

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

by Mario Barajas¹

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

Educational System at secondary and post-secondary level

In order to acquire a comprehensive understanding of the current implementation of competence-based learning in Spain in secondary and post-secondary education, it is worth considering factors related to the administrative and political structure of the country. To that goal, in this section we review relevant data from the Spanish Educational System, National Policies and Spanish curriculum.

The education system in Spain is organised into mainstream education and specialised education. Mainstream education comprises:

- Compulsory secondary education: it is divided into four years and it is usually completed at the age of 16.
- Vocational training: it offers a range of training provision that equips pupils with the necessary skills to undertake any one of various trades, have access to the labour market, and actively participate in social, cultural and economic life. It is organised into 26 professional families and divided into two stages: intermediate and advanced, which have a flexible modular structure and variable duration
- Post-compulsory secondary education: Baccalaureate, 2 years, not compulsory, generally until students are 18. Three types of studies: Scientific, Humanities and social sciences, and Arts
- University education: it is organised into three cycles, namely Bachelor, Masters and Doctorate, with different duration and a minimum required number of ECTS credits.

Secondary education comprises compulsory secondary education (4 years, free and compulsory) and post-compulsory secondary education (Baccalaureate, 2 years, not compulsory). Higher education includes university education,

¹ Associated Professor, Department of Didactics and Educational Organisation of the Faculty of Education, University of Barcelona.

✉ ma.barajas@gmail.com

advanced arts education, advanced vocational training, advanced plastic arts and design education and advanced sports education.

Specialised education programmes are concerned with arts, sports and languages education and can be undertaken from the second cycle of primary education. Figure gives an overview of the Spanish Educational System

The Spanish Constitution addresses an essential aspect of the educational organisation in Spain, that is, the decentralisation of educational responsibilities and the distribution of educational competences between the State and the Regions. The latter may undertake the organisation and administration of the education system in their respective regions, with the exception of those powers which are exclusively central, such as the regulation of the conditions for the awarding, issuing and recognition of academic and vocational qualifications. Regions are also responsible for teaching their own co-official languages which, together with Spanish, have official status in some regions.

National Policy on competence-based learning

Review of National Policy suggests that student competences have an increasingly important role in the Spanish Educational system. At the moment, the **Education Law to Enhance the Quality of the Educational System (MECD, 2013)** demands to lower the rate of early school leaving, which is twice as high as the mean from the European Union (MECD, 2013). Other goals are to increase youth employment, modernise professional training, give more autonomy to schools and increase the use of ICT in education.

The Law gives more weight on student competences. Competences are present in the curriculum development and assessment of all educational levels and modalities. Moreover, the Law states that cognitive abilities must be accompanied by students' acquisition of transversal competences such as critical thinking, management of diversity, creativity and communication skills. To that goal, National and regional governments must cooperate so to make a link between these competences and the current contents and evaluation criteria of all the education delivered across the country.

According to current regulations, the National Curriculum is a set of goals, basic competences, content, pedagogical methods and assessment criteria of all the training provided in Spain. The goal of the National Curriculum is to guarantee a common education for all students in Spain as well as to ensure the validity of the degrees awarded all around the country.

In 2006 basic competences were introduced for the first time in the Spanish National Curriculum for Primary Education (National Agency Official State Gazette, 2006) and in 2007 for Secondary education (National Agency Official State Gazette, 2007). The competences have strong similarities with those set in the European Reference Framework (European Commission, 2008): linguistic communication, mathematic competence, competence in knowledge and interaction with the physical world, digital and information processing competence, social and citizenship competence, cultural and artistic competence, learning to learn, and personal autonomy and initiative. The Curriculum states that students must acquire the appropriate level of the competences by the end of compulsory education. Moreover, it explains how each subject such as Spanish Language, Mathematics, Physical Education, etc. contributes to the acquisition of the aforementioned competences.

According to the distribution of powers among National and Regional government, the National Curriculum in Spain constitutes a framework which is further developed by regional governments. To date, most regional governments have organized their curriculum around student competences (School Council of the Basque Country, 2008). As an example, the curriculum for primary and secondary education in the region of Catalonia links student acquisition of basic competences with traditional school subjects. Basic competences are divided into two groups, i.e. transversal and specific. Transversal competences are defined as linguistic and audiovisual communication, artistic and cultural competence, information processing and digital competence, mathematic competence, learning to learn, and sense of initiative and entrepreneurship. Specific competences correspond to knowledge and interaction with the physical

world, and social and civic competence. In order to support teachers in the implementation of competence-based teaching and assessment, the Department of Education of Catalonia has published teacher guidelines for Competence-Based learning and assessment for two subjects, i.e. Language and Mathematics, for primary (Generalitat de Catalunya, 2013) and secondary education (Generalitat de Catalunya, 2013).

Finally, the law gives freedom to schools to carry out the final development of the curriculum for the educational levels that they offer. Within this context, there are reasons to think that schools wishing to do so can make their own policies on competence-based learning and assessment provided the goals of the regional and national curriculum are met.

To sum up, review of National Policy on Competence-Based education in Spain shows that the Spanish educational system is in line with the European policies. Such change is promoted by the Spanish Ministry of Education, Culture and Sports in collaboration with the Regions.

STEM Teachers competences development

The National Policy focuses currently on competences is the Strategic Framework for Educators' Professional Development. It was announced in May 2013 by the National Institute for Educational Technology and Teacher Training (2013). It is a holistic framework whose goals are: (1) to structure initial and in-service teacher training around a new competence model of education professionals from the 21st century, (2) to explore new training modalities that facilitate collaboration among teaching professionals and (3) to establish a common regulation framework which allows for professional competence certification and certification of activities which show evidence of an effective professional development for teachers and trainers. The framework is composed by three main pillars:

- Professional teacher competences: the project aims to redefining the profile of the teaching professionals through a competence framework for educational professionals, which should allow teachers to develop and assess students' competences.
- New training modalities: The Ministry wishes to incorporate learning which takes place in online communities of practice and other innovative learning opportunities into certified teacher training programmes.
- Regularisation of training: it is concerned with updating regulation about certification of teacher training around professional competences.

The encouragement of STEM is supported by the new LOMCE curriculum for secondary education. For students age 15-16, one of the objectives is that the upper secondary education should help develop in the students the capabilities *"to understand the basic elements and procedures of the research and scientific methods."* Current changes in the enacted curriculum are in line with STEM objectives. All regional governments (in charge of the real implementation of these policies) are developing professional development programmes, including pre-service and in-service teacher education, however there is a lack of a clear general framework for STEM competencies in the line of ICT teachers competencies.

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

In line with Recommendation 2006/962 / EC of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning, the Spanish Royal Decree establishing the basic curriculum of secondary education and Baccalaureate (MECD, 2015), is based on the empowerment of competency-based learning, integrated in the curricular elements to promote a renewal in teaching practice and in the teaching and learning process. New approaches to learning and evaluation are proposed, which, according to the Law, must be a major change in the tasks to be undertaken by students, as well as innovative methodological approaches. The competence is a combination of practical skills, knowledge, motivation, ethical values, attitudes, emotions, and other social and behavioural components that are mobilized together for effective action. They are, therefore, considered

as knowledge in the practice, knowledge acquired through active participation in social practices which, as such, can be developed both in the formal educational context, through curriculum, as in non-formal and informal educational contexts. In the Spanish educational system, competences, therefore, are conceptualized as a "know-how" that applies to a diversity of academic, social and professional contexts. For the transfer to different contexts being possible is indispensable an understanding of the knowledge present in the competences, and the linkage of the latter with the practical or skills that integrate them.

Competence learning favours the learning processes themselves and the motivation to learn, due to the strong interrelation between its components: we learn a concept together with the procedure used to learn this concept. The Law adopts the name of the key competences defined by the European Union. The role of the teacher is fundamental, as he/she must be able to design tasks or situations to solve problems, the application of learning and the promotion of student activity.

In practice, the current Educational Law LOMCE, at the level of primary education refers to STEM competencies as an integrated basic competence. At the level of secondary education, although the competence approach mentioned above is used, it discriminates among the different knowledge areas, i.e. considers competences for maths, for physics, and so on. As such it lacks a holistic vision of competences, and adopts a narrow vision of the STEM competencies, separated in knowledge areas, limiting in practice an integrative view of these areas and the possibility of using new didactical approaches, as e.g. project-based learning or inquiry-based learning.

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

Currently in Spain there is not an official Master's Degree Program in STEM education. Conversely, pre-service teacher education for teaching in secondary schools is divided into four STEM related subjects: Maths, Physics, Chemistry and Technology. However all share communalities in terms of competences. Table 1 below presents a synthesis of the competences to achieve (knowledge, skills and dispositions) out of the Inter-University Master's Degree Programs for teacher accreditation in each of the STEM-related subjects.

Table 1: *Competences (knowledge, skills, dispositions & attitudes) evident the Inter-University Master's Degree Programs for teacher accreditation in STEM-related subjects*

<i>Cross-disciplinary aspects of knowledge and mastery of the content</i>
— Know the contents of the STEM subjects to teach.
— Know the history, recent developments and the future prospects of the disciplines that make up STEM in order to convey to the students a dynamic vision of these disciplines.
— Know the nature of the STEM disciplines and the specific forms of making STEM knowledge.
— Know the possible theoretical-practical developments that correspond to the teaching and learning of the STEM disciplines
— Know the epistemological perspectives that provide the knowledge of the reality that unfolds STEM disciplines.
— Have criteria for the selection and ordering of conceptual and practical aspects most relevant for the teaching of the STEM disciplines.
— A critical capacity to interpret and evaluate the socio-economic aspects and the environmental effects of the applications of STEM knowledge.

— Ability to solve problems related to the STEM subjects, qualitative and quantitative type, based on the models developed for the subject

Teaching skills

Curriculum and educational practices

— Meet all current curricular elements of the subjects that are taught, deeper into the issues that are necessary for their education (specific and transversal skills of the disciplines that have been developed).

— Know identify questions and key ideas of the different topics that are part of the curriculum.

— Ability to plan, organize, manage and explain phenomena, information, solving problems, projects and processes related to the fundamental aspects of the subjects STEM that teach.

— Know contexts and situations (historical also referred to the matter in question) in which they are used or can be applied for the various curricular contents.

— know how to design and develop individually or collectively educational projects, programming units, plans of action, environments, activities and innovative materials, that allow to adapt the curriculum of STEM subjects to the diversity of the students and promote the quality of the contexts in which the educational process.

— Have criteria for the selection and evaluation of didactic and hands-on activities that may constitute a landmark in the teaching of the subjects STEM.

— Use teaching strategies that contribute to the significant construction of knowledge and reasoning, that encourage a critical spirit in relation to STEM.

— Recognize the importance of language in the learning of the raw materials and the characteristics of the scientific language and promote STEM the use of teaching materials for students to learn science and mathematics learning to speak and write Science and mathematics.

— Assess the importance of experimental work in the teaching and learning of Sciences; Learn about different ways to integrate it into the design and implementation of educational inquiry.

— Recognize the importance of integrating information and communication technologies in teaching and learning activities of STEM. Meet models and examples of how to integrate them into the activities of teaching and learning. Ability to integrate information ICT in educational practices.

Focus on diversity

— Consider diversity issues, taking into account the resources available, supports psycho-to cater to the diversity in the centre and in the classroom, the organisation and the management of the classroom, the various forms of grouping.

— Detect learning difficulties of students. Use the knowledge of the characteristics of the development of the students, their social contexts and the motivations and interests to design and

develop the educational proposals that will enable them to continue learning throughout life , help them to reason critically and to behave autonomously, relying so tight in the personal capabilities.

— Recognize the importance that the ways of understanding and reasoning of the students are in the process of teaching and learning in the subjects STEM and identify them in specific situations.

— Transform the curriculum of various subjects STEM in activities and work adapting them to the ways of understanding and reasoning of the students, their educational levels, social context, diversity, etc.

— Design and develop learning spaces with particular attention to fairness, emotional education and values, equality of rights and opportunities between men and women, public education and the construction of a sustainable future.

Evaluation

— Know how to use strategies and techniques of evaluation. Understand the evaluation as an instrument of regulation and stimulus to the effort, as well as the promotion of the improvement of the teaching and learning of subjects STEM.

— Assess the impact of the use of technologies in the processes of development and learning of the STEM.

Dispositions and attitudes

— Understand learning as a global, complex and transcendent; self-regulate the own learning and mobilize knowledge of all kinds to adapt to new situations and connect knowledge as a method to draw up new ones.

— Carry out work related to STEM (according to their speciality) independently and responsibly.

— Apply fundamental techniques and methodologies in educational research and be able to design and develop projects of applied research and innovation in the educational intervention and to situations that are specific to the area of knowledge of STEM.

— Motivate and promote communication between students and teachers, and the same students, in order to get a good climate for learning, and developing teaching strategies that prevent exclusion and discrimination.

— Know the historical evolution of the labour market, its current situation and perspective, the characteristics of the teaching profession, the interaction between the social reality of the time, work and the quality of life, as well as the need to acquire suitable for adaptation to the changes and transformations that may require the professions.

— Appreciate the educational value of reflective practice of teachers during their working life and to promote its application in the students themselves as a way to become citizens with critical thinking. Identify information needs, find it, analyse it, process it, use it and communicate it effectively, critical and creative.

— Acquire an ethical commitment based on the ability of criticism and self-criticism and the social importance of education; critically analyse the personal work and find new resources for the

autonomous learning and professional development; take on the ethical dimension of teaching, acting with responsibility, making decisions and analysing critically the ideas and proposals on education, from both the research and innovation and the educational administration.

—Assume that teaching must improve, update and adapt to the educational, social and cultural, and scientific changes; understand the importance of participating in research and innovation projects related to teaching and learning, and to introduce innovative proposals in the classroom.

— Know and analyse the basic elements of the organizational model of the schools and its link with the political and administrative context. Meet the institutional approach of the centres, the organization of human resources, the structures of participation of the educational community, the characteristics and the forms of organization of the class groups, the organization of resources materials and of their relationships with the environment

— Design and carry out activities that contribute to make the school a context of participation in general, and participation in the evaluation, research and educational innovation in particular, in order to promote team work and teaching between teams .

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

By analysing students STEM curricula of both secondary education and baccalaureate, Vazquez and Massanero (2017) have identified certain competence dimensions that teachers need to master. Table 2 presents outcomes of the above mentioned study, providing insights on STEM teachers' competences that are implicitly evident in students STEM curricula in Spain.

Table 2: STEM teachers' competencies implicitly evident in students' curricula as identified by Vazquez & Massanero (2017)

<i>Dimensions</i>	<i>Aspects</i>	<i>Extracts of learning standards (examples)</i>
Related to scientific inquiry processes	Skills and strategies of scientific methodology (baccalaureate)	"Apply abilities of scientific inquiry (posing questions, identifying and analysing problems, suggesting sound hypothesis, gathering data, analysing trends based on models, designing and proposing action strategies)"
	Scientific culture (secondary education)	"Analyse a scientific text, critically appraising its content"
		"Analyse the role of scientific research as the engine of our society, and its historical importance"
	Scientific activity (secondary education)	"Recognise and identify the symbols in labels of chemical products and facilities"

Related to students' research projects	Research project (secondary education)	"Use argumentation, justifying the hypothesis posed"
		"Explain with precision and coherence both verbally and in writing the findings of the research"
Related to contents	Ecology and environment	"Compare the practical consequences in the sustainable management of resources, critically appraising its importance"

A review of students' STEM curricula in the country – with the aid of EC (2015) teachers' competence framework - provides evidence that the following aspects of teachers' competences mentioned in the framework are implicitly required by STEM teachers in the country:

Knowledge & Understanding:

- Pedagogical Content Knowledge
- Issues of inclusion and diversity
- Effective use of technologies in learning

Skills:

- Collecting analyzing, interpreting evidence and data for teaching/learning improvement
- Using, developing and creating research knowledge to inform practices

Dispositions & Attitudes:

- Dispositions to promote students' democratic attitudes and practices as European citizens (including appreciation of diversity and multiculturality)
- Dispositions to team working, collaboration and networking.

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

Proposed issues for discussion on STEM teachers' professional development for competence development in the country – as identified via the exploration of the Spanish context at policy, policy mediation and practice levels presented in this document - are:

At macro level, relating to policy envisions on STEM teachers' competence development: Competence-based education is supported by law in all level of compulsory education and baccalaureate. Key competencies are part of the evaluation of the effectiveness of the educational system. Furthermore, STEM has more weight in the curriculum in terms of content and time. The law demands teacher education being adapted to this new situation in terms of contents and methods. In this sense, the Spanish reform recommends methods to facilitate methodological strategies that allow for classroom competencies work (ECD/65/2015). Among the most prominent issues, we can mention:

- Weariness in front of the continuous legal changes and budget cut-outs.
- Lack of coordination among the national, regional CPD providers in terms of policies and strategic plans for STEM CPD that respond to these changes.

At meso level, relating to the mediation mechanisms from policy to practice (teacher training): Universities have undergone an important challenge on creating their own Master's Degree in Secondary Education (should to be approved by a Spanish National Agency of Evaluation), with a competence approach (knowledge, skills and attitudes) that vertebrates the study programs. However, many times University teacher trainers lack experience on the reality of the school, and are more oriented to theoretical approaches. However, there is a great opportunity for the updating of both in-service and pre-service STEM teacher education programs (the new Law specifically mention 7 key competencies, including "mathematics competence and basic competencies in science and technology"). Then teacher education programmes should follow the same approach.

On the other hand, there is a persistence of providing teacher training on STEM according to the traditional subjects (physics, chemistry, technology and maths), which hinder the possibility to include methodologies that are becoming more and more popular in secondary education, as e.g., Project work. Many times University teacher trainers lack experience on the reality of the school, and are more oriented to theoretical approaches.

However, although training contents has been updated, there is a lack of EU policies insufficiently considered (e.g. OSR, STEM gender aspects, ICT, RRI, STE(ART)M), and methodological aspects (e.g. IBL, project work,) are still a challenge in teacher education programs. Among the most prominent issues, we can mention:

- Teacher education programmes need a holistic approach to STEM competencies, getting used to work according to a competence-based approach, working in coordination with all STEM related subjects, and with other key competencies (e.g. digital competencies)
- CPD programmes need to integrate those methodologies and innovations that favour the acquisition of STEM competencies, as e.g. IBL, PBL, OSR, ICT, Gender, etc
- Need to provide STEM training paths for in-service teachers in collaboration with different types of institutions, e.g. science centres, research centres, universities and governmental initiatives.

At micro level, relating to teaching/learning practice: There should be a high level of coherence between the competencies required by teachers and those described for students in the Law of Education and further deployments in the regions. However, in practice this does not always happen for different reasons related to the day-to-day work. On the other hand STEM competencies imply a new role for students, more active and autonomous (conscious and responsible of their own learning). Finally, the participation of parents in the day-to-day of the educational centres is important at the time of pushing for STEM-related extra-curricular activities. Among the most prominent issues, we can mention:

- For teachers, there is a surplus of subjects and contents, obsession for finishing the programs, as well as a tendency to use summative evaluation.
- For students, there is a lack of interest on contents because students do not find their connections with reality. And considering also the gender differences in STEM.
- Parents need more information on the importance of implementing STEM innovations in the schools, so they can be involved on the decision-making on their particular centres.

In the frame of the ELIte project, the above mentioned issues will be discussed and negotiated with policy, policy mediation and practice stakeholders (in the course of a multiplier event). The focus of the event will be on the STEM policies at both national and regional level, 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 Spanish youth.

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STEM teachers' competence development in Spain

Key messages to be discussed at the Spanish multiplier event

The background

Spanish educational Laws have been changed several times during the last twenty years. Since 2013 and in process of deployment, there is a **new Educational Law** named “Organic Law for the Improvement of the Quality of Education” (LOMCE, 8/2013). Fruit of the political instability and, to a certain extent, a lack of a culture of consensus, implementation is being challenged in many levels, giving a sense of provisionality, which is reflected in the fact that regions, local authorities, and educational councils are in **continuous negotiations with the Ministry in order to modify the law**. In this situation there is certain weariness in front of the continuous legal changes and budget cut-outs.

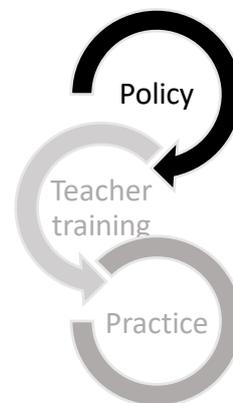
There are important changes very much in concordance with the EU policies (European Parliament, 2006/962/EC). The Law emphasises quality and employability, encouraging selecting both the professional and the academic path at earlier ages. There is **more emphasis in STEM**, more instrumental type of disciplines, and less subjects optional. Of importance is the interest of giving the **schools more freedom in terms of adapting the national curriculum** (curriculum proposal) or **introducing new methodologies** and optional subjects (didactical programme), within their legal competencies. The **curriculum is now organised according to a competency approach**, in which knowledge, skills and attitudes have been identified in all subjects and at all levels. Key competencies, named “basic competencies” inform the competence model. This panorama implied also **the reform of the Continuous Professional Development (CPD) programmes**, as well as access to the teacher profession, now based on Master’s Degree Programmes.

At macro level (policy):

Competence-based education is supported by law in all level of compulsory education and baccalaureate. Key competencies are part of the evaluation of the effectiveness of the educational system. Furthermore, STEM has more weight in the curriculum in terms of content and time. The law demands teacher education being adapted to this new situation in terms of contents and methods. In this sense, the Spanish reform recommends methods to facilitate methodological strategies that allow for classroom competencies work (ECD/65/2015).

Among the most prominent issues, we can mention:

- Weariness in front of the continuous legal changes and budget cut-outs.
- Lack of coordination among the national, regional CPD providers in terms of policies and strategic plans for STEM CPD that respond to these changes.



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

At meso level (teacher training institutions):

Universities have undergone an important challenge on creating their own Master's Degree in Secondary Education (should to be approved by a Spanish National Agency of Evaluation), with a competence approach (knowledge, skills and attitudes) that vertebrates the study programs. However, many times University teacher trainers lack experience on the reality of the school, and are more oriented to theoretical approaches.

However, there is a great opportunity for the updating of both in-service and pre-service STEM teacher education programs (the new Law specifically mention 7 key competencies, including "mathematics competence and basic competencies in science and technology"). Then teacher education programmes should follow the same approach.

On the other hand, there is a persistence of providing teacher training on STEM according to the traditional subjects (physics, chemistry, technology and maths), which hinder the possibility to include methodologies that are becoming more and more popular in secondary education, as e.g., Project work. Many times University teacher trainers lack experience on the reality of the school, and are more oriented to theoretical approaches.

However, although training contents has been updated, there is a lack of EU policies insufficiently considered (e.g. OSR, STEM gender aspects, ICT, RRI, STE(ART)M), and methodological aspects (e.g. IBL, project work,) are still a challenge in teacher education programs.

Among the most prominent issues, we can mention:

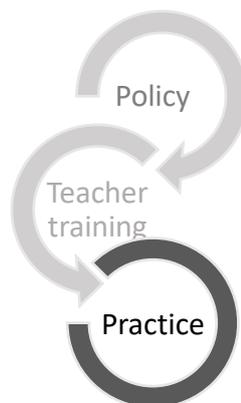
- Teacher education programmes need to get used to work according to a competence-based approach, working co-ordinately in all subjects with other key competencies (e.g. digital competencies)
- CPD programmes need to integrate those methodologies and innovations that favour the acquisition of STEM competencies, as e.g. IBL, PBL, OSR, ICT, Gender, etc
- Need to provide STEM training paths for in-service teachers in collaboration with different types of institutions, e.g. science centres, research centres, universities and governmental initiatives.



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

At micro level (students' curricula):

There should be a high level of coherence between the competencies required by teachers and those described for students in the Law of Education and further deployments in the regions. However, in practice this does not always happen for different reasons related to the day-to-day work. On the other hand STEM competencies imply a new role for students, more active and autonomous (conscious and responsible of their own learning). Finally, the participation of parents in the day-to-day of the educational centres is important at the time of pushing for STEM-related extra-curricular activities.



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

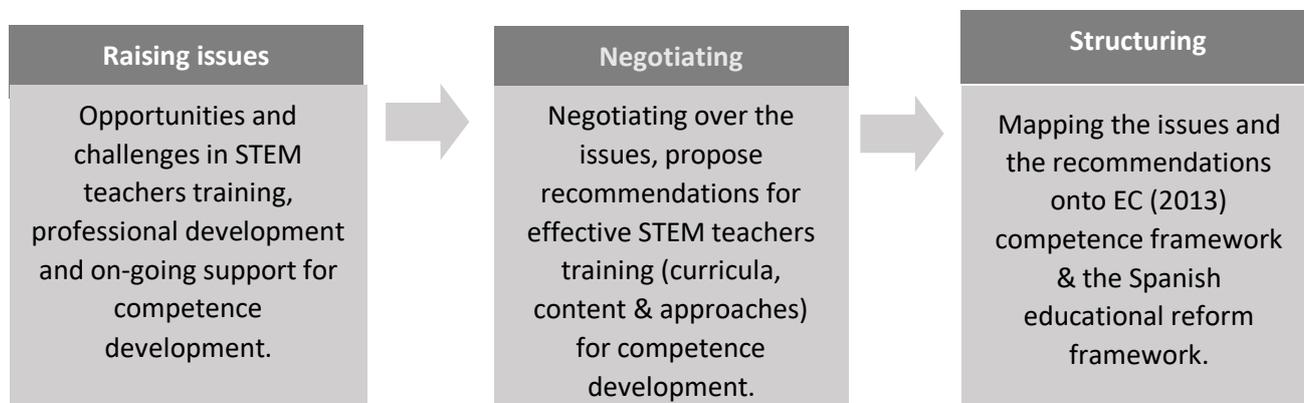
Among the most prominent issues, we can mention:

- For teachers, there is a surplus of subjects and contents, obsession for finishing the programs, as well as a tendency to use summative evaluation.
- For students, there is a lack of interest on contents because students do not find their connections with reality.
- Parents need more information on the importance of implementing STEM innovations in the schools, so they can be involved on the decision-making on their particular centres.

Main themes for the Spanish multiplier event

Focus on the STEM policies at both national and regional level, 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 Spanish youth.

Structure of the Spanish multiplier event



Desarrollo de competencias del docente CTIM en España

Mensajes clave

para ser discutidos en un evento con diferentes actores interesados

Antecedentes

Las leyes educativas españolas han cambiado varias veces durante los últimos 20 años. Desde que el 2013 y en proceso de reforma antes de ser totalmente implementada, una nueva ley educativa denominada "Ley Orgánica para la mejora de la calidad de la educación (LOMCE, 8/2013.)", ha comenzado a desplegarse con muchos recortes presupuestarios. Fruto de la inestabilidad política y, en cierta medida, la falta de una cultura de consenso, la aplicación está siendo impugnada en muchos niveles, dando una sensación de provisionalidad, que se refleja en el hecho de que las regiones, las autoridades locales y los consejos educativos están en continuas negociaciones con el Ministerio de Educación para modificar esa ley. En esta situación hay cierto cansancio en la comunidad educativa y en la sociedad en general frente a los continuos cambios normativos.

En esta ley, se aprecian cambios importantes en concordancia con las políticas de la UE (Parlamento Europeo, 2006/962/CE). Se enfatiza la calidad de la educación y la empleabilidad, fomentando la selección tanto de las futuras profesiones como trayectorias académicas a edades más tempranas. Hay más énfasis en las **carreras CTIM (ciencias, tecnologías, ingenierías y Matemáticas, STEM** en la nomenclatura internacional), con disciplinas más instrumentales, y en la práctica, menos asignaturas optativas. De importancia es el interés en dar a los centros más libertad en términos de adaptación del currículo nacional (propuesta curricular), o de introducir nuevas metodologías y asignaturas dentro de sus competencias legales. El currículo se organiza ahora de acuerdo al enfoque por competencia, identificando conocimientos, destrezas y actitudes en todos los temas y en todos los niveles. Las competencias clave (denominadas "competencias básicas"), informan el modelo de competencia. Esta situación implicaba también la reforma de los programas de desarrollo profesional del profesorado, así como el acceso a la profesión docente, ahora basada en los nuevos programas de maestría.

Aspectos destacados para su consideración en la discusión del desarrollo de competencias del profesorado CTIM en España.

A nivel macro (política):

La educación basada en la competencia está respaldada por la ley en todos los niveles de educación obligatoria y bachillerato. Las competencias clave son parte de la evaluación de la efectividad del sistema educativo. Además, CTIM tiene más peso en el currículo en términos de contenido y horario. La ley exige que la formación docente se adapte a esta nueva situación en términos de contenidos y metodologías. En este sentido, la reforma en España hace recomendaciones para facilitar estrategias metodológicas que permitan el trabajo de las competencias en el aula (ECD/65/2015). Entre los aspectos más controvertidos a discutir, podemos mencionar:

- cansancio de la comunidad educativa frente a los continuos cambios legales y recortes de presupuesto.
- falta de coordinación entre los proveedores nacionales y/o regionales de formación inicial y permanente en términos de políticas y planes estratégicos para el desarrollo profesional del profesorado CTIM que respondan a estos cambios.

A nivel meso (la formación docente):

Las universidades han experimentado un importante reto en la creación de sus propios Másteres en educación secundaria (deben ser aprobado por una Agencia Nacional Española de evaluación), con un enfoque de competencia (conocimientos, habilidades y actitudes) que vertebra los programas de estudio. Sin embargo, muchas veces los formadores de profesores universitarios carecen de experiencia en la realidad de la escuela, y están más orientados a enfoques teóricos. Existe una gran oportunidad para la actualización de los programas de formación de profesorado CTIM a nivel inicial y permanente (la nueva ley menciona específicamente siete competencias clave, incluyendo "competencia matemática y competencias básicas en ciencia y tecnología"). Es decir, los programas de formación docente deben seguir el mismo enfoque.

Por otro lado, pervive el hecho de proporcionar formación de profesorado CTIM de acuerdo a las disciplinas tradicionales (física, química, tecnología y matemáticas), que dificultan en cierta manera la posibilidad de incluir metodologías cada vez más populares en la educación secundaria, como por ejemplo, el trabajo por proyectos.

Sin embargo, aunque se ha actualizado el contenido de la formación, están insuficientemente consideradas algunas de las políticas promocionadas por la UE en sus programas de innovación educativa (por ejemplo, Recursos Educativos Abiertos, aspectos de género y CTIM, TICs, Investigación e Innovación Responsable, CTIM(Arte). Muchas metodológicas didácticas, (por ejemplo, Aprendizaje Basado en la Indagación, trabajo de proyectos) están presentes, pero siguen siendo un reto en los programas de formación del profesorado. Entre los aspectos más controvertidos a discutir, podemos mencionar:

- los programas de formación docente necesitan acostumbrarse a trabajar de acuerdo con un enfoque basado en competencias, trabajando coordinadamente y transversalmente con otras competencias clave (por ejemplo, las competencias digitales)
- los programas de desarrollo profesional del profesorado necesitan integrar las metodologías e innovaciones mencionadas anteriormente que favorezcan la adquisición de competencias CTIM,
- la necesidad de proporcionar rutas formativas en CTIM para docentes en servicio en colaboración con diferentes tipos de instituciones tales como centros científicos, centros de investigación, universidades y otras iniciativas gubernamentales y no gubernamentales.

A nivel micro (la práctica)

Debería existir un alto nivel de coherencia entre las competencias exigidas por los docentes y las que se describen para los estudiantes en la ley de educación y en el despliegue de ésta en las comunidades autónomas. Sin embargo, en la práctica, esto no siempre ocurre por razones relacionadas con el trabajo día a día. Por otra parte, las competencias troncales implican un nuevo rol para el estudiante, más activos y autónomos (conscientes y responsables de su propio aprendizaje). Por último, la participación de los padres en la cotidianidad de los centros educativos es importante en el momento de impulsar actividades extracurriculares relacionadas con CTIM. . Entre los aspectos más controvertidos a discutir, podemos mencionar:

- para los docentes, hay un exceso de asignaturas y contenidos, la conocida obsesión por terminar los programas, así como la tendencia a utilizar, por práctica, la evaluación sumativa.
- para los estudiantes, hay una falta de interés en los contenidos CTIM porque generalmente no encuentran conexiones con la realidad que viven
- los padres y madres necesitan más información sobre la importancia de implementar las innovaciones CTIM en el currículum, para que puedan participar en la toma de decisiones en sus centros particulares

Temas claves para la discusión en el evento en España

Se pondrá el foco, siguiendo lo mencionado anteriormente, en las políticas de CTIM (a nivel nacional y regional), en los programas de formación y en la metodología docente – el papel de las diferentes partes interesadas en el desarrollo de las competencias de los docentes, y el papel de las competencias de los docentes para el desarrollo de la nueva generación de jóvenes.

Planteando cuestiones controvertidas (**en grupos homogéneos**): oportunidades y desafíos en la formación inicial de profesorado CTIM, su desarrollo profesional, y el apoyo actual recibido para el desarrollo de competencias docentes.

Negociando sobre las cuestiones controvertidas identificadas anteriormente (**sesiones de grupos heterogéneos**): negociación de temas, proponer recomendaciones para una efectiva formación del docente CTIM (currículos, contenidos y enfoques) para el desarrollo de sus competencias.

Estructurando (**sesión plenaria**): mapeo de los temas clave más controvertidos, y recomendaciones sobre el marco de competencias de la UE (publicado en el 2013) y el marco de la reforma educativa española.

