Innovative Teaching for Creative Learning : Teacher Training

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Abstract

The advancement of society today leads to rapid changes in science. Therefore teachers and educators should have solid and regular training to acquire new knowledge emerging in all spheres of life. An important aspect of professional qualification is the training of teachers in applying new, interactive, teaching methods in order to achieve higher interactivity in the educational process and to raise the interest of their students. A special emphasis is placed on practice-oriented teaching and classroom activities that encourage learners to be more active participants in the learning process. ICT training of teachers is directly linked to the mastering and application of new teaching methods.

The present paper views the issues of the teachers' qualification and training in Bulgaria, the opinions of chemistry teachers on the necessity and forms of training aimed at the improvement of their teaching skills, as well as the strategies and approaches that enhance the development of ICT competences.

1. Key aspects of the European policy related to teacher competency

The basic concept of the European educational strategy, which is in compliance with the UNESCO strategy in that area, is to encourage and ensure cooperation between the educational systems of the European countries so as to foster the development of the intellectual potential of young people. The main tool to implement that concept is the application of ICT in all aspects of the educational process - teaching/learning methods, learning content and assessment approaches. This calls for building and improvement of ICT skills on behalf of the direct participants in the teaching/learning process, i.e. on behalf of both educators (teachers) and learners (students).

The key element of the common European educational policy is to encourage the use of ICT in education as a basic approach to improving the efficiency of the educational systems thus leading to the enhancement of the competitiveness of the European economy. The European Strategy i2010 for E-learning defines three areas in relation to this policy:

- Development of the infrastructure and provision of access to Internet and multimedia sources for each student in the classroom;
- Definition of specific skills that are of great significance for the young and improvement of their key competences;
- Enhancement of the qualification of teachers in order to successfully build these competences [1].

A survey of the Education, Audiovisual and Culture Executive Agency (EACEA) of the European Commission, related to the application of ICT in European schools in order to encourage innovativeness in the educational process and students' creativity, and published in 2011, presents a thorough analysis of the national educational policies of the EU countries and their amendments referring to the application of ICT into the teaching/learning methods, the content of the learning resources and the assessment approaches. It focuses on the competence of the teachers to operate with the new technologies and the methods for improving their professional skills in this field [1].
The main conclusions underlie some common trends.

- The European key competences are one of the important elements of the state education requirements in relation to the secondary education in most European countries. A great number of them offer the use of ICT as a tool to acquire such competences. In this respect Bulgaria is recognized as one of the few exceptions.

- The use of all types of computer applications (PCs, multimedia, DVD, video, interactive white boards) in the teaching/learning process is fostered. The teachers are offered to use a virtual educational environment which helps the development of a personal educational space for the learner in the Internet.

Along with the above mentioned the following should also be taken into consideration:

- In schools ICT are used as a tool for implementing separate tasks in different subjects included in the curriculum. The use of computers for educational purposes at home is considerably rare. Computers are mainly used for entertainment.
- In natural science classes computers are also rarely used for simulations, experiments, visualization of phenomena and processes.

With respect to the professional development of the teachers and the improvement of their competences, the following conclusions could be drawn:

- Teachers build their ICT skills mainly during the process when they are taught to be become teachers. The possibilities for and the forms of lifelong learning are underdeveloped and underused. They are preferred by math teachers rather than by teachers in natural sciences. These opportunities are used least by primary teachers within both groups of teachers.
- The possibilities and the advantages of the electronic portfolio for assessing students' knowledge are underused as well. One of the reasons is the low ICT competence of a number of teachers.

The following tools for encouraging teachers to improve their professional qualification and competences are proposed:

- Regular assessment of their performance. It can be external (by the Inspectorate) or internal (by other teachers and/or by the school principal). Assessment criteria - general and specific depending on the scientific area and the subject taught. They should provide a feedback related to teachers' teaching performance, knowledge and skills. With regard to teachers' computer skills, only internal assessment is used in Bulgaria.
- The use of different forms of cooperation among teachers - on-line platforms, forums, blogs and social networks, which make possible the exchange and promotion of professional experience, teaching materials, good practices, useful initiatives thus positively influencing the professional development of teachers [1].

2. Teacher training in Bulgaria

2.1 Regulations related to teachers' qualification actions
The actions related to education, in particular the education and qualification of teachers, are an integral part of the national policy. They are regulated by a series of documents which form the legislation framework in relation to those actions. These regulations are as follows:

- Public Education Act: it regulates the structure, functions and management of the public education system which provides education according to the state educational requirements - part 39(4) states that „teachers and school principals are provided with conditions to improve their qualification" [2].
- State educational requirements for obtaining qualifications by occupation [3] – they regulate the conditions and educational requirements towards all occupations, including that for obtaining teacher's certificates and qualification;
- Regulations on the conditions for improving the qualification of the teaching staff in the public education system and regulations on acquiring professional qualification degrees [4]: they also include rules on how to implement the procedures related to the acquisition of professional qualification degrees by teachers and school principals.

Along with the above mentioned documents, national programmes and strategies are developed as well. They plan those activities for a given period of time in compliance with the common European educational strategy and the specific nature of the Bulgarian educational system:

- National Programme for Developing School Education and Pre-School Education and Training (2006: 2015 г.)[5]

- National Programme „Qualification" [6]: the programme is in conformity with the objectives and priorities of the Programme for Developing Education, Culture and Youth Policies in Republic of Bulgaria 2009-2013 of the Ministry of Education, Youth and Science, as well as with the demand for teachers.
- National Strategy for Introducing ICT in Bulgarian Schools [7] - the strategy is based on the programmes of the Bulgarian government in relation to the development of secondary education and the improvement of the competitiveness of Bulgarian economy. It has been developed on the grounds of a prior analysis which covers the Bulgarian and world experience related to the introduction of ICT in education, educational ICT trends in the developed countries, societal ICT needs [7]. Most of the activities linked to the strategy implementation have already been completed.

2.2 Bodies and organizations related to teachers' training

The coordination of the actions related to the planning, organization and conduction of education and improvement of teachers' qualification is performed by the Qualification and Career Development Directorate at the Ministry of Education, Youth and Science. It is responsible for the actions referring to the development and implementation of the state policy regarding the qualification and career development of the teaching staff.

The educational and qualification activities are performed by institutions or specialized units accredited by the National Evaluation and Accreditation Agency. The education/training of school teachers, including Chemistry teachers, is performed at the following universities: Sofia University "St. Kl. Ohridski", South-West University "Neofit Rilski", Konstatin Preslavski University of Shumen, Plovdiv University "Paisii Hilendarski". The training for enhancing the qualification and improving the teaching skills is implemented by the National Institute for Education and Qualification in the Educational System. The educational programmes are mainly intended for school principals so as to update and improve their management, organizational and financial competences, as well as to apply ICT in the management process.

The training for enhancing the qualification and improving the teaching skills of chemistry teachers is conducted at the following units:

- Faculty of Chemistry and Pharmacy, Sofia University "St. Kl. Ohridski"- Research laboratory on chemistry education and history and philosophy of chemistry;
- Faculty for Postgraduate and Distance Learning at the University of Chemical Technology and Metallurgy-Sofia;
- Department for Information and In-Service Teacher Training, Trakia University-Stara Zagora- it qualifies teachers in all subjects (including Chemistry) and grades in secondary school , including introduction of ICT in the teaching/learning process;
- Department for Information, Qualification and Lifelong Learning, Konstatin Preslavski University of Shumen.

3. Teacher competence – current situation, problems, solutions

The National Programme for Developing School Education and Pre-School Education and Training (2006: 2015)[5] focuses on the development of the professional competences of teachers in three areas:

- regular updating of knowledge
- acquiring new teaching skills and mastering new teaching methods;
- building competences in relation to the application of ICT in the educational process [5].

The third area has become very topical in recent years. It is also a priority of the EU educational policy.

3.1. Research on the opinions of teachers

Some research was done among chemistry teachers, which actually provides information about their attitudes and disposition to issues such as active learning, application of respective methods and tools in the real-life school practice, needs for different forms of teaching/learning, and promotion of good teaching/learning practices [8,9].

The research covers main areas such as general disposition and attitudes of teachers in relation to active learning, teaching/learning methods and techniques motivating and stimulating students' cognitive activities, type and form of teachers' qualification in relation to the use and development of

good teaching/learning (pedagogical) practices. The respondents were teachers in math and informatics, chemistry, biology and physics, some of whom had been trained within LLL programmes.

The following conclusions can be drawn:

- The role of the modern educational technologies in real-life school practice is underestimated, as well as the fact that the output of the teachers' work is evaluated according to formal criteria and indicators rather than creativity in teaching;
- Despite the wide promotion of methods and techniques for active and interactive learning and teaching, they are not widely used in the real-life school practice due to low qualification.

Most teachers consider the subject content they teach as appropriate for the application of innovative practices. However, this does not happen in schools. The following reasons could be given:

- Unawareness of the possibilities of innovative practices for achieving the educational goals, and orientation to traditional methods, tools and forms of teaching/learning
- Insufficient methodological competence in integrating active and interactive technologies in the teaching/learning process
- Insufficient provision of teaching aids and equipment to cover such type of teaching/learning, and lack of encouraging educational environment in schools.
- The evaluation of teachers' performance and the career growth are not related to professional creativity and innovation.

A special emphasis is placed on the ways, sources and forms of training so as to improve teachers' professional competences. Most teachers prefer organized and group forms in order to improve their qualification: educational programmes and seminars. Most motivated to apply modern educational technologies in teaching are teachers who have work experience of 10-20 years. They are also the most active participants in different LLL programmes.

Teachers prefer interactive qualification forms which provide possibilities for getting acquainted with what has been achieved so far and establish conditions for purposeful and complete communication within the professional community. Most of them consider the necessity to research and promote good teaching practices and identify interactive communication as a possible way to do that [*8, 9*].

3.2   System for evaluating teacher competences related to the application of e-learning

The state educational chemistry content standards define the basic elements of the teaching content and the level of its mastering. The latter is achieved by various methodological and pedagogical approaches. Due to the specific nature of chemistry as a science, it is very useful to apply ICT in schools for the following purposes: visualization of the teaching materials, mastering of the learning content and raising students' interest in the subject. There are a great number of web sites and forums, as well as interactive teaching materials in chemistry, thus imposing requirements on teachers in relation to their competences referring to the proper selection and work with them. Therefore it is very important to evaluate the current level of teachers' competence in ICT use so as to define the needs for improving their qualification. A system for evaluating Chemistry teachers' competence has been developed by the Research laboratory on chemistry education and history and philosophy of chemistry at the Sofia University. It is based on the methodical guidelines for ICT competence assessment standards of UNESCO [10] and reflects the current situation of the educational environment in chemistry - not more than one PC and one multimedia projector in the chemistry classroom. The structure of the system links the contemporary educational approaches related to the development of the individual such as technological literacy, knowledge depth and development of knowledge to the components of the educational system such as educational policies and approaches, content and assessment, pedagogy (didactic skills in a given area), ICT, organization and administration, training and professional development of teachers.

The system proposes some possibilities for assessing chemistry teachers' competences in the following areas:

- Selection of electronic teaching content
- Integration of ICT within the framework of the traditional educational environment
- Technological skills required to work with interactive materials.

It can also be successfully applied to the training of university students, future teachers in Chemistry [11]

4. Teachers' motivation in relation to the improvement of their qualification

4.1. State educational policy and tools

One of the main documents regulating the state policy in the area of teachers' training and qualification, including chemistry teachers, is the National Programme for Developing School Education and Pre-School Education and Training (2006: 2015 г.) [5]. The teacher is described, in this document, as a key factor for the development of the educational system and its quality. Therefore, along with the other activities in the educational sector, the programme envisages a number of measures to enhance the social status and prestige of Bulgarian teachers:+ù

- to work out a programme for developing teachers' professional competences in relation to their regular knowledge brush-up, mastering new teaching methods and ICT training;
- to elaborate a system for monitoring, analysis and evaluation of the development and performance of teachers so as to regularly research and analyze qualification needs and to improve the planning process of the qualification activities;
- to introduce a performance quality evaluation system on the basis of which to develop a differentiated remuneration model.

Most of the measures have already been implemented, especially those related to the performance evaluation and the differentiated remuneration model [12]. Those two measures involve the following indicator: application of interactive methods, innovations and ICT in the education and training process.

Since 2000 the National Strategy for Introducing ICT in Bulgarian Schools [7] has been implemented. A considerable number of its activities address teacher training and skills referring to the application of ICT in all subjects. Teachers' training includes three stages: training of persons responsible for the computer labs, training of all teachers in relation to basic computer skills and use of office applications, and specialized training of teachers by individual subjects, targeting acquisition of skills to use ICT in teaching.

The second group of activities targeted by the Strategy and related to teachers' training is linked to the development of an educational portal, platforms for distant learning and educational content for all subjects. The national educational portal provides information to anyone who is willing to improve their knowledge and competences, including Chemistry teachers, by offering access to knowledge databases, analytical information about the national educational structure, information about national educational projects (including ICT introduction), indicators for the current state of teaching/learning, comparative data and trends related to education [13]. The portal involves local software platforms with good possibilities for computer-aided teaching, teaching software, multimedia content (a set of teaching modules by teaching subjects) according to scenarios set by the teachers.

Teachers' training is also one of the priorities of the National Programme «Qualification» [6]. The programme is in conformity with the objectives and priorities of the Programme for Developing Education, Culture and Youth Policies in Republic of Bulgaria 2009-2013 of the Ministry of Education, Youth and Science, as well as with the demand for teachers. Some of its activities related to qualification improvement target encouragement of and support to the professional development of teachers.

The 2012 annual activity report of the Ministry of Education, Youth and Science (MEYS) states that the main objectives of the activities of MEYS in relation to teachers' training have been as follows:

- „to improve the legislation regulating the status and professional development of pedagogical experts;
- to enhance the qualification of teachers so that they can acquire new knowledge and skills in their teaching activity and new assessment and self-assessment competences;
- to establish conditions for improving the professional competence of teachers and to develop a tool for the professional growth of young pedagogical experts [14].

This policy is also involved in the MEYS draft proposal for the Act on Pre-School and School Education in Bulgaria [15]. One of the observations in the concept for the basic principles and innovative aspects in it [16] is that the existing tools for the support of young teachers and for the motivation of the school teams in relation to the improvement of their qualification are insufficient. Over the last 5 years the teachers in the comprehensive schools within the age range of 25-29 decreased by 36% and within the professional schools they are only 3% from the total number of teachers. The mandatory regular qualification of teachers is not regulated, as well as the mandatory qualification recommended by the control body. Therefore the draft proposal for the Act underlies the basic tools for improving teachers' qualification in the future, which adequately reflect the societal changes and

correspond to the expectations of both the participants in the educational system and the society in relation to better and more complete educational and training process. It considers the enhancement of teachers' qualification as a continuous process of improving and broadening of their competences. Thus they have to improve their qualification on an annual basis. One of these tools is the system for qualification and career development of the pedagogical experts.

4.2. Other approaches to teachers' training

Projects. The project titled „**Qualification of Pedagogical Experts"** [17] is funded by the Operational Programme "Human Resources Development" 2007-2013, co-funded by the European Social Fund of the European Union. The project is implemented by MEYS through the Qualification and Career Development Directorate in a partnership with the National Institute for Teaching and Qualification in the Educational System. The project objective is to train over 42000 teachers by the end of 2014, which is 80% of the total number of teachers, so as to improve their qualification. One of the project main activities is to elaborate a tool for qualification and motivation of pedagogical experts who have already demonstrated their professional qualities. The main purpose of this tool is to establish conditions for encouragement of and support to the professional development of recognized teachers by providing access to short-term and specialized training forms, state-of-the-art pedagogical literature and best practices. The tool is intended for teachers who took first place in national and international events (competitions, olympiads, etc.) as mentors of school teams or individuals during the school years 2009/2010 and 2010/2011. 125 teachers in natural sciences, including chemistry, were trained within the frame of the project.

The project titled "ICT in Education" [18], funded by the Operational Programme "Human Resources Development", aims at developing a modern educational ICT environment in Bulgarian schools by:

- buying software licenses for the system of education and science;
- introducing a management and control system for the process of introduction of ICT in education;
- certifying teachers in relation to their ICT skills - 30 000 will be certified;
- developing a network of connected schools with high-speed Internet and providing access and connection to the Pan-European Educational Network GEANT;
- increasing the number of computerized work places in schools.

Internet-based approaches. A few web sites and portals provide opportunities for enhancing the teaching competence and improving the skills of teachers in relation to the application of ICT in the educational processes. The project titled **"**National Educational Portal**"** is the first step to the development of electronic education in Bulgarian schools. The Portal has been designed and developed by LEKSiS Consortium which consists of two companies that are leaders on the ICT market in Bulgaria. One of the main advantages of the Portal is its interactivity **[**19**].**

Teachers Innovators Network: Teacher.bg. The virtual school of Teacher.bg offers free on-line training in relation to the state-of-the-art technologies, methods and programmes referring to the introduction of electronic teaching content in the classroom to all teachers registered in the Network. The training is carried out according to topics set in advance. The lecturers are leading teachers from Bulgarian schools who have won recognition as leading experts in the area of electronic content, as well as experts in the field of various technologies. Such an innovative initiative will contribute to the motivation and qualification of Bulgarian teachers so as to actively use ICT in their daily work with the students, as well as for their personal professional growth [20].

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