

Supporting STEM teachers' professional learning for competence development on working with parents

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The background

A key to ensuring education reform for a 21st century education is to put the **learner in focus** and offer **learning pathways individualised** enough to be relevant and attractive for each and all. This is crucial in education in general, but even more so in Science, Technology, Engineering and Mathematics (STEM) education, an area still not held at high enough esteem by many, but an absolute necessity in present and future labour markets. This needs a **collaboration of all stakeholders**, but especially students, parents and teachers, and must be based on **new approaches to training, empowerment and teaching**.

In this document, reflecting on the state of play in four very different European countries – namely Greece, the Netherlands, Bulgaria and Spain, and feedback from parents, the aim was to draft an ideal scenario and highlight areas to tackle on macro, meso and micro systemic levels for development of STEM teaching, most of them not traditional, subject-specific areas, and to offer a starting point for training development.

EU policy background

Official EU policy has recognised the importance of engaging parents and learners in all aspects of

education since the early 2010's. A need to assess and improve teachers' collaboration and negotiation skills has also been identified as an important development field to transform European education systems to meet the needs of 21st century learners, and thus also help to achieve the EU2020 headline target of reducing early school leaving.

The aim of the document is to complement the ELITE's project analysis of four national contexts¹ from the perspective of parents, to provide ground for discussion and reflection among STEM education stakeholders on how to improve teacher training and competence development – both pre- and in-service.

Recognition of parents as primary educators
Legally² and de facto parents are the primary – first, but also most impacting at all ages - educators of their children. In teacher trainings, this is not used as a starting point, parents are often shown and thus seen as a burden, an extra task. Innovative approaches must include this as a starting point, empower teachers in innovative training for parental engagement and cooperation. Necessary methodology is to be offered to teachers to empower parents.

¹ See policy briefs on a) the state of affairs on STEM teachers' competence development in the 4 countries in the ELITE-s project website learning-in-teaching.eu (→ Outputs→Intellectual Output #1); b) systemic opportunities and challenges for supporting STEM

teachers competence development in the 4 countries in learning-in-teaching.eu (→ Outputs→Intellectual Output #3)

² according to the [UN Convention on the Rights of the Child](http://www.un.org/children)

Key issues in Europe in STEM teaching from the parents' perspective

Parental engagement & teacher training: prominent issues for consideration

- ⌚ Teacher training does not aim at understanding that parental engagement is an obligation for both the school and the parent, and does not offer methodology to make parents also understand this – parents staying away and not ‘interfering’ are still considered a positive role model, while they it is a legal obligation of the parent to be involved in designing elements of the right educational pathway for their children
- ⌚ Teachers in Europe confront difficulties in making parents understand the need for innovation – although parents want the best for their children, the vast majority of them has no other reference point than their own schooling and experiences, but they bring real life and realistic future needs to the school that could be used as a basis
- ⌚ Teacher training does not consider co-designing curricula building on personal experiences and professional knowledge of parents
- ⌚ Teacher training does not offer methodology to support STEM-at-home

The role of parents in teacher training

It is still seen as unusual, happens very rarely that parents or parents' associations are invited to offer part of training for teachers, and co-training of teachers and parents is also nearly unheard of. This should be considered as a necessary element, to include the parents' associations' experiences and expectations on cooperation.

Make transitions smooth - cooperate with ECEC³ and primary

In most European countries, the transition between different levels of education is not smooth enough, with STEM becoming more and more theoretical with age. At the same time cooperation of secondary school teachers and parents should also aim at ensuring a solid STEM basis, totally linked to the everyday experiences of children. Thus, innovative teacher training of secondary teachers should include the element of reaching out to ECEC and primary, with the assistance of parents.

Make transitions smooth – have knowledge about and cooperate with tertiary education

The content of STEM curricula is a very delicate one. When designing local and individualised curricula, teachers should be able to make the right choices to include knowledge for everyday life, but also to prepare students for their respective career pathways, not teaching tertiary curricular content in secondary.

Gender issues

Early childhood links are crucial also for balancing the gender bias happening early. Secondary teachers' training should include elements that help parents in avoiding gender bias with their younger children and also to help other parents in it.

Need to change general public opinion

For strengthening a balanced approach to STEM there is a need to change general public opinion and bias towards arts subjects (that considers it 'normal' that somebody is bad at maths, not interested in chemistry, etc.). Innovative teaching methodologies and media (including social) presence have led to changes of general attitudes. Innovative methodologies for this should include

³ ECEC = early childhood education and care

real life connections, a holistic approach to STEM, to decrease subject segregation (and to stop it in primary) and to put emphasis on soft skills necessary for lifelong learning and future life-success (as an employee, a citizen and in private life)

Use of digital technology

When using digital technologies in training and also in STEM teaching, the digital divide should be considered. Internet penetration and the use of smartphones, tablets, etc. is different in different countries. Digital technology is a great asset in STEM, so teachers should be prepared for exploring individual access of students, and also to encourage the use of public offer (libraries, internet centres, and school access). Digital

technology use at home and at school can help make the real-life connection as well as increase attractiveness. Teachers' awareness levels are to be raised of resources, teacher communities on the internet, but they should also be able to use digital technologies for parental engagement in a way comfortable for everyone – taking into consideration parents' schedules, but without too much intrusion into their private lives.

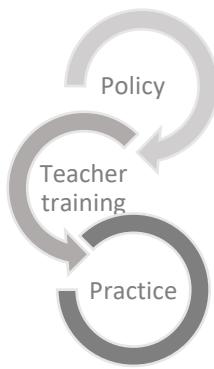
Ensuring the children's voice

In most cases, it falls on parents to ensure that they are given a real voice and decision-making power with regards to their own personal learning pathways as well as the STEM offer of the school. Child rights, the best interest of the child and their impact on school life is often missing from training

In the general national competence frameworks for secondary STEM teachers, parents consider it crucial to include the following:

	Knowledge	<ul style="list-style-type: none"> •on the parents' role in the education and learning of their children •of earlier phases in education, their STEM curricula and methodology •of realities, psychological background and cultural roots in gender bias
	Skills	<ul style="list-style-type: none"> •for engaging parents and students in school •for collaborating with primary and ECEC professionals on STEM base development •for supporting the empowerment of parents in their role as educators •for an equitable approach to STEM education, with special focus on disadvantaged students
	Dispositions	<ul style="list-style-type: none"> •that encourage and embraces parents' and students' engagement in school •that support gender equality •that understands parents' previous experiences' effect on the STEM education of their children and ready to overcome them

Implications for policy and curriculum developers as well as training



Prominent issues for consideration that emerged from the review the national contexts, outcomes of the multiplier events held with policy, policy mediators and teachers, and discussions with EPA members are presented here below:

Policy level

Implement a truly inclusive policy not only in provisions, but also in design

- Highlight and promote equity over equality, inclusion and engagement over involvement
- In line with countries' resolution taken at ratifying the UNCRC, officially recognise the primary responsibility of parents for educating their children and the state's obligation to offer support in that
- Revisit and if necessary revise national curricula for a holistic approach to STEM education and for a right balance of skills development and agreed academic content
- Include parental engagement and child participation requirements in both the legislative framework for formal education and professional requirements for teachers
- Provide resources for digitalization – for equipment and training

Policy Mediation level

Mainstream inspiring practices and provide space for further innovation of necessary

- Use available tools and create alliances for promoting STEM and its importance for all, including girls
- Create and promote accessible and easy-to-use media for up-scaling inspiring practice that works
- Ensure the most effective use of funds, not require innovation when up-scaling and mainstreaming would be possible
- Design pre-service and in-service trainings for developing necessary STEM teacher competences
- Foster cooperation among education institutions – horizontal as well as vertical

Practice level

Ensure competence development and frameworks for inclusive STEM provisions

- Provide pre-service and in-service training for developing the necessary skills for engagement of parents and children
- Provide and provide for the necessary outreach, empowerment and training of parents for their engagement
- Provide training to counterbalance gender bias
- Provide methodology and communication skills development for overcoming difficulties rooted in parents' own experiences with STEM education
- Build links with lower and higher levels of formal education as well as cooperation among schools on secondary level