

## **Teacher training: the role of universities and the Union of Czech mathematicians and physicists**

Šárka Hošková-Mayerová<sup>1</sup>

**Abstract.** Further teacher education has its own specifics mainly due to the very profession of teaching. Lecturers - teachers in their role should always consider what barriers may act on education and learning with teachers and take them into account in their learning and teaching strategy and the approach to the students which are in fact teachers. On the other hand, teachers have many advantages over other adults -learners that are well utilized in their further education.

**Keywords** Union of Czech mathematicians and physicists, teacher training

### **1. Introduction**

Further teacher education has its own specifics mainly due to the very profession of teaching. Lecturers - teachers in their role should always consider what barriers may act on education and learning with teachers and take them into account in their learning and teaching strategy and the approach to the students which are in fact teachers. On the other hand, teachers have many advantages over other adults - learners that are well utilized in their further education.

In the Czech Republic the further education is based on Act 563/2004 Sb., and 317/2005 Sb. about further education, the accreditation committee and teacher career system.

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<sup>1</sup> University of Defence, Brno, Czech Republic, e-mail [sarka\\_mayerova@unob.cz](mailto:sarka_mayerova@unob.cz)

For additional training is necessary to take into account the overload of teachers emerging with increasing complexity of the profession and the excesses of the job. As a result, teachers are mentally exhausted, often even almost burnout. Teachers (educators from various universities) must work with teachers so that not to worse more this situation.

Further education should benefit teachers and support them as an expert profession, i.e., it should be appropriately intellectually and professionally valuable and mainly lead to career growth and professional development. Teachers tend to be satisfied when they are educated in what they already know.

On the other hand, many teachers believe that they are educated enough and do not need any "scholarly" content and approaches. Professional rigidity leads to rejection of further education. Also conservatism manifested especially in older teacher resistance to any change is a barrier to further education. Innovation in education and training are not accepted by such teacher, it is rather passively tolerated. Unwillingness to be trained rises mainly from the absence of a systemic solution of further education, professional development and career, along with the evaluation of teachers and their remuneration. Teachers are demotivated and it is difficult to convince them of the importance and benefits of their further training. [2]

On contrary, professional group of teachers is primarily a group of educated, intelligent personalities and their professional and intellectual potential can be well used in other benefits such as education.

*Let us name some of benefits of teaching that can be used in further education and learning of teachers, see [2]:*

- The need to communicate and share the experience
- Be accepted as an intellectual
- The need for recognition, measurement
- Higher level of thought operations
- Ability to formulate and verbalize
- Understanding the value of education

- Practical experience in the profession
- Creativity
- A sense of obligation
- High level of responsibility
- Need to be managed, instructed
- Ability to organize, lead people.

In education of teachers their intelligence, level of thinking, creativity and the ability to formulate and express can be used for more complicated and difficult concept of the content and methods of education. Teachers need to be convinced of their real and hidden qualities. If they settle the recognition as intellectuals and experts in the profession, it affects their attitudes, educational needs and interests for the benefit of the professionalization of teaching. [2], [11].

## **2. The Union of Czech mathematicians and physicists**

The Union of Czech mathematicians and physicists (*Jednota českých matematiků a fyziků -JČMF*) is a scientific society joining researchers, teachers, and amateur supporters of mathematics and physics. It has been founded in 1862.

The Union aims to support the development of mathematics and physics beyond the realm of academic and industrial institutions, in particular by means of popularization, support of talented students and by issuing expert opinions.

In its scholarly fields The Union of Czech Mathematicians and Physicists:

- organizes conferences, seminars and meetings,
- organizes competitions at all educational levels,
- publishes journals, books and monographs,
- popularizes new and traditional attainments before the general audience,
- explores and promotes the history of mathematics and physics,

- issues opinions on scientific works.

The Union is a member of the Council of scientific societies of the Czech Republic.

The Union welcomes all adherents of mathematics and physics, in particular teachers, scientists and students. Institutions and organizations whose activities are related to mathematics and physics may become institutional members of the Union. The Union provides a forum to meet other people with similar perspective and interests.

It is one of the oldest mathematical societies in the world. Active members can realize their interests, in particular:

- prepare events that support mathematics and physics, e.g. contest for students,
- deliver lectures and publish papers on contemporary and historical subject in either popular or scientific form,
- enjoy the opportunity to cooperate with international partner societies,
- interact on the national level with other scientific societies, academic institutions, etc.

JCMF also organize a number of seminars with lectures which are targeted to supplement teachers' knowledge of mathematics and getting ideas for innovation in their teaching practice with a focus on developing practical skills, new modern technology in education, new approaches, methods and views. There are also introduced new textbooks and teaching aids as well as mathematical competition for talents and other appropriate events and activities in the field of mathematics for pupils of secondary and primary schools. Speakers are prominent experts from all over the Czech Republic. [6]

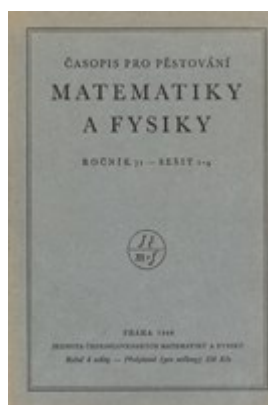
## **2.1 History of the Union of Czech Mathematicians and Physicists**

The Union of Czech Mathematicians and Physicists is one of the oldest extant learned societies in the Czech Republic. It was founded in 1862 as the *Verein für freie Vorträge aus der Mathematik und Physik* (Club for Free Lectures in Mathematics and Physics) and

renamed in 1869 *Jednota českých matematiků* (Union of Czech Mathematicians).

From the very beginning the Union aimed at the improvement of physics and mathematics education at all school levels and types, and support for the development of these sciences. The Union expanded in 1912, and together with the new statutes adopted the present name. Among its members were associated many of the teachers of secondary schools, but also university professors and scientists.

Throughout its history, the Union devoted great care and attention to the publication of professional literature. Already in its 10th anniversary (1872) began issuing *Časopis pro pěstování matematiky a fysiky* (Journal for Cultivation of Mathematics and Physics), probably the first of its kind in Austro-Hungarian monarchy. A year later, the Union started publishing textbooks and scientific monographs. After the establishment of independent Czechoslovakia it became de facto the only qualified publisher of textbooks, professional books and journals in the fields of mathematics and physics. In 1922 it issued the magazine *Rozhledy matematicko-fyzikální* (Perspectives of Mathematics and Physics), which was established as an addendum to the *Časopis pro pěstování matematiky a fysiky*.



At the beginning of the 50s the Unity had to transfer assets in favor of the newly established Czechoslovak Academy of Sciences, and became a learned society at the Academy. The mathematical part

of its library became the basis of the library of the Mathematical Institute of the Academy. Journal published by the Union was replaced by two titles - *Časopis pro pěstování matematiky* (Journal for Cultivation of Mathematics, since 1991 *Mathematica Bohemica*) a *Československý časopis pro fyziku* (Czechoslovak Journal of Physics). Since 1956 the Union publishes also the journal *Pokroky matematiky, fyziky a astronomie* (Advances in Mathematics, Physics and Astronomy), which became the member magazine. [6].

The support of and interest in the education in mathematics and physics led to the foundation of the journal *Matematika a fyzika ve škole* (Mathematics and Physics at School) in 1948; succeeded in 1991 by the magazine *Matematika – Fyzika – Informatika* (Mathematics - Physics - Computer Science). JČMF also initiated the Mathematical Olympiad (in 1951) and Physics Olympiad (in 1959) in the Czech Republic. In 1995, the publisher *Prometheus, spol. s r. o.*, has been founded with the participation of JČMF. This publisher focuses on math and physics textbooks for all types of schools. [1], [6], [10].

### 3. Conclusion

In fact, there cannot be any conclusion because we are just at the beginning of a long, systematic and demanding work in the field of education of teachers, which might or should lead and be targeted at increased knowledge ability, education and knowing. [13] One way which can help to reach this target is E-learning or e-education programs. It can offer wider content on a topic than the conventional education lesson. The important issue to be addressed is actually the teaching method embedded in the training programs because the teaching methods link directly to the learning outcomes. Replacing conventional training programs without considering teaching methods and interdisciplinary elements is unlikely to increase the overall effectiveness of education. Ready and prepared population using information and communication technologies is a necessary foundation on which the future generations can gradually add further

storeys of education. Let's hope that those who move onto a higher floor will also leave behind bad habits and adopt new paradigm of life.

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