



DEAR LADIES AND GENTLEMEN,

we are pleased to present the third edition of our ICSE Newsletter to you! It is great to see that you are still on board and following our work. We are excited to use this opportunity to tell you about our recent summer activities, to update you on our projects and to present you with new opportunities to get involved with ICSE. We hope you enjoy the read!

Best regards,

Katja Maaß and the ICSE team

CONTENT

1. Announcements:
 - a. Summer School 2019 in Vilnius, Lithuania
 - b. Educating the Educators III, October 2019 in Freiburg, Germany
2. IncluSMe: Intercultural Learning in Science Education
3. MaSDiv: What does 'Chocolate Consumption' have to do with Maths?
4. STEM PD Net: It is time for STEM PD centres to step up and be active in the processes of change
5. ICSE: The importance of STEM Education's connection to the World of Work



INCLUSME SUMMER SCHOOL 2019

Summer School on Intercultural Learning in Mathematics: Discover different approaches to math education from all over Europe

The missing link: Why teachers should combine math education with Intercultural learning

Intercultural learning combines the acquisition of knowledge (on other cultures, cultural differences, and differing perspectives) with the development of personal competences that affect attitudes, values and opinions. While being an integral part of initial teacher education (ITE) in the humanities, intercultural learning is not included in most maths and science curricula of ITE in Europe. Yet, prospective maths and science teachers need to learn how to cope with language barriers, culturally different conditions and highly varying proficiencies of (immigrant) pupils. Prospective science teachers need to be aware of the cultural realities of many science tasks as well as of culturally different algorithms. They should be able to perceive culturally different perspectives and develop intercultural sensitivity.

For prospective math teachers: Join a unique Intercultural experience preparing you for the future classroom!

For intercultural learning, **first-hand experiences** are indispensable and in particularly relevant for the future classroom. Therefore, **IncluSMe** offers a summer school in Vilnius, Lithuania, June 23 - July 3 2019, with the focus on intercultural learning in math. Participating students will be prepared for their stay abroad with the help of a module on raising students' intercultural awareness. The module will also equip students with **methods for reflecting own Intercultural experiences** they will make during the summer school and connect them to their learning processes linked to natural sciences. During their stay, students will have numerous opportunities for intercultural exchange, both within the international student group and outside when meeting local students, teacher and pupils. This will enable them to gain rich intercultural experience connected to their own future profession.

First insights into the programme

During the summer school, **lectures and workshops** with a particular emphasis on those topics will be given:

- Intercultural experience and culture related study events
- Introduction to culture and diversity for prospective mathematics and science teachers
- Different cultures – different approaches to reasoning and algorithms in mathematics
- Dealing with deficiencies and excellency in the mathematics proficiency of immigrant pupils
- Relevance of language in mathematics education
- Intercultural mathematics learning outside of school

In addition, IncluSMe will offer a cultural learning programme: for example, visits of museums or expositions. Also, excursions to schools and other relevant institutions will be organised to give prospective teachers an insight into the life in school and society in another country. Further activities are planned, the detailed program is currently being set up and we will be published on the IncluSMe website by the end of 2018.

Key information:

Date: June 23 - July 3 2019

Venue: Vilnius University, Lithuania

Main target group: Math (and informatic) students in teacher education programmes – also interested university teachers welcome!

Application deadline: tba

Award: 3 ETCS credits, certificate of participation

Language: English

Costs for students of IncluSMe partner universities: Participants can apply for funds for travel, accommodation and subsistence up to 910, - EUR

Fee for students of other universities: Travel, accommodation and subsistence costs on own expenses

Organizer: IncluSMe Project – Vilnius University

Contact for information: Valentina Dagienė at valentina.dagiene@mli.vu.lt

[READ MORE ABOUT INCLUSME](#)

MaSDiV Final Conference

EDUCATING THE EDUCATORS III

3rd international conference on approaches to scaling-up professional development in maths and science education

7–8 October 2019
in Freiburg, Germany



ICSE
ICSE Consortium
MaSDiV

EDUCATING THE EDUCATORS III

International Conference on Approaches to Scaling-up Professional Development in Maths and Science Education

The conference will take place from **7 to 8 October 2019** at the University of Education Freiburg, Freiburg, Germany.

We are pleased to announce the third conference of our conference series “Educating the educators”. After the successful first two conferences in 2014 in Essen, Germany and 2016 in Freiburg, Germany, the third conference will continue to offer participants from all over the world a platform to explore, discuss and exchange approaches to scaling up professional development (PD) in math and science education. The conference will bring together representatives of research, practice and policy with the intention of disseminating knowledge, building networks and exchanging ideas and experiences in relation to the topic. We will address three dimensions:

- **Personal dimension:** Which roles, contents and activities have to be considered in professional development courses for PD course leaders and facilitators in professional learning?
- **Material dimension:** Which role can materials play in professional development for maths and science teachers (classroom materials, face-to-face PD materials and e-learning PD materials)?
- **Structural dimension:** How can adequate designs of projects or initiatives for scaling up PD look like and how can they be evaluated?

ETE III will feature a number of innovative as well as traditional formats such as discussion groups, paper presentations, workshops, a material market, poster sessions and a policy seminar. Three prominent keynote speakers from mathematics and science education will provide high-quality contributions on different approaches on the topic:

- **Kara Jackson** (University of Washington, USA),
- **Susanne Prediger** (University of Dortmund, Germany) and
- **Jim Ryder** (University of Leeds, UK).

The International Centre for STEM Education (ICSE, icse.eu) of the University of Education Freiburg, the International Consortium for STEM education and the project MaSDiV (masdiv-project.eu) will host the conference. The conference is also supported by the DZLM (German Centre for Mathematics Teacher Education, initiated and funded by Deutsche Telekom Foundation). Conference chairs are Prof. Dr. Katja Maass, (ICSE, University of Education Freiburg, Germany), Associate Professor Dr. Michiel Doorman (ICSE Consortium & Utrecht University, Netherlands) and Elena Schäfer (ICSE, University of Education Freiburg, Germany).

We would like to invite **researchers, policy makers** and **practitioners** to take part in the conference.

We welcome contributions and invite you to submit proposals for research, practice or policy-oriented paper-presentations.

The deadline for submission of proposals (paper presentations, interactive sessions, posters) will be in **March 2019**. Please regularly check our website for the newest updates (like the soon to be released Call for Proposals) and further information.

[READ MORE ABOUT ETE III](#)

INTERCULTURAL LEARNING IN SCIENCE EDUCATION

The first IncluSMe Summer school for students of natural sciences in initial teacher education (ITE) programmes took place 20 - 29 June 2018 in Prague, Czech Republic

Written by Dr. Martin Bílek and Dr. Marta Romero Ariza

One of science education’s most current and relevant challenges is a proper engagement with intercultural aspects in teaching and learning practices. Intercultural learning is an omnipresent theme that penetrates all spheres of maths and natural science education. In light of this, we from the IncluSMe project team asked ourselves the following questions: How can maths and science educational content be connected with intercultural aspects? How can different social, cultural, religious, historical and ethical contexts be included in maths and science classrooms? Finally, is this really even a challenge that is relevant to maths and science education or should it be left to social science classes only?

Our experiences with intercultural classroom settings have revealed that maths and science education urgently has to be inclusive of intercultural aspects. While maths and science principles, phenomena or laws are universal and thus global by nature, their instruction and explanation becomes much more efficient, when connected to social, cultural, religious, historical, ethical and other locally variant contexts. Thus, prospective science teachers need to be aware of the cultural realities of many science tasks as well as of culturally different algorithms. They should be able to perceive culturally different perspectives and develop intercultural sensitivity. For intercultural learning, first-hand experiences are indispensable and particularly relevant for the future classroom.

Having taken these reflections into account in the project design of IncluSMe, we set out to prepare a first common activity: an International Summer School with selected, science oriented modules, targeting students of natural sciences (extendable to technology or other branches) from initial teacher education programmes at higher education institutions from all over Europe. We selected Prague as the location of the first summer school, since it is a beautiful and multicultural city in heart of Europe that offers great opportunities to learn from intercultural relations.



26 students from the following seven European countries joined us in the unique learning opportunity: Czech Republic (5), Slovakia (5), Spain (5), Norway (3), Sweden (3), Cyprus (3) and Malta (2). Their accommodation and the study programme was realised at the Faculty of Education of Charles University. The educational and cultural programmes were organised by our project partners from the University of Hradec Králové (UHK) and included lectures and workshops. Additional activities, such as visits to Czech schools and non-governmental institutions that are working in and with intercultural settings and themes, were to enhance students' understanding of the local context of Prague with its rich historical and intercultural heritage. The programme offered students the opportunity to perceive and analyse different aspects of science education in its interrelations with cultural, national, religious and other dimensions of society as well as current ecological problems.

The international batch of students had numerous opportunities for intercultural exchange, both within the lectures and workshops as well as outside, when meeting local students, teacher and pupils. The shared working and living spaces created a great setting to practice intercultural communication. Thereby, the students gained rich intercultural experiences connected to their own future professional life as science teachers, which hopefully enabled them to understand, appreciate and accommodate cultural and social diversity in their classrooms.

Our evaluation showed that students were pleased with the content, learning environment and work atmosphere of the summer school. Some seemed overwhelmed by the density of lessons and the extensive scope of activities in the compulsory modules. We will surely take the results of the evaluation into account, as the planning of the upcoming IncluSMe Summer School 2019 in Vilnius, Lithuania (see announcement above), has already started.

Here is what participating students had to say about their experience in Prague:

"...it is a new point of view. For me, mathematics and science are not connected with culture. It is rather a domain of history and geography. But now I think I was wrong. That's why I think everything was GREAT!"

"...I like most getting in contact with pre-service teachers from other countries..."

"...now I am more aware about all the multicultural issues that can happen in a classroom and how to deal with them..."

"...we needed more connections to how this all can be used to teach math and science..."

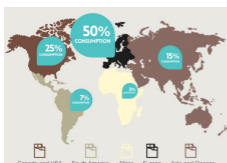
[READ MORE ABOUT INCLUSME SUMMER SCHOOLS](#)

WHAT DOES 'CHOCOLATE CONSUMPTION' HAVE TO DO WITH MATHEMATICS?

In the MaSDiV project you can find a collection of teacher materials that supports teaching in the area of **fundamental values** and **socio-scientific issues**. These are science-related issues linked to moral questions concerning the real-world, which includes well-known topics like climate change or genetic engineering.

In our activity 'Chocolate consumption' students perform research on the consumption and production of chocolate. They are required to perform data measures and estimation/calculations connected to the topic. They also investigate how a production process works and address the issue of child labor.

Discussing these included socioscientific issues prompts students to use different types of discourses, knowledge (school subjects), values and emotions. Furthermore, this specific task prompts students to evaluate how to contribute to a better and fairer world and to think about **their own sphere of influence**.



Chocolate Consumption around the World: Last year we ate **7.3 million** tons of chocolate across the world. The consumption is not equally divided over the world.

Source: pointedpixel.com/worldchocolateday

Here is an overview of the activity:

Time	One or two lessons (circa 50 minutes)
IBL	As a teacher you will need to decide how to organize the collaborative work, and how to share/communicate the various strategies and whether to offer more structure, guidance and help.
Achievement	Students in search of more challenges may want to investigate the production process even further. More math challenges can be added.
Context	The context is relevant to the day-to-day lives of the students, who doesn't eat chocolate? The idea of children of your own age being responsible for your chocolate bar is possibly a shocking context
Culture	Encourage students to find their own solution strategies. Appreciate and acknowledge diverse solutions and take that opportunity to discuss characteristics of the solutions to afford whole class progress.
Fundamental Values	Decision making (head or heart) on moral difficult topics (child labor/ fair trade), valuing each other's reasoning in group discussion. When are products "Fair" or "good"?
SSI/RRRI	Child labor/ slavery vs Fairtrade products.

Sources:

- statista.com/topics/1638/chocololate-industry/
- brandongaille.com/26-incredible-chocolate-consumption-statistics/
- ICSE/MaSDiV source: fi.uu.nl/toepassingen/28648

STEM PD NET: IT IS TIME FOR STEM PD CENTRES TO STEP UP AND BE ACTIVE IN THE PROCESS OF CHANGE

April 25-27th STEM PD Net project partners had a meeting in Vilnius, Lithuania. The objective: to review project progress, to share experiences in project activities' implementation as well as to present and discuss intellectual output. During the meeting, policy briefings developed by Linköping University, Sweden, received a lot of attention. The author, Dr. Claes Klasander, presented two already developed policy briefings as well as the planned content for the third briefing. We interviewed Dr. Claes Klasander (Centre for School Technology Education, CETIS, at Linköping University) and STEM PD Net project manager Elena Schaefer (project coordinating institution: International Centre for STEM Education, ICSE, at the University of Education in Freiburg, Germany) about the aims, topics, and main insights of these policy briefings.



Dr. Claes Klasander, Linköping University, Sweden

Why have you decided to develop policy briefings in this project?

Elena: The European STEM PD NET acknowledges the importance of a successful collaboration between policy makers and professional development institutions. The communication and cooperation between these actors is key to improving STEM education, to overcoming current challenges in providing high quality professional development and to supporting teachers in delivering high quality STEM education to all students. STEM PD Net establishes and strengthens cooperation with policy makers by providing a newly developed set of policy briefings to them.

Claes: STEM PD is very important. I think we need to find ways to address policy makers and to show the benefits of supporting good STEM professional development. Most teacher educators are not used to negotiate with policy makers. Our project can help with this.

But policy makers receive briefings, summaries, infographics and other documents from various organizations. What is peculiar about these briefings?

Claes: I would not say that anything is peculiar. Every organization wants to have policy makers' attention for their cause. In line with that, also STEM PD centres need to present information and good arguments to policy makers that are innovative in ways of both enhancing existing STEM PD and taking initiatives for developing new PD. Cooperation is a key word, if we want to define the uniqueness of our policy briefings.

Elena: Another key is the topic itself. Teacher Professional Development in STEM education is a rarely tackled field in many countries. The policy briefings are related to the overall aim of giving PD centres a voice, by enhancing STEM PD Net communication with the policy levels on regional, national as well as European policy levels. This requires that all policy briefings are available in an international English version as well as in the partners' languages, adapted to the national circumstances in the respective countries.

Elena Schaefer - ICSE, University of Education, Freiburg, Germany



You introduced three policy briefings in total – each focuses on a specific topic or problem. Can you please elaborate a bit: what topics are covered, what problems addressed? Why did you decide to choose these particular topics/problems? There are so many angles to look at STEM PD...

Claes: The first policy making briefing focuses on presenting STEM PD and especially the STEM PD Net project to policy makers. Raising awareness for STEM PD is the first important step. Therefore, each country adapted and translated this first briefing to their own contexts and language. In this briefing, we elaborate a little about the three arenas that together form this landscape – the Formulation Arena, The Transformation Arena and the Realisation Arena – each one with their own groups of Policy Makers, Stakeholders and actors. The idea is that our participating countries can also learn from each other. The second briefing is more complicated. It is about different models for how to set up STEM PD Centres. Here we used the same three arenas with the ambitions to inform Policy Makers on alternative ways of affiliating a STEM PD Centre to e.g. a Ministry of Education, a university or a regional body. From this stance we also discuss how a STEM PD Centre can have different levels of autonomy. Here the focus is "change". If policy makers want to achieve stronger HQ STEM PD, then this briefing wants to support them with some dimensions on how to analyse a present situation in relation to a desired situation. This briefing will inspire with examples from other PD centres and organizations across Europe. The third policy briefing will deal with the implementation of PD in the STEM area and how quality in PD initiatives can be assured and measured.

STEM PD Centres and their activities appear to be the centrepiece of these briefings. How could centres use insights from the briefings effectively?

Claes: The briefings are thought to be important support to STEM PD Centres communication with different Policy Makers on the three arenas. We have already learned a lot from each other. Now we need to step up and be active in the processes of change, together with actors on the three arenas. Hopefully, some of these actors will come up with initiatives and contact the STEM PD Net partners to start collaborations concerning STEM PD.

Elena: In my opinion, policy briefings could benefit new STEM PD centres (that are currently developed or will be set up in the future in countries, where they do not yet exist). They could use them to start cooperating with policy makers.

What do you consider the most important insights from the two briefings you have already published?

Claes: On a personal level, it is a better understanding of how diverse the PD and educational landscapes are across Europe. On a STEM PD Net Project-level, it is the importance of formulating a STEM philosophy and a vision for future changes towards higher quality STEM PD. This is necessary in order to address Policy Makers with strong arguments for improved cooperation aiming at strengthening STEM PD.

Is there something else you would like readers of this interview to pay attention to?

Claes: I think it would be interesting, if readers of this started discussions on "What does STEM and STEM PD mean to us?" and "What makes STEM education and STEM PD unique?" In the STEM PD Net project, I represent the Swedish National PD Centre for School Technology Education. The school subject Technology concerns knowledge about the human relation to "The Made World" and puts it in a school setting. There are many opportunities to support pupils' and students' knowledge growth towards a holistic worldview, if you engage them in activities, where the STEM subjects together can contribute to a better understanding of how artefacts or technological systems are constructed, how they have changed over time and what consequences that has for the individual human, the societies and the natural environment. As until now, I think the technological aspects of STEM are underestimated.

The interview was conducted by Rūta Mazgelytė, Lithuanian partner from the Education Development Centre

POLICY BRIEFINGS:

You can access the briefings online through the following links:

[First briefing - Introducing STEM PD Net to Policy Makers](#)

[Second briefing - STEM PD Centre models](#)

The project European Network of STEM Professional Development Centres (STEM PD Net) has received co-funding by the Erasmus+ programme of the European Union.

Co-funded by the
Erasmus+ Programme
of the European Union



[READ MORE ABOUT STEM PD NET](#)

WHY ARE CONNECTIONS TO THE WORLD OF WORK IMPORTANT AND RELEVANT IN STEM EDUCATION?

An opinion piece by Dr. Katja Maaß

STEM (Science, technology, engineering and mathematics) education can include connections to the world of work, by discussing fascinating questions like the following in class: How can we make the transshipment of containers from ships as efficient as possible? How can we design a pipe clamp? How can we determine the water quality so that swimming without risk is possible? Critics might rightfully ask however, why these topics should be discussed in classes, when the time table for STEM-education is overcrowded anyway and students need to be prepared for final exams. Should not simply specific vocational trainings be left to deal with these topics? Why should we bother with connections to the world of work? How are they supposedly relevant for STEM education?

There are several reasons why I think STEM education needs to include connections to the world.

First of all, there is a dramatic shortage of skilled employees in the STEM sector, which we are regularly reminded of by the media. There are few young people who aspire to STEM careers. Even if there is an existing interest in STEM subjects, many students and their families are simply unaware of professions connected to science. Some are convinced that the only possibility of working in science is to become a scientist, a science teacher or a doctor. Therefore, most consider science irrelevant to their own professional future (Archer et al., 2013).

Second, in relation to mathematics in particular but not exclusively, we are faced with the so-called relevance paradox (Niss, 1992). The role of mathematics merges with the role of technology, as mathematics is at the core of computers' modus operandi. Simultaneously, mathematics remain hidden in all sorts of tools that function as black boxes for users. Thus, despite the central role of mathematics in our society, most people never witness its working and consequentially think that only a few people are doing mathematics.

Third, in Europe 17% of 15-year-olds underachieve in science and 22% in maths - and alarmingly, students of low socio-economic status (SES) and migrant backgrounds are particularly at risk (ET 2020).



Consequently, action is required to overcome these challenges. We need to make STEM subjects more interesting to students, support them in becoming more proficient in STEM, give them insight into the vital role of STEM in our modern societies and into STEM related careers. There are of course several possibilities to reach these different aims: Including inquiry-based learning, starting from interesting problems and including connections to real life and the world of work into STEM education. The latter demand can give rise to discussions regarding the aims of STEM education: Is the objective really to only provide a background for students entering the place of work? Or should STEM be taught for its general educational value? From my point of view this perspective falls short. The requirement of showing students the relevance of STEM subjects for our society and careers should not be misunderstood as to only focusing on preparing students for the place of work. It means balancing subject matter learning with learning about its relevance. Even the educational reformer, John Dewey (1916) already argued for a study of subject matter through an intertwining of academic and vocational education. It is amazing to see how 100 years ago Dewey pointed in a direction, which seems so contemporary nowadays.

So, for example, why not have students learn about geometry, let them inquire and get insight into the use of mathematics while designing a parking garage? In fact, the design of a building is a complex task involving many variables. Architects have to think about the structure, installations (electricity, water, heating...), the distribution of the space (staircase, corridors, rooms, entrance hall...), orientation of the building, etc. Often, decisions taken in prior steps affect what is possible to be done in the next ones. The structure of the building and the distribution of the pillars have already been decided and cannot be changed. When students design the lay-out of the car park, the parking spaces and the entrance ramp, they learn about perimeters, areas, rectangles, lengths and so forth and understand how they interact and how they are used in reality. There are many opportunities of including such examples in STEM education. You will find more tasks in relation to the world of work and materials for a professional development course intended to prepare teachers for including connections to the world of work on www.mascil-project.eu.

References

Archer, L., Osborne, J., DeWitt, J., Dillon, J., Wong, B. & Willis, B. (2013). *Aspires - Young people's science and career aspirations, age 10 – 14*. King's college, Department of education and professional studies.

Nicol, C. (2002). Where's the Math? Prospective teachers visit the workplace. *Educational Studies in Mathematics*, 50(3), 289-309.

Niss, Mogens (1992): *Applications and modelling in school mathematics – Directions for future development*. – Roskilde: IMFUFA Roskilde Universitetscenter.

ET 2020 (2015). *2015 Joint Report of the Council and the Commission on the implementation of the strategic framework for European cooperation in education and training (ET 2020) New priorities for European cooperation in education and training*.

*Prof. Dr. Katja Maaß is the **ICSE Director** and Professor at the University of Education in Freiburg, Germany. She has published various works on IBL (inquiry based learning) and other topics related to innovative STEM education.*



[READ MORE](#)

IMPRINT / CONTACT

INTERNATIONAL CENTRE FOR STEM EDUCATION (ICSE)

University of Education Freiburg
Kunzenweg 21
79117 Freiburg
Phone (secretary's office): (0049761) 682-349
E-Mail: icse@ph-freiburg.de
WebSITE: <https://www.icse.eu>

Competent licensing and supervisory authority:

Ministry of Science, Research and the Arts Baden-Württemberg (MWK)
Königstraße 46
D-70173 Stuttgart
Web: mwk.baden-wuerttemberg.de

Sales tax ID and tax number:

Value added tax ID: DE811374611
Tax number: 06471/44697