

Long-term activities for innovations in in-service teacher education

Deliverable 8.3

All partners are deeply involved in in-service teacher education and regularly offer courses on a regional, national or international level. They cooperate with various institutions for teacher education and will use these channels to disseminate and exploit the results of "KeyCoMath" on a large scale. So in the long-term, substantial innovations in in-service teacher education on a European level can be expected, giving more weight to pupils' key competences. This paper offers a description of long-term activities in this field. However, all activities of the partners in this field in the next years cannot be foreseen.

Specific strategies of the eight partners for long-term in-service teacher education are:

University of Bayreuth (DE)

- (1) The Chair of Mathematics and Didactic of Mathematics at the University of Bayreuth, Germany, developed a multipliers concept for the urban network of primary schools with the aim to extend mathematics education and to adapt competences. The idea is implemented on a local scale and addresses mathematical school teachers. More specifically, the concept is realized in the region of Swabia, where 28 primary schools take part in this face-to-face professional development and in the region of Upper Franconia, which addresses teachers, who work with "inclusion" and for teachers of regular classes. Plausible scientific lectures on the current status of the didactical discussion in connection with practical examples and implementable possibilities for the realization in class are one feature of a successful concept for education multipliers. Beyond that, the inclusion of pupils' utterances and solution processes, which demonstrate how children operate in a special lesson's sequence, prove itself valuable. The reciprocal observations of teaching lessons, the comparison of the different ways to give lessons on the same specific mathematical topic, the exchange about the ready-made experiences, whereby mathematics education can be refined, turned out to be particularly suitable. The idea to link local schools and to stimulate a professional exchange, already existed in the projects "SINUS", "SINUS Transfer", "SINUS for Primary Schools" and "Fibonacci". Even after the termination of "KeyCoMath", this successful multipliers concept will continue due to the involvement of the regional education authority.

- (2) The partners "University of Bayreuth" and "University of South Bohemia" are planning a common project funded by means of the European Regional Development Fund (ERDF). It will extend the cooperation in the framework of "KeyCoMath" to more subjects (Natural Sciences, Mathematics and Languages). Teachers in the common border region of Bavaria and the Czech Republic should develop professional competences to deal with the diversity within classes in school in adequate ways. This additional cooperation is the basis of a long-term valorisation. It is clear that the results of "KeyCoMath" influence the new task.
- (3) The partners "University of Bayreuth" and "University of Klagenfurt" extend their cooperation in a common project for teachers' professional development. It will start in November 2015 and will run until autumn 2017. For the participating teachers this educational offer will be even more intense than the activities in "KeyCoMath". The teachers will meet for 2 to 5 days several times per year. They will be made acquainted with general pedagogical and didactical ideas and they will cooperatively develop teaching and learning materials for their students. Between the meetings, the teachers will try to teach according the new strategies in their classes. Afterwards, they reflect all experiences in the next meeting of the network of colleagues.
- (4) From 2016 to 2019 the University of Bayreuth will set up a new network of schools in the region which involves all types of secondary schools. The strategies for teachers' professional development will be similar to the strategies in "KeyCoMath", but they will be extended to 12 different subjects.

Bulgarian Academy of Sciences (BG)

The Institute of Mathematics and Informatics of the Bulgarian Academy of Sciences regularly organizes different kinds of teacher training courses enhancing the use of ICT and IBL (inquiry-based learning):

- (5) Each summer the "KeyCoMath" team offers training courses for teachers in Bulgaria. The teachers work on pedagogical problems related with the following: reformulating math problems in IBL style in order to enhance the development of specific key competences; formulating their own math problems reflecting real-life situations, not solvable with the current math knowledge of the students but allowing for explorations by means of dynamic geometry models, leading to a good enough approximation of the solution; studying and proposing methods for solving problems which are unstructured, or whose solutions are insufficient or redundant; solving "traditional problems" with "non-traditional" data, for which the use of a computing device is necessary; applying game-design thinking in order to better engage students in the process of problem solving; formulating more relevant evaluation criteria for the students' achievements; project-based work with a presentation of the results; assessment of learning resources in terms of formation and development of IBL skills and key competences.
- (6) In so-called "PD events" (seminars and workshops) within the frame of conferences, teachers play an active role and act as partners in a research team. They share their good practices in oral or poster presentations (sometimes jointly with their students), work in groups on specific tasks and present their ideas to the other participants.
- (7) The individual work with teachers includes support for the development of a lesson, educational materials, course projects, peer reviews, and preparation of a pedagogical experiment.

- (8) The development and maintenance of a Virtual Mathematics Laboratory, available online for all schools in Bulgaria, is another long-term activity for innovations in in-service teacher education.

University of South Bohemia (CZ)

The areas of responsibility of the University of the South Bohemia, Czech Republic, include the organisation of courses for in-service training of mathematics teachers, e. g. one-day seminars, longer seminars, workshops, etc.

- (9) On demand, the Department of Math Faculty of Education holds seminars directly at schools. There, university teachers impart for example the use of attractive examples from daily life in mathematics lessons (useful mathematics - problem solving, social, communicative, digital, professional, learning competencies) directly in class.
- (10) There are regularly common publications of members of the "KeyCoMath" team with teachers dealing with the development of key competences by mathematics education.
- (11) Moreover, a network of schools from various regions is one important activity of the Czech project partner in long-term.
- (12) The establishment of a didactic lab, which is equipped with multi-touch and three-dimensional models, will also exploit project results in the long-term and on large scale and will help initial-teachers as well as in-service teachers to develop or refine several key competences, especially digital competence.

As noted above, the University of South Bohemia and the University of Bayreuth continue their cooperation in a further in-service teacher education project, which aims at the development of professional competences to deal with the diversity within classes in school in adequate ways.

University of Bergen (NO)

The University of Bergen offers two types of teacher education. Both of them addresses in-service teachers.

- (13) Primary and lower secondary school teachers could receive a postgraduate certificate in education, building upon a Bachelor or a Master degree for upper secondary school teachers in two subjects.
- (14) In addition, a local tradition for inclusion of the "KeyCoMath" ideas in all teacher-related activities will be established.

University of Cyprus (CY)

The University of Cyprus organizes most of the courses for in-service education in Cyprus.

- (15) In these courses, in which pre-primary, primary and secondary school teachers participate, ideas referring to key competences and how the teacher will offer opportunities to develop these competences are presented. These activities have been supported by "KeyCoMath" in the last two years and they will be continued when the funding project period ends.

University of Klagenfurt (AT)

The Institute of Instructional and School Development of the University of Klagenfurt, Austria, as national Educational Competence Centre, implements the concept of key competences in various nation-wide in-service teacher education programmes (e. g. IMST, PFL mathematics, PROFIL, etc.).

- (16) There, teachers, teacher educators and other contributors to the field of education are supported in their professional development, in putting innovative instructional projects into practice and providing support in terms of content, organization and finances.

German Department of Education in South Tyrol (IT)

Marta Herbst is responsible for the planning of long-term activities in in-service teacher education in the Autonomous Province of Bolzano. Every year the German Schoolboard Bolzano organizes several advanced training events, taking strategies and concepts for in-service teacher education of "KeyCoMath" into account.

- (17) Regular meetings with math teachers to develop learning environments, tasks and criteria for evaluating assessments are organized.
- (18) In each high school in South Tyrol a modelling day is planned to foster the cooperation of all MINT-teachers.
- (19) Courses on the subject "Dialogic learning" with focus on formative assessment are established.
- (20) The final examination of the lower secondary school has been changed. The various mathematical competences will appear in the assessment. The German Department of Education in South Tyrol will support those concerned teachers of lower secondary schools to develop assignments, formative and summative tasks.
- (21) Furthermore, a long-termed in-service education project will be institutionalized. These courses include various parts of reflection, of experiences in the own class, working out end-refining assignments and assessments in groups. The first approach for primary school teachers starts in 2016 and lasts until 2018.
- (22) Multipliers for school development will be trained in future as another strategy of long-term activity in in-service teacher education. This multipliers concept has the aim to extend mathematics education and to adapt competences.

School Rottenschwil (CH)

Even School Rottenschwil, a state school, comprising a kindergarten and a primary school, in Switzerland has gotten involved in a sustainable development of in-service teacher education.

- (23) Courses for teachers on dialogic learning, including results and experiences from "KeyCoMath", are offered by the Swiss project members.
- (24) In cooperation with Universities and Colleges of Education, the coaching of schools and teachers' professional development with focus on competence-oriented education are organised.
- (25) A network of schools and multipliers is also established.

Most of the partners of the "KeyCoMath" consortium are intensively engaged in in-service teacher education. They will use, disseminate and implement the results of "KeyCoMath" in their future works.

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