Systemic opportunities and challenges for STEM teachers' competence development in Spain

A report on the processes and outcomes of the ELITe's project Spanish Multiplier Event

by Mario Barajas[1]

Introduction

Providing digital professional learning opportunities for secondary teachers' competence development is on the base of the ***Enhancing Learning In Teaching via e-inquiries (ELITe)*** Erasmus+ project as a priority of the "Education and Training" EC policy agenda. The main project goal is to support teachers' professional learning for competence development, targeting specifically in-service educators in the STEM domain. Achieving this goal pass through conceptual, methodological and domain specific perspectives, forming respective specific objectives of the project.

The multiplier event E3 is focused on the ***deepen understandings on the requirements for STEM teachers competence development at national levels***, as conceptualized and expressed by policy makers, policy mediators and practitioners. The presented report describes the methodology of the E3 multiplier event design, conduction and delivery, as well as the main conclusions from methodology and domain specific aspects of STEM teachers' competence development in Spain.

As the educational reform in Spain has just started, there are many challenges faced from all the stakeholders – policy makers, policy mediators, teachers' trainers, STEM teachers, and broad society. The role of the report is to clarify main opportunities and barriers, as they are seen by each stakeholder's group, and to find a way to negotiate the possible ways for their extended use (opportunities) and solving or removing (barriers). The extracted analysis and resume will be used as input for further inquiry-based learning model development and the design and implementation of specific digital learning scenarios for STEM teachers' training.

---

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

✉ ma.barajas@gmail.com

Approach and methodology

Aims and objectives of the events

The aim of the multiplier event E3 is to communicate and negotiate with policy, policy mediators and practitioners outcomes from activity 1.1 and Intellectual outcome O1, i.e. "Policy envisions and requirements for STEM teachers competence development in Greece, the Netherlands, Bulgaria and ", focused on the Spanish situation.

Expected outcome is identification of systemic opportunities and challenges to implement training activities for STEM teachers' competence development in Spain. This will be documented in a national report, accompanied by the "key-messages" document, as a part of the ELITe report about 4 countries – Greece, the Netherlands, Bulgaria and Spain.

The EASW methodology

The **European Awareness Scenario Workshop (EASW)** methodology relies on working in varying compositions groups and in plenary to develop scenarios on the workshop topics, name barriers and propose strategies and steps for realizing the goals and overcoming the barriers. Building on concrete "scenarios" or proble constellations, it invites working group members to think about realistic challenges rather than dreaming up unlikely problems and solving them. Such a workshop follows three phases - the critical analysis phase, the visionary phase and the implementation phase – "to create a basis for local action". The EASW setting *allows for interaction between stakeholders* - rather than a static one, in which presentations are provided to participants, and *aim for consensus building rather than instructional approach.* One disadvantage of EASWs is their reliance on stakeholder balance, which might never be reached realistically. However, targeting a certain number of distinctive stakeholders is a good starting point to make "bringing together a broad range of interests" a little more concrete.

Following the EASW methodology, the multiplier event E3 was structured in three session – **Raising issues** session, **Negotiation** session, and **Structuring proposals** session. During the *Raising issues* session participants work in homogenous groups, aiming to identify the opportunities and challenges on implementing activities for STEM teacher's competence development. During the *Negotiation* session they were re-arranged in heterogeneous groups, looking for solving the conflict aspects and generating recommendations on how to take advantage of the opportunities and how to avoid / deal with the challenges. The aim of *Structuring proposal* session was, in plenary, to map the issues and recommendations in the frame of broader educational priorities.

Rationale for selection of participants

For the successful implementation of the EASW methodology, three homogenous groups of stakeholders were identified: **policy makers**, teacher trainers, **practitioners** and **broad society members, including representatives of parents associations**. Policy makers group involves representatives of the regional ministry of education, regional teacher support centers, professors responsible for teachers' training curricula from different universities, head teachers responsible for local school policy in STEM teaching AND (MIRAR LA LISTA DE PARTICIPANTS. Selection of the practitioners - STEM teachers representing

general and vocational schools, was based on their involvement in previous STEM initiatives with both the University of Barcelona and the regional Government,. The group of the broad society members includes active parents and representatives of private educational centers, private companies (publishing houses) and research centers in education.

Rationale for selection of specific issues for discussion

In Spain, the 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, modernize professional training, give more autonomy to schools and increase the use of ICT in education.

The Law gives more weight 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. 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 regional Government (in charge of education) has started STEM initiative (named STEMcat) to promote teachers training, offer resources for schools, and connect different initiatives from research centers and museums with the schools to promote combined STEM programs in schools. Furthermore, there are both pre-service and in-service programs which are organized according by a competence approach, but lacking integration in terms of STEM competences.

As a result of the analysis of all these documents and initiatives, we identify the main issues and describe them in the Key messages document. On the base of these issues we formulate the main topics for the multiplier event discussions:

- **Teacher competences are needed to design IBL activities in the class. Teachers need a support for IBL day-to-day application. Content should be provided to spread widely the approach** (micro level)
- **Opportunities and challenges in schools management of strategy, curricula and teaching approaches** (mezzo level)
- **Opportunities and challenges in building teacher competences by the teacher trainings** (macro level)

Implementation

Setting and context of event

The multiplier event E3 took place on 28th September 2017, at the beginning of the academic year in Barcelona, at the Faculty of Education, Llevant Building, 240 Hall, 2nd floor at University of Barcelona.

Invitations were sent via e-mails, and in some cases, personally or by by phone, with attached short information about the ELITe project and multiplier event goals, presented as a flyer, text information about previous stage – Analytical report of National policy documents, and Key messages document as a conclusion of Analytical report. The invitation was sent to 65 persons in total, and the participation was confirmed by 35 persons, who received a remainder a week before the event. The actual number of participants was 32.

Following the EASW methodology, participants were separated in three groups:

- **Policy makers** –university teachers, members of the regional ministry of education, coordinators of regional STEM resource centers
- **Practitioners** – STEM teachers from general and vocational schools, CPD trainers
- **Broad Society members** – a representative of the federation of parents associations, directors of private educational centers, and a national publishing house

Structure of the event

The workshop started with registration of all participants. Upon registration they received a different colored badge according to the group in which they were involved, paper folder including a workshop agenda, an ELITe project flyer, and an evaluation questionnaire (Figure 1).

The workshop was divided into two sessions with a coffee break in between. The workshop was opened by the ELITE's local coordinator, prof. Mario Barajas, providing detailed information in relation to project description and aims. He also presented the results from the Analytical Report of national policy documents on policy envisions and requirements for STEM teachers' competence development and *Key messages* for consideration. Furthermore, a member of the Elite team, Gemma Sala, provided instructions in relation to the warm-up activity: all people, having the same colour wrap shall make a group during the coffee break and agree on one word, which describes their common feelings, emotions, and attitude to the position they practice at work place. The coffee break finished with short presentation of colored groups – names, institution, and common word (and why they choose it) of participants.

Figure 1. Familiarizing with the ELITe procedure and methods

After all participants got to know each other better by participating in the warm-up activity, they were divided into three focus groups (policy makers, practitioners and broad society members) arranged around three round tables. Each one of the groups have to choose two moderators, which have to lead discussions on different topics and questions such as:

- Which are the greatest challenges, which the new Educational Law places this school year?
- What opportunities the new Law opens?

The research team presented the way to proceed, which crystallised in the implementation of SWOT analysis by each group. Each group's discussion was based on the ***Key messages*** of the Analytical Report of national policy documents on policy envisions and requirements for STEM teachers' competence development. During the discussions, each participant used a badge colour, according to the profile from which s/he tackles the issue. Then the moderators wrote down on 4 different colours pieces of paper, each colour representing strengths, weaknesses, opportunities and treats of the new regulatory framework (SWOT analysis). All aspects of the SWOT analysis were presented in front of all participants by appointed representative of the group.

Figure 2. Homogenous groups' work using the SWOT analysis sheets

Figure 3. Homogenous groups' work using the SWOT analysis sheets

After each group has presented its opportunities and challenges in form of SWOT analysis, the participants synthesised now all together the main points that emerged as strengths, weaknesses, opportunities and threads, using different coloured sheets (Figures 2 and 3).

During the plenary session of the multiplier event, the heterogeneous groups (Figure 4) presented the suggestions for negotiation. A summary and conclusions on the main needs and considerations in relation to STEM teachers' training was agreed between all participants (Figure 5). Furthermore, the requirements for effective and efficient teachers' trainings – topics, logistic, delivery were outlined.
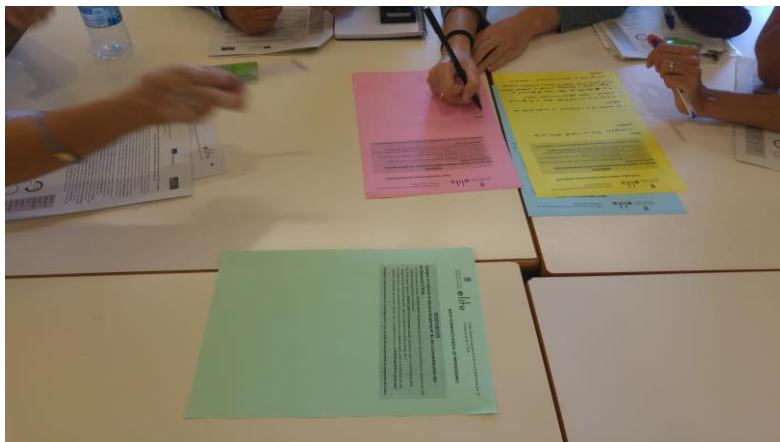

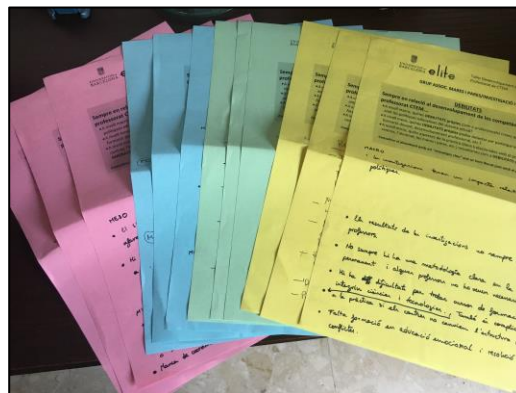*Figure 4. Heterogeneous groups' work*

Figure 5 Summary and conclusions on the main needs groups: first outcomes

Evaluation of the event

The evaluation of the event was done through an electronic sheet, which was filled upon by 97% of participants shortly after the event. The questionnaires were anonymous. The participants were asked to evaluate the organization of the event in terms of content / thematic, process and venue, background materials, process / methodology of the event, and overall satisfaction from the event.

SWOT analysis was performed presenting strengths, weakness, opportunities and threats in relation to planning and implementation of the multiplier event, the effect of networking, and quality and relevance of outcomes.

Outcomes of the event

Raising and negotiating issues Sessions

Following the documentation provided by the ELITe team, as well as a generic SHOWT analysis sheet , the groups were discussing basically the key points provided previously to them (by email), and a hard copy of the same document handed out to them during the meeting. During the Raising issues session different homogenous groups were focused on the different presented in the above mentioned sheet.

The outcomes of the Raising and Negotiating issues session, related to the new National regulatory framework, are synthesized and presented as a SWOT analysis result, as shown in **Error! Reference source not found.Error! Reference source not found.**:

Table 1. SWOT analysis of the National regulatory framework according to the work with homogeneous and heterogeneous teams.

STRENGHTS	
1.	Freedom to develop your own lesson plans according to the regular education framework, and curriculum regulations. The current laws allow it.
2.	The education policies in line with the development of cross-competence approaches.
3.	Education policies could be nourishing by results and tools that applied educational research provide.
4.	Freedom for teachers to use inquiry-based methodologies
5.	Teachers' personal motivation to improve their competences based on CPD.
6.	STEM teachers can teach a diversity of STEM subjects

WEAKNESSES	
1.	In practice, STEM research results do not make a significant impact on educational policies.
2.	Results of research don't flow to teachers and their practice. There is not a good communication between university researchers and school teachers.
3.	An important part of teachers do not perceive the necessity of changing STEM teaching paradigms, because they do not trust on new methodologies and tools.
4.	Teachers work separately by departments, not knowing well the contents of the different school disciplines. This prevents a integrated curriculum approach or working holistically in competences development, for example in projects.
5.	CPD programmes sometimes do not provide courses which incorporate innovative pedagogical approaches to new STEM topics, since they consider only the new knowledge as the most important.
6.	The cross-competence approaches sometimes do not match the organisation of the curriculum, which is usually organised by subjects, splitting the contents on the different STEM components.
7.	Different motivational levels on teachers, which hinder the possibility of introduce STEM innovations
8.	Lack of communication among teachers at the school
9.	Teachers lack skills on issues as gender and STEM, conflict resolution, and emotional education not only to teachers, but to parents

	OPPORTUNITIES
1.	Flexible educational organisation based on the autonomy of schools. This allows for certain freedom for curriculum organisation, e.g. defining learning objectives by educational cycle, and not by course. This allows for achieving the objectives in a longer term, so STEM contents can be organised differently by course
2.	Educational centers can proposal interdisciplinary programmes, then they receive support by the administration in terms of teachers training and resources
3.	Families can influence the introduction of STEM innovations (robotics, etc), which can be included not only as extracurricular activities but within the curricula
4.	There are resource centers, as well as resource banks….but it would be necessary to offer more training support
5.	Pre-service education allows for the integration of contents coming from different STEM subjects
6.	In both secondary and upper secondary education, there are targeted subjects (Project research work, Synthesis project) that imply a more comprehensive approach to STEM and inquiry-based education

	THREATS
1.	The rotation of school teachers (given to the low labour stability) works against the continuation of collaborative projects and innovations at schools. Then the motivation for initiating innovative STEM projects is reduced.
2.	The administration promotes CPD programmes, however it is not compulsory for teachers to enrol
3.	The educational institutions are reluctant to change their functioning and organisation.
4.	Families lack of participation in the school life, probably because adolescence is the time for students to be independent
5.	Lack of leadership of the school management in promoting innovation
6.	Lack of time for enrolling in CPD in the school calendar, and sometimes the training is mostly based on single subjects
7.	Teachers lack confidence in implementing STEM innovations, including the parents' pressure to get fast results.

Structuring issues onto EU and national priorities Session

During the plenary session the heterogeneous groups' recommendations were presented, discussed, analyzed, summarized and arranged across different teachers' professional development options. These options are related to the **content** of the teachers' training courses, their **form**, and **assessment** of the courses and course providers.

The **teachers' training courses' topics** were the most discussed. The recommendation for them is to cover at least the following areas:

- **Active teacher strategies: inquiry-based learning project-based learning** – this is a key point for any professional development course as well as pre-service training. Many times teachers have modern materials and resources at the school; however they don't take all the advantages of them because of not using the adequate teaching methodologies, as inquiry-based learning. Project-based learning is also a must, since this methodology is becoming very popular, and an integrated view of STEM competencies call for the use of this approach.

- **Dealing with diversity in education** is considered a key point, which in the case of gender has been already identified by the regional authorities. It seems then that supporting training on this issue match this current national and regional priority. There is also an interest on using personalization strategies for approaching differences in terms of learning.

- **Using socio-scientific issues** for the STEM learning. This has been identified by experts as a good strategy for attracting students to science. The use of, for instance science in the news, scientific controversies, etc. proves to fight the lack of interest in STEM introducing very up-to-date themes to be further developed from the content point of view at the classroom.

- **Working with digital resource.** Open Science resources have been identified as a good help for teacher designing STEM activities. The use of ready-made resources is a good entry level for this type of digital resources, since many teachers ask for easy ways of introducing innovative practices. For those more active the adaptation or the design of resource based on these examples are also seen important for improving the interest of students, so their competencies. Teachers would need examples of good practices in this respect.

- **Considering the school as a community.** In some schools teachers and parents work together in many aspects related to STEM, from extracurricular activities to the organization of science fairs and other events. However, many of the teachers lack skills for working with parents associations in preparing strategies and examples of good practice of STEM activities at schools.

- **Approaching STEM in collaboration with scientific centres**, and science museums and other local institutions have been identified of importance to supporting STEM in the schools, and in the CPD courses for teachers.

Also, they find that demonstration and participation in innovative teaching methods implementation is very important for the successful transfer of given teaching methodology to the classroom. Beside of these, participant's opinion is that it is great idea to have training courses content online for future use, as well as to have an online tool for support of the established professional community during the course.

As with respect to the delivery system of professional development online courses offering, they see no major problems since they are used to use online platforms on the professional development courses. They prefer developing project work as the assessment methodology.

Evaluation Results & SWOT analysis

Evaluation questionnaire results

The evaluation questionnaire was filled in by 30 participants (97%).

Asking about the quality of the organization, most of them give high level of satisfaction marks for the content, process, venue and facilities. They share that the event *was well organized*, also they liked *interactivity* during implementation.
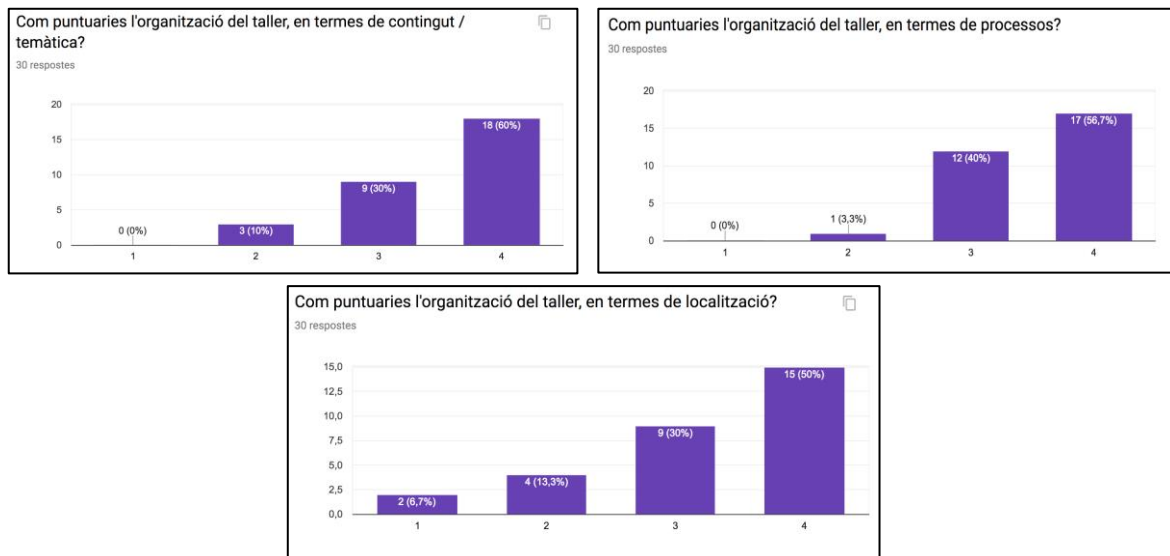

Figure 4 Evaluation of the organization of the event: 1 mean 'poor', 4 - 'excellent'

Background materials – initial information, **Key messages**, and presentation, relevant to the event topic and their personal professional interest, are very relevant for the topic, performing high quality of content (Figure 1 Evaluation of background materials).
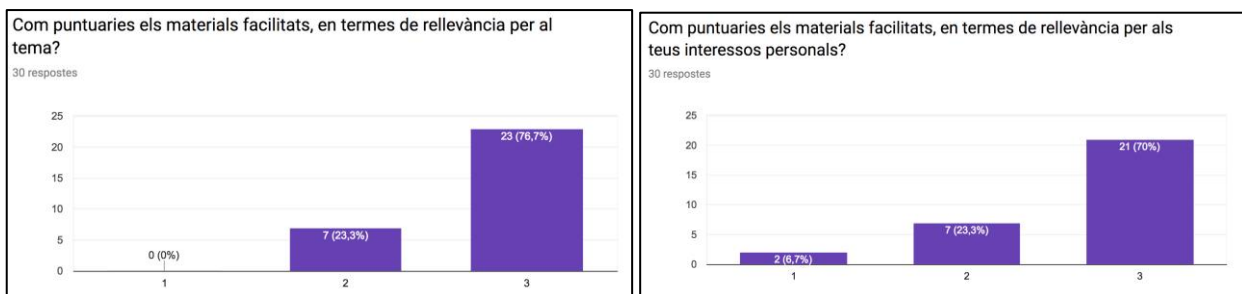
Figure 1 Evaluation of background materials

Evaluation of the process and methodology shows also good comments. The majority of participants provide high scores of the methodology and process of implementation of the event. They mentioned as relevant positive aspects of the event in terms of CPD, and participant teachers the interest for their work in class, with good expectations for either participating or collaborating with the future ELITe training modules. They valuated the sharing sessions, especially at the end of the workshop, interesting.
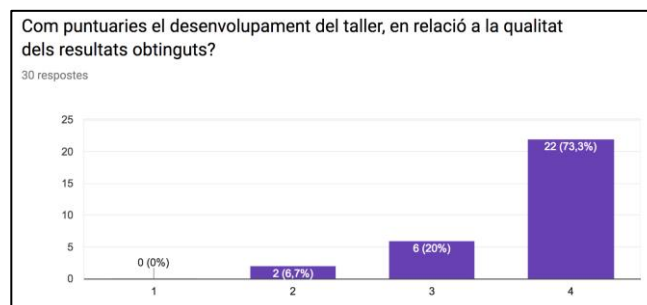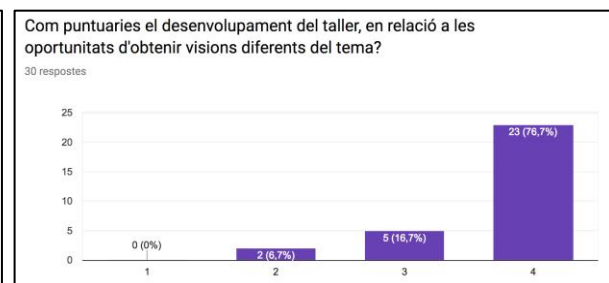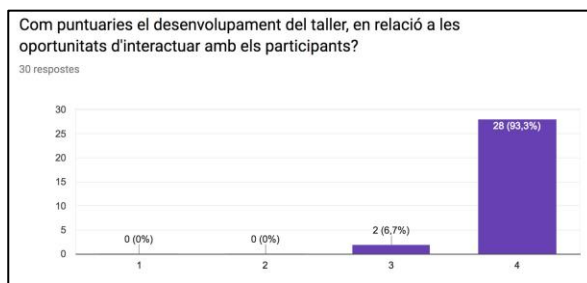

Figure 2 Evaluating the process / methodology

SWOT analysis results

The success of the multiplier event E3 in Spain provided the needed information about strengths and opportunities of organization and implementation of teacher training in STEM. Some issues for consideration, presented in the SWOT analysis (see Appendix 7).

Overall, the E3 event was very attractive, dynamic, interactive and rich of outcomes. Although many of the people did not know each other, there was a good atmosphere from the very beginning, which assures a good a base for long-term stakeholders' network development. The outcomes will inspire the ELITe e-scenarios development

A weak aspect was the fact that at the time the event took place, there were large political turmoil that affected the school life; we understand that this affected the turn-out of the event, as confirmed later on.

Conclusions

The multiplier event E3, delivered at the end of September 2017, developed a good network of policy makers, teachers' trainers, teachers and broad society members, including parents associations. The main issues elaborated during the event were the opportunity and challenges that the new regulatory framework provides for efficient and effective STEM teachers' trainings.

The common opinion is that the **new educational law and policy documents provide much more flexibility and autonomy** in decisions in front of all stakeholders' groups. At the moment not only the universities and the regional governments, but also the science institutions, publishing houses and non-government organizations are eligible to offer teachers training courses, which raise the level of concurrency in terms of thematic of offered courses and quality of their design and implementation. It will be a challenge for ELITe but not in terms of competing with these offers but complementing them and in some cases collaborating with these institutions. Teachers, themselves, are encouraged by the policy framework and career paths to upgrade their professional qualifications requiring gaining of credit each year, some that is recognised not only participation in trainings but also active participation in experience exchange activities – workshop, seminars, open lessons, conferences, etc. The schools might receive a dedicated financial support for teachers' professional development if they present training plans; however the training is mostly out of the school time, which limits the impact of the offer. This opens also opportunities for ELITe's training offer.

The main outcomes from the ELITe perspectives relate to the **methodology**, interdisciplinarity of STEM teachers' trainings, and access to the STEM resources.

Teachers lack **training on STEM-related methodologies, and examples of good practice**. For STEM teachers to improve their teaching methodologies, the use of open science resources, or the inclusion of topics related to the socio-scientific issues that attract students' attention. They claim also practical courses related to the use of STEM digital resources, and looking for interdisciplinarity so they can collaborate with other colleagues in developing a more integrated view of STEM, and as a consequence, on developing STEM competencies of their students.

All the stakeholders groups agree on the need of application of **active teaching and learning methods** in the classroom. Special attention is, again, dedicated to the inquiry-based and project based learning methods which are emerging in the Spanish schools, and **are required to develop STEM competences in**

an integrated way. For STEM learning disciplines there is a special need teacher to be trained on how to design, deliver and conduct **attractive STEM resources.**

Inclusive education is still a challenge in front of Spanish teachers. Aspect related to the STEM and the fighting **gender stereotypes** y STEM, were discussed and an agreement upon including this area for teacher training was reached

Work with parents and with other actors. The role of parents associations in the school is very important. They organize extracurricular activities, many of them related to STEM areas, as e.g. robotics, science days, etc. Furthermore the role of parents is also key in order to break stereotypes about science among their sons, and more importantly among girls. They also are sensible to introducing learning innovations and projects (many times with science centers) since this means prestige for the school and better outcomes.

According to the **modalities of teacher' training**, the common opinion is that there a need of development of communities of practice between STEM teachers, something that can be done both face-to-face and online, especially given the limitations of teachers in terms of schedule and geographical distribution.

Discussing the teaching methodology, all the stakeholders share their believes that the teachers' training should be based on the same innovative learning methods which are expected teachers to apply in the classroom, as opposite to the popular lecture-based teaching, which is less and less popular in Spain.

The multiplier event E3 allowed many participants to meet each other. We expect that the links made will fructify during the training to be offered in the near future. Participants would like to try the ELITe online platform, and have resources both in the regional language as well as in Spanish for a larger community.

The evaluation of the event shows a high level of quality, allowing the discussions to crystallize into suggestions for STEM CPD courses. An ELITe informal network was build between different stakeholders, based on constructive communication and understanding of each group's role. The outcomes are very useful in accordance to the next ELITe developments in terms of teachers' training scenarios and e-learning content. They have the potential to contribute to improvement of the teachers' training practices at national level. The evaluation questionnaire shows that participants are very satisfied by the organization, quality, and interactivity of the multiplier event.

Appendix

Key messages extracted from the Analytical Report of the Spanish national policy documents

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 el 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 Másters 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 los 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.