Key Action 2 – Strategic Partnerships for school education

ELITe: Enhancing Learning in Teaching via e-inquiries

Agreement No. 2016-1-EL01-KA201-023647

Policy envisions and requirements for STEM teachers' competence development: State of affairs in BULGARIA

by Nikolina Nikolova[1]

Recent changes in Bulgaria in terms of policy envisions for STEM teachers competence development

During the last decades, Bulgaria was faced with the need of dramatic changes in educational system and regulatory framework. The low level of functional literacy of Bulgarian students, the high percentage of drop-out students, old and cumbersome regulatory framework in education, economic development, labour market and business needs, etc., are just some of the factors, determining the need of educational reform in the country.

The reform has started in 2010 and since 2016 it is in the effective use. The new **Law for pre-school and school education** defines the education as a national priority. It keeps the balance between regularity and autonomy (authority) of the players. It delegates more rights to the schools, teachers, parents and students to take decision and respective responsibility about their relationships. The simpler framework guarantee the transparence and predictability of the policies in the educational system.

The main goals of educational reform are:

- Change of the educational system.
- Increasing the quality of general education.
- Defining new educational levels and providing possibilities for more students to graduate.
- Possibility to separate students who'd like to go to the labour market after 16 years from those, who'd like to prepare for university education.
- Increasing of quality of teaching and possibilities for career development of the teachers.

The Law for pre-school and school education discusses only general education. Professional education is still in the process of reform.

The Law for pre-school and school education offers new understanding about educational standards focused on the achievement of the educational goals and outcomes, national qualification framework and competences which should be developed at pre-school and school age, regulation of inclusive education as a part of human educational rights,

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etc. The Law provide more flexibility and freedom in curricula, providing autonomy to schools to develop their own curricula for extensive and addition learning courses. It governs also validation of competences, developed by informal or non-formal educational process. The Law ensures possibility for implementing individual, distance or blended forms of education.

The law takes special attention on qualification and career development of the teachers. It introduces:

- Mandatory qualification for in-service teachers (48 academic hours per attestation period), measured by ECTS credits.
- Mandatory internal institutional qualification (16 academic hours per year).
- Attestation period of 4 yours for all pedagogical specialists.
- Possibility for professional development for all pedagogical specialist.
- Opportunities to attract young people to work as teachers by introducing of new positions: trainee-teacher and mentor teacher.

Under the frame of the Law for pre-school and school education there were developed 19 National standards and other sub-law regulatory documents. The main of them, related to the general and STEM education, are:

- Ordinance on National requirement for acquiring professional qualification 'teacher' which formulates the teachers' competences and defines a model for career development of teachers.
- Ordinance #12 on the status and professional development of teachers, headmasters and other pedagogical specialists. It takes special attention on:
    - teachers' competences;
    - teachers' career development;
    - stimulating teachers' research;
    - stimulating application of innovative methods of teaching.
- Ordinance on inclusive education.
- National Educational Standards about expected results of STEM education, focused on the development of the key competences. As a consequence – the new curricula for each school subject and each grade, contacting subject learning content description as well as recommendations for appropriate teaching approaches.

Dimensions and aspects of STEM teachers' competences that are evident in policy documents in Bulgaria

The national policy documents, based on relevant European policy documents provide evidence for requirements for covering each of three key dimensions of teachers' competences - knowledge and understanding; skills; dispositions.

Knowledge and understanding

The basic aspect of required knowledge is the deep knowledge in **subject matter**: *... as a minimum, teachers should have a specialist knowledge of the subject(s) they teach* (European Commission, 2013). The requirement reflects on the main national policy document ORDINANCE #12 from 01 of September, 2016 on the status and professional development of teachers, headmasters and other pedagogical specialists (Ministry of Educaton and Science, Republic of Bulgaria, 2016f), which defines the National Standard for the pedagogical staff requirements and qualification, as

well as the way of career development of teachers, headmasters, and other pedagogical specialists. There it is explicitly numbered the initial education that the teacher should be graduated as well as additional conditions (i.e. additional courses or SDP), if any at the specific case, that should be taken to be a legal teacher in a specific subject. About STEM teacher, the requirement is to have bachelor or master degree in one of the following: science (math, informatics, physics, chemistry, biology, etc. according to the teaching subject), pedagogy of education in... (specific subjects), or engineering. The same document defines the types of qualification of pedagogical specialist:

...

2. long-life - directed to professional and personal development... through:

*- short term training courses dedicated to periodical actualisation of **subject knowledge**, to development of skills to teach key competences, to familiarizing and applying innovative approaches in education,...etc.*

The special attention in the policy documents is dedicated to the **inclusive education**. *Equal access to high-quality education, inclusion of every student and child* is a priority, defined in the Law on pre-school and school education (Ministry of Education and Science, Republic of Bulgaria, 2015a). During the educational reform, a National Standard about inclusive education (Ministry of Educationa and Science, Republic of Bulgaria, 2016d) was developed. The standard defines principles and conditions for students' inclusion in educational process, independently of their individual characteristics, special educational needs, ethnic and cultural specifics, etc. The standard recommends that teachers should be able to *apply differentiated pedagogical approaches in accordance with Interests and stimulating the motivation of the child and the student, adapted to the age and social changes in his / her life and adapted to his / her ability to apply the acquired competencies in practice*, which means at least they should have theoretical basis on the specific educational needs and variety of pedagogical approaches for differentiated education. The issues of inclusion and diversity is also a subject matter of the National requirement of the teaching profession: the teacher's responsibility is planning *and conduction of educational process in accordance to: ... encouraging achievements and providing the necessary support and assistance for their (students') full integration into the educational and social environment according to their specific needs*.

In Bulgaria, there is a good tradition for the last 10 years in the use of **ICTs in education**, reported in the Science Education in Europe: National Policies, Practices and Research, Figure 3.4, p.72 (EC, Eurydice, 2011) and Key Data on Learning and Innovation through ICT at School in Europe 2011, p. 69 (EACEA, Eurydice, 2011). These good practices are kept in the new policy documents – as it is written above, the National requirements for "teacher" qualification includes at least 30 academic hours of study how to use ICTs and digital environment in teaching process (Ministry of Education and Science, Republic of Bulgaria, 2016c).

Current policy documents focuses attention also on the use of **innovative teaching methods** in all teaching disciplines. The Ordinance #12 (Ministry of Educaton and Science, Republic of Bulgaria, 2016f) states that *the position "teacher" includes the following features ... use of effective methods of teaching...*. It stimulates teachers to gather knowledge on different modern innovative educational methods not only through formal education but also by participation in large teachers' networks (national general or thematic, Scientix, etc.), teachers forums, conferences, experience exchange events.

Other aspect of teachers' competences is focused on knowledge and understanding of the key role of **evaluation and assessment** methodologies and technics. The policy documents comment different aspects of the evaluation process:

- Students' assessment – formative and summative.
- Teachers' assessment in relevance to career development.
- Educational process / system evaluation at macro level.

The Ordinance # 11 (Ministry of Educaton and Science, Republic of Bulgaria, 2016e) describes the National Educational Standard on assessment of the students' achievements. It determines the components, types and forms of assessment of students' educational achievements; тhe terms and procedure for organization of external evaluation and maturity

exams; recognition of skills in arts and sport; etc. The document presents the different forms and types of assessments, the role and expected responsibilities of teachers, the importance of formative assessment in tracking students' progress, as well as the role of summative assessment for diagnostics, monitoring and future improvement of educational policies.

The assessment of teachers' proficiency is discussed in ORDINANCE # 12 (Ministry of Educaton and Science, Republic of Bulgaria, 2016f), where the attestation card is provided. The document treated knowledge, understanding and skills for self-assessment of the teachers' as crucial for his/her career development.

Much less of the teachers are involved in evaluation of the educational process – mainly in conduction of the evaluation procedure at operational level.

Skills

All of the policy documents treats the teachers' **academic and pedagogical** competences as a whole – all the listed above knowledge are accompanied by relevant skill for design, conduction and evaluation of the teaching process.

For in-service teachers, the **pedagogical competences: planning, teaching, evaluation and assessment, class / group management** take a special place in procedure for teachers' attestation (Ministry of Educaton and Science, Republic of Bulgaria, 2016f).

In addition, the teachers' assessment card in ORDINANCE #12, Appendix #2 (Ministry of Educaton and Science, Republic of Bulgaria, 2016f) defines two more group of teachers' competences: **communicative competences** and **administrative** competence.

Communicative competence includes **team working skills** – partnership with other pedagogical specialist and school managers, didactical support and mentoring of newly recruited teachers, leadership skills and skill for takin decisions at school policy level and corresponding responsibility, participation in institutional, out-of-school, cultural and social activities; and **skills for collaborating with parents and other stakeholders** – inclusion parents in educational process, support and stimulation of the parents of children with special educational needs, etc.

Administrative competences relates to familiarizing with National Educational Standards and skills to apply them, ethics in work with children, privacy of the personal information, work with policy documents.

Not at last place, the teacher is expected to act as **researcher** in the classroom and to develop sustainable competences in the field (Ministry of Educaton and Science, Republic of Bulgaria, 2016f):

The qualification of pedagogical specialist... is: ...

2. long-life - directed to professional and personal development... through:

*- Participation in **research**, **inquiry** and **creative** activities.*

Disposition, beliefs, attitudes

The Law on pre-school and education takes special attention on **commitment to promoting the learning to all student**. One of the main principle there is *Equality and non-discrimination when conducting pre-school and school education* (Ministry of Education and Science, Republic of Bulgaria, 2015a). The principle is expressed in:

- Equal access and inclusion of every child and student
- Humanism and tolerance
- Safety of cultural diversity and inclusion by Bulgarian language

The Ordinance of inclusive education (Ministry of Educationa and Science, Republic of Bulgaria, 2016d) regulates the public relations relating to the provision of Inclusive education of children and pupils in the pre - school system, school

education, as well as the activities of the institutions in this system on providing support for the personal development of children and students. It requires

- Unique support of personal development of each pupil in dependence of his/her special educational needs
- Differentiated pedagogical approaches in correspondence with personal interests and motivators of the student, age and social life and changes
- Acceptance and respect to the uniqueness of each child and pupil - individual needs and opportunities, personal qualities, knowledge, skills and interests to which the educational institution must respond in such a way that the child or pupil can maximize its potential.
- Systematic and holistic approach in organization and collaboration of educational institutions, etc.

The ordinances accompanying the new law contain special dispositions to **change, flexibility, ongoing learning and professional improvement, including study and research**: According to the Ordinance #12:

47. Organizational forms of long life qualification are:

..

(6) forums (conferences, contests, planers, etc.) in accordance to present research results, studies, best practices, innovative practices or achievements. (Ministry of Educaton and Science, Republic of Bulgaria, 2016f)

Promotion of **students' attitudes and practices as European citizens** is also a subject of the Law of pre-school and school education, where the next principles and goals are defined:

- Principles:
    - Humanity and tolerance
    - The preservation of cultural diversity and inclusion through the Bulgarian language
- Goals:
    - Acquisition of competences needed for successful personal and professional development and active civic life in modern communities
    - Acquisition of competences for understanding and application of principles, rules, responsibilities and rights arising from EU membership

The Law is supported by a special Ordinance on civic, health, ecological and intercultural education (Ministry of Education and Science, Republic of Bulgaria, 2016b), which states that *Civic education is aimed at forming civic consciousness and civic virtues and involves knowledge about the formation of a democratic society, the rights and obligations of the citizen, and skills and readiness for responsible civic behavior*.

Dimensions and aspects of STEM teachers' competences that are evident in teacher training curricula in Bulgaria

The Low of pre-school and school education and accompanied regulatory framework is quite new – it is in effect from the 2016. At the moment the institutions, responsible for teacher's education and development are in process of development new educational plans and curricula, so to be able to implement the new regulation since 2017/2018 academic year. This is the reason there is a lack of information about how the different universities and other institution will respond to the new rules in teachers' development. Moreover, not only the universities, but also the separate faculties (preparing teachers in different disciplines) have their academic autonomy in in decision what subjects to teach, under which curricula, how deep and what content to include.

The main regulatory framework in teachers' development is provided by the Ordinance on National requirements for acquiring professional qualification "teacher". The other main aspect of the required teachers' knowledge and understanding is on the field of **pedagogy and educational technologies** as well as the field of **psychology**. The knowledge of how to teach (in general) and how to teach specific subject are crucial for teaching profession in Europe: *Initial teacher education is an intensive experience that requires student teachers to be both learners and teachers simultaneously – being supported in learning how to teach, and supporting pupils in how to learn* (Caena, 2014). In correspondence with this need, the Ordinance on National requirements for acquiring professional qualification "teacher" (Ministry of Education and Science, Republic of Bulgaria, 2016c) suggests the minimal academic hours pre-service teacher have to learn:

- Pedagogy: 60;
- Psychology: 60;
- Pedagogy in… (specific subject): 90;
- Inclusive education: 15;
- ICT in education and work in digital environment: 30.

The policy document defines the minimum of academic hours to study basic disciplines, but it does not provide any requirements for learning content. It is responsibility of the training providers.

The Ordinance define who can teach specific school subject. For STEM teacher it is expected to have a stable base in a **specific content** (they should have basic bachelor or master degree in the field) and to have taken additional or parallel courses in **pedagogy and psychology**. The experience at Sofia University and discussion and forums with other teachers' training institutions shows a gap between subject matter education and pedagogical education – usually both groups of disciplines are led by professors with very different expertise without any concurrence. The relationship between both groups of subjects are responsibility of departments of pedagogy in… (specific subject).

The main organizations that are eligible to prepare STEM teachers are universities. Most of them prepare dual subject teachers – biology & chemistry, physics & mathematics, physics & chemistry, mathematics & informatics, chemistry & informatics, etc. There is a good practice at Sofia University to share disciplines between pre-service teachers from faculties of chemistry, physics and mathematics and informatics. In this specific case, the IBL is taught in parallel with ICT in education.

In addition to main teachers' training providers, other institutions can also provide (usually short-term) teacher training courses – Bulgarian Academy of Science (BAS), special departments for teachers' CDP, NGOs, etc. Since 2016 the National register of teachers' qualifications programs (Ministry of Education and Science, Republic of Bulgaria, 2016a) has been developed. All the courses are approved by Ministry of Education and Science and provide corresponding ECTS credits which are required for teacher' attestation and professional development. Unfortunately, only brief annotation of the course is publicly accessible. According to it, the main directions of **STEM teachers' courses** are:

- subject matter course, dedicated to the new curricula in specific subject and class;
- innovative methods of teaching;
- applications of ICTs in specific subject education.

It is a good practice that some of organizations provide European proven courses developed under a European research project. For STEM teachers special place has **Inquiry-based learning courses**, related to the corresponding EU projects and networks: Mascil (BAS), weSPOT (Sofia University), Scientix (BAS).

Dimensions and aspects of STEM teachers' competences that are implicitly evident from students STEM curricula in Bulgaria

The Bulgarian educational system determine two type of schools: general schools and professional school. STEM subjects are compulsory in both schools until graduating first level of secondary school. In general schools, second level of secondary school, there is a National standards for profiled education in STEM subject. The standards and the corresponding curricula are used by the schools, who have chosen to offer profiled education in the field.

The National standards for STEM education approve the necessity for STEM teacher to be very well familiarized with the **subject matter**. Second level, which goal is to prepare pupil for universities, requires these teachers to have much more academic knowledge than other, teaching in first level.

The National standards for first and second level of STEM learning reveals also additional teachers' competences, implicitly describe there.

The National standard about learning content (Ministry of Education and Science, Republic of Bulgaria, 2015b), App#3 – mathematics, informatics and ICTs specify the next goals for the basic education (5. – 7. grade):

- Forming of logical thinking, combinability, observability and mathematical competence;
- Empirical formation of a part of geometric knowledge,

for the first level (8. – 10. grade):

- Development the ability and desire of the individual to use mathematical methods of thinking and presentation - by means of formulas, models, constructions, graphs, diagrams - in general, "working with data";
- Taking responsibility for self-fulfillment of tasks as well as showing attitude and choice of decision and behavior according to specific problems and circumstances.

The goals implicitly shows that the teacher should be able to lead the **Inquiry-based learning process** as well as to form the different levels of **research skill** of student. The same requirement is much more explicitly stated in the National Standards in Human and Nature, Biology and Health Education, Chemistry and Environment, Physics and Astronomy, where the next goals are described:

- Ambient word (1. – 4. grade): Forming skills to study of environment changes through discovery of data, facts, and by observatory of processes and phenomena
- Human and nature (5. – 7. grade):
    - Stimulating curiosity to the nature…
    - Forming skills for research of objects, processes and phenomena in the nature
    - Using primary (observation, experiment) sources and secondary (schemes, charts, graphics, models, etc.) sources of information, related to organisms, solids, substances, natural phenomena and processes.
- Biology and Health Education (5. – 7., 8. – 10. grade)
    - Forming practical skill to work with laboratory instruments, appliances and apparatuses, observation and study of objects of the nature.

    - Development of curiosity to the life nature
    - Forming practical skills for observation and study of different levels of organization of the live matter
- Physics and Astronomy (8. – 10. grade): Development of practical skills for preparation and conduction of observations and experiments, for use of physics' instruments and apparatus, for measuring physical magnitude, and verification of physical laws.
- Chemistry and protection the environment (5. – 7., 8. – 10. grade):
    - Forming the skills for observation and comparison of objects, noticing of causal links; explaining properties of substances through their construction, aggregation of information; formulating conclusions
    - Developing self-learning skills by exploring information presented through text, tables, charts, patterns, diagrams, including using ICT; discussing the impact of the studied substances on the environment and people

The same standard and the STEM curricula implicitly reveal the also the teachers' competences in the development of **critical thinking**, **creativeness**, the **team-work skills**, and the **work on a project skills**:

Critical thinking

- ICTs (I level): development of informational culture, critical and responsible attitude to the information
- Biology and Health Education (8. – 10. grade): Forming of critical thinking and reasoning the position in solving specific cases and problems, related to the own and relatives' health and the protection of the environment

Creativeness:

- ICTs: Creative use of the possibilities of the modern technologies for elaborating information, solving problems and communication.

Team working skills:

- ICTs: Working online in team on the common problem.

Work on a project:

- ICTs: Forming skills for team work in development, presentation and documenting of group project.

The requirement of the STEM curricula on the interdisciplinarity of the learning process:

- Math (II level): development the ability for application of mathematical thinking and reasoning in solving problems in other learning disciplines
- Informatics (I level): modelling object of real word
- Ambient word (elementary): Development of integrated knowledge about ambient word…

means that the teacher should have a good base on other STEM subject as well as to act as e **team member** in local teacher's community.

The very important teacher's competence is to use the ICTs in teaching process, as in Bulgaria students use ICT in class AND for complementary activities (homework, projects, research) in Maths and Science at all grades (EACEA, Eurydice, 2011) (Figure C3: Student use of ICT by subject area according to official steering documents in primary and general secondary education, p.46).

Major issues for consideration: Proposed issues for discussion about STEM teachers' professional development in Bulgaria

The educational reform defines new profile of the teacher as a main actor in the educational process. The change of the in-service teachers' knowledge, skills and attitudes, as well as professional life habits and behavior in parallel with accepting of new understanding of teachers' responsibilities is a big challenge not only for teachers themselves but also for supporting institutions – Ministry of Education and Science, Regional Management Centers of Education, teacher training institutions and schools. Only working together, they can react to:

Key message 1: The academic, pedagogical, communicative and administrative teachers' competences needed to be developed and supported all together.

Key message 2: Teachers needs to act as a researchers and innovation providers in the classroom.

Just few years ago the schools were strongly recommended to follow the national directions on management, internal organization of school life, and development strategies according to the school type. Now a day they have more autonomy and freedom for decisions, and respectively – more responsibilities.

Key message 3: Schools and teachers are more flexible to reflect to the users' expectations and economy changes, and they needs to manage their own strategy, curricula and teaching approaches.

The teachers' training institutions are in front of the f the challenge to prepare new curricula, corresponding to the new requirements for teachers. In the same time they should to support in-service teacher to develop their competences according to new rules and methodology of teachers' assessment, providing relevant courses for CPD in appropriate forms, duration and places.

Key message 4: The teaching training institutions needs to respond to the new requirements of schools and teachers with new curricula and updated learning content, and to be flexible for permanently changing requirements.

The educational reform open the doors for business companies and NGOs to provide short-term teachers' trainings. These give possibilities for publishers to participate in the teachers' competence development process familiarizing them with knew students' textbooks and learning resources, for business companies to prepare teachers to develop particular professional skills in professional schools, for NGOs to provide support and training in inclusive education issues, etc.

Key message 5: Institutions and organization, eligible to provide short-term thematic training courses, need to be prepare for their new role and for understand of such a responsibility.

The students' curricula demonstrated the need STEM teaches' to be able stimulate pupils natural curiosity to the science and nature, and to develop students' inquiry skills - to organize different levels of experiments, to observe variety of phenomena, to make conclusions and to reason them. In addition, teachers are required to act as pedagogical researchers in the classroom and to share their experimental results, and to be able to evaluate in a critical way innovative experience of other teachers.

Key message 6: The application of IBL in STEM subject teaching should be interweave in development of competences, curricula, training and practice in all level and institutions.

All of these key messages are not only challenge for all the stakeholders but they also provide a set of possibilities for new way of communication and collaboration between institutions. The real educational reform is possible only with a common efforts of all sides together

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STEM teachers' competence development in Bulgaria

Key messages to be discussed at the Bulgarian multiplier event

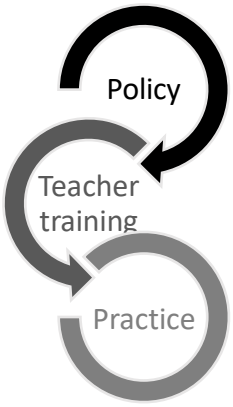
The background

During the last decades, Bulgaria was faced with the need of dramatic changes in educational system and regulatory framework. The reform has started in 2010 and since 2016 it is in the effective use. The educational reform defines new profile of the teacher as a main actor in the educational process. The change of the in-service teachers' knowledge, skills and attitudes, as well as professional life habits and behavior in parallel with accepting of new understanding of teachers' responsibilities is a big challenge not only for teachers themselves but also for supporting institutions – Ministry of Education and Science, Regional Management Centers of Education, teacher training institutions and schools.

Prominent issues for consideration on STEM teachers' competence development in Bulgaria

***At macro level*: Opportunities and challenges in building teacher competences by the teacher trainings**

- Policymakers at national, regional and local level need to organize work together with traditional training providers (holding the methodology knowledge) and new one (holding concrete practical approach).
- Policymakers and all levels to create conditions IBL approach to be embraces by new teacher trainings providers (business, publishing houses, etc.) and teaching materials?



***At meso level*: Opportunities and challenges in schools management of strategy, curricula and teaching approaches**

- School authorities to manage autonomy and freedom for decisions, and respectively – more responsibilities, so to use it to develop environment and space for application of the IBL

***At micro level*: Teacher competence are needed to design IBL activities in the class. Teachers needs a support for IBL day-to-day application. Content should be provided to spread widely the approach.**

- Teachers need to build competences to design the education in IBL manner, to develop IBL scenarios and introduce them into day-to-day practice.
- Teachers needs support to design IBL activities.
- Content providers to respond to the new requirements of schools and teachers with new curricula and updated learning content interweaving the approach into it, and to be flexible for permanently changing requirements.

Main theme for the Bulgarian multiplier event

Focus on the STEM teachers' training curricula and methods – the role of different stakeholders in the teacher teachers' competences development and the role of the teachers' competences for the development of new generation of Bulgarian youth.

Structure of the Bulgarian multiplier event

Raising issues	Negotiating	Structuring
Opportunities and challenges in STEM teachers training, professional development and on-going support for competence development.	Negotiating over the issues, propose recommendations for effective STEM teachers training (curricula, content & approaches) for competence development.	Mapping the issues and the recommendations onto EC (2013) competence framework & the Bulgarian educational reform framework.

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Ключови компетенции за българските учители по природни науки, инженерни науки и математика

Основни послания

За дискутиране по време на семинара

Описание на контекста

През последните десетилетия България се изправи пред необходимостта от сериозни промени в образователната система и основните закони в тази сфера. Последната реформа започна през 2010 г., като промените влязоха в сила през 2016 г.. Тези промени определят важна роля за учителя в образователните процеси. От друга страна се изискват сериозни промени в знанията, уменията и поведението на учителите. Това води до трудности не само за учителите, но и за всички други въвлечени институции – министерството, регионалните инспекторати, институциите подготвящи учители и училищата.

Важни въпроси свързани с развитието на компетенциите на учителите по природни науки, инженерни науки и математика в България

На ниво класна стая (микро ниво): **Учителите трябва да могат да проектират класни учебни дейности, свързани с прилагане на изследователския подход. Учителите имат нужда от помощни инструментални средства за ежедневното прилагане на този подход, както и от подходящо учебно съдържание.**

- Необходимо е учителите да изграждат и развиват компетенции за прилагане на изследователския подход в училище, да създават и прилагат сценарии, базирани на този подход в ежедневната си практика в клас.
- Необходимо е да се предоставят инструменти на учителите за по-лесно и ефективно прилагане на този подход чрез подходящи учебни дейности.
- Авторите на учебно съдържание трябва да нагодят учебния материал с цел възможност за прилагане на изследователския подход, като дадат достатъчно свобода на учителите да избират как да се случи това на практика.

На ниво училище (мезо ниво): **Възможности и предизвикателства пред училищните ръководства за по-гъвкаво прилагане на нови стратегии, учебни програми и иновативни методи за преподаване**

- Училищните управи да използват правото си на автономни решения и отговорността пред обществото за високо качество на образователни услуги, като създават условия и възможности за прилагане на изследователския подход в обучението

На национално ниво (макро ниво): **Възможности и предизвикателства за изграждане на нужните компетенции на учителите чрез повишаване на квалификация и обучение през целия живот**

- Министерството да организира и гарантира провеждане на обучения за учители на национално, регионално и локално ниво чрез привличане на компетентни преподаватели и организации, специализирани в подготовката и квалификацията на учителите

- Министерството да стимулира създаване на подходящи инструментални средства и учебни материали за прилагане на изследователския подход в образованието

⇨ **Основни теми за семинарите в България**

Основен фокус и център на внимание ще бъдат въпросите свързани с ефективното прилагане на изследователския подход в обучението в природните науки, инженерните науки и математиката. Ще се разгледат проблемите свързани с изграждане на нужните компетенции на учителите, ролята и отговорността на родителите, осигуряването на необходимите ресурси за прилагане на този метод в ежедневието.

Повдигане на въпроси и проблеми (дискусии в еднородни групи): Възможности и предизвикателства пред подготовката и развиването на компетенциите на учителите за прилагане на изследователски подход в обучението по природни и инженерни науки и математика.

Постигане на съгласие (дискусии в разнородни групи): Дискутиране на конкретни въпроси и проблеми, свързани с подготовката на учителите, постигане на съгласие и формулиране на конкретни предложения пред съответните национални органи.

Финално структуриране (пленарно заседание): Финално оформление и структуриране на повдигнатите проблеми и предложения за решения, и намиране на съответствие с европейската скала на компетенции и правната рамка на Българската образователна реформа.