

**OUTCOMES: MASCIL AND DZLM CONFERENCE ON ‘EDUCATING THE EDUCATORS – INTERNATIONAL APPROACHES TO SCALING-UP PROFESSIONAL DEVELOPMENT IN MATHS AND SCIENCE EDUCATION’**

**TEACHER PROFESSIONAL DEVELOPMENT: EUROPE-WIDE PERSPECTIVE ON CURRENT NEEDS AND TRENDS**

Conference hosts were strongly committed to connecting researchers and practitioners engaged in the field of maths and science education in order to discuss concepts of scaling-up teacher professional development. Teachers are the key factor in ensuring the achievement of creative and sustainable learning outcomes in mathematics and science education, in fostering young peoples’ competences and enabling them to become critically thinking, responsible and active citizens. Therefore, teacher professional development is of great relevance and always an essential key to effecting change in education, regardless of the national educational system. Teacher professional development and research in this area is a growing field throughout Europe. The difficulty consists in the fact that there is little knowledge about how to scale-up professional development successfully – and sustainably.

The conference was thus organised to give an opportunity for leveraging international exchange about concepts and experiences concerning such questions as: What are the features of successful concepts of professional development for teachers? What are the needs and experiences of the different target groups? Which pitfalls have to be avoided? Key to scaling-up concepts is the education, professional development and support of multipliers – and this factor was core to the conference.

Specifically, four tracks were offered that highlighted major aspects that need to be addressed when ‘educating the educators’: (1) Approaches to scale-up with multipliers in face-to-face professional development courses from a research, as well as from a practice-oriented, perspective; (2) Challenges to, and opportunities for encouraging professional development through professional learning communities. In such communities, one teacher acts as the facilitator, but even so, learning in a professional development group is considered to require much more self-organisation than PD courses that are prepared and given by a multiplier; (3) Opportunities and limitations of teacher professional development with the help of blended learning concepts and e-learning support and (4) Scaling-up through appropriately designed materials that support teachers’ professional development and ways to disseminate materials.

**BRINGING TOGETHER A UNIQUE CIRCLE OF PARTICIPANTS: RESEARCHERS, PRACTITIONERS AND POLICY MAKERS**

Addressing the conference issue by means of these four tracks allowed a broad perspective on relevant approaches of educating the educators for research, as well as for practice. A dynamic and increasing field of research on professional development of teachers and teacher educators is arising. Scaling-up teacher professional development in maths and science and, thus achieving improvement of education, is receiving increased public attention, policy support and we also see a beginning institutionalisation across Europe.



The tracks allowed discussions and insights into the concepts, approaches and programmes currently being developed and applied across Europe. Having over 170 participants with varying professional backgrounds and coming from more than 20 nations added to diverse perspectives given in discussions and contributions. Among the presenters and conference participants were multipliers, teacher educators and multipliers, researchers, policy makers, relevant networks and representatives of national ministries. A high-level policy maker introduced core topical issues in the conference welcome address: Sylvia Löhrmann is the Minister of Schools and Further

Education of North Rhine-Westphalia, Germany and in 2014 served as president of the Standing Conference of the Ministers of Education and Cultural Affairs of the States (KMK). Her attendance emphasised the importance and timeliness of our chosen topic. Highly regarded keynote and track plenary speakers presented state-of-the-art research and practice with regard to scaling-up teacher professional development. Konrad Krainer from the

Alpen-Adria-University Klagenfurt, for example, discussed in his keynote chances and challenges of scaling-up professional development. Justin Dillon from the University of Bristol made a contribution focusing on the role of informal science institutions in teacher education. Student participation in out-of-school activities offered by such institutions is one key factor in increasing student interest in the sciences and educating teachers how to design and include high-quality informal learning activities is therefore an important field of action. A third keynote by Peter Birch from Eurydice at the European Commission presented policies and practices for continuous professional development in European countries and gave first hand insights into current findings of an international study on professional training for teachers.

### *Innovation: Establishment of a future-oriented, European network of teacher training centres*

Through the attendance of teacher professional development centres and institutions in maths and science education, the conference organisers brought together a further group of actors who are of increasing importance in the European arena. The relevance of this group for issues relating to teacher professional development becomes apparent through an increasing number of these specialised centres which have been set up across Europe in recent years. Mascil and the DZLM responded to these current developments and needs by offering a special pre-conference for presidents and heads of these professional development centres and institutions. Particularly important to the field, and also a particular success of the conference, is that this was the first European meeting of these teacher professional development centres in maths and science education across Europe. More than a dozen such institutions were represented at the first meeting.

The main aim of the pre-conference was therefore to provide a platform for the mutual exchange of ideas and experiences. The centres all have similar aims and agendas, namely: investing in teacher professional development to substantially improve maths and science education as it happens day-to-day in schools. The meeting enabled an exchange about the challenges and opportunities such institutions face. The circle of participants discussed critical aspects that need to be considered when cooperating with the educational administrations, appropriate strategies for doing so and how the various centres might benefit from an exchange on the similar scope and focus of their work in the different countries. A further major issue that was discussed centred on different approaches for promoting professional development of teachers and making these activities sustainable.

One of the most significant developments of the pre-conference was: those attending strongly urged the conference organisers to provide an opportunity for a second European meeting of the professional development centres. We are therefore pleased to announce that a second meeting of the centres is in the works. It will take place 6-7 May 2015, in connection with the mascil project meeting in Lithuania. Due to the high topicality of the discussed issues in the pre-conference, many participants have confirmed that they will take part in the meeting. As we aim to enlarge the circle of participants, we have been inviting professional development centres from all over Europe to participate in the second European professional development centres network meeting and look forward to insightful discussions and exchanges during the meeting. European Schoolnet has also accepted our invitation to present the SCIENTIX teacher support platform to the meeting participants.

In the long run, it would be desirable and advantageous to hold such meetings on a regular basis. Indeed, the dates for a third meeting of professional development centres have already been fixed (2-3 December 2015 in Sofia) and we see this as an encouraging development with respect to forging stronger links and networks between these important actors in teacher professional development in maths and science education.

### *Mascil and DZLM - combining research and practice*

mascil – a research, development and dissemination project that involves 18 European research teams – hosted the conference together with the German Centre for Mathematics Teacher Education (DZLM). This collaboration of two important entities from the fields of research and practice proved highly successful. mascil is coordinated at the University of Education Freiburg, Germany. The institution has been coordinating international projects fostering innovation in maths and science education for over a decade. This made it possible for the conference to revert to an international network of currently almost 1000 stakeholders in ‘scaling-up professional development in maths and science education’ across Europe. The DZLM has a leading

role in the field of maths teacher professional development in Germany, and therefore represents particularly the practice side.

This co-organisation and co-responsibility were foundational to the success of the conference. The conference proved that collaboration between research and practice is not only fruitful - but indeed essential, so as to take innovation in maths and science education forward in a coherent and effective manner. Projects like mascil, the research teams and universities behind these and the international community of researchers in maths and science education bring in the research perspective: concepts, approaches, materials and the research-based development, evaluation and improvement of these. Organisations such as the DZLM, other teacher professional development Centres from Europe, as well as further actors (multipliers, teacher trainers, etc.) also bring in the practice perspective: the needs, affordances, the experiences and feedback to research including calls for where more research is needed. Providing a platform for exchange between researchers and practitioners and achieving impact became possible only through such collaboration at the organisational level. In fact, this need for continuing to support an exchange between research and practice was one of the core conclusions reached by conference participants.

### *Lessons learnt from a successful conference*

The conference was highly topical, meaning that the platform provided by the organisers served to foster discussion and exchange about approaches and challenges to improving the education of educators in maths and sciences – and thus, improve education in these subjects and schools. A final panel and plenary discussion brought key insights from the different tracks together, looked to the future and defined core strategies that are needed for a ‘scaled-up’ teacher professional development.



As just mentioned, one of the core messages from the conference is that further and more strongly linking of research and practice is indispensable to moving forward. Also, linking policy to research and practice is necessary.

An example of the urgent need of these links is the demand from the side of policy for innovation in class which could be implemented through use of new teaching and learning materials, such as those based on inquiry-based-learning methods and/or materials that combine school subjects with the world of work. However, successful, classroom innovation also requires curriculum updates and modification – which, in turn, are reliant upon the availability of appropriate example materials. With this example, the mutual dependency of and the need for coordinated action between policy and practice becomes obvious. In addition to having good tasks and providing for their distribution, innovation in class also necessitates knowledge of which learning processes and goals are addressed. This is where the link to research becomes relevant.

A further outcome of the conference and its final discussion was the acknowledgement that policy, practice and research might have different perspectives on learning processes and goals. Such differences are legitimate – however, to achieve well-founded and sustainable innovation, different perspectives need to be the subject of open, mutual exchange. Here, it is the task and demand for practitioners, researchers and policy makers to increase collaboration and communication amongst each other and to step up coordinated efforts. This is especially apparent when it comes to detecting and responding to current national and European-wide trends and perspectives. Developing a strong network for European teacher professional development centres and strengthening the voice of the practice side is therefore an important approach – and a next step towards doing so are the aforementioned next meetings of the centre representatives that will be organized in connection with the mascil project meetings.

Another important conference conclusion is that although a range of promising approaches already exists about professional development for multipliers who in turn carry out professional development for teachers, much more needs to be done. There is an increased need for development activities (such as the development and evaluation of materials for multipliers and facilitators of teacher professional development) and most of all, a strong need for more research. Conference participants discussed that it is essential to strengthen further

conceptualisation, research and practice-based testing of effective concepts – like the multiplier concept – in order to implement teacher professional development on a solid basis. Open questions in relation to the multiplier concept are, for example: What are the needs of multipliers when carrying out professional development activities? How can they support teachers who struggle with the implementation of innovative teaching approaches? How can they deal with teachers’ fears, complaints or constraints?

Furthermore, bringing together different concepts and trends, like the ‘use’ of multipliers and the establishment of professional learning communities in schools needs to be further elaborated in research. Although a research need, such elaboration should involve the practice side from the beginning. Responding to these research needs will require the support of specific projects, the use of existing networks in research and practice and possibly setting up specialised new research groups to facilitate progress.

This leads us back to the broad need of conceptualising scaled-up teacher professional development in order to target and overcome obstacles to its success. A viable approach discussed at the final plenary was to in the future more strongly utilise the concept of professional learning communities. In such communities, one of the teachers, or on occasions, an external ‘expert’, acts as the facilitator. This means that the learning community generally is more self-directed and immersed in the realities of day-to-day professional practice than in multiplier-provided professional development courses. Combining the concept of multiplier education with the concept of professional learning communities (both in research and in practice) promises to lead to sustainable approaches to scaled-up teacher professional development. This is because professional development is most successful and sustainable when it involves collaboration between teachers and encourages reflection and mutual support. Learning communities are an excellent method of fostering these practices, as teachers’ day-to-day professional lives contain inherent hurdles to setting up self-sustaining and sustainable learning communities. These hindrances include factors such as time, engagement or distances. School-based, professional learning communities, supported by experienced and professionally trained facilitators and multipliers, can help overcome such obstacles and could be seen as a route to scaled-up teacher professional development.

In addition, e-learning environments may also be a strategy that helps surmount hindrances to scaled-up teacher professional development and at the same time, facilitates the use of professional learning communities. However, as we also learned during the conference, e-learning in teacher professional development has its own inherent obstacles. These include: some educators have reservations about using online learning, difficulties involved in adapting professional development materials for use in an e-learning environment and the challenge of securing engagement and sustainability in virtual learning communities. In consequence, the use of e-learning in teacher professional development has been identified as an area with tremendous research needs.

The mascil mid-term conference made first crucial contributions to achieving scaled-up professional development of European maths and science teachers by discussing different means of scaling up. In the course of the conference and especially during the final plenary discussion, it became clear that it is necessary to delve even deeper into key issues relating to ‘educating the educators’ and the improvement of maths and science education at school. The mascil project and its partners are working intensively to meet this request within the framework of the project’s final conference to be held in 2016.

We would like to take this opportunity to once again thank all those who helped make the conference such a success and look forward to providing updates about the implementation and progress made in achieving resulting future actions.

For more information about the conference, its outcomes as well as the conference proceedings, please see the conference website: <http://educating-the-educators.ph-freiburg.de>