciences study programmes?
- How to integrate competences into syllabus of basic maths courses – rewrite syllabus in terms of competences and share in our community?

Other points of interest were formulated as general suggestions to get in touch with reputable centres of education in Europe that are studying the effect of the undesirable situation in teaching/learning mathematics and ask for their attitude and advice how to deal with this unpleasant development.