



JRC SCIENCE FOR POLICY REPORT

Innovating Professional Development in Compulsory Education

*An analysis of practices
aimed at improving
teaching and learning*

Vuorikari Riina

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Contents

Abstract	1
Foreword	2
Executive summary	3
1 Introduction	16
2 Context and problem statement	17
3 Literature guiding the design of the study	21
3.1 Defining innovation in teacher professional development	23
3.2 A brief methodological note	24
4 Presentation of the inventory: 30 examples	25
5 Main analysis of practices in teacher professional development	27
5.1 School as a learning organisation	28
5.2 Empowering learners through a competence-oriented approach	31
5.3 Innovating online delivery	35
5.4 Re-inventing blended learning	38
5.5 Engaging learners in first-hand experiences	42
5.6 Innovating degree programmes	45
5.7 Innovating partnerships and actors	47
6 Discussion on innovative aspects of the examples	51
6.1 Types of innovation and its nature	51
6.2 Other key outcomes	52
7 Conclusions and policy pointers	55
7.1 Key conclusions	55
7.2 Policy pointers	56
References	60
List of Textboxes, Figures and Tables	65
Appendix 1: Analysis of the key features of the inventory	66
Appendix 2: Attributes of innovation of the selected examples	69

Abstract

This report comprises the key outcomes and final analysis of the study *Innovating Professional Development in Compulsory Education*. It aims to help education authorities face the challenges of meeting the professional development needs of tomorrow's teachers in Europe and elsewhere. This report focuses on innovative and emergent practices of teacher Continuous Professional Development (CPD) and professional learning by teaching professionals who work in compulsory education.

The first part of the study gathered an inventory of 30 examples illustrating new and innovative models and practices that have emerged to overcome the known barriers and limitations that teachers say hinder them today from participating in CPD. An accompanying Technical Report looks at their key elements and uses seven labels to describe and analyse the broad areas in which innovation currently takes place (Vuorikari, 2018). The labels are not categorical, and many of the examples feature many of them.

This report further analyses the inventory of models and practices focusing on their innovative aspects. The 30 examples were classified according to their *type of innovation* representing *product innovation* as well as *process, organisational* and *marketing innovation* allowing for a discussion on the innovative aspects of the emergent practices in teacher professional development and professional learning. The key outcomes of the study are discussed in a cross-case analysis with the help of the above-mentioned seven broad areas. Lastly, together with providing conclusions, a number of policy pointers are given in order to better inspire and support those who plan and design policies and provision of teacher professional development and professional learning.

Foreword

Continuous Professional Development (CPD) for Teachers is one of the key determinants in improving the quality and relevance of education and learning. However, there are quite a number of barriers and limitations to effective professional development and learning by teaching professionals.

This Science for Policy Report provides the final analysis of 30 examples of innovative and emergent practices aiming at improving teacher professional development. The report is accompanied by a Technical Report called "*Innovating Professional Development in Compulsory Education – Examples and cases of emerging practices*".

Education systems are increasingly attaching importance to the quality and professionalism of their teachers. They recognise that teachers are learners too, at all stages of their careers. Investing in relevant, effective and accessible professional development is therefore an element of making careers in teaching more attractive and sustainable – which is a current focus area of EU-level exchanges on school policy. Traditional formats, such as courses and seminars, often organised away from school, are increasingly complemented with other forms of delivery. The examples in this report show how collaborative and school-based formats, often supported by new technologies, offer great potential to take the professional development of teachers to another level and help create direct impact on student learning.

This study was undertaken on behalf of the European Commission's Directorate-General for Education, Youth, Sport and Culture.

The JRC will shortly release a similar report on innovating CPD in Higher Education, with an analysis of cases of innovative practices for the continuous professional development of academics. Both studies bring together evidence that can support education policy makers at all levels in re-thinking the continuous professional development of educators. The evidence not only focusses on digital learning opportunities, it also embraces non-digital professional learning. Unsurprisingly, however, analogue and digital activities are increasing becoming blended.

Both studies are part of the JRC research on "Learning and Skills for the Digital Era". Since 2005, more than 20 major studies have been undertaken on these issues resulting in more than 120 different publications. Recent work focuses on the development of digital competence frameworks for citizens ([DigComp](#)), educators ([DigCompEdu](#)), educational organisations ([DigCompOrg](#)) and consumers ([DigCompConsumers](#)). A framework for opening up higher education institutions ([OpenEdu](#)) was also published in 2016 along with a competence framework for entrepreneurship ([EntreComp](#)). Some of these frameworks are accompanied by self-reflection instruments, such as [SELFIE](#), which focusses on digital capacity building of schools.

Additional research has been undertaken on Learning Analytics, MOOCs ([MOOCKnowledge](#), [MOOCs4inclusion](#)), Computational thinking ([Computhink](#)) and policies for the integration and innovative use of digital technologies in education ([DigEduPol](#)). In 2017, a report on the potential of [blockchain in education](#) was released and more recently, in November 2018, so was a report on the impact of [Artificial Intelligence on learning, teaching and education](#).

More information on all of our studies can be found on the JRC Science hub: <https://ec.europa.eu/jrc/en/research-topic/learning-and-skills>.

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Executive summary

The aim of this study is to support and inspire teachers, school leaders and education policy-makers for excellent teaching and learning in the European Union. This report constitutes the final analysis of the study *Innovating Professional Development in Compulsory Education*. The starting point for the study was to look for innovative and emergent practices of teacher professional development and other forms of teacher professional learning that overcome a number of known barriers that hinder teachers from participating in professional development activities, and on the other hand, that help them to meet today's needs in terms of covering pertinent topics for which teachers say they have a need.

For the purpose of the study, an inventory of 30 examples with case studies was collected from Europe and beyond using qualitative methods (Table 1). Each example was analysed using seven labels that indicate the broad areas in which innovation takes place (Figure 1). In this final report, the aspects of innovation that emerge from these practices are discussed while drawing out a number of policy-pointers aimed at improving opportunities for teacher professional development and learning in the future. The Joint Research Centre conducted the study between summer 2017 and 2018 on behalf of the European Commission's Directorate-General for Education, Youth, Sport and Culture.

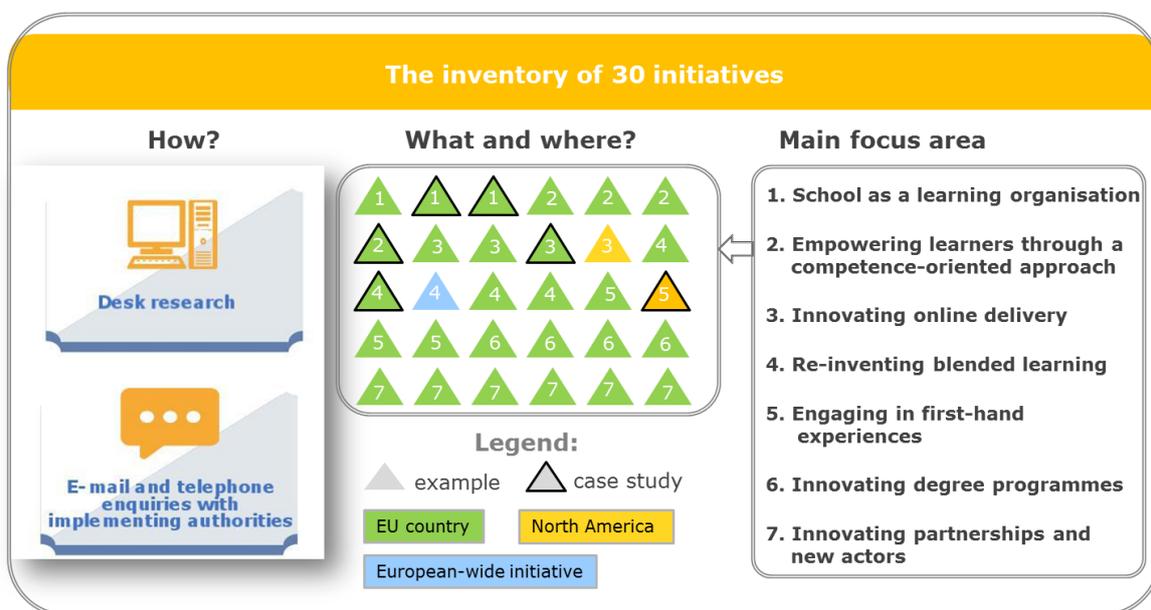


Figure 1. The main elements and a brief description of the data gathered for the study

Policy context

Innovating and modernising education and training are key priorities in several flagship initiatives of the Europe 2020 strategy especially Agenda for New Skills and Jobs, Youth on the Move, the Digital Agenda and the Innovation Union.

The European Commission contributes to the discussions on the future of education and training through communications such as 'Strengthening European Identity through Education and Culture'¹ and the Digital Education Action Plan², and by working with EU countries to strengthen citizens Key Competences for Lifelong learning, thus following the recommendation of the Council³.

¹ https://ec.europa.eu/commission/sites/beta-political/files/communication-strengthening-european-identity-education-culture_en.pdf

² https://ec.europa.eu/education/initiatives/european-education-area/digital-education-action-plan_en

³ https://ec.europa.eu/education/education-in-the-eu/council-recommendation-on-key-competences-for-lifelong-learning_en

Main Findings

The following first outlines the main findings in the seven broad areas in which innovation in professional development and other forms of professional learning is currently taking place. Then the aspects of innovation are discussed.

1. In which areas is innovation taking place in teacher professional development and professional learning?

School as a learning organisation

When improving the experiences and outcomes of all actors in a learning system, the focus shifts from the individuals to a school as a learning organisation:

[learning organisations] “encourage and enable teachers and school leaders to improve both their pedagogical and their organisational practices concurrently through local collaborative research, networking and continued professional development.” (European Commission, 2018b, p. 6)

Of the examples, three models focus on concurrently improving both pedagogical and organisational practices, namely Matematiklyftet (Boost for Mathematics) from Sweden (ex.1), LeerKRACHT from the Netherlands (ex.2) and Prof'Essor from the French-speaking community of Belgium (ex.3). In all these three examples, a shift of professional learning activities targeting multiple actors within the organisation instead of only focusing on an individual teacher is observed. In particular, LeerKRACHT and Prof'Essor focus on all teachers and the school leadership team (case study I⁴) whereas “Matematiklyftet” focuses on subject-teachers within the school.

Another feature which also emerges strongly is that professional development activities in these models increasingly take place onsite in the school. Instead of teachers leaving the school to attend an activity in a training facility, the training now takes place onsite in school and focuses on learning *how to* collaborate with colleagues with whom one works every day. As the benefits of teacher co-operation and collaboration in a job-embedded context have gained more proves (e.g. TALIS studies), it also makes sense to create learning opportunities for teachers to learn how to collaborate with their own colleagues in an authentic setting. Similarly, the model of Mediacoach (ex.13) and Young Coaches for the Internet 2.0 (ex.4) focus on professional collaboration among staff in the same institution.

Lastly, in all three examples, teachers form small groups and are set to work together using a certain method, including reflective cycles. Importantly, all three models (ex.1-3) are supported by mentors or coaches, either external or in-house.

Empowering learners through a competence-oriented approach

The Future of Education and Skills 2030 talks about learner agency in the following way: “Future-ready students need to exercise agency, in their own education and throughout life. Agency implies a sense of responsibility to participate in the world and, in so doing, to influence people, events and circumstances for the better. Agency requires the ability to frame a guiding purpose and identify actions to achieve a goal.” (OECD, 2018, p.4).

However, teaching transversal themes and competences for the future is an area in which 40% of teachers say that they have a high or moderate need for professional development (Table 3). Four models and practices are presented under this label. Two of them are courses: Young Coaches for Internet, from Cyprus (ex.4) and the Oxfam Intercultural mentoring programme (ex.5). Two less structured examples of professional

⁴ For more detail see case study I on LeerKRACHT and Prof'Essor in the accompanying Technical Report (Vuorikari, 2018, p.86)

learning activities are illustrated by a digital platform called PoPU School (ex.6) and Innokas Network for educational maker spaces (ex.7, see also case study II⁵).

First of all, the common theme in these examples is that teachers are guided in setting up a conducive environment where students are given opportunities to understand what it means to identify, plan and execute actions in a safe environment, that is to say, to experiment with taking agency and influencing other people, and to change the circumstances for the better.

Moreover, models such as those exemplified here help to move teachers towards competence-oriented approaches in education. During the structured activities in the models of Young Coaches for Internet 2.0 (ex.4) and the Oxfam Intercultural mentoring programme (ex.5), teachers are concretely taught how to co-create a favourable environment for students to practice their key competences, their soft skills and further hone their transversal skills such as taking the initiative and using creativity. In the other two examples (ex.6-7), which are more informal and/or less structured, the goal of moving towards competence-oriented approach is the same but less explicitly so.

Innovating online delivery

Still today, half of the surveyed teachers in TALIS cite conflicts with their work schedule as a barrier to participating in professional development activities. Figures are very high in some European countries, e.g., three out of four teachers in Portugal, 60% in Italy and Spain and 42% in Flanders (OECD, 2014). In these cases, offering teacher professional development and learning opportunities online in a paced (fixed start and end date) or self-paced mode (any time) offers ways to remove the barrier of time conflict.

The online delivery format also allows a large number of participants to be reached in a short period of time thereby alleviating the pressure of the physical space needed for training facilities and also the need to commute to a training facility. Especially in the case of Croatia (ex.8) and Portugal (ex.9), but also in Sweden (ex.1), Slovenia (ex.12) and Slovakia (ex.27), online arrangements have allowed the programme to reach large numbers of teachers in a systematic way.

Varying the length and/or depth of the online content or learning activity can offer flexible opportunities. Short learning units and short-term learning activities are also known as "micro-learning". An interesting example of this in the inventory is by the Spanish Ministry of Education who started offering short online content modules that only require 1 to 3 hours learning time (ex.10⁶). Innovation in online delivery can also take place in the area of certification. In the same initiative, the Ministry started issuing Open Badges, an informal but verifiable digital recognition of skills and achievements, for those who complete their open online courses. In addition, Education Plaza from Iceland (ex.15) offers a variety of social media-led activities that are officially recognised as professional development by education authorities.

Re-inventing blended learning

An emerging feature in the inventory is the introduction to an otherwise traditional online course a period of practical hands-on experience where teachers experiment "onsite in school" with the newly acquired knowledge and skills (ex.12 from Slovenia). Similarly, the programme of Mediacoach mixes online delivery with an onsite hands-on project, but additionally also adds face-to-face sessions (ex.13, case study IV⁷). Under this label, there are also examples of professional learning activities that are delivered through network-based models (ex.14: eTwinning, ex.15: Education Plaza, ex.16: iKlasé): they also create similar opportunities for experimenting with new practices in the classroom, although in a less structured way. Such authenticity of tasks makes the learning content

⁵ For detail see case study II on Innokas Network in the accompanying Technical Report (Vuorikari, 2018, p.98)

⁶ For detail see case study III on AprendeINTEF in the accompanying Technical Report (Vuorikari, 2018, p.111)

⁷ For detail see case study IV on Mediacoach in the accompanying Technical Report (Vuorikari, 2018, p.123)

more varied by considering both subject knowledge and subject-specific pedagogy, but also touches upon another barrier - the transfer of knowledge from professional development activities to classroom practices, which previous studies have shown to be problematic.

Secondly, classroom experimentation units such as those exemplified above, when combined with a follow-up session (e.g. opportunity for structured self-reflection; exchange of experiences in a peer-learning context) provide the much needed way for teachers to solicit feedback from peers and experts - an opportunity that they seldom have. Follow-up sessions also provide an opportunity to engage the participant in the analysis of and reflection about the underpinning pedagogical rationale and their own experience. According to the literature, this kind of active learning has the potential to engage teachers directly while embedding the professional development activity deeply in their own context at the same time (Teacher Development Trust, 2015).

Engaging in first-hand experiences

Professional learning processes situated in the context of the real-world can be a powerful tool for teacher professionalism. A common theme across professional development activities with a real-world context is that they require active participation and/or a certain level of engagement from the participants, therefore moving away from traditional models like those of lecture-based courses where there is little room for active participation.

Consequently, two separate themes are focused on under this label: firstly, those that offer an authentic school/classroom setting for professional development such as a week-long excursion in Finnish and Estonian schools (ex.17), which is organised as a course, and a more informal exercise of shadowing a student (ex.18). Also, an example from Sweden which institutionalises teacher's career development through a stipend (ex.19) is looked at. Secondly, the other theme explores professional learning activities that engage the participant directly in the same style of learning as the student would experience, i.e., trying out activities first-hand (ex.20: Pedagogical Hackathons, ex.21:Escape rooms). In addition, these examples create participation and engagement by means of playful methods, a process which is also known as gamification.

Professional development models such as the ones mentioned above have the potential to engage the participants in the process of learning in a new way by making it more emotional and/or social. For example, Shadow a student-challenge (ex.18, see also case study IV) is actually a "challenge" for the school leader to follow a student for an entire school day. This role reversal offers a fundamentally new way to see their school through the eyes of a student. The programme is based on design-thinking following the idea that each observation can lead to an action that implements a quick change in practices (i.e. a "hack"). Another model, that of Pedagogical hackathons (ex.20), is also a tool for educators to experience the new method of learning first-hand. Importantly, the model is not only "learning by doing" but also combines reflective steps throughout the process so that learning of various skills can be made more explicit. The idea is, of course, that once teachers have experienced a Pedagogical hackathon themselves, they are better equipped to integrate them or aspects of them into practices in schools.

Innovating degree programmes

Four examples have been included here of innovation in degree programmes; they are all for professional development purposes, but they also offer elements for diversifying one's career path in the teaching profession. The course content of *Digi-teacher*, a rather classical post-graduate degree programme in Finland, is structured in a novel way around what the teachers and educational institutions need in order to support digitalisation of education (ex.22). Another degree programmes focuses on trainers in Vocational education and entrepreneurship (ex.25: Practical Entrepreneurship), which is also a transversal theme for which teachers have expressed a high/moderate need for

professional development. Both of the degree courses are delivered by universities and result in certification.

On the other hand, two Master's level programmes offer somewhat alternative educational content and activities for those already in teaching or willing to get into it (ex.23: New Education Laboratory in Spain and ex.24: Teach Live from Czech Republic). Regarding the organisation of programmes, both examples rely heavily on syllabuses with an ample scope for classroom practices and observations, guides trainees through the course by using peer-mentoring and tutoring, and both programmes combine online modules allowing for greater flexibility in how the instruction is organised. Both are paid study programmes whose stipends are offered by pedagogical interest groups who wish to have more say and influence on the vision of how future teachers are educated. It is also interesting that in the first place, both programmes started as *unaccredited* degrees, possibly pushing to shake up the world of teaching that sometimes faces difficulties with renewing itself from the inside.

Innovating partnerships and new actors

Partnering up with social partners and industry has a long history in education but its forms differ greatly from country to country. Currently, no data is available in Europe regarding involvement of philanthropic or corporate social responsibility programmes in education. Within the examples, a number of innovative partnerships and actors are present who, alone or through partnering up with a more conventional player, (co)produce and/or deliver the content of the teacher professional development activities.

Some of partnerships are more conventional such as the British Council in Slovakia partnering up with the Ministry of Education (ex. 26) to create digital resources and educational aids, but also to link local native speakers with schools. New players have also got involved, for example, the Golinelli Foundation in Italy which is driven by philanthropic activities (ex.27). Through its newly expanded "*Educare a educare*" (Educate to educate) programme, Italian teachers can engage in STEM related professional development activities which are also accredited by the Ministry of Education. On the other hand, FYXXILAB in Belgium (ex.28) is an example of business-education collaboration that provides tools for the first educational makerspace in Flanders, Belgium. Examples under this label also illustrate how local actors can be leveraged for the purpose of teacher professional development more effectively: two examples from Finland include the Lighthouse (Majakka) network (ex.29) and the Staff "swap", the latter representing rather "out of the box thinking" (ex.30).

Innovative partnerships were formed in a number of other examples, too. Behind the examples of LeerKRACHT (ex.2) and Prof'Essor (ex.3), there is a model developed by McKinsey & Company, which was partly initiated through their CSR programmes. In addition, the Czech Depositum Bonum Foundation (ex.24) is part of the CSR programmes of the Česká spořitelna bank and has newly established itself in the field of education in the Czech Republic to spread new educational cultures. The IT and software industry has also historically run many CSR programmes. iKlase (ex.16) illustrates a link with the training & sponsorship programme by IT industry (e.g. Apple). Moreover, examples of social partners include the Free Educational Institution (ex.23), Danish Foundation for Entrepreneurship & VELUX Foundation (ex.25), a Finnish non-profit Development Centre Opinkirjo (ex.6) and School Retool in the USA (ex.18). On the other hand, there is a rather new type of micro-entrepreneurial activities in education (ex.17 and ex.16), in which teachers themselves take the helm in terms of deciding the content and the type of the training offers. Such activities can be described as entrepreneurial as they generate value for the community, either social or monetary. They also can illustrate social innovation in the field of education.

2. What are the various attributes of innovation?

In terms of the *type of innovation*, using the vocabulary of the Oslo Manual (OECD/Eurostat, 2018), it can be seen that the inventory represents a variety of both *product and process innovation* in the field of teacher professional development and professional learning. On the one hand, new *products and services* are introduced by public education authorities and educational organisations, e.g., non-formal education and training institutions, schools, universities, but also by 3rd party actors, e.g., non-profit associations, social and civic partners and even by individuals. Examples of *product innovation* include **digital platforms**, e.g., eTwinning (ex.14), AprendeINTEF (ex.10), Education Plaza (ex.15), EnglishOne (ex.27), TeachingChannel (ex.11), PopUpSchool (ex.10); **online and blended learning courses** (ex.8, ex.9, ex.12); and also training **curriculum with novel** topics for which teachers say they have a need, e.g. Intercultural mentoring programme (ex.5), Young Coaches for Internet (ex.4), Mediacoach (ex.13), Digi-teacher (ex.22), Practical Entrepreneurship (ex.25) and the Best Practices Benchmarking course (ex.17).

On the other hand, *process innovation* focuses on a new **delivery method** of professional development, examples of which are professional development courses delivered using digital means and those that mix modes of delivery in a new way, e.g., theory delivered online combined with hands on experimentation onsite in school. Totally new models are also being used to implement professional development, examples of which include collaborative models such as those of Pedagogical hackathons (ex.20) and Escape rooms (ex.21). A more job-embedded model to deliver less-structured professional learning experiences is through job-shadowing (ex.18, also ex.17, ex.30). On the other hand, teacher networks, e.g., eTwinning (ex.14), Education Plaza (ex.15), Innokas Network (ex.7) and iKlase (ex.16) are increasingly used as a novel method of delivering professional learning through teacher co-operation which can vary from peer-coaching to professional collaboration in a joint pedagogical project to informal chatting regarding classroom practices. *Process innovation in education* can also be understood to be innovative pedagogic practices, which are included in many of the examples in this report.

Another type of process innovation is *organisational innovation*, which in the field of education involves introducing a new organisational method, for example, to organise teachers' activities. Some models presented in this report explicitly focus on a group of teachers or all of the teachers in the school introducing new ways to plan work, share goals and learn from each other, e.g. Matematiklyftet (ex.1), LeerKRACHT (ex.2), Prof'Essor (ex.3). These models strive for a vision of a school as a learning organisation and require the support of the management team. Such professional development models target a group of teachers or a whole school instead of just attempting to change the practices of individual teachers which is more typically the case.

Organisational innovation is also exemplified in models and practices that focus on widening teachers' tasks and functions outside classical teaching activities and so challenging prevalent conceptions of linear career paths in teaching. Whereas only one model explicitly focuses on this aspect (ex.19), a number of other models and practices in the inventory allow for variations in the tasks performed by teachers, e.g. to become an in-school coach in a specific area such as media coaching (ex.13) and educational maker-spaces (ex.7), student counselling and mentoring (ex.9); or peer-coach for school-based collaboration models (e.g. ex.2 and 3); or focusing on organising multicultural education in the school (ex.5). Such models aim at improving the teachers' career building options but also retaining them in the teaching profession. These examples can further inform education policy-makers regarding teacher retention strategies.

The last type of process innovation deals with *marketing innovation* which, in the field of education and training, could be a new admission strategy or a way of pricing the service. Both of these are visible among the examples such as opening up online courses for an unlimited number of participants without any pre-requisites (see teacher training

MOOCs in ex.10). Degree programmes also offer innovative study stipends and pricing schemes (ex.23 and 24). In addition, the OECD extends this type of innovation to *external relations*, examples of which would be relationships with parents, academic institutions, local actors, etc. A number of practices in the examples illustrate this type of innovation, e.g. Education Plaza (ex.15), EnglishOne (ex.27), Colinelli Foundation (ex.26), FYXXILAB (ex.28) and Lighthouse network (ex.29).

Lastly, other attributes of innovation were examined, for example, *the nature of innovation* in order to capture the progressive levels of change that might be introduced in the field (scale: incremental, radical, disruptive). Whereas many of the examples in the inventory only introduce some new elements to already known models of professional development (i.e. they showcase *incremental* innovation), around half of the examples have a more *radical level of innovation* introducing a number of innovative elements to already known models of teacher professional development. Many of these examples are small scale and are not necessary at the level of affecting the existing practices at scale, however, they could be inspirational models for those who design and provide teacher professional development. A small number of the examples could be considered *radical* as they introduced a profound and comprehensive change to how teacher professional development is usually provided or understood. Depending on the context where teacher professional development is implemented, such models can also offer an alternative and complimentary way of providing teacher professional development and learning.

Key conclusions

A number of innovative and emergent practices were studied for their *type of innovation*. This will help policy makers understand how innovation is taking place in the field of teacher professional development and professional learning, i.e. at the level of **new products** (e.g., digital platforms, curriculum with novel course content) and **new processes**. The latter could deal with delivering existing training courses by digital means, enhancing teacher pedagogical processes, affecting **organisational** processes within the school and dealing with **external relations**, e.g., innovating with stakeholders. All these areas of innovation have the potential to remove existing barriers and/or overcome them.

Firstly, this study demonstrates pertinent practices of *product* and *process* innovation in the field of teacher professional development and other forms of professional learning. Many of the examples **combine** both a *product* and a *process innovation*, in other words, the professional development or professional learning activity itself is a new product (e.g. digital platform, new guidebook), but it also involves new methods, pedagogies and/or competences for teachers to perform. Similarly, many of the examples **combine** a *process* and an *organisational* innovation, in other words, teachers are adopting new working methods, but they also carry out changes to how teachers and other stakeholders co-plan and co-create activities together in a learning organisation.

A similar trend in complementarity of innovation types is seen in other areas too, for example, economists talk about interdependent relationship between *product* and *process* innovation and how the value of one can raise the value of the other. Such complementary relationship also means that conducting either *product* or *process* innovation in isolation rarely results in desirable outcomes. Therefore, efforts are needed to adopt practices that serve both ends, for which the examples in this study are a good source of practices and models. Especially when it comes to innovation involving new technologies, this can provide economies of scale and better strategic benefits. In practices collected for this report, even though digital technologies did not play a key role in all of them, about half use digital technologies in addition to other modes of delivery.

Secondly, regarding the mismatch between what teachers demand for topics and what is on offer, the inventory suggests that by widening the pool of 3rd party providers of professional development activities (e.g. actors from not-for-profit associations, corporate responsibility programmes, philanthropists, micro-entrepreneurs and also volunteer individuals), the education authorities have a better chance of covering a wider

range of topics which may more closely coincide with those that teachers say they have a moderate to high need for (e.g. ICT skills for teaching, Teaching in multicultural setting, Student counselling, Transversal themes and competences for future, see Table 3 for more details).

Thirdly, adding more 3rd party providers alone is not sufficient. Education authorities should consider recognising teachers' participation in a plethora of forms of professional development activities and other forms of professional learning, including peer learning. New evidence from the OECD shows that in the last decade, considerably more teachers took part in peer learning (e.g. discussing how to teach a particular topic, collaboration in planning and preparing lessons), while those who attend formal professional training remained stable (OECD, 2019, p.10). Peer learning, or professional learning, includes less structured and possibly also less formal activities, but it can be carried out in a more timely manner and be more strongly connected to teachers' needs.

In order to **recognise peer learning as a form of professional development**, education authorities would do well consider how to proceed with its approval and further accreditation. In many European countries providers of teacher professional development activities are reviewed or accredited by education authorities, so in the light of widening the offer of professional development and other forms of professional learning, it seems that this is a good area for education authorities to revisit. Eventually, this could have a dual impact: employers (e.g. school head) would look more favourably on peer learning and other professional learning activities if they were recognised by education authorities - at the same time, thanks to official recognition, some teachers would feel more incentivised to engage with them.

Quick guide

The remainder of this report is composed as follows: after the Introduction (section 1), the context and problem statement of the study are developed. Section 3 first introduces the contemporary literature that guided the design of the study and its methods and then discusses various aspects of innovation that were taken into account for this study. Section 4 presents the inventory while section 5 constitutes the main cross-analysis. Last, aspects of innovation are discussed in section 6 which leads to key outcomes and policy-pointers in section 7.

This document is accompanied by a JRC Technical Report that contains the main documentation of the study (Vuorikari, 2018). The Technical Report includes descriptive narratives of all 30 examples with details, links, and further references to original sources. It also contains 5 case studies that allow for finer details to emerge with a description of the local (cultural and educational policy) context in which the practice or model had evolved. It also includes a methodological section that outlines the steps taken for the study and how the enquiry was conducted. The exploratory nature of the study is emphasised: no quantitative sampling techniques were used which means that results cannot be *generalised* to the whole field.

Related and future JRC work

The JRC releases a similar report on Higher Education called *Innovating Continuous Professional Development in Higher Education - An analysis of practices aimed at improving CPD of academics*. Both studies bring evidence to support education policy makers at all levels in re-thinking the professional development of educators. The evidence focusses on digital learning opportunities, but also embraces non-digital professional learning. Both studies are part of the JRC research on "Learning and Skills for the Digital Era". More information on all studies can be found on the JRC Science Hub⁸.

⁸ <https://ec.europa.eu/jrc/en/research-topic/learning-and-skills>

Table 1. The inventory collected for the study: 30 examples (name and country, mode of delivery, type of practice, provider and type of innovation). Those in bold include a case study.

#	Name of the example	Delivery	Type of practice	Provider	Type of innovation
School as a learning organisation					
1	Matematiklyftet (SE): Content modules for collegial learning and peer tutoring https://larportalen.skolverket.se/#/moduler/1-matematik/	free courses by public authorities: onsite in school, online	School-based collaborative PD; Mentoring and/or peer observation;	public authority (Skolverket): school	service/organisation
2	LeerKRACHT (NL): Creating continuous improvement culture in schools https://stichting-leerkracht.nl/	cost associated: onsite in school, out of school	School-based collaborative PD; Mentoring and/or peer observation; observation visit to business premises	3rd party: non-profit associations (LeerKRACHT foundation)	service/organisation
3	ProfEssor (BE): a method for fostering in-school teacher collaboration http://enseignement.catholique.be/segec/index.php?id=2239	free courses by school network authorities: onsite in school	School-based collaborative PD; Mentoring and/or peer observation	Catholic school network (SeGEC)	service/organisation
Empowering learners through a competence-oriented approach					
4	Young Coaches for the Internet 2.0 (CY): empowering students to educate others https://youngcoaches.pi.ac.cy/	free courses by public authorities: onsite in school, out of school	Course/workshops: School-based collaborative PD	non formal education and training institute (Cyprus Pedagogical Institute)	service/organisation /process/external relations
5	Oxfam intercultural mentoring programme (IT): tools for teachers to support migrant integration at school http://edu.oxfam.it/erasmusplus/portfolio-view/intercultural-mentoring/	cost associated: out of school	Course/workshops; individual research	3rd party: non-profit associations (Oxfam)	service/process
6	PopUp School (FI): a digital platform for creating communal learning events https://www.popupkoulu.fi/	no direct cost: onsite in school, out of school	Course/workshops	3rd party: non-profit associations (Development Centre Opinkirjo), school community and parents	service/process/ external relations

7	Innokas Network (FI): Maker-space activities for cross-discipline learning https://www.innokas.fi/en/	no direct cost: onsite in school, online	School-based collaborative PD; Participation in a network of teachers; Course/workshops	formal education institution (Faculty of Educational Sciences, University of Helsinki), public authorities	service/ organisation/ external relations
Innovating online delivery					
8	Improving the Quality of the In-Service Teacher Training System (HR): courses delivered online on topics teachers need http://www.azoo.hr/index.php?option=com_content&view=article&id=1999&Itemid=343	free courses by public authorities: online	Course/workshops; In-service training courses	public authorities (Education & Teacher Training Agency)	service
9	MENTOR (PT): online in-service course with the focus on NEETs https://www.psi.uminho.pt/pt/layouts/15/uminho_portais_uaei.ui/pages/eventsdetail.aspx?id=50313	free courses by public authorities: online	Course/workshops; In-service training courses	public authorities (MoE), formal education institution (University of Minho)	service
10	Aprende INTEF (ES): Digital micro-learning opportunities to overcome time barriers http://aprende.intef.es/	free courses by public authorities: online	Course/workshops; In-service training courses	public authorities (Ministry of Education)	service/process/ marketing
11	Teaching Channel (US): professional videos for peer-observation in the classroom https://www.teachingchannel.org/	no direct cost/cost: online	Observation of others through video	3rd party: commercial (Teaching Channel)	service
Re-inventing blended learning					
12	E-competent teacher (SL): Blended online delivery with practical hands-on session https://www.ouslovenia.net/project/slovenian-educational-network-teachers-training/	free courses by public authorities: online, onsite in school	Course/workshops; In-service training courses	non formal education and training institutions (Methodological and Pedagogical Centre)	service/process
13	Mediacoach (BE): a programme to foster Media multipliers in educational organisations https://mediacoach.mediawijs.be/	cost associated: online, out of school, onsite in school	Course/workshops	3rd party: non formal education and training institutions (Mediawijs.be)	service/organisation/ process

14	eTwinning (EU): mixing classroom practices and digital components to acquire cross-curricular and multilingual competences www.etwinning.net	free by public authorities: online, onsite in school, out of school	Participation in a network of teachers; School-based collaborative PD; Course/workshops	public authorities, school	service/process
15	Education Plaza (IS): connecting teachers in a sparsely populated country http://menntamidja.is/education-plaza/	free courses by public authorities: online, onsite in school, out of school	Participation in a network of teachers; informal dialogue; Course/workshops; In-service training courses	public authorities (MoE), Formal education (University of Iceland) & 3rd party	service/process/ external relations
16	iKlasé (LT): Informal teacher network providing professional learning opportunities http://www.iklase.lt/	free: online, onsite in school, out of school	Participation in a network of teachers; informal dialogue; Observation visits to other schools; Other	3rd party: individuals	service/process/ external relations
Engaging learners in first-hand experiences					
17	Best Practices Benchmarking course (ET-FI): Excursion to visit schools and observe practices https://www.euneoscourses.eu/?p=147	cost associated: onsite in school, out of school	Course/workshops; Observation visits to schools; job-shadow	3rd party: commercial (Euneos Corporation)	service
18	Shadow a Student (US): a day-long challenge for school leaders http://shadowastudent.org/	free: onsite in school	Observation visits to schools; job-shadow	3rd party: non-profit associations (School Retool), school	service/process
19	Teacher career services (SE): Career building stipend for Swedish teachers https://www.skolverket.se/	Application process: onsite in school	Other; Mentoring and/or peer observation and coaching, as part of a formal school arrangement; Individual research	public authorities (Skolverket), school	service/organisational

20	Pedagogical hackathons (FR): A course for fostering transversal competences https://www.reseau-canope.fr/notice/le-hackathon-pedagogique.html	free courses by public authorities: out of school	Course/workshops; Collaborative PD	public authorities (MoE), non formal education and training institutions (Réseau Canopé)	service/process
21	Escape rooms (FR): gamifying teacher professional development http://eduscol.education.fr/jeu-numerique/article/2238	free courses by public authorities: out of school/onsite in school	Course/workshops; Collaborative PD	public authorities (MoE), non formal education and training institutions (Réseau Canopé)	service/process
Innovating degree programmes					
22	Digi-teacher (FI): A post-graduate degree programme on digital education http://www.uef.fi/web/erikoistumiskoulutus-digiope/	cost associated: online, onsite in school, out of school	Qualification programme	Formal education institution (University of Eastern Finland)	service
23	New Education Laboratory (ES): Degree programme challenging conventional courses http://master.fundacioninger.org/modulo.html	cost associated: online, onsite in school, out of school	Qualification programme	Formal education institution (University Carlos III of Madrid), 3rd party (non-profit associations)	service/marketing
24	Teach Live (CZ): Degree programme for future teachers https://www.ucitelnazivo.cz/en/	cost associated: online, onsite in school, out of school	Qualification programme	3rd party: non-profit associations (Depositum Bonum Foundation)	service/marketing
25	Practical Entrepreneurship (DK): Supporting VET teachers to support entrepreneurial education http://www.ffe-ye.dk/undervisning/efteruddannelser/indsats-for-efteruddannelse/projekt-fagligt-entreprenorskab-eud	cost associated: online, onsite in school, out of school	Qualification programme	Formal education institutions, 3rd party (non-profit associations)	service
Innovating partnerships and new actors					
26	EnglishOne (SK): Boosting English teaching through digital content https://anglictina.iedu.sk/	free courses by public authorities: out of school, onsite in school	Course/workshop; mentoring; In-service training courses; other	non formal education and training institutions (Methodological and Pedagogical Centre)	service/external relations

27	Golinelli Foundation (IT): Accredited STEAM courses by a philanthropist https://www.fondazionegolinelli.it/teacher-courses	cost associated: out of school, online	Course/workshops; In-service training courses	3rd party: non-profit associations (Fondazione Golinelli)	service/external relations
28	FYXXILAB (BE): Educational Makerspace for students and teachers https://www.fyxxi.be/	cost associated: out of school, onsite in school	Course/workshops	3rd party: non-profit associations (eduCentrum vzw)	service/external relations
29	Lighthouse network (FI): peer to peer learning opportunities between schools https://www.oph.fi/kehittamishankkeet/kehittamiskouluverkosto/aineistoa	free courses by public authorities: online, onsite in school, out of school	Mentoring and/or peer observation; Observation visits to other schools; Course/workshops; Other	public authorities (local municipality), school	service/external relations
30	Staff exchange (FI): Teacher exchange for phenomena-based learning https://www.sitra.fi/blogit/opettajat-koulutuksessa-nappikaupasta-rohkeisiin-ratkaisuihin/	free: onsite in school	Observation visits to schools; School-based collaborative PD; job-shadow	Formal education institution (University of Jyväskylä), school: employer	service/external relations

1 Introduction

The aim of this report is to support teachers, school leaders and education policy-makers for excellent teaching and learning in the European Union. The report constitutes the final analysis and key outcomes of the study called *Innovating Professional Development in Compulsory Education*. The study was conducted by the Joint Research Centre on behalf of the European Commission's Directorate-General for Education, Youth, Sport and Culture between summer 2017 and 2018.

The study focuses on innovative and emergent practises in teacher professional development and other forms of teacher professional learning among teaching professionals who work in compulsory education. The starting point for the study was to recognise the current limitations that teachers say hinder them from participating in professional development activities. The TALIS study finds that across all the participating countries and economies, teachers most often cite conflicts with their work schedule (51% of teachers); lack of incentives (48%), lack of support from employers; and on average, 44% of teachers consider professional development activities to be too expensive (OECD, 2014). The same study also identified areas of high/moderate need for professional development: 57% of teachers lack training in 'ICT skills for teaching'; 48% in 'teaching for diversity'; 41% in 'student counselling and behavioural issues'; and 40% in 'teaching transversal, soft and future skills' (see Table 3).

The starting point for the study was the following: to look for practices and models that have emerged as a "workaround" to overcome the above-mentioned barriers and limitation; that were fine-tuned to teachers' needs; that took into account a diversity of types of professional learning activities (e.g. networks of teachers, mentoring, peer-learning, digital courses and school-based collaboration); and that represented a wide range of content areas. Lastly, a variety of education and training providers were looked at ranging from national/regional educational authorities to non-profit organisations, corporate providers, or even individuals and new educational entrepreneurs in the field. The focus was mainly on the EU Member States, but examples from other countries have been included where deemed relevant to the scope of this study.

Qualitative methods (e.g., desk research, online searches, and enquiries through networks) were used to identify 30 examples of practices used for teacher professional development and professional learning in compulsory education which were collected together and documented in an accompanying Technical Report (Vuorikari, 2018). The examples were analysed for their key features using recent literature to underpin the analysis (Table 5). Additionally, a number of case studies were carried out to get more in-depth understanding of the model, and also of the local context in which it had evolved. The first part of the work resulted in grouping the 30 examples under seven labels representing the base of broad areas where innovation takes place.

This report outlines the main findings and key conclusions of the study. First, the problem is introduced (section 2) which is followed by a short review of the literature to underpin the analytical framework (section 3). The examples are briefly presented section 4 after which the examples are analysed using a topology of seven labels that illustrate areas where innovation is taking place (section 5). The 30 examples in the inventory were also classified according to their *type of innovation* representing *product* innovation as well as *process, organisational and marketing* innovation. A discussion on innovative aspects of the inventory is presented in section 6. Lastly, together with conclusions, a number of policy pointers are given in order to better inspire and support those who plan and design the policies and provide teacher professional development and professional learning.

2 Context and problem statement

Teacher professional development can be used to improve teacher classroom practices and student achievement. However, international studies repeatedly find that only a small proportion of teachers participate in high-quality professional development activities (OECD, 2017a). Moreover, the issue of the ineffectiveness of professional development programmes is often brought up, an example of an extreme description of professional development programmes being “too conventionally taught, too top-down, and too isolated from school and classroom realities to have much impact on practice” (Buczynski & Hansen, 2010, p.1).

The provision of professional development in Europe is delivered in three ways: free courses by public authorities; through subsidies for schools, and professional development where teachers participate in courses provided by the 3rd parties and apply for the funding of the costs. Moreover, in some countries, Continuous Professional Development is a duty or required for promotion whereas in other countries, it is less regulated or left as a voluntary activity (European Commission/EACEA/Eurydice, 2015a). There is also variations on actors *who* define teacher professional development needs in the first place (Figure 2). Eurydice reports that this responsibility is shared in the majority of education systems between three actors: (1) the top-level authority for education (usually the national Ministry of Education), (2) local education authorities or schools themselves, or (3) individual teachers.

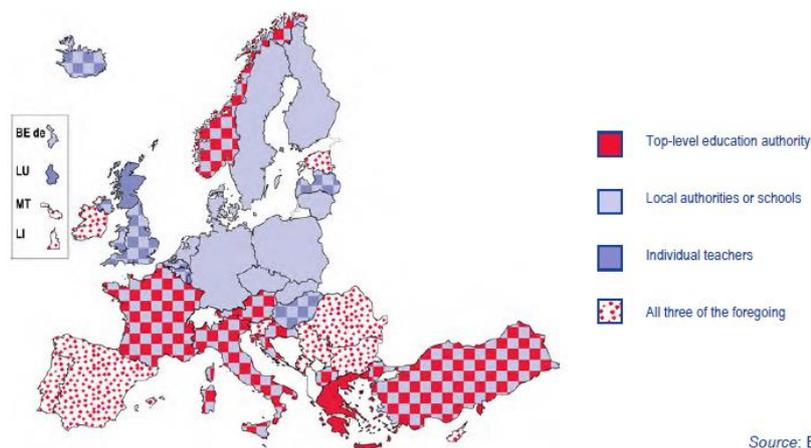


Figure 2. Players who determine CPD needs and training plans by Eurydice

The participation rate in professional development activities by European teachers who work in lower secondary education (ISCED 2) varies between the countries and jurisdictions, but on average 85% said they had participated in professional development activities in the 12 months prior to the TALIS survey (OECD, 2014). Nine types of development activities were identified, the European participation rates of which can be grouped as the following:

- Overwhelmingly **most teachers** state that they participate in workshops and courses (65%).
- Around **a third** of teachers say they participate in the following four types of activities:
 - individual or collaborative research on a topic of interest to you professionally (35%)
 - education conferences or seminars (32%)
 - a network of teachers formed specifically for the professional development of teachers (30%)
 - mentoring and/or peer observation and coaching as part of a formal school arrangement (29%)

- Only **around one in 6** or less participate in
 - Qualification Programmes (17%)
 - Observation visits to other schools (14%)
 - In-service training courses at business premises, public organisations, non-governmental organisations (12%)

The EU averages only tell part of the story. In fact, there are differences in professional development cultures across the EU. The Eurydice report goes into more details in the analysis of participation stating that "...in some countries participation rates are consistently fairly high across most types of activities. For instance, in Lithuania and Poland participation rates are higher than average for eight out of the nine development activities... This relatively high level of participation across a broad range of activities may be the sign of a well-developed and active professional development culture." (European Commission/EACEA/Eurydice, 2015a, p.58)

Teachers' participation in different *types* of professional development activities varies from one country to another and the patterns of participation vary widely too. For example, Table 2 shows how teachers in different European countries have participated in two different types of activities: 'workshops and courses', the most popular type and 'in-service training courses in business premises, public organisations, non-governmental organisations'.

Table 2. Two examples of teachers participating in different types of activities in the last 12 months before the survey. Percentage by county (Source: Eurydice, 2015b on the basis of TALIS 2013).

	Participation in courses and workshops	In-service training courses in business premises, public organisations, non-governmental organisations
Country	%	%
EU	65.0	11.5
BE ^{nl}	78.8	11.3
BG	60.3	23.8
CZ	69.7	14.4
DK	72.9	5.3
EE	82.0	22.8
ES	66.6	7.6
FR	53.7	2.7
HR	79.1	6.6
IT	50.9	3.4
CY	60.6	13.2
LV	88.8	9.3
NL	78.4	23.4
PL	81.0	16.3
PT	66.5	12.8
RO	51.9	16.3
SK	38.5	4.0
FI	60.1	8.8
SE	58.1	7.4
UK-ENG	75.0	22.4
IS	70.0	9.3
NO	64.2	3.9

From Table 2, it can be observed that participating in these two different types of activities varies between countries. Similar differences in participation rate prevail in other types of professional development activities, too. However, the reasons for these differences are unclear. They might be due to the fact that courses and workshops are the types most often organised and therefore also participated in. On the other hand, the Eurydice report mentions some country level correlations between participation in a type of professional development activities and the decision-making process on needs, e.g., involvement of teachers in defining their needs and participation in 'observation visits to other schools' ($r=0.57$) and 'in-service training courses in business premises, public organisations, non-governmental organisations' ($r=0.49$) (European Commission /EACEA/Eurydice, 2015, p.67). This finding indicates that teachers' participation in certain types of activities could be influenced by involving them in the decision making process on needs. Thirdly, personal preferences may also play a role. For example, that the activities offered in a paced-mode (meaning that there is a fixed start and end date like in many courses/workshops or educational conferences) could be more or less popular with certain groups of teachers rather than activities that are less structured and more flexible, e.g. participation in a network of teachers, mentoring and/or peer observation. Recent research indicates that the *type* of activity matters, the TALIS survey reports the following (note correlation, not causation):

"Teachers who report participation in professional development activities involving individual and collaborative research, observation visits to other schools, or a network of teachers, are more likely to report using active student-centred practices, such as practices that involve small groups, projects requiring more than a week for students to complete and information and communications technology." (OECD, 2014, p.150).

Lastly, the *topic* of professional development activities is also discussed (see Table 3). The TALIS study asked about participation in different topics of professional development activities, the EU average being the following:

- About **half** of the teachers said they had participated in:
 - Activities related to content knowledge, curriculum and pedagogical competences (56%);
 - ICT skills for teaching (51%);
 - Student evaluation and assessment practices (49%).
- Just above **a quarter** had participated in topics such as
 - 'Teaching for diversity', e.g. special needs, individualised learning and teaching in a multicultural/lingual setting (28%);
 - Student counselling and behavioural issues in class (27%);
 - Management, administrative tasks and ICT at work (25%).
- Just around **15%** stated that they had participated in 'Teaching transversal skill and skills for the future'.

The TALIS study also asked about the needs that teachers would have for their professional development in terms of topics for activities. The aggregated percentages by **moderate/high needs** are marked in Table 3, where it can be seen that 'ICT skills for teaching' and 'Teaching for diversity' top the chart with about half of the teachers surveyed stating a moderate/high need for professional development activities in these areas. In Europe, the needs hierarchy is generally speaking quite similar in all countries. Moreover, the rightmost column of Table 3 reveals the proportion of teachers who have *not* followed professional development activities in the 12 months prior to the survey in the topics *for which they expressed moderate and high levels of need*. The exact reasons for not following an activity are not clear from the survey, but nevertheless, it is alarming to see that in some areas almost as many who stated the need have not followed a professional development activity in these topics.

The gap between participation and the need for training is discussed by Eurydice in the same report, elaborating on a possible mismatch: “High proportions of teachers stated that their professional development activities contained topics for which the lowest percentages of teachers expressed a need. Conversely, in the case of many topics for which high percentages of teachers expressed a moderate or high need, relatively fewer said they covered these topics during their professional development activities. This points to the possible existence of a mismatch between what is offered by these activities and what teachers perceive to be necessary, suggesting that a readjustment to align the two would be welcome.” (European Commission/EACEA/Eurydice, 2015, p.12)

Table 3. The top level topics in professional development programmes in Europe based on teachers’ participation and need (categories are own elaboration using Eurydice and TALIS data)

Topics covered in professional development activities in the 12 months prior to the survey	High/moderate need	Participation	High/moderate need but no participation
ICT skills for teaching ICT skills for teaching	57%	51%	35%
Teaching for diversity Approaches to individualised learning; with special needs; Teaching in a multicultural/multilingual setting	48%	28%	46%
Student counselling and behavioural issues in class Student behaviour and classroom management; Student career guidance and counselling;	41%	27%	38%
Student evaluation/assessment Student evaluation and assessment practice	40%	49%	38%
Management, administrative tasks and ICT at work School management and administration; New technologies in the workplace	40%	25%	35%
Teaching transversal themes and competences for future Teaching cross-curricular skills (e.g. problem solving, learning-to-learn); Approaches to developing cross-occupational competencies for future	40%	15%	39%
Content knowledge, curriculum and pedagogical competences Knowledge and understanding of the subject field(s); Pedagogical competencies in teaching subject field(s); Knowledge of the curriculum	30%	56%	26%

The realities outlined above are: (1) the stated high barriers to participation in professional development activities by teachers; (2) the differences in participation by the type of activity and the lack of clarity about the reasons for this; and (3) the topical discrepancies and mismatches - all in combination might suggest that there is a need to look at the teacher professional development offer: its types, content, and how could it be delivered in better ways so that it more effectively meets the needs of today’s teachers. Could the delivery of professional development activities be more fine-tuned to alleviate the barriers that teachers state hinder their participation? In which ways could teachers themselves influence the topics and types of activities more strongly? Might it also be worth asking if more non-formal and informal ways of professional learning could be leveraged by educational authorities, for example, by officially recognising their usefulness to teachers? What about widening the offer of professional development activities by opening the field to more actors such as social partners?

In the following, the literature is examined in order to guide the next steps of this research by observing and documenting the new, emerging and innovative ways of teacher professional development and learning.

3 Literature guiding the design of the study

Policies that aim to improve the quality of teaching, learning and student achievement often focus on teacher professional development. For this study, effective professional development is defined as the following:

"structured professional learning that results in changes in teacher practices and improvements in student learning outcomes" (Darling-Hammond et al., 2017).

In general, there is a lack of rigorous studies that focus on demonstrating the link between teacher professional development, teaching practices and student learning outcomes. New evidence is arising thanks to two recent meta-reviews that are briefly introduced below. First, Darling-Hammond et al. (2017) outline seven elements of effective teacher professional development after a review of 35 methodologically rigorous studies which were able to show the link between teacher professional development, teaching practices and student learning outcomes (listed in the middle column of Table 4). Another large scale review, called "Developing Great teaching: Lessons from the international reviews into effective professional development", also found that the reviewed professional development opportunities, which were carefully designed with a strong focus on pupil outcomes, had a significant impact on student achievement (Teacher Development Trust, 2015). The study also outlined key components of professional development which are also shown in the right column of Table 4 which maps the common components of both studies. In order to make the connections between the analysis and the framework more concrete, throughout section 5 of this report, the numbers in the leftmost column of Table 4 are referred to.

A great deal of similarity, but also complementarity, is found between the two above-mentioned studies. They both were used to guide the overall design of this research. For example Table 5 in Appendix 1 shows the analysis of key features of all the 30 examples based on the 7 key components of effective professional development (incorporate active learning; keep content focus; support collaboration in job-embedded context; model effective practices; provide coaching and expert support; offer opportunities for feedback and reflection; sustain duration over a long period). For more details on the design of the data extraction template and design of case studies, see the accompanying Technical Report (Vuorikari, 2018).

Moreover, in order to orient the study, a broad-but-shallow review of the literature was carried out on emerging trends such as the use of Japanese Lesson Study (a process in which teachers jointly plan, observe, analyse and refine actual classroom lessons); practices involving peer-observation, observation visits, mentoring and coaching; emerging academic and grey literature on micro-learning (e.g. social media use and blended communities); and approaches that focus on design thinking looking at teacher professional development as a "design challenge". We also reviewed a number of European Union projects funded through Erasmus+ and Horizon2020 programmes focusing on innovation in schools and teacher education. Links to the Erasmus+ project database are given where relevant. References to this literature, where relevant to the discussion, are made in section 5.

Table 4. Key elements of effective teacher professional development underpinning the analysis.

	Darling-Hammond, Hylar & Gardner (2017, p. v)	Teacher Development Trust (2015)
1	Content focus: PD that focuses on teaching strategies associated with specific curriculum content supports teacher learning within teachers' classroom contexts. This element includes an intentional focus on discipline-specific curriculum development and pedagogies in areas such as mathematics, science, or literacy.	Alignment of PD processes, content and activities by offering relevant content to participants - their day-to-day experiences with, and aspirations for, their pupils. [...] The equal importance of both pedagogic and subject knowledge.
2	Incorporating active learning: Active learning engages teachers directly in designing and trying out teaching strategies, providing them an opportunity to engage in the same style of learning they are designing for their students. Such PD uses authentic artefacts, interactive activities, and other strategies to provide deeply embedded, highly contextualized professional learning. This approach moves away from traditional learning models and environments that are lecture based and have no direct connection to teachers' classrooms and students.	Teachers also implemented what they had learned by experimenting in the classroom.
3	Supporting collaboration: High-quality PD creates space for teachers to share ideas and collaborate in their learning, often in job-embedded contexts. By working collaboratively, teachers can create communities that positively change the culture and instruction of their entire grade level, department, school and/or district.	Collaboration and peer learning was a common feature in effective professional development, however, it alone is not sufficient.
4	Providing coaching and expert support: Coaching and expert support involve the sharing of expertise about content and evidence-based practices, focused directly on teachers' individual needs.	The role of external providers and specialists is a common factor in successful outcomes, working sometimes in tandem with internal specialists. External input must offer support in a constructive, effective way (coaches and/or mentors).
5	Offering feedback and reflection: High-quality professional learning frequently provides built-in time for teachers to think about, receive input on, and make changes to their practice by facilitating reflection and soliciting feedback. Feedback and reflection both help teachers to thoughtfully move toward the expert visions of practice.	Activities associated with effective PD include explicit discussions, following the initial input, about how to translate PD content to the classroom. .. [Teachers] engage in the analysis of and reflection around the underpinning rationale, evidence and relevant assessment data.
6	Sustained duration: Effective PD provides teachers with adequate time to learn, practice, implement, and reflect upon new strategies that facilitate changes in their practice.	The duration and rhythm of effective support: the most effective PD lasted at least 2 terms - more usually a year (or longer). More limited change on specific learning tasks could be achieved through shorter-term interventions.
7	Modelling effective practice: Curricular models and modelling of instruction provide teachers with a clear vision of what best practices look like. Teachers may view models that include lesson plans, unit plans, sample student work, observations of peer teachers, and video or written cases of teaching.	
8		Importance of PD programmes creating a "rhythm" of follow-up, consolidation and support activities to reinforce key messages to have an impact on practice.
9		Leadership around PD and core roles for school leaders.

3.1 Defining innovation in teacher professional development

Following the previous JRC work on innovation in education (e.g. Bocconi et al., 2012), all 30 examples were analysed for a number of attributes of innovation such as the **type** of innovation (product, process); nature of innovation (e.g. incremental, radical, disruptive); who the innovation targets (e.g. individual teacher vs. the whole school); the geographical coverage (e.g. pilot, mainstream), and implementation phase (e.g. local, cross-border). These are outlined in Table 6 in Appendix 2 and further discussed in section 5.

Regarding the type of innovation, this study follows the widely adapted definition of innovation from the new Oslo Manual:

An innovation is a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (**product**) or brought into use by the unit (**process**). (OECD/Eurostat, 2018, p.20)

The generic term "unit" describes the actor responsible for innovation, which in the case of education could be public authorities, educational organisations (e.g. training centres, schools, universities), professional development providers, etc. Following the definition above, the types of innovation used in this study are those from Vincent-Lancrin et al. (2019) aligning it with the project "Measuring Innovation in Education" (OECD, 2014b; Vincent-Lancrin et al., 2017).

- **Products and service innovation**, e.g., textbooks or educational resources, study programmes, and also new syllabi and new educational software. In the examples in this study, this could be a new professional development course or professional learning activity.
- Process for **delivering** and also innovating **pedagogic practices** in the examples involves focusing on improving teacher pedagogical practices, but on the other hand, also on a new way of delivering existing professional development experiences, for example, by using digital technologies or through new types of activities.
- Process of **organising practice**, e.g., organisational routines, changing how teachers work together, knowledge management practices; support for the introduction of new ideas and practices, participation in training and retraining courses. Additionally, "Organisational changes typically aim at improving learning in the classroom by changing the supporting environment offered by the school to students or staff. These changes can correspond to a new pedagogic offer, to new professional practices by teachers such as collaboration or teacher evaluation." (OECD 2014, p.30).
- Process for **marketing innovation**, a new way of pricing the education service or a new admission strategy, e.g., free and open MOOCs for all. This type is also known as **external relations** (e.g. relationships with parents, employers, research organisations, other academic institutions). The OECD has made a point in its previous work about capturing innovation in relationships with parents, "which are highly important given the importance of family involvement for student achievement." (OECD 2014, p.30).

In addition to the types outlined above, the new Oslo Manual (2018) acknowledges combinations of the above-mentioned types, e.g.:

- **Both a product and a process innovation**: The innovation involves significant improvements in both the characteristics of the service offered and in the methods, equipment, and/or skills used to perform the service.
- **Both a process and an organisational innovation**: The innovation involves both new or significantly improved production or supply methods and the first use

of organisation methods. For example, the introduction of new processes may also involve the first use of new organisational methods such as group working.

As with any innovation process, it should also be noted that its development and evolution are driven by local needs and conditions. Consequently, it is likely that the examples in this study have evolved as a response to their own context and possibly as a work-around to local barriers. Such examples often have unique ways in which they evolve, therefore, what is considered innovative in one (geographical/cultural) context is not necessarily going to be so in another. Understanding the dynamics of each system and their particular needs can help estimate the aspects of innovation and their transferability to a new context. This has been kept in mind while describing the examples and so information about **the local context and culture** where they take place has been included. In some cases where information is available, conducive **policies** and/or supportive measures to showcase how the local needs drive the development and evolution are presented. Special attention was paid to scrutinising the availability of evaluations of efficacy/effectiveness of such offers. This information is available in the narratives of the examples in the Technical Report (Vuorikari, 2018).

3.2 A brief methodological note

Textbox 1 provides the minimum information briefly outlining the main methods, parameters, and inclusion/exclusion criteria for the literature and examples in the study. The accompanying Technical Report includes more details, e.g., a section on methodology and methods used for the enquiry, detailed narratives of all 30 examples, the selected in-depth case studies, the data extraction template (Vuorikari, 2018).

Textbox 1. Main elements and parameters of the study.

The overall parameters of the study are the following:

- Population: teachers in compulsory education (ISCED 1-3)
- Main context: teachers working in compulsory education in EU28
- Focus: emerging/innovative forms professional development as considered in their own local and cultural context
- Outcome: define characteristics and create a new typology for emerging forms of teacher professional development
- Speciality: our intention is to find pertinent evidence to define the “new frontier” of “innovative forms” of teacher professional development

Main elements of the study:

- Literature note to set the boundaries for this research;
- An inventory of examples and case studies aiming at covering all EU Member States;
- A set of in-depth case studies and final outcomes.

Methodology: The above outlined elements are combined to generate a comprehensive picture of the situation on which sound policy recommendations (e.g. pointers) can be based.

Example about determining the search criteria and identification of examples for the inventory

- An active outward look is cast to find pertinent examples on the topic which was loosely described as finding “teacher PD with a wow-factor”. Various criteria was defined, each of which alone would be sufficient for inclusion for the study:
- Topic, e.g. teachers learning coding, teaching in multicultural classroom, learning about conflict resolution;
- Way of delivery, e.g. combination of known formats of delivery (e.g. Mooc + f2f workshop + project over a period); school based training; job-embedded practice; blending online and offline; community of practice
- Provider, e.g. organised by education authorities, non-profits, NGOs, a pop-up school by parents, etc.;
- Formal, informal or non-formal type of PD

4 Presentation of the inventory: 30 examples

The examples included in the study are listed below to give a quick overview of the inventory of 30 examples and accompanying case studies (in bold). Each line contains the name of the initiative, the country of its origin in brackets after which a short descriptive title is given. Other key details are included in Table 1 (see p. 11) which identifies the following additional attributes: how the **delivery** is conducted (online; onsite in school, out of school) and the possible cost; the **type** of activity using an enriched TALIS vocabulary (courses/workshops, conferences or seminars, observation visits to other schools, qualification programme, participation in a network of teachers, individual, or collaborative research, mentoring and/or peer observation and coaching, and school based collaborative professional development and job-shadowing); **training provider**, e.g., national/regional educational authorities, non-profit organisations, corporate providers, or even individuals and new educational entrepreneurs in the field, and lastly, the type of **innovation**.

Textbox 2. List of the inventory: 30 examples (more details available in Tables 1, 5, and 6). Those in bold are developed into case studies (see Technical Report, Vuorikari, 2018).

1. Matematiklyftet (SE): Content modules for collegial learning and peer tutoring
2. **LeerKRACHT (NL): Creating continuous improvement culture in schools**
3. **Prof'Essor (BE): a method for fostering in-school teacher collaboration**
4. Young Coaches for the Internet 2.0 (CY): empowering students to educate others
5. Oxfam intercultural mentoring programme (IT): tools for teachers to support migrant integration at school
6. PopUp School (FI): a digital platform for creating communal learning events
7. **Innokas Network (FI): Maker-space activities for cross-discipline learning**
8. Improving the Quality of the In-Service Teacher Training System (HR): courses delivered online on topics of teachers' needs
9. MENTOR (PT): online in-service course with the focus on NEETs
10. **Aprende INTEF (SP): Digital micro-learning opportunities to overcome time barriers**
11. Teaching Channel (US): professional videos for peer-observation in the classroom
12. E-competent teacher (SL): Blended online delivery with practical hands-on session
13. **Mediacoach (BE): a programme to foster Media multipliers in educational organisations**
14. eTwinning (EU): mixing classroom practices and digital components to help teachers and students acquire cross-curricular and multilingual competences
15. Education Plaza (IS): connecting teachers in a sparsely populated country
16. iKlasé (LT): Informal teacher network providing professional learning opportunities
17. Best Practices Benchmarking course (ET-FI): Excursion to visit schools and observe practices
18. **Shadow a Student (US): a day-long challenge for school leaders**
19. Teacher career services (SE): Career building stipend for Swedish teachers
20. Pedagogical hackathons (FR): A course for fostering transversal competences
21. Escape rooms (FR): gamifying teacher professional development
22. Digi-teacher (FI): A post-graduate degree programme on digital education
23. New Education Laboratory (ES): Degree programme challenging conventional courses
24. Teach Live (CZ): Degree programme for future teachers
25. Practical Entrepreneurship (DK): Supporting VET teachers to support entrepreneurial education
26. Golinelli Foundation (IT): Accredited STEAM courses by a philanthropist
27. EnglishOne (SK): Boosting English teaching through digital content
28. FYXXILAB (BE): Educational Makerspace for students and teachers
29. Lighthouse network (FI): peer to peer learning opportunities between schools
30. Staff exchange (FI): Teacher exchange for phenomena-based learning

Firstly, looking at the examples of activities and practices used for teacher professional development and professional learning in compulsory education, the overall trend is that about half of the examples are provided as a free course by public authorities whereas about a third of the providers are considered 3rd party providers. Within the latter, there is an interesting mix of actors composed of not-for-profit associations, philanthropists,

corporate responsibility programmes and small entrepreneurs in the field of education as well as individual volunteers (see Table 1 for more details).

Secondly, about half of the activities are organised as a course or a workshop, but it is interesting to note that most of them cannot be described by only using one type of activity, but by two or three. This emerging trend is interesting as it illustrates that the novel practices such as those here combine different activity types together, possibly to meet the needs of the teachers more effectively. Furthermore, regarding the structure of the activities, a variety can also be seen in terms of time (e.g. fixed starting date vs. ongoing activities) and place. They range from more structured ones to less-structured activities. Some of them are also more informal in their nature such as participation in teacher networks or in-school teacher collaboration (i.e. professional learning). The final general trend is the mode of delivery (online, blended, onsite in school, out of school). Interestingly, about 2/3 of the examples mix more than one mode of delivery and about half of the examples use digital technologies in addition to other modes of delivery (see Table 1 for more details).

Moreover, for the purpose of this study, all the examples were analysed using the seven **key elements of effective** professional development (for details, see Table 5 in the Appendix). Below is a brief discussion of the general trends that arise. First of all, all of the examples **incorporate active learning** for participants. Therefore, they could be seen to be moving away from the more traditional lecture based models to ones that utilise adult learning theories, being based on the active involvement of the participants in the process. This means, for example, that practices directly engage participants in activities that are directly connected to the teachers' classrooms. Moreover, they are highly contextualised and use authentic artefacts, also often providing teachers opportunities to engage in the same style of learning that they would design for their students (e.g. first-hand experience). Secondly, a great number of examples also take advantage of **modelling effective practices**, for example, by including samples of practices that have been proven to work and use videos and written cases of teaching. Many also tap into observation by peers, either in the same school, elsewhere, or even through video recordings. Darling-Hammond et al. (2017) show that modelling how effective instruction looks like can provide teachers with a clear vision of what best practices are, and so gives them some concrete examples on which to base their own learning and professional growth.

We highlight two other trends that also emerge from the examples, namely that of the **models explicitly supporting job-embedded collaboration** with colleagues and the models **providing coaching and expert support** for participating teachers. In about two-thirds of the examples, there are features of both in varying intensities. In a small number of models, professional collaboration was directed towards working with the colleagues of the same school (ex.1, ex.2, ex.3, ex.14, ex.13). This trend will be discussed at a later point when models that emphasise *school as a learning organisation* are discussed (section 5.1). On many of the other examples, a more informal type of collaboration was expected e.g., collaborating with colleagues who participate in the same training. Whereas the concept of teacher collaboration is already rather well known (e.g. TALIS by OECD, 2014), recent research also shows that this alone does not make professional development effective and successful (Teacher Development Trust, 2015). When applied correctly, Darling-Hammond et al. (2017) show that by working collaboratively, teachers can create a culture of positive change in their teaching.

Regarding the **trend of coaching and expert support to teachers**, the focus is on evidence-based practices that directly fit the teachers' individual needs. About a third of the examples either involved provision for an in-school pedagogical coach or someone from outside appointed for this task. The rest rely on some kind of less structured expert help or support, for example, through peers in an online community.

5 Main analysis of practices in teacher professional development

In the following, a number of emerging practices and features that arise from our examples are outlined. Moreover, a discussion on how they potentially better meet the changing needs of teachers' interests and time-constraints, and how they help teachers to align their competences better with the needs of the learners of the future. To facilitate the cross-analysis and further discussion of the examples, the following labels were used to describe *the focus of innovation*:

1. School as a learning organisation
2. Empowering learners through a competence-oriented approach
3. Innovating online delivery
4. Re-inventing blended learning
5. Engaging learners in first-hand experiences
6. Innovating degree programmes
7. Innovating partnerships and new actors

Textbox 3. Outline of the analysis of the 30 examples in the 7 areas. Six initiatives are developed into case studies (see green box) which are reported in the accompanying Technical Report (Vuorikari, 2018).

5.1 School as a learning organisation



5.2 Empowering learners through a competence-oriented approach



5.3 Innovating online delivery



5.4 Re-inventing blended learning



5.5 Engaging learners in first-hand experiences



5.6 Innovating degree programmes



5.7 Innovating partnerships and new actors



Case studies



Textbox 3 shows the grouping of the examples under the labels, the numbering refers to sub-sections where the main cross-analysis will be discussed. Details about the key elements of all the examples are found in Table 5 in the Appendix 1 and the whole narrative is available in the accompanying Technical report (Vuorikari, 2018). The labelling is not hierarchical or categorical, there is more than one way to group examples together as many have similar traits. The purpose of the labels is to allow cross-analysis of emerging features.

The following analyses a small number of examples for each label that illustrate the case well. Each text starts by introducing the examples which are referred to by their numbers, e.g. ex.1, throughout the text. This corresponds to the numbering used in the list on p. 25 (ex.1 corresponds to 1. Matematiklyftet, SE). Moreover, in order to make the connections between the examples and analysis clear, the different points of the underpinning theoretical framework in Table 4 are referred to. In addition, the relevant literature is introduced as well as key concepts where they add value and offer interesting insights without being too exhaustive. A number of other examples with similar emerging features are also included where appropriate. Each text also includes a discussion about the type of innovation as defined in section 3.1. Lastly, more information about all attributes of innovation can be found in Table 6 of the Appendix 2.

5.1 School as a learning organisation

Main examples discussed:	Examples with some similar features:
<ul style="list-style-type: none"> ex.1 Matematiklyftet (SE): Content modules for collegial learning and peer tutoring ex.2 LeerKRACHT (NL): Creating continuous improvement culture in schools ex. 3 Prof'Essor (BE): a method for fostering in-school teacher collaboration⁹ 	ex.4, ex.13; ex.29, ex.17, ex.11; ex.18, ex.20; ex.6, ex.7, ex.15, ex.27, ex.29

Three examples are introduced under this label with all of them sharing the trait of considering professional learning activities as a collective exercise to be practiced in its own context, namely in that of a school with colleagues from the same school. When improving the experiences and outcomes of all actors of an educational system, the focus shifts from the individual to a school as a learning organisation.

“[Learning organisations] encourage and enable teachers and school leaders to improve both their pedagogical and their organisational practices concurrently through local collaborative research, networking and continued professional development.” (European Commission, 2018b, p. 6)

The Swedish example of Matematiklyftet (ex.1), ‘the Boost for Mathematics’, focuses on professional development of subject-teachers within the same school, in this case mathematics teachers. The programme is composed of ‘modules’ which are delivered as web-based digital resources and executed onsite in school with a group of colleagues. One module takes about 30 hours to complete and includes four steps: (1) individual reading and viewing of videos, (2) meeting with colleagues and the tutor, (3) a classroom activity, and (4) meeting again to discuss the consequences experienced.

The other two examples, LeerKRACHT in the Netherlands (ex.2) and Prof'Essor in the French-speaking community of Belgium (ex.3) are both based on the same initial model that focuses on professional learning from a whole school development point of view. Working in cycles of 8 weeks, teams of 6-8 teachers apply a set of “tools” with the help of an in-school coach. First, teachers engage in short weekly staff sessions, called whiteboard sessions, where ideas are translated into goals and action plans for the whole team to achieve. Secondly, bi-monthly classroom visits are organised onsite in school in order to enhance knowledge sharing among colleagues and to observe colleagues in action. Lastly, the classroom visits alternate with bi-monthly follow-up/reflection sessions that are there for joint lesson planning, for collaboration on possible solutions to issues, etc. Whereas the basic model in LeerKRACHT (ex.2) and Prof'Essor (ex.3) is the same, both examples have

⁹ See case study I on LeerKRACHT and Prof'Essor in the accompanying Technical Report for more details (Vuorikari, 2018, p.86)

localised traits which are further discussed in case study I (see the accompanying Technical Report, p.86).

A common prominent observation within these examples is how the professional development activity is shifted from one teacher to many. In other words, instead of only focusing on the development and changes of individual's practices, the focus is on how the school, or a teacher community within the school, can be developed and improved. Another feature also emerges strongly, namely that professional development activities increasingly take place onsite in school. In all three examples above, instead of teachers leaving the school to attend a professional development activity in a training facility outside the school and with teachers from other schools, the activities now take place onsite in school with colleagues with whom the teacher works every day while using the equipment and resources that are available every day. Of course, such arrangements also require resources from the school management, who need to ensure that appropriate time is allocated as well as enough space, etc. Concerning the known barriers that teachers cite as a reason for not participating in professional development activities, conflicts with their work schedule is at the highest place (51%), closely followed by that of lack of support from employer (OECD, 2014). Therefore, the examples here offer ideas on how to overcome some of the known barriers in this area.

Moreover, as more evidence for the benefits of teacher co-operation and collaboration in a job-embedded context has surged (e.g. TALIS studies), it makes sense for professional learning opportunities to be created for teachers to learn *how to* collaborate with their own colleagues in an authentic setting. For example, in all three programmes teachers co-design lesson plans together, thereby engaging in active learning and collaboration with authentic artefacts. Such collaboration is a key component according to research on effective professional development (Table 4, point 3), but also receiving feedback and having time for reflection with practitioners can help teachers to move towards the expert visions of desired practices (Table 4, point 5). In addition, the fact that there is time and space reserved for such collaborative activity is important, sending a message that job-embedded collaboration is valued, including by the school management (Table 4, point 9). Other examples of a teacher professional development programme with an *explicit goal* for collaboration with in-school colleagues are Young Coaches for the Internet 2.0 (ex.4) and Mediacoach (ex.13). Research suggests that collaborating teachers can set an example for collaborative students, aligning teacher learning with that of the pupils (Johnson & Johnson, 1999).

Yet another noticeable feature that emerges is the introduction of the systematic use of peer-observation with colleagues of the same school (both ex.2 LeerKRACHT and ex.3 Prof'Essor), which according to research is also a component of effective teacher professional development (Table 4, point 7). A number of other examples feature this trend too: a school network called Lighthouse (ex.29) in Finland uses peer-observation and classroom visits to innovative schools in the *nearby* community as a means to leverage the idea that good practices often evolve from a specific local need, so the transfer of innovative practices within the same region could be easier. Ex.17 offers a 7-day-long tour to visit schools and classrooms in both Finland and Estonia, whereas *asynchronous* peer-observation is provided through classroom video recordings in ex.11 (Teaching Channel). In general, video is an effective way of modelling good practices in the form of a recording of a demonstration lesson, for example. Some recent research focuses on video becoming a new "hot tool" for peer observation (see 5.3 for more information).

As visits by teachers to other classrooms are a rather inexpensive activity, and possibly also a collegial one, it is not surprising that the OECD reports that over time between 2003 and 2011, more classroom visits have taken place (OECD, 2014b, p. 221). However, there are quite big variations in practices within Europe. For example, around 40% of teachers in lower secondary education in Poland, Slovakia and Romania said they had participated in 'Mentoring and/or peer observation and coaching as part of a formal school arrangement' whereas that figure is only 5% in Finland. The literature on the topic seems to agree that

there is no uniformly accepted model for carrying out peer-observation or how school visits should be conducted in order to be effective. Darling-Hammond (1998) discussed the topic in the context of school education. A recent study in the US reported that *structured* lesson observation led to gains in student and teacher performance, but this result was not confirmed in a study in English schools carried out by the Education Endowment Foundation (Worth et al., 2017).

Lastly, in all three examples, teachers from the same school form groups and are set to work together using a certain method for a period of time. In all of the examples, teachers are supported by coaching/mentoring activities to help reflect on practices in a cyclical manner. This creates a "rhythm" or a "cycle" of introducing a new theme or knowledge, its implementation in an authentic context, and support activities to follow it up to help reinforce its impact on practice (see Table 4, point 8).

It is also interesting that the practices in all these cases are based on models that have proven to work: Matematiklyftet (ex.1) uses a theoretical framework which is based on the Japanese Lesson study and Sinus model (Ostmeier et al., 2010); whereas both LeerKRACHT (ex.2) and Prof'Essor (ex.3) stem from the LEAN-management approach used in industry, but in this case being fine-tuned to the specific context of schools (for more information, see Case study I in the Technical Report¹⁰). Similarly, in some other examples, models proven to work elsewhere have been adapted for educational purposes, e.g. the example of pedagogical hackathons (ex.20) uses a model that was first designed for programming purposes and the example of Shadow-a-Student (ex.18) implements a model used in design thinking.

The four features introduced above: the shift from training an individual to training a group of teachers; professional learning opportunities to learn how to collaborate with in-school colleagues; the use of peer-observation and classroom visits; and the use of 'cycles of activities' strongly coincide with the current discussion of *schools as a learning organisation* where the goal is to improve the experiences and outcomes of all actors. Moreover, schools as a learning organisation rarely exist in isolation:

"Developing the capacity and role of teachers and school leaders is essential for schools to provide a clear strategic vision and leadership that guides and fully support teaching and learning, and which enables effective communication with other practitioners and stakeholders. Such schools do not exist in isolation; they are linked and embedded within a learning system...taking place in and around schools" (European Commission, 2018b, p. 6).

Seeing the school as linked and embedded within a larger ecosystem around it becomes evident from some other examples, too. Ex.7 (Innokas Network) emphasises the link with local actors and partners (e.g. visits, collaboration and hands-on practices with local industry and business) while ex.29 (the Lighthouse network) focuses on networking local schools together. Similar example of local collaboration is by Education Plaza (ex.15) in Iceland: it fosters a wide set of partnerships involving educators, educational administrators, policy makers, the academic community and other stakeholders working in communities of practice, both online and in physical spaces. This offers an interesting model of how digital technologies and resources can be used and pooled in a small country with a sparse population to focus on learning opportunities at the national or local level.

Some other examples also tap into local human resources. In ex.27 (EnglishOne), local native English speakers in Slovakia were recruited as a resource for classrooms, while in ex. 4 (Young Coaches for the Internet 2.0), students would go out, for example, to teach ICT skills to Internet-illiterate adults and older citizens in the community centre. In ex.6 (Pop-upSchool), learning spaces are created blurring the boundary between teacher, student, parent, locals, etc. fostering the method of school as an open learning community. In all these programmes, emphasis is on the idea that schools are strongly

¹⁰ For detail see case study I in the accompanying Technical Report (Vuorikari, 2018, p.86)

linked to local developments that take place around it, and so connecting to and tapping into these resources adds value.

In terms of discussing the innovative aspects of these examples, the most prominent observation is how the professional development activity is shifted from developing and improving one teacher to the whole school or a teacher community within. These programmes are the type of process innovation targeting *organisational processes*, such innovation is commonly understood to be the implementation of a new or significantly improved method of organising workplace activities (see 3.1). On the other hand, all three examples are also understood to be *product innovation* as they introduce a new or improved service in the field of teacher professional development.

- Shift from training an individual to training a group of teachers
- Create professional learning opportunities to find out how to collaborate with in-school colleagues
- Tap into existing resources: in-school coaching and mentoring, the use of peer-observation and classroom visits in nearby school and leverage local resources for the benefit of student teaching
- Link and embed schools within a larger ecosystem around it - schools as a learning organisation rarely exist in isolation

5.2 Empowering learners through a competence-oriented approach

<p>Main examples discussed:</p> <ul style="list-style-type: none"> • ex.4 Young Coaches for the Internet 2.0 (CY): empowering students to educate others • ex.5 Oxfam intercultural mentoring programme (IT): tools for teachers to support migrant integration at school • ex. 6 PopUp School (FI): a digital platform for creating communal learning events • ex.7 Innokas Network (FI): Maker-space activities for cross-discipline learning¹¹ 	<p>Examples with some similar features:</p> <p>ex. 10</p>
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Competence-oriented approaches in education and training focus on the outcomes of a learning process and its further application in a new context. Recently, European policy makers in the field of education & training have acknowledged a need for them, suggesting that educational institutions applied

“cross-curricular approaches, a greater emphasis on interactive learning and teaching styles, combining formal with non-formal and informal learning, more collaboration with non-education stakeholders and local community, a new role of the teacher, trainer and educator in guiding learning processes as well as new approaches to assessment.” (European Commission, 2018a, p.5).

It is clear that this also calls for new ways of supporting teachers in this endeavour. In the examples, a number of professional development courses and professional learning activities exemplify how teachers can be supported in moving towards competence-oriented approaches in education. Two of the examples are structured courses that apply such an approach: Young Coaches for the Internet 2.0 (ex.4) and Intercultural Mentoring Program by Oxfam (ex.5). On the other hand, two other examples (ex.6 and 7) support educational staff in building learners’ key competencies by co-creating learning opportunities: Pop-upSchool (ex.6) through combining formal with non-formal and

¹¹ For more details see case study II on Innokas Network in the accompanying Technical Report (Vuorikari, 2018, p.97)

informal learning and collaboration with the local community, and Innokas Network (ex.7) using cross-curricular approaches with a greater emphasis on active learning. The two latter cases can be considered to be less structured professional learning experiences than the first two.

Young Coaches for the Internet 2.0 (ex.4) by the Cyprus Pedagogical Institute is offered annually for 15 schools to participate. In each participating school, a teacher and some 20 young coaches, i.e., students, will be involved. The goal of the programme is that the “young coaches”, together with their teachers and along with a coach, will develop an action plan for their school on the safer use of Internet. Over the school year, various actions are implemented in the school which include training opportunities for fellow students, teachers and even for people outside the school (e.g. Internet-illiterate people in community centres). The in-service training programme will support teachers in all aspects of it. The programme includes two types of workshops; one focusing on content-knowledge related to safer internet and others that focus on coaching skills: how to coach students, and how to teach students to coach and teach others. The third aspect is the support of a coach for teachers to implement and follow-up the planned activities over the school year. At the end of the school year, a follow-up seminar is organised for the participating teachers to share practices.

The other example of a competence-oriented teacher professional development course is by Oxfam Italy (ex.5). It focuses on participatory approaches in multicultural educational contexts. The 5-day course introduces teachers to tools and methods that can be used in schools to support migrant integration through peer mentoring by fellow students. The models introduced during the course help teachers to identify, train and supervise a group of mentor students in their school whose job it will be to guide and support other students, especially those with a migrant background, during their integration phase at school and throughout the whole school year. The participatory tools, which have been tested in schools in five countries (Italy, Poland, Spain, Turkey and the United Kingdom)¹² thanks to a Comenius project, can help create the right mind-set and support students in becoming the change agents in the school. The course itself, which also includes creation of a plan for the participants’ own school, therefore also focuses on helping educational staff to become more competent in implementing competence-oriented approaches in their own educational institutions in the long run.

The goal of the professional development programme in both examples above (ex.4 and ex.5) is for the teacher to learn how to enable *learner agency*. In these two examples, teachers are taught to develop situations where learners are given an opportunity, within a guided setting and with the help of their teacher, to start exercising their own *agency* in a sense of taking responsibility to peer-mentor fellow students (ex.5) or through teaching others in or outside the school community (ex. 4). In doing so, students are given an opportunity to understand what it means to identify, plan, and execute actions in a safe environment, that is to say, to experiment with taking agency and influencing other people, and to eventually change the circumstances for the better. In fact, a recent document by the OECD also focuses on *learner agency*:

“Future-ready students need to exercise agency, in their own education and throughout life. Agency implies a sense of responsibility to participate in the world and, in so doing, to influence people, events and circumstances for the better. Agency requires the ability to frame a guiding purpose and identify actions to achieve a goal.” (OECD, 2018, p.4).

On the other hand, two additional examples under this label can be seen to support educational staff in co-creating a conducive environment where learners can practice key competencies and transversal themes such as taking the initiative and being creative. These examples are not organised as courses but are better described as less structured professional learning experiences that offer a setting. Pop-upSchool (ex.6) is a digital

¹² Video: <https://youtu.be/3-gFbnLjdZI>

platform already used in hundreds of cases by schools, students, and/or parents in Finland to organise learning events that involve co-organised activities. In general, all pop-up participants are committed to creating learning spaces where exchange can take place, thus blurring the boundary between teacher, student, parent, the local community, etc. The platform fosters a method of schools as an *open* learning community, thus combining formal with non-formal and informal learning while inviting collaboration with non-education stakeholders and local community.

In the long run, platforms such as Pop-upSchool can help to provide educational staff and other stakeholders with the support they need to practice and empower *learner agency* as part of the approach to lifelong learning. In all of the above examples (ex. 4, 5, 6), even if somewhat more implicitly, the focus is also on learners' personal and interpersonal competencies (sometimes referred to as 'life skills', 'soft skills') which

"have become more important in today's society. They can respond to the growing needs of individuals to deal with uncertainty and change, remain resilient, develop personally and build successful interpersonal relations." (European Commission, 2018, p.39).

It is also possible that these examples are effective in citizenship education. According to the latest research, school is the right place to start working on the students' mind-set in promoting democratic attitudes and behaviour:

".. in contemporary Europe, schools have a moderate but non-negligible impact with respect to adolescents' attitudes and behavioural intentions related to civic life. How much students can learn about political and civic issues, to what extent they experience democracy within the school, and whether or not they can get involved in the broader community are all related to how they think and how they feel about democracy and society, although different educational approaches might promote one area more than another." (Blasko et al., 2018)

The last example of a competence-oriented approach to professional teacher learning is the example of Innokas Network (ex.7). At the heart of the Network are activities that aim to cultivate active learners for the 21st century and support their acquisition of competences of the future. The activities are all framed by the model of 'Innovative school' which translates into education that, on the one hand, is often known as 'maker culture': an approach for learning by doing in a social environment that is based on informal, fun, typically peer-led and networked learning. On the other hand, there is a more theoretical concept which sees both teachers and students as innovators. All activities, including teacher professional learning and development, are organised through a non-formal network that is coordinated in collaboration with the Faculty of Educational Sciences at the University of Helsinki and the local level coordinators.

A variety of professional learning opportunities are offered which range from half-day tool oriented training sessions focusing on the *pedagogical how-to* of robotics and coding tools (e.g. LEGO EV3, Micro:bit) to, for example, a MOOC for coding as a pedagogical tool (Case study II in the accompanying Technical Report¹³). A major factor, however, in terms of supporting teachers in moving forward the vision of 'Innovative school' comes through local coaches who can be invited to intervene in schools. As is noted in Table 4, point 4, the role of external specialists can be very constructive in terms of creating the right conditions for professional learning.

The novelty of Innokas Network supporting teachers in this type of competence-oriented professional learning lies in its research-based view on teacher professional development which considers that if the professional development can be better embedded in the development of the entire school and its vision, it is a win-win for both the school development and teacher professionalism. More details about Innokas Network, its future

¹³ For more detail see case study II in the accompanying Technical Report (Vuorikari, 2018, p.97)

competence-oriented approach and teacher professional learning can be found in Case study II in the accompanying Technical Report (Vuorikari, 2018, p.97).

Some of the examples introduced under other labels also use the competence-oriented approach to professional development. In the case of online content made available by the Spanish Ministry of Education (ex.10), the expected learning outcomes of each online course are clearly outlined according to the "Reference Digital Competence Framework for Teachers¹⁴" which is based on the European Digital Competence Framework for Citizens. It outlines the knowledge, skills and attitudes that teachers are expected to possess regarding their digital competence (e.g. they include competences related to collaboration through the internet, management of autonomous learning and participation in educational communities).

In terms of discussing the innovative aspects of these examples, all of them represent new *product innovation* by introducing a new service as a professional development activity that differs significantly from what has previously been available. It can also be said that in Young Coaches for the Internet 2.0 (ex.4) and Intercultural Mentoring Program by Oxfam (ex.5), the innovation is related to organisational innovation by changing the supporting environment offered by the school to students through new teacher professional practices. Both examples could be considered to be radical innovations in their nature because they introduce a number of new elements, e.g. involving students in an active learning process, and introducing collaborative activities and mentoring tasks to be carried out by students.

Going a few steps further, the example of PopUp School (ex.6) introduces a whole new way of delivering teacher professional learning experiences, thus also having aspects of process innovation. Its nature is radical or even disruptive when compared to the previously known model of teacher professional development (e.g. workshops). Innokas Network (ex.7) combines many of the innovation types. While it focuses on affecting the individual teacher's teaching processes through different types of training and mentoring/coaching support, it also targets organisational innovation in terms of putting in place a new vision of the "innovative school" and the method of achieving it. Lastly, all of them also represent the type of innovation with external relations (e.g. relationships with parents, research organisations, academic institutions, NGOs).

Further pursuit of innovation in this area is important. Within OECD countries, the share of students with teachers participating in professional development activities aimed at improving critical thinking and problem solving ability of the students varies significantly across countries from less than 10% in Norway to over 65% in the USA. Data comparing 3 different years was used, but still the report concludes: "All these changes have remained modest overall and there has not been much innovation in this area in any covered country" (Vincent-Lancrin et al., 2017, p.35).

- Create opportunities for teachers to learn how to enable learner agency
- Support educational staff in co-creating a conducive environment where learners can build and practice key competences and personal and interpersonal competences (e.g. life skills)
- Co-create learning spaces and experiences where various exchanges can take place, thus blurring the boundary between teacher, student, parent, the local community, etc.
- Recognise school as the right place to practice the mind-set of students in promoting democratic attitudes and behaviour

¹⁴ <http://aprende.intef.es/mccdd>

5.3 Innovating online delivery

Main examples discussed:

- ex.8 Improving the Quality of the In-Service Teacher Training System (HR): courses delivered online on topics teachers need
- ex. 9 MENTOR (PT): online in-service course with the focus on NEETs
- **ex.10 Aprende INTEF (SP): Digital micro-learning opportunities to overcome time barriers¹⁵**
- ex. 11 Teaching Channel (US): professional videos for peer-observation in the classroom

Examples with some similar features:

ex.1, ex.12

Nowadays delivering teacher professional development courses online hardly sounds like “new news”. However, it is worth bearing in mind that 51% of teachers still cite conflicts with their work schedule as a barrier to participation in professional development activities and in some European countries, figures are very high, e.g. three out of four teachers in Portugal, 60% in Italy and Spain, and 42% in Flanders, Belgium (OECD, 2014). In such cases, offering teacher professional development and learning opportunities online in a paced (fixed start and end date) or self-paced mode (any time) can offer ways of alleviating the barrier of time conflict. Examples included under this label are all delivered predominantly online, their various aspects of innovation are explained below.

The online delivery format reaches a large number of participants in a relatively short period of time, thereby alleviating the pressure of physical space needed for training facilities and also the need to commute to a training facility. The case from Croatia (ex.8) exemplifies this well, where approximately 10% of all general education school staff has already participated in online only e-learning programmes to refresh and strengthen their application of modern didactic approaches in teaching. Courses, which are delivered on five different topics that polled high on teachers’ interest, re-start every 2-3 months and the maximum number of participants is admitted based on a cohort system. Annually, approximately 1 500 individuals participate and their feedback is very positive. The training provider estimates that choosing digital delivery has proved to be an enormous success working around the known barriers of participation: increasing access to professional development activities for teachers living and working in remote areas of Croatia (e.g. islands); for younger teachers with small children; and for those who work in several schools to make up a full-time job. Furthermore, the fact that topics of training were aligned with those that Croatian teachers had indicated a high interest in plays an important role (Table 4, point 1).

Other examples where online delivery was used to reach large numbers of participants include the Slovenian example (ex.12), which will be discussed in more details under the next label, where a blended course reached more than 80% of all teachers in the country. Matematiklyftet (ex.1) from Sweden, where online course modules were used in addition to face-to-face, reached almost 35 000 Mathematics teachers (76% of all mathematics teachers) from more than 4000 schools.

Another interesting example under this label is the course offered by the Portuguese Ministry of Education (ex.9). In 2017, the Portuguese education system adopted a new strategy to reduce the rates of early school leaving and NEET (youth Not in Employment, Education or Training), so schools were provided with means to set up small groups of students (<10) who were accompanied on a weekly basis by a regular teacher acting as a mentor. The intention was that this close monitoring could create the necessary conditions for improving students’ academic achievement and students could obtain at least a lower

¹⁵ For more details see case study III on Aprende INTEF in the accompanying Technical Report (Vuorikari, 2018, p.110)

secondary education certificate. There was an urgent need for teachers to gain the mentoring and counselling skills required.

A new online course called MENTOR (ex.9) was the response. The strategy was two-fold: teachers were offered two different types of online courses, both with complimentary content, but each accommodating the different needs and time constraints of teachers. On the one hand, there was a 6-week online course where teachers worked autonomously (15h) using a digital platform. The content was designed to help them cope with their on-going mentoring task at school. It included theoretical sections and purpose-built videos addressing how mentors are expected to set up mentoring sessions, for example. It also introduced scientific papers, short assignments, and a forum where participants could share experiences and materials. On the other hand, a Moodle course was offered that lasted for eight weeks (25h). It was designed to have weekly assignments which required participants working at their own pace (2h-2.5h) and in synchronous (1h) sessions where real-time discussions could take place. More than 2000 teachers completed the courses over the school year of 2017-2018. The online course requiring autonomous study had an average completion rate of 58% and the course requiring participation in certain fixed period of times even reached a completion rate of 98%. The success of both programmes was not only in their design, but also in their relevance to classroom activities (Table 4, point 1) – teachers had an urgent need to upskill, which was also probably one of the drivers for the high completion rate.

Offering online only courses for in-service teachers in a paced mode (fixed start and end date) was used in the three examples mentioned above. All these courses were provided by (or delivered on behalf of) national educational authorities and they also resulted in an official certificate of participation. Such online courses are also offered by the Spanish Ministry of Education who, in 2014, expanded its offer and first moved to experiment with MOOCs, that is, Massive Open Online Courses (ex.10). The new aspect was that instead of offering online courses only for in-service teachers of Spanish state-funded schools, participation in these MOOCs were offered to anyone no matter whether they were employees in Spain or not. Another innovation was that in contrast to the normal courses, the MOOC courses had no limitation for participants (hence Massive) so the offer was made available to a larger number of learners at once. At the end of each MOOC, the participants who completed all course requirements receive an Open Badge issued by the Ministry. Instead of being an officially recognised certificate for Continuous Professional Development, an Open Badge is an informal but verifiable digital recognition of skills and achievements, in this case of those acquired during the MOOC.

The MOOCs organised by the Spanish Ministry of Education are 5 week-long courses that require between 3.5 and 5 hours of studying effort per week. According to a recent in-depth study, the participants considered these MOOCs to be a good option for teachers who otherwise lack entrance prerequisites; who do not have school support to follow other type of professional development activities; or who lack time to follow less flexible training (Castaño Muñoz et al., 2018). Similar to the case of Croatia, they also offered advantages such as the potential to widen access to professional development especially for those teachers who have more difficulties accessing traditional training (see Case study III in the accompanying Technical Report, 2018¹⁶).

In general, MOOCs are offered in a paced mode (fixed start and end date) and in a fixed manner so learners have little choice in the order or when they follow the content. In the case of Spanish MOOCs by the Ministry, while the course provider analysed the results of the first MOOCs using online log files, a peculiar user behaviour was revealed: some participants actually skipped parts of the course and only joined in certain modules. This user behaviour resulted in the creation of a new type of course: a shorter one, an average 3-hour long session that only focused on acquiring and developing a single competence. Thus Nano Open Online Courses, NOOCs, were born which are now made available on the

¹⁶ For more details see case study III on Aprende INTEF in the accompanying Technical Report (Vuorikari, 2018, p.110)

Ministry's digital platform, and which also award Open Badges. In general, NOOCs subscribe to a new trend called *micro-learning*, the idea of which is to offer very short nuggets of knowledge, experiences, training, etc. at the time so that learning can potentially take place without much of time-commitment and at sporadic times, e.g. an opportunity for micro-learning might appear while travelling on public transportation. Twitter is particularly popular among some groups of teachers who use it as "the virtual watercooler" where, through given hashtags, participants can exchange ideas, resources, links and so on.

The last example regarding the innovation in online delivery of professional development and professional learning opportunities illustrates the potential of video. The examples include a US-based commercial digital platform called Teaching Channel (ex.11) which uses video as a way of modelling good practices and showcase inspiring teachers and their work in the classrooms (see Table 4, point 7). Teaching Channel delivers professional development videos for teachers over the Internet and on television. In general, video can be used for many purposes in teacher professional development. Sherin & Dyer (2013, p.9) reviewed more than 100 articles published on the topic between 2008 and 2013 suggesting that

"there is strong evidence that video can promote changes in how teachers think about and pay attention to classroom interactions. Specifically, sustained reflection on video helped teachers learn to more effectively diagnose student strategies and comments, as well as to provide more in-depth interpretations of the effects of pedagogical techniques."

Other researchers also focus on videos for professional learning purposes. Lofthouse (2015) discusses its use for teacher coaching to stimulate discussion while Knight (2012) talks about how inspiring teaching videos could be used as part of the school-based professional development activities where videos are used as "thinking prompts" to help ask effective questions about current practices, and Kersting et al. (2012) conducted a series of studies on analysis of video clips, classroom practices and student learning in the domain of mathematics.

Any teacher can access the library of videos on the Teaching Channel website free of charge. The videos are proposed by teachers but the Teaching Channel selects them and videos are recorded by the company itself. It also hosts a community for educators to share ideas and best practices, and the platform also allows participants to reach out to other educators to get guidance on teaching methods, strategies, lesson plans and curriculum. A number of schools and school districts around the US use the platform as a pay-service to enhance professional development, there are over 1 million members of the community made up of teachers, administrators, coaches and educational support personnel.

In terms of discussing the innovative aspects of these examples, they all strongly represent *product innovation* as they introduce a whole new product or service of teacher professional development activities delivered through digital technologies that differ significantly from previous products offered by these providers. Mentor (ex. 9) also shows *process innovation* as the strong intention was to change process of how student mentoring was done. On the other hand, AprendeINTEF (ex. 10) also has features of *marketing innovation*, an example of which is that through making the content available with no previous requirements and accessible to anyone, they have adopted a new admission strategy. The examples from Croatia (ex.8), Portugal (ex.9) and the Teaching Channel (ex.11) are incremental in their nature of innovation as they still remain with an idea of a course and only change the mode of delivery (e.g. peer observation in real time vs. through video). There is a more radical nature of innovation in the example of Spanish online content (ex.10), which is exemplified in terms of innovating with the length of the content and the nature of certification. Read more about the innovation with NOOCs and Open Badges in Case study III in the accompanying Technical Report (Vuorikari, 2018, p.110).

- To remove barriers, rethink digital delivery!
- Experiment with the length of the digital content and introduce micro-learning to help alleviate the time pressure
- Delivering already existing digital content to new audiences or in a different way (e.g. length; pace mode vs. self-paced) can give more impact for the same content
- When delivering online, use log-file information and digital trace data to design better for teachers' needs

5.4 Re-inventing blended learning

<p>Main examples discussed:</p> <ul style="list-style-type: none"> • ex.12 E-competent teacher (SL): Blended online delivery with practical hands-on session • ex.13 Mediacoach (BE): a programme to foster Media multipliers in educational organisations¹⁷ • ex. 14 eTwinning (EU): mixing classroom practices and digital components to help teachers and students acquire cross-curricular and multilingual competences • ex. 15 Education Plaza (IS): connecting teachers in a sparsely populated country • ex. 16 iKlasè (LT): Informal teacher network providing professional learning 	<p>Examples with some similar features:</p> <p>ex.1, ex.2, ex.3, ex.9, ex.17, ex.18, ex.20, ex.22, ex.25</p>
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A well-established concept of blended learning combines two different modes of delivery: online learning with traditional classroom methods that require the physical presence of both the teacher and the learner (i.e. face-to-face learning). Whereas this type of blended learning is already established in online training, and to a certain extent also in teacher professional development, an emerging feature is the introduction to an otherwise traditional online course of a period of practical hands-on experience where teachers experiment onsite in school with their newly acquired knowledge and skills (ex.12 and ex.13). Under this label, we also look at professional learning activities that are less structured and network-based, mixing activities between the digital world and the physical one resulting in actions that place onsite in school (ex.14 eTwinning, ex.15 Education Plaza, ex.16 iKlasè).

"E-competent teacher" (ex.12) is an online course for Slovenian teachers that attracted more than 20 000 in-service teachers. 50% of the course was organised online using a digital learning platform and the other half involved classroom implementations allowing teachers to experiment with the new strategies and knowledge from the course in their own classroom. In other words, the participants directly translated the content of the course into their teaching practices. The courses were structured to take advantage of the mixed mode of the delivery. They usually started (1) with a 4-hour online session after which (2) participants were provided with online course content to work on a digital learning platform allowing for peer-to-peer learning to take place. Over this period of 2-3 weeks, (3) teachers also carried out a classroom implementation onsite in school. The courses ended (4) with another 4-hours synchronous session for feedback and (5) an additional "come and tell us" video conference for sharing good practices. Altogether, the organisers estimate that the combination of online and offline activities limited teachers weekly workload to about 2 hours/week which was estimated to be one of the success factors.

Another example of mixing different modes of delivery is a year-long course called Mediacoach (ex.13) in Flanders, Belgium. It prepares participants to become expert-coaches in digital education in order to support their institutions and their colleagues in

¹⁷ For more details see case study IV on Mediacoach in the accompanying Technical Report (Vuorikari, 2018, p.122)

implementing digital learning and teaching. The course is delivered in three modes: online, face-to-face and onsite in school. Following the traditional blended learning model, the theory and content-knowledge is delivered in an online mode and it is further processed in monthly face-to-face sessions. These sessions have a focus on hands-on activities and practices related to the theoretical parts, but they also allow time for in-depth discussions and reflection on practices. To facilitate participants' access and to cut down the time to commute, the face-face sessions are delivered in three different cities. Additionally, the course includes an individual project which is set to take place in participant's own institute. An innovative aspect of the practical project is that it requires the involvement of the colleagues in the process, a point which is also used as a criterion for evaluation. For more information about Mediacoach, see Case study IV of the accompanying Technical Report (Vuorikari, 2018, p.122).

Independent *onsite in school exercise units*, such as those mentioned above, add a practical hands-on experience allowing for the teacher to experiment in the classroom with the newly acquired knowledge (Table 4, points 1 and 2). They also facilitate the transfer of knowledge from professional development courses to classroom practices, which previous studies have shown to be problematic. Moreover, all the examples above also include a reflective session for a follow-up, which is also being a key component in effective teacher professional learning (Table 4, point 5). The research points out that activities such as opportunities to ask questions about implementation of a practice, go over a specific situation that might have been difficult or problematic, exchange experiences in a peer-learning context, and/or engaging in a structured self-reflection - all provide teachers with a much needed way of soliciting feedback from peers and experts, an opportunity that they seldom have (Darling-Hammond et al., 2017). In addition, opportunities that allow teachers to combine their own experience with the opportunity to engage in the analysis of and reflection on the underpinning pedagogical rationale are valuable. According to literature, this kind of active learning has potential to engage teachers directly at the same time embedding their professional development deeply in their own context (TDT, 2015). Other examples also carry such components, e.g. ex.1, ex.2, ex.3, ex.17, ex.18, ex.20, ex.22, ex.25 (see more details in Table 5 in Appendix 1).

Our last remark regarding blending authentic tasks into coursework is related to the Portuguese example (ex.9) which was described under the previous label (an otherwise rather conventional online course on student mentoring and counselling). In this case, since the teachers were already mentoring students while taking the course, the participants were faced with authentic problems on-the-go. The organisers of the courses used these authentic problems to their advantage by asking participants to report them in an anonymous way so that no student or a school could be identified. These problems were then reviewed by experts who took a theoretical look at the case. The experts then delivered their reflection and accompanying discussion as a video recording, thereby offering teachers a new way to tackle the issues and giving them important guidance in conducting their mentoring sessions. This illustrates two of the key components of effective professional development: that of providing teachers with a clear vision of what best practices look like (Table 4, point 7); and that of the role of an external specialist's input delivered in a constructive manner (point 4).

The examples under this label also include teacher professional networks. In the last 10 years their role in professional learning has been strengthened in many ways through research and practice. What used to be purely "online only" social networks and professional communities of practice have now morphed into blended networks where digital activities merge and overlap with physical activities, including in schools. Recently, academic research has focused on blended teacher communities that go between the online and physical worlds. Matzat (2013) asked whether blended communities provide more practical benefits to teachers in terms of both *perceived improvements to their teaching capabilities* and *substantial understanding of their core topic*.

"The findings show beneficial effects of blended communities.[..] Moreover, the results modify earlier claims about the integration of online communication with

offline interaction by showing that complete integration is unnecessary. This facilitates a scaling up of the use of online communities for teachers' professional development."

On the other hand, Trust & Horrocks (2017) suggest that the critical elements that shape participation and learning in a blended community of practice are multiple means of engagement, face-to-face learning activities and leadership roles. Additionally, participation in a blended community of practice creates reciprocal growth opportunities: teachers can develop as professionals across multiple domains (e.g. individual, classroom, school, blended community of practice) while also shaping the growth of these domains.

The examples in this study include both top-down networks, where the meta-level structure and support is provided by public authorities (ex.14 eTwinning, ex.15 Education Plaza), but also a bottom-up informal network (ex.16 iKlasé). This variety illustrates how teacher networks take different shapes and structures and that they also evolve over time. It also prompts us to reflect how blended learning communities and networks can be better supported and incentivised for the purpose of teacher professionalism.

The eTwinning platform (ex.14) offers a number of professional development opportunities such as online courses, events and chats which can potentially increase teacher professionalism. eTwinning also organises face-to-face events both nationally and internationally, illustrating the blend of online and physical activities. At the core of eTwinning, however, are pedagogical projects that involve teachers and students in joint activities that are carried out both online and onsite in school. The eTwinning online platform facilitates partner finding (either from the same or another country) and the setting up of a pedagogical project, but the project activities are often conducted onsite in school (e.g. in classrooms, after school clubs) using digital technologies. Richness of models to conduct eTwinning projects exists, but from a professional learning point of view, emphasis is on teacher co-operation and collaboration (see TALIS by OECD, 2014). In eTwinning, such increased collaboration thanks to a common project also often involves a wider set of colleagues from the same school (e.g. teachers, librarians, ICT people) therefore fostering the diffusion of effective practices and the creation of favourable collaborative environments.

Pedagogical projects like those in eTwinning offer an authentic context for teacher professional collaboration. The TALIS study found that the more "professional collaboration" took place, the better the benefits were for teachers (OECD, 2014). While the final outcomes of professional collaboration seem to be beneficial, the reality is that professional collaboration can be time-consuming, labour intensive and it requires effort, so better ways to incentivise and recognise teachers' input is important. In general, 48% of respondents in TALIS reported a lack of incentives as a barrier for their participation in professional development. In eTwinning, Quality Labels are used to acknowledge successful project-work, but only a small number of participating countries recognise such work for professional development or career advancement purposes (Vuorikari, 2010).

Education Plaza (ex. 15) from Iceland has been able to take a step further in terms of recognising teachers' participation in professional learning activities thanks to a recent policy shift towards giving teachers more flexibility in how they wish to pursue their professional development. The overall goal of all Education Plaza activities is to enhance teacher collaboration across Iceland, a sparsely populated country with a small number of inhabitants, and to make the existing practices and the innovators more accessible to other teachers. Social media and online interest groups are used to a large extent, but also face-to-face knowledge sharing events are organised (e.g. EduCamps). Increasingly, the participants are supported by self-organising into groups based on interests, organisational affiliations, locale, etc. In particular, the latter has helped to sustain the momentum even after the official initiative ended. Teachers' participation in such activities is now officially recognised as professional development activities, so for example, teachers can receive recognition for their participation in the above described live online discussions as well as for attending face-to-face events. Reportedly, school principals also hold positive views on it (European Commission, 2018c).

The third example of teacher networks introduces iKlasė (ex.16) that, over the course of almost 10 years, has evolved from a simple online blog by a single Lithuanian teacher into a Facebook community with more than 2 400 members as of October 2018. The network mostly has a Lithuanian member-base, but because of the country's close proximity with Estonia and Latvia, the community also attracts members from those countries. This loose network of like minded teachers share things that they are passionate about, thus being better able to address their professional learning needs in a timely manner. It draws inspiration from various different sources such as simple self-organised visits to interesting schools, and from nationally and/or EU coordinated projects (e.g. through the National ICT Centre, eTwinning) and through involvement in industry-related training programmes.

Over the last couple of years, this informal teacher network has taken different shapes through evolution of interests and opportunities and some self-organisation. Recently, a group of 20 teachers within the network started offering schools a set of small workshops and seminars (2-4 hours). This type of escalation of activities illustrates a novel micro-entrepreneurial action aimed at creating value for their own community and peers, also often discussed in terms of social innovation. In general, a little research or practice exists to understand the complementarity or co-existence of professional learning activities offered by such informal networks and communities of practice, and those offered through more institutional channels such as professional development programmes by educational authorities. With the shared goal of teacher professionalism and professional learning in mind, it seems to be important that policy makers and training providers contemplate how they can help create the right conditions for such bottom-up activities to take place and be sustained in the long run, and how to leverage their already existing potential. A recent example of such thinking is Education Plaza in Iceland which launched a new initiative to work more directly with already existing self-organised groups focusing more on linking these groups together than linking individuals together.

In terms of discussing the innovative aspects of these examples, they could all be considered to be the type of *product innovation* introducing a new or enhanced service delivering teacher professional development. Under this label, the examples are also of the *process innovation* type because their delivery includes changes in the techniques of delivering, for example, by introducing hands-on practical units that take place onsite in school and other delivery mechanisms that emerge in teacher networks. In addition, the programme of Mediacoach (ex. 13) also represents processes of *organisational innovation* as there is the requirement to collaborate with colleagues of the same institution. To a certain extent, this is also the case with eTwinning (ex.14), especially as a result of school teacher collaboration through eTwinning Team work.

In terms of the nature of innovation, *disruptive* models introduce comprehensive changes to the system and disrupt the existing status quo. Education Plaza in Iceland (ex.15) has a disruptive nature, especially in terms of the policy change thanks to which Icelandic teachers can participate in social media events for CPD credits. The delivery of teacher professional learning experiences through teacher networks in a less formal way, as is the case in eTwinning projects (ex.14) and through teacher collaboration as in iKlasė (ex.16), could also be considered radical in nature: they both introduce a profound change compared to more conventional models of continuous professional development. On the other hand, e-Competent teacher (ex.12) and Mediacoach (ex.13) could be considered to be incremental in nature since they introduce some new components, e.g., alternation between asynchronous online delivery and independent work and hands-on practical units.

- Reinvent mixed mode delivery to more effectively serve teacher needs and to overcome teachers' time constraints
- Mix methods and elements that are known for their effectiveness, e.g. introduce a period of hands-on onsite in school experimentation to a training course otherwise packed with theory
- Create built-in time for reflective sessions in order for teachers to make changes to their practices: give teachers an opportunity to receive feedback, review input and reflect on these
- Continuously re-invent professional development: look at professional collaboration and other forms of informal methods as a source of innovation rather than a threat

- Give recognition, the more official the better, for teachers who participate in professional development and professional learning activities

5.5 Engaging learners in first-hand experiences

<p>Main examples discussed:</p> <ul style="list-style-type: none"> • ex.17 Best Practices Benchmarking course (ET-FI): Excursion to visit schools and observe practices • ex.18 Shadow a Student (US): a day-long challenge for school leaders¹⁸ • ex.19 Teacher career services (SE): Career building stipend for Swedish teachers • ex. 20 Pedagogical hackathons (FR): A course for fostering transversal competences • ex. 21 Escape rooms (FR): gamifying teacher professional development 	<p>Examples with some similar features:</p> <p>Ex. 30</p>
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Professional learning processes situated in a real-world context can be a powerful element in professional teacher development programmes (e.g. see Table 4, point 2). A common theme across professional development activities with a real-world context is that they require active participation and/or a certain level of engagement by the participants, thus moving away from traditional models like those of lecture-based courses where there is little room for active participation. Two separate themes are focused on under this label: those that offer an authentic school/classroom setting for professional development going from a more structured course (ex.17) to an exercise of shadowing (ex.18), leading eventually to exploring the example from Sweden which institutionalises teacher's career development through a stipend (ex.19).

The other theme under this label explores professional learning activities that directly engage the participant in the same style of learning as the student would experience, in other words, trying out activities first-hand. Additionally, Pedagogical Hackathons (ex.20) and Escape rooms (ex.21) create participation and engagement through play, also known as gamification, which can potentially engage learners in the learning process by making it more emotional and/or social.

A week-long Best Practices Benchmarking course (ex.17) targets an international audience where participants travel to visit schools in Finland and Estonia, two of the EU's top-performing education systems according to the PISA study. The course programme includes school visits with lesson observation; interaction with principals, teachers and students; and even opportunities to 'shadow' teachers' classroom practices. Furthermore, the observation practices are grounded by lectures and discussion sessions with experts to improve understanding of the context in which these practices take place, e.g. discussing the specific educational policies and curriculum requirements, the school development and managerial related issues in both countries, and reflecting on possible lessons learned from the PISA study. Time is also built-in for feedback and reflection in small groups, in plenary sessions and through the use of social media. Previous research on effective teacher professional development points out that such activities can scaffold participants to observe their surroundings and reflect more deeply about the underpinning pedagogical and philosophical groundings that play an important role (see Table 4, point 5). The course, which is well received by the participants, is provided by a small business headed by a retired Finnish school principal who works with a wide network of expert-teachers and educationalists worldwide, so possessing great understanding of the professional needs of those working in the field of education.

¹⁸ For more details see mini-case study V on Shadow a student-challenge in the accompanying Technical Report (Vuorikari, 2018, p.130)

On the other hand, 'Job shadowing' is a method of on-the-job learning which can be used both for young people to learn what it is like to perform a certain type of work and for staff already working in the field for the purpose of career development. For example, the staff mobility grant from Erasmus+ can be used for a job shadowing period in an educational institution abroad. In general, shadowing can lead to powerful and deep observations, and when implemented well, it can even lead to insights that can drive change.

The example of job shadowing targets school leaders. Shadow a student-challenge (ex.18)¹⁹ offers a new perspective to shadowing – namely that of a student. The model and accompanying support material, which school leaders can use to organise their day of shadowing, includes guidance on how to prepare the experience in advance, how to choose a student to shadow, a template for observations during the day of shadowing and some prompting questions to help reflect on the experience afterwards. An important part of the model is the part of 'acting', there is a strong underlying idea that the observation can, and *should*, lead to a change in practices in the school (something that the model calls a 'hack'). The model is based on *design-thinking*, an idea of co-designing artefacts and directly involving users in each step of the design of the tools that they use. The programme's website allows participants to share experiences among themselves and it also displays 'hacks' in order to promote innovative practices in schools.

The US-based initiative Shadow a student-challenge was first run in 2016 and according to the map of participants on the website, only a few schools in Europe have participated in the initiative, although it seems to be a very transferable concept in the European setting. For more information see Case study V in the accompanying Technical Report (Vuorikari, 2018, p.130). Another example of the inventory also features a day of job-shadowing for in-service teachers (ex.30). This model also challenges the conventional roles of job-shadowing because in this case, it is the in-service teacher who shadows a pre-service teacher implementing a new part of the curriculum (phenomena-based learning) during their period of student teaching. This exchange allows for the in-service teacher to see new ways of implementing and delivering the curriculum, while at the same time offering a chance to observe their students being taught by a different teacher.

The last example under this theme is "Teacher career service" from Sweden (ex.19). In order to raise the status of the teaching profession and to develop the teaching itself, in 2013 the Swedish education authorities introduced a year-long stipend that school leaders could request for one of their teachers. With the help of the stipend, the teacher would have free time for activities that would benefit the school's needs best, e.g. coaching other teachers, being responsible for an introductory period for newly employed teachers, conducting projects aimed at improving teaching, being a senior lecturer at a secondary school. According to an evaluation report, the duties of the teachers were often linked to subjects such as mathematics, Swedish, English, technology and nature-oriented subjects in combination with various development assignments. The latter was often largely determined on the basis of the needs of the school and the teacher's specific skills. During the year of the stipend, the teacher would still be required to teach at least 50 percent of the time, teaching being defined broadly (e.g. alone or with colleagues planning and following up the teaching; assess, grade, or document students' knowledge development; feedback pupils' development to students or guardians). This example blurs the boundaries between career building and professional development by introducing a new concept of active professional learning for teachers while at the same time focusing on retaining them in the teaching profession.

Moving on to examine the second theme under this label, the following two examples present truly emerging models of teacher professional development, namely Pedagogical hackathons (ex.20) and Escape rooms (ex.21). They also take up the challenge of teaching transversal themes such as critical thinking, creativity, taking the initiative, problem solving, risk assessment, decision taking and constructive management, to

¹⁹ For more information, see Case study V in the accompanying Technical Report (Vuorikari, 2018, p.130).

mention but a few. The challenge with such themes is that they seem to be best learned through *doing* rather than by only learning theoretical knowledge about the topic. Attitudes and personal dispositions also play a big role. This might be one reason for which organising teacher professional development in these topics still lags behind demand: an average of 40% of teachers say they need professional development activities in 'teaching cross-curricular skills (e.g., problem solving, learning-to-learn)' and 'approaches to developing cross-occupational competencies for future work or future studies' (see Table 3). Examples such as those presented here may help to set a conducive environment.

The model of Pedagogical hackathon (ex.20) as a tool for teacher professional development can help educators experience the acquisition of the above-mentioned transversal competences themselves before they engage their students in the same style of learning. Importantly, the model of pedagogical hackathon, which was introduced by Réseau Canopé (Canopé, 2017), a public institution under the supervision of the French Ministry of Education, is 'learning by doing' but it also combines reflective steps throughout the process so that learning of these competences can be made explicit (Table 4, point 5). The idea is that once teachers have experienced Hackathons themselves, they are better equipped to bringing them, or aspects of them, into practice with students. Interestingly, compared to other countries in Europe, France also has a high number of Hackathons in the field of education.

Escape room is another example of an emerging trend of gamifying learning experiences, including those of teachers in their professional development. The concept of Escape rooms/games in education is based on active learning theory, experiential pedagogy and playful learning. Escape rooms (Ex.21) is provided by the French Ministry of Education through its online resources portal for teachers. The model is developed by the Académie de Creteil for the purpose of training teachers about the pedagogical use of digital technologies. The CPD programme consists of an online game that a group of 3-4 teachers play in a physical room competing against a time limit and collaboratively solving twelve puzzles and riddles, all designed with a pedagogical goal in mind. There are also coaches who help groups to advance without giving direct answers. The role played by the coach in the training situation would be that of the teacher if she or he were to implement an escape game in their own teaching.

In general, escape rooms are an immersive way to experience problem solving in an authentic context in a limited time to solve a problem. This way of gamification is often used in video games and simulations where an individual has to solve a problem in order to move on to the next task in a game. In real life implementations, escape rooms can be physical spaces where, in a playful manner following a background scenario, a group has to collaborate in order to solve a set of problems and thus being able to escape from it within a limited time. This requires participants to actively engage in collaborative problem solving, enquiry, group functions and team building, creative use of resources and time management under pressure - all transversal and life competences for which teachers say they have a high need for professional development activities (see Table 3).

In terms of discussing the innovative aspects of these examples, again, all of them are *product innovation* introducing a new or enhanced service in delivering teacher professional development. A common theme is offering opportunities for active learning experienced in a context that is relevant to teachers. Teacher career service (ex.19) also has features of processes related to *organisational innovation* as the school principal can now liberate the teacher from normal duties to focus on organisational aspects.

The examples of Shadow-a-student-challenge (ex.18), Pedagogical hackathons (ex.20) and Escape rooms (ex.21) also focus on affecting practices (*process innovation*), for example, through reversing roles, role-playing games and task performance under time-constraints. Regarding the nature of innovation process, these three examples can be considered to be disruptive: they totally diverge away from the known conventional models of delivering CPD. On the other hand, excursion with school visits in Estonia and Finland (ex.17) and Teacher career service (ex.19) could be considered radical in nature, having many new features.

- Move away from more traditional models of courses and lectures to experience with active models of professional development and learning
- Active participation and first-hand engagement offer new perspectives to professional learning from job shadowing to active games - they can engage participants through emotional and social experiences
- Active models engage participants in first-hand experiences and can make it easier for teachers to implement them in their practices in schools - they also allow for first-hand experience of how students would feel in the classroom
- New models of job-shadowing leverage job-embedded learning onsite in school – learning from other teachers, but also from students and trainees can offer a new perspective to the life in school which, in turn, can prompt a change in practices

5.6 Innovating degree programmes

Main examples discussed:

- ex.22 Digi-teacher (FI): A post-graduate degree programme on digital education
- ex.23 New Education Laboratory (ES): Degree programme challenging conventional courses
- ex.24 Teach Live (CZ): Degree programme for future teachers
- ex.25 Practical Entrepreneurship (DK): Supporting VET teachers to support entrepreneurial education

In previous years, teacher participation in degree programmes as a means of professional development in Europe represented 17% of teachers in lower secondary education (European Commission/EACEA/Eurydice, 2015). Out of the examples in this study, four degree programmes are presented for professional teacher development purposes. They all contain some innovative aspects hinting that this area is also being transformed and slowly starting to change. Three of the examples deal with a topic of digital education (ex. 22, 23, 24), an area in which the TALIS study identified teachers having a high need for professional development activities (see Table 3). The last example is for teaching in vocational education and training and it also addresses a pertinent topic - entrepreneurship education (ex.25).

A new degree programme called the Digital Teacher has been offered in Finland since 2016 (ex.22). It is a post-graduate level programme of 60 ECTS in digital education available to those with a minimum of a master's degree and 3 years of teaching experience. New ways of teaching and learning are at the centre of the programme, but so are other aspects of digitalisation in schools and education in general. The programme includes theoretical studies with an emphasis on teachers' own experimentation in the classroom and a personal project that implements aspects of the programme's curriculum. The studies can be conducted alongside regular teaching activities over a period of 2 years.

The programme includes the following modules: The school of the future as a place for learning and work (10 ECTS); Learning and teaching in digital environments (15 ECTS); External experts and professionalism in educational institutions (15 ECTS); and a Personal project (20 ECTS). The link between the faculty members and practitioners is important, allowing for creation of new knowledge and academic evidence in the field. Three universities in different parts of Finland now offer the course. All participants are supported by a nation-wide network allowing for more sharing, peer-learning and peer-support. The network is also linked to Government policy-level action to further develop digital education in Finnish educational institutions, thereby reinforcing the link between research, practice and policy-making in the area.

Whereas the example above is a rather classical academic degree programme in terms of its set-up and accreditation, the two following examples represent some more emerging features in the way they were conceived. Both the master's programme of 'New

Education Laboratory' in Spain (ex.23) and 'Teach Live' in the Czech Republic (ex.24) were set up to challenge the conventional teaching diplomas in their respective countries.

In the case of New Education Laboratory (ex.23), the master's degree awarded after the completion of the course programme is an *unaccredited* degree (in Spanish *título propio universitario*) which is not recognized by the Ministry of Education as an official degree, but still holds weight in the work environment (e.g. private schools). The *unaccredited* degree allowed the course providers to go around the rather rigid requirements of a conventional teaching degree and, for example, include interventions by a wide set of experts in the field rather than by the faculty members only. There was also more flexibility in terms of organising classes by online and blended means. In the case of Teach Live (ex.24), the first group of pilot students graduated in 2017. From the onset on, parts of the programme were already eligible as Further Teacher Education, but the Initial Teacher Education programme just recently received accreditation by the Ministry of Education (note: both programmes target those already in the teaching profession and those with bachelor degree wishing to move into teaching).

Another common denominator for the two above-described degree programmes is that they both have a very strong vision of education and the values that should drive it. For example, the vision of the teaching professional in Teach Live (ex.24) is the following:

"We want teachers who build mutually trusting relationships with their pupils, give every individual the space and conditions they need for learning in accordance with their own individual understanding as an authentic, integrated and socialized person, and reflect on their work with reference to evidence."

The vision by New Education Laboratory (ex.23) loosely translates into the following:

"The objective [of the programme] is to provide the students with the essentials for their teacher education enabling them to maximise their professional career and to participate in the transformation processes of the schools. And to recover the true sense of education: creating the citizens of the 21st century who are autonomous, creative, critical, innovative, enterprising, able to collaborate, committed to the society and willing to learn throughout their lives."²⁰

Both visions are put into practice through a course syllabus combining a variety of contemporary educational theories, introducing pedagogical strategies and alternative pedagogies but also emphasising the possibilities afforded by digital technologies. Both programmes also use methods of team work, peer-mentoring and coaching, and combine online modules with a large number of both onsite in school classroom observations and face-to-face sessions for reflection and feedback (Table 4, points 3-5).

These two "alternative" teaching degrees (ex.23 and ex.24), both of which were set up to change the status quo of teacher education in their respective countries, have curricula that probably offer something that the official Initial Teacher Education or professional development programmes in their countries do not, e.g. flexibility of arranging tuition, involvement of certain pedagogical ideas which are not part of mainstream education and offer topics that teachers have a high need of. It is also interesting that in the first place both programmes were set up as *unaccredited* degrees, possibly shaking up the world of teaching that sometimes faces difficulties renewing itself from the inside.

The last example of a degree programmes targets those teaching in Vocational Secondary Education in Denmark (ex.25). The content of the course was designed by the Danish Foundation for Entrepreneurship and first offered in 2016. It focuses on developing teachers' competences to engage VET students in entrepreneurial and innovative learning processes. The focus of the course content is not only on procedural and practical knowledge of entrepreneurship education, but also on methodological aspects of teaching: it focuses on the innovation process within the context of

²⁰ <https://master.fundacionginer.org/presentacion.html>

entrepreneurship, with the latter being the innovative aspect of the content. An evaluation of the course was published in 2017 (Moberg, 2017; Sorensen et al., 2017) indicating that the chosen entrepreneurial approach in teaching is motivating for students in vocational education, especially for those who are academically challenged and have previously had negative experiences at school. Among other things, a follow-up evaluation showed that students become more engaged when the teaching moves away from traditional teacher and student roles providing more room for student-directed processes. In entrepreneurship education, teachers enable students' greater influence on content and time consumption, but also on the end-product and form of evaluation. The evaluation report therefore suggests that this programme may offer a more suitable method of retaining students in VET education. Currently, the majority of the Danish University Colleges offer this further development training which leads to 10 ECTS upon completion of the course. The Foundation behind the course has set an overall goal to train 1 500 educators in Denmark by 2020.

In terms of discussing the innovative aspects of these examples, all of them focus on *product innovation* introducing a new product to deliver teacher professional development through degree programmes that differ significantly from previous products offered by these providers. There are also aspects of marketing innovation involved, as both ex.23 and ex.24 (New Education Laboratory and Teach Live respectively) introduce novel ways into the admission strategy as well as into the pricing of the degrees. Whereas two of the degree programmes are incremental in nature introducing only some new components (ex. 22 and 25), both New Education Laboratory and Teach Live (ex.23 and 24) are more radical introducing many new aspects into an otherwise conventional teacher training degree (e.g. online teaching units, non-conventional guest lectures). Finally, in the last two examples, the aspects related to certification stand out as a radical component in the two programmes.

- A new trend in degree programmes is to offer alternative pathways to the teaching profession
- Degree programmes for teaching have moved to take advantage of the possibilities of multi-modal delivery and strengthening theory with observation, coaching and (peer-)mentoring
- Topics for which teachers say they have a great need of professional development also appear in new degree programmes

5.7 Innovating partnerships and actors

Main examples discussed:	Examples with some similar features:
<ul style="list-style-type: none"> • ex.26 EnglishOne (SK): Boosting English teaching through digital content • ex.27 Golinelli Foundation (IT): Accredited STEAM courses by a philanthropist • ex.28 FYXXILAB (BE): Educational Makerspace for students and teachers • ex.29 Lighthouse network (FI): peer-to-peer learning opportunities between schools • ex.30 Staff exchange (FI): Teacher exchange for phenomena-based learning 	<ul style="list-style-type: none"> ex.2, ex.3, ex.6, ex.16, ex.17, ex.18, ex.19, ex.23, ex.24, ex.25

Partnering up with social partners and industry has a long history in education and training but its forms differ greatly from one country to another. Within the examples in this study, there are a number of teacher professional development and learning activities where innovative partnerships are formed and new types of actors are involved. Some of the partnerships are more conventional as is the case of the British Council in Slovakia (ex. 26) whereas others are new players in the field, e.g., the Golinelli Foundation in Italy (ex.27). On the other hand, FYXXILAB (ex.28) gives an example of setting up a business-education collaboration that is used to provide tools for an

educational makerspace. Lastly, the examples under this label also illustrate how local stakeholders in education can be more effectively leveraged for the purpose of teacher professional learning onsite in schools (ex.29 and ex.30). Under this label, references are also made to examples already described elsewhere regarding innovative actors and partnerships in the field of education and training.

In 2014 a national project in Slovakia called New Trends in Education of Primary School English Teachers (ex.26) was initiated as a response to a change in legislation which made English as a foreign language a compulsory subject starting from the third grade in all primary schools. This created a need for building teaching capacity in the area. The Ministry of Education partnered with the British Council in a project to create digital resources and educational aids, accompanied by a training programme. Currently, virtually all English language teachers in Slovakia have access to the platform. Apart from the British Council helping to define the future content and teacher training (a 2-day workshop), the more innovative aspects of support to teachers included offering motivational lessons in schools by native English speakers. These native speakers were already living in the region and were contracted through the British Council (a small remuneration was established through the project). Evaluations of the programme found a very high level of satisfaction by participating teachers. Schools particularly welcomed the support from native speakers because the pupils seldom get a chance to speak with native speakers or hear them speak.

Today, the influence of philanthropy is less common in education in Europe than in the USA, for example. Therefore, is it interesting that at least one of the examples is driven by philanthropic activities. The Golinelli Foundation, based in Bologna, Italy (ex.27), is "a unique example in Italy of a fully operational private foundation" inspired by the model of North-American philanthropic foundations. It works in molecular biology, genetics and biotechnology to mention but a few emerging areas of science it concentrates on. Through its newly expanded "Educare a educare" programme, 3 000 Italian teachers have already engaged in STAEM related professional development activities which are also accredited by the Ministry of Education. Courses are offered in 7 core areas: Methodologies and activities in science laboratory; Digital didactics and learning environments; Computational thinking and creativity; Entrepreneurship education; Teaching strategies; Transversal didactics; and Early childhood science education. The Fondazione Golinelli also has an extensive network of scientific partnerships and other collaborators that are used to create and deliver the content of in-service courses, thereby allowing teachers to have first-hand experiences with top experts in the field.

Corporate social responsibility (CSR) programmes are also visible in the examples and illustrate the emergence of new actors in the field. Behind the examples of LeerKRACHT (ex.2) and Prof'Essor (ex.3), there is a model developed by McKinsey & Company, which was partly initiated through their CSR programmes. The IT and software industry has also historically run a lot of CSR programmes. Ex.16 illustrates a training & sponsorship programme by Apple, other popular ones being by Intel²¹ and Microsoft²². In addition, the Czech Depositum Bonum Foundation is part of the CSR programmes of the bank Česká spořitelna and has newly established itself in the field of education in the Czech Republic in order to spread new educational cultures (ex.24, the Foundation organises and subsidises a teacher training course with other donors). The overall aim of the foundation is to support Czech society in the areas of science, research, development and education. However, its origin is rather unconventional: according to its website²³, the funds originate from the yields of anonymous pass-books which were banned by the EU and then by the Parliament of the Czech Republic too.

²¹ https://www.intel.co.uk/content/www/uk/en/education/intel-education.html?_ga=2.195098347.657240948.1540397714-349574308.1540397267

²² <https://education.microsoft.com/>

²³ <http://www.nadacedb.cz/en/about-us/founder>

Other foundations or non-profit organisations are also involved in the example, either through content-development or the delivery professional development activities. They are the Free Educational Institution in Spain (ex.23), the Danish Foundation for Entrepreneurship & VELUX Foundation (ex.25), Finnish non-profit Development Centre Opinkirjo (ex.6) and School Retool in the USA (ex.18). In this context, it is important to mention that no data currently exists in Europe on the extent to which philanthropy, Corporate Social Responsibility programmes and the civic sector is involved in the area of education and training.

Regarding new actors in the field of teacher professional development and learning, it is interesting to point out some specific activities among the examples. The examples of Euneos (ex.17), Fyxxilab (ex.28) and iKlasè (ex.16) represent a rather new type of micro-entrepreneurial activity in education which generates value for the community of teachers and educators. On the one hand, these initiatives were started by individuals, teachers and school heads who seized the opportunity to address an unmet need and offered new types of professional activities for their fellow teachers (also considered as social innovation). By taking such a leadership role, they used their expertise to help fellow educators in their journey. At the same time, though, their professional growth put them on the new path of being an entrepreneur (generating value, either social or monetary). This point could also be extended to another current theme which concerns teachers' career paths and possible options in career development. Whereas all the three of the above-mentioned examples are based on individual choice, such activities could be considered to be an additional motivator for staying in the profession. Even if these experiences cannot be generalised, the example from Sweden (ex.19) offers an alternative way of investing in teachers' career path with the support of educational authorities.

Industry partnerships or sponsorships have also always been present in education. FYXXILAB (ex. 28) illustrates an interesting type of business-education partnership in the emerging area of maker-movement and educational maker-spaces where tools and hardware, even though nowadays decreasing in cost, represent significant expenses. FYXXILAB is run by a Belgian non-profit organisation called Educentrum.be and its funding comes from two main sources: project-based funding from Ministries in Flanders and the European Union, and funding through its large partner network of more than 70 industry partners. The latter means that an authentic set of tools is available to students and educators when they come to the lab for workshops, a rough estimation being that some three quarters of the tools and hardware have been received through a collaborative partnership. In return, the industry partners receive feedback on the use of their tools in educational settings, get classroom scenarios and additional educational resources for the use of their tools - something that is well valued in return.

Lastly, the examples also include teacher professional development and learning activities based on the idea of closely collaborating with local actors and stakeholders. Two examples come from Finland where teacher CPD is rather loosely defined leaving room for somewhat unconventional implementations. One of the examples is about collaboration between schools in the same local area through the Finnish Lighthouse network (ex.29). The Network was initiated by the National Agency for Education and it focuses in pre-defined themes: Co-teaching, collegial collaboration and team teaching strategies; Pedagogy and teaching methods; and Teacher professional knowledge and well-being. In this scheme, local schools organise and offer professional development and professional learning opportunities to each other free of charge. Various flexible professional learning models exist that are published in a good practice guide by the National Agency for Education: schools organise a training event, offer peer observation possibilities for teachers from nearby schools, offer expert help or coaching to other schools, make their own planning material available for reuse, etc. The focus is on effective use of local resources in order to respond to local needs.

The other example is between a small-sized Finnish municipality and an Initial Teacher Training institution within the University of Jyväskylä (ex.30). The scheme consisted of a

3-day exchange between a group of 50 pre-service teachers and their supervisors and all of the teachers of one primary school (400 pupils from grades 1 to 6). During the exchange, the pre-service teachers were supervised to teach the primary school pupils while separate CPD activities were organised for the in-service staff. Interestingly, the focus was on applying phenomenon-based learning; active enquiry-based-learning and cross-class teaching mixing all age groups of pupils. These topics are rather new additions to the national core curriculum. For example, each in-service teacher had a chance to shadow a pre-service teacher in their teaching for one day and see how these new curriculum themes could be put in practice. This was a unique chance of job-shadowing for in-service teachers because little previous experience exists and practices are only just being built up.

In terms of discussing the innovative aspects of these examples, all of the examples focus on *product innovation* introducing a new or enhanced service of delivering teacher professional development and learning experiences. FYXXILAB (ex.28) also exemplifies the type of *process innovation* because it provides professional development courses in the lab but it also innovates by introducing new training processes to schools, e.g. the “tool box” with lesson ideas that schools get free of charge when paying for training. Most importantly, there is a plethora of process innovation in *external relations* (e.g., relationships with employers, research organisations, civic society players, industry and other academic institutions), something which the OECD has previously pointed out as a broad new area of innovation in education that needs to be monitored better in the future (Vincent-Lancrin et al., 2017, p. 45). Examples are many: whereas ex.28 focuses on industry-collaboration, ex.27 focuses on research partners and expertise. On the other hand, ex.26, ex.29 and ex.30 focus on local actors and human resources leveraging which is already available at local level for education and common goals.

In terms of the nature of the innovation process: the Golinelli foundation (ex. 26) and EnglishOne (ex.27) could be considered incremental as they introduce some new components to teacher development but still remain in a rather classical setting in terms of providing it. On the other hand, FYXXILAB (ex.28) can be considered to be of a radical type whereas the two examples from Finland (ex. 29 and 30) have a more disruptive nature. In both cases, it is the school itself who becomes both the provider and the receiver of the professional development activity or professional learning experiences.

- Professional development programmes and those organising professional learning activities are innovating in ways that external relations are built
- Job-based professional learning opportunities can be expanded through collaboration between schools, local actors and interest groups
- Formal and informal ways of leveraging local resources for local needs can enrich and widen professional learning opportunities

6 Discussion on innovative aspects of the examples

This study has looked at a number of attributes of innovation in models and practices for teacher professional development and professional learning. The aim of the following discussion is to inspire and support those who plan and design the policies and provision of teacher professional development and professional learning. Firstly, the overall aspects regarding the *type of innovation* of the practices and models in the examples are discussed, and then a number of other interesting findings relating to innovation that is taking place in this area are examined. The aspects of innovation that were paid specific attention, and which are referred to below, are outlined in more detail in section 3.1 of this report. Moreover, Table 6 in the Appendix details these aspects for each of the examples. Further descriptions of each example with details and links can be found in the accompanying Technical Report (Vuorikari, 2018).

6.1 Types of innovation and its nature

In terms of the *type of innovation*, using the vocabulary of the Oslo Manual for measuring innovation (OECD/ Eurostat, 2018), it can be seen that the inventory represents a variety of *product innovation* in the field of teacher professional development and professional learning. New *products* and *services* are not only introduced by education authorities and educational organisations (e.g. training centres, schools, universities) but also by 3rd party actors (e.g. non-profit associations, social and civic partners) and even by individuals. Examples of *product* innovation include digital platforms (e.g. eTwinning, AprendeINTEF²⁴, Education Plaza, EnglishOne, TeachingChannel, PopUpSchool); online and blended learning courses on various topics (ex.8, ex.9, ex.10, ex.12); and training curriculum with novel topics for which teachers say they have a need (e.g. Intercultural mentoring programme, Mediacoach²⁵, Best Practices Benchmarking course, FYXXILAB).

On the other hand, *process innovation* can focus on a new method of delivering professional development. This study includes examples of professional development courses that are delivered by digital means and those that mix modes of delivery in a new way (e.g. theory delivered online combined with hands on experimentation in the classroom). Totally new models are being used to implement professional development, too, examples of which include collaborative models such as those of Pedagogical hackathons (ex.20) and Escape rooms (ex.21). A more job-embedded model to deliver less-structured professional learning experiences is through job-shadowing (ex.18, ex.30). Similarly, teacher networks (e.g. eTwinning, Education Plaza, iKlase) are increasingly used as a novel method of delivering professional learning through teacher co-operation, which may vary in form as peer-coaching or professional collaboration in a joint pedagogical project or as informal chatting regarding classroom practices. An advantage of teacher networks is that professional learning activities can be sustained for an extended period of time because they are not necessary bound to fixed start and end dates. Another advantage is time-sensitiveness; urgent topics can be addressed in a more timely manner as there is room for self-organisation. *Process innovation in education* involves innovating in pedagogic practices, which is included in many of the examples.

Moreover, also of interest in this study were innovation processes that involve introducing a new *organisational* method, for example, to organise teachers' activities. Some models among the examples examined in this study explicitly focus on a group of teachers or all teachers of the school introducing new ways to plan work, share goals and

²⁴ For more details see case study III on AprendeINTEF in the accompanying Technical Report (Vuorikari, 2018, p.111)

²⁵ For more details see case study IV on Mediacoach in the accompanying Technical Report (Vuorikari, 2018, p.123)

learn from each other (e.g. Matematiklyftet, LeerKRACHT²⁶, Prof'Essor). These models strive for a vision of a school as a learning organisation and require the support and involvement of the management team. Such professional development models target a group of teachers or a whole school instead of simply attempting to change individual teachers' practices, which is more typically the case. A number of other models also actively push for teachers to co-operate, but these often only require collaboration between a few colleagues in the school without the vision of long-term organisational change.

An additional model to exemplify *organisational innovation* in this area is ex.19 where school leaders in Sweden could request a year-long stipend for one of their teachers so that a re-organisation of tasks could take place and the teacher could focus on tasks that best benefit the school's needs (e.g. responsible for the introductory period for newly employed teachers, coaching other teachers, conducting projects aimed at improving teaching, being a senior lecturer at a secondary school, being responsible for topics, etc.). This model aims to improve teachers' career building options and possible career retention too. A number of other practices in the examples studied also allowed for the diversification of teachers' tasks, e.g., to become an in-school coach for other teachers (e.g. ex.2 and 3) or in a specific area such as media coaching (ex.13), to organise school's multicultural education (ex.5), or student counselling and mentoring (ex.9), which all also focus on aspects of teacher career building.

The last type examined was innovation processes that deal with *marketing innovation* such as a new admission strategy or a way of pricing the services in education. Both of these are visible among the examples studied in this report. Opening up an online course for an unlimited number of participants without any pre-requisites is a good example of *marketing innovation* (see teacher training MOOCs by AprendeINTEF, ex.10). Furthermore, degree programmes offer innovative study stipends and pricing schemes (ex.23 and 24). Additionally, OECD extends this type of innovation to *external relations*, examples of which would be relationships with parents, academic institutions, local actors, etc. A number of practices in our inventory can be used to exemplify this type of innovation (e.g. Innokas Network²⁷, Education Plaza, iKlase, EnglishOne, Colinelli Foundation, FYXXILAB, Lighthouse network).

Lastly, other attributes of innovation were also examined, for example, *the nature of innovation* in order to capture the progressive levels of change that it might be able to introduce in the field (scale: incremental, radical, disruptive). Whereas many of the examples in our inventory only introduce some new elements to already known models of professional development (i.e. they showcase *incremental* innovation), around half of the inventory exemplify a more *radical level of innovation* introducing a number of innovative elements to already known models of teacher professional development. Many of these examples are on a small scale and are not necessary at the level of affecting the existing practices at scale, but they could be inspirational models for those who design and provide teacher professional development. A small number of the examples could be considered *radical* as they introduced a profound and comprehensive change to how teacher professional development is usually provided or understood. Depending on the context where teacher professional development is implemented, these models can also offer an alternative and complimentary way of providing teacher professional development and learning.

6.2 Other key outcomes

In the following, the discussion returns back to our initial working definition of finding examples of professional development and professional learning activities that could

²⁶ For more details see case study I on LeerKRACT and Prof'Essor in the accompanying Technical Report (Vuorikari, 2018, p.86)

²⁷ For more details see case study II on Innokas Network in the accompanying Technical Report (Vuorikari, 2018, p.98)

overcome, remove or alleviate the known barriers of participation (e.g. conflicts with work schedules, a lack of incentives for teachers to participate, lack of support from employers, topic mismatch). Even if the inventory is by no means a representative sample of the field in general and the results *cannot be generalised* to the whole field, pertinent key outcomes with inspiring examples are outlined below. First of all, *key elements of effective professional development* were scrutinised for all examples. Secondly, various *types* of activities were examined that could provide more flexibility for teachers. Also, *support and incentives methods*, which could lower the barriers for teachers to engage in professional development and professional learning activities, were paid attention to. Last, knowing that a significant proportion of teachers think that professional development does not meet their needs, activities with pertinent *topics* that teachers say they have a need for were studied.

For all the examples, the **key elements of effective** professional development, as they are outlined in recent research, were looked at (see Table 5 in the Appendix). All examples incorporate active learning moving away from the more traditional lecture based models to ones that utilise adult learning theories. A great number of examples also take advantage of modelling effective practices, for example, by including samples of practices that have been proven to work, use videos and written cases of teaching. Many also tap into observation by peers, either in the same school, elsewhere, or even through video recordings. Two other trends were highlighted, too, namely models that explicitly support job-embedded collaboration with colleagues and the models that provide coaching and expert support for participating teachers. Last, the trend of coaching and expert support to teachers was discussed too. These examples show evidence that some actors in the field actively work re-inventing models of professional development.

Regarding conflicts with work schedules, it might be assumed that professional development models and practices which combine different types of activities, different degrees of structure and that mix more than one mode of delivery, including the use digital technologies, better meet teachers' needs and allow overcoming or removing some of the known barriers. The following outlines interesting examples.

About the half of the activities in the examples are organised as a course or a workshop, but interestingly, many of them are identified with additional **types of practices**, such as observation visits to schools; collaborative professional development; and individual research (for details see Table 1 "Type of practice"). Another trend is that the design of a structured training model moves away from lecture based models to alternating activities that 1) require the presence with 2) those activities that can be carried out at one's own pace with 3) those that require experimentations in the classroom (ex.1, ex.12, ex.13), allowing for more flexibility in terms of a choice when to carry out the required activities. On the other hand, the example from the Portuguese Ministry of Education (ex.9) even offered two different versions of a course: one self-study and the other with online contact hours, a choice which resulted in high completion rates. Such design decisions clearly allow the participants to choose the times when they will carry out activities and so fit them better into otherwise busy timetables. Lastly, an interesting trend design-wise is also seen with practices that could be described under the term of "micro-learning". In this case, short 1-3h learning modules called NOOCs from the Spanish Ministry of Education (ex.10²⁸) are a great example. Education Plaza is also now experimenting with shorter training programmes in order to fit the activities into teachers' schedules better and to improve the completion rate. Also professional learning activities that are less-structured in terms of time and place (e.g. no fixed start and end date) offer more flexibility for teachers. Some of them are also more informal in their nature such as participation in teacher networks or in-school teacher collaboration (i.e. professional learning).

²⁸ For more details see also case study III (p.111) in the accompanying Technical Report (Vuorikari, 2018)

An important issue to touch upon is how participation in professional development and professional learning activities is **incentivised**. Apart from professional duty or intrinsic motivation to learn and self-improve, incentives can play a role in getting more teachers to participate, especially among the groups of teachers who otherwise do not regularly engage in professional development. Educational policy makers are often asked to consider a variety of support and incentive mechanisms to help teachers improve their practice throughout their career. Incentives in the examples include having scheduled time within working hours to participate in professional development activities, or other types such as recognition of participation for the development activities. Typically, the courses by education authorities award accreditation for in-service courses, however, in some educational cultures this is not regarded as necessary (Mentep, 2016).

Scheduled time for professional development activities to take place during regular working hours at school is the most popular type of incentive in the EU. In this context, the “whole school training models” (ex.1-3) are interesting in addition to a number of other models where teacher professional collaboration is supported and explicitly planned for (e.g. through planning joint activities ex.4, ex.7, ex.13, ex.14). However, whether this happens during or outside working hours most likely depends on the priority that the school management gives to the matter.

Examples of **recognition** include various cases. On the one hand, there is the case having 3rd party providers accredited to extend the pool of topics and expertise, example of which is the Golinelli Foundation, a philanthropic organisation in Italy whose professional development courses are accredited by the Ministry of Education (ex.27). An example of *unaccredited* certification also exists in the case of the Ministry of Education in Spain who awards OpenBadges for those who complete its MOOCs (ex.10). However, in terms of incentivising teachers, and especially those who are not frequently participating in professional development activities, the power of such *unaccredited* certification could be more that of an encouragement than a real incentive. On the other hand, the case in Iceland shows an example where the focus of professional development shifts away from formal forms of learning and now teachers who participate in social media-led activities in Education Plaza can receive recognition for their participation (ex.15).

At the global level, the **cost of activities** also represents a barrier. It is remarkable to see that about half of the examples are provided **free of charge** by public authorities. Additionally, in the case of two activities, the costs could be covered with the help of an Erasmus+ grant (ex.5, ex.17) even if the course content itself still lacks official accreditation. Another two examples are degree programmes that offer innovative pricing schemes (ex.23 and ex.24).

The last issue that emerges from the examples is linked to enriching and widening the *offer to topics* to better match the professional development needs of teachers (e.g. ICT skills for teaching, Teaching in multicultural setting, Student counselling, Transversal themes such as problem solving and learning to learn and competences for future, see Table 3 for more details). In addition to public authorities venturing into new and more dynamic topics and activities (e.g. ICT skills for teaching, Student counselling), in our examples, 3rd party actors clearly also have a role to play in offering emergent and pertinent topics that teachers have said that they have a need of. Within this group, there is a mix of social partners from not-for-profit associations to philanthropists, corporate responsibility programmes, micro-entrepreneurs and interest-groups of civic society, but also actors from close stakeholders such as parents (see Table 1 for details).

7 Conclusions and policy pointers

This study looked at the innovative and emerging practices and models of professional development and other forms of professional learning activities that can overcome a number of known barriers that teachers say hinder them from participating. These barriers include conflicts with work schedules, a lack of incentives for teachers to participate and lack of support from employers. An additional barrier is the topic mismatch: what is offered does not meet the teachers' needs.

In order to have more teachers participating in professional development and professional learning activities over a sustained period of time more often and more regularly, concrete actions to remove the barriers, or at least alleviate their existence, should be of interest to education authorities and policy makers in this area.

The following firstly outlines the key conclusions and then provides a number of policy pointers for educational authorities and for those who design and provide teacher professional development activities in order to move towards more innovative planning and design of education policies and the provision of development activities.

7.1 Key conclusions

A number of innovative and emergent practices were studied for their *type of innovation*. This will help policy makers understand how innovation is taking place in the field of teacher professional development and professional learning, i.e. at the level of **new products** and **new processes**. The latter could deal with delivering existing training courses by digital means, enhancing teacher pedagogical processes, affecting **organisational** processes within the school and dealing with **external relations**, e.g. innovating with stakeholders. All these areas of innovation have the potential to remove existing barriers and/or overcome them.

Firstly, this study demonstrates pertinent practices of *product* and *process* innovation in the field of teacher professional development and other forms of professional learning. Many of the examples **combine** both a *product* and a *process innovation*, in other words, the professional development or professional learning activity itself is a new product (e.g. digital platform, new guidebook), but it also involves new methods, pedagogies and/or competences for teachers to perform. Similarly, many of the examples **combine** a *process* and an *organisational* innovation, in other words, teachers are adopting new working methods, but they also carry out changes to how teachers and other stakeholders co-plan and co-create activities together in a learning organisation.

A similar trend in complementarity of innovation types is seen in other areas too, for example, economists talk about interdependent relationship between *product* and *process* innovation and how the value of one can raise the value of the other. Such complementary relationship also means that conducting either *product* or *process* innovation in isolation rarely results in desirable outcomes. Therefore, efforts are needed to adopt practices that serve both ends, for which the examples in this study are a good source of practices and models. Especially when it comes to innovation involving new technologies, this can provide economies of scale and better strategic benefits. In practices collected for the examples in this report, even though digital technologies did not play a key role in all of them, about half use digital technologies in addition to other modes of delivery.

Secondly, regarding the mismatch between what teachers demand for topics and what is on offer, the inventory suggests that by widening the pool of 3rd party providers of professional development activities (e.g. actors from not-for-profit associations, corporate responsibility programmes, philanthropists, micro-entrepreneurs and also volunteer individuals), the education authorities have a better chance of covering a wider range of topics which may more closely coincide with those that teachers say they have a moderate to high need for (e.g. ICT skills for teaching, Teaching in multicultural setting,

Student counselling, Transversal themes such as problem solving and learning to learn and competences for future, see Table 3 for more details).

Thirdly, adding more 3rd party providers alone is not sufficient. Education authorities should consider recognising teachers' participation in a plethora of forms of professional development activities and other forms of professional learning, including peer learning. New evidence from the OECD shows that in the last decade, considerably more teachers took part in peer learning (e.g. discussing how to teach a particular topic, collaboration in planning and preparing lessons), while those who attend formal professional training remained stable (OECD, 2019, p.10). Peer learning, or professional learning, includes less structured and possibly also less formal activities, but it can be carried out in a more timely manner and be more strongly connected to teachers' needs.

In order to **recognise peer learning as a form of professional development**, education authorities would do well consider how to proceed with its approval and further accreditation. In many European countries providers of teacher professional development activities are reviewed or accredited by education authorities, so in the light of widening the offer of professional development and other forms of professional learning, it seems that this is a good area for education authorities to revisit. Eventually, this could have a dual impact: employers (e.g. school head) would look more favourably on peer learning and other professional learning activities if they were recognised by education authorities - at the same time, thanks to official recognition, some teachers would feel more incentivised to engage with them.

7.2 Policy pointers for education authorities and for those who plan and design the provision of teacher PD

In order to have more teachers participating more often and more regularly in professional development and professional learning activities over a sustained period of time, some pointers in three areas are outlined below: the choice of topics and providers; design and delivery; and incentives and recognition.

1. On widening the topics and provision

Education policy-makers and education authorities (education governance):

- At all levels, include teachers as players who determine professional development needs; topics, delivery, time and processes. While top-level education authorities might have an overall picture, the details from the field could guarantee good buy-in from teachers.
 - ex.9 (Croatian survey on teachers PD needs)
- Teacher professional development is a time sensitive matter. Education authorities could work out new schemes to encourage, but also to include, a wider group of providers into their pool of accredited activities. This would contribute to modern approaches to the governance of school education systems and further help schools respond to the changing educational demands of learners and society.
 - Take advantage of 3rd party actors to include professional development in emerging topics, ex.26 (the Golinelli Foundation on genetic research and biotechnology), ex.28 (FYXXILAB on robotics and STEAM), ex.5 (course by Oxfam, Italy), ex.17 (School visits in different countries)
 - Partner up with 3rd party players to address new, pertinent and policy-relevant topics, ex.27 (British Council with MoE)
 - For more concrete guidance, see the report "European ideas for better learning: the governance of school education systems" produced by the ET 2020 Working Group Schools²⁹

²⁹ https://www.schooleducationgateway.eu/downloads/Governance/2018-wgs4-learning-organisations_en.pdf

- Accompany new time-sensitive education policies with professional development activities.
 - ex.9 (Portugal in mentoring NEETS), ex.27 (Slovakia supporting English teachers); and ex.10 (Spanish Reference Digital Competence Framework for Teachers)
- Develop anticipatory capacity and scan informal teacher networks for inspiration to gauge the topics of potential interest for teachers, many of them will most likely be mainstreamed in 2-3 years' time
 - ex.10 micro-learning, ex.15 Education Plaza
- Enforce the link between teacher professional development, teaching practices and student learning outcomes by focusing on overall policies that aim at improving student learning

At institutional level (schools and teachers):

- Continuously involve teachers in defining what their professional needs are (topics, delivery, time and processes), but also *how* they would best be supported and incentivised to achieve the goals they set for themselves.
 - Teachers define their own professional goals through collaborative processes, ex.2-3: LeerKRACHT and Prof'Essor where groups of teachers are given time and space to decide for themselves.
 - Use existing digital platforms and supports for teachers to self-organise around topics of their interest, ex.6 (Pop-upSchool for teacher PD), ex.14 (eTwinning through professional project collaboration)
 - Enable partnerships that teachers and learners find useful through tapping into local expertise and hubs, ex.7 (Innokas), ex.15 (Education Plaza), ex.16 (iKlase), ex.26 (EnglishOne), ex.29 (Lighthouse network)
- Involve students in the process to allow for a wider lens
 - ex. 4 (Young Coaches co-design school development plan), ex.7 (students also plan and deliver training), ex.18 (Shadow a student-challenge allows seeing the school through someone else's eyes)

2. On innovating design and content delivery

Education policy-makers and education authorities (education governance):

- Ensure top level policies to make school's professional development plan a collective responsibility co-designed by all teaching staff to ensure transparency and buy-in
 - Make professional development a core commitment for the whole school: use participatory methods, peer learning and other forms of professional cooperation that eventually become rooted practices and a routine way to work (e.g. ex.2 and ex.3)
- Innovate the design and delivery of professional development and learning activities:
 - Use key elements of effective professional development – they are known to work for teachers: incorporate active learning, keep content focus, support collaboration in job-embedded context, model effective practices, provide coaching and expert support, offer opportunities for feedback and reflection, sustain duration over a long period (see Table 4 and 5).
 - Take the best of both worlds: mixed-mode delivery can remove barriers: ex.12 (Slovenian course mix: online and hands-on experimentation), ex. 1 and ex.13 (Matematiklyftet and Mediacoach mix: online, face-to-face and hands-on experimentation)

- Experiment with the duration and depth of the course content, ex.10 (micro-learning by Spanish Ministry of Education), ex.9 (Mentoring course with two course designs for different teacher time constraints)
- Teacher networks increasingly take different shapes, e.g. online, blended, offline, local, cross-border. Support and incentivise *all of them* as they allow room for self-directed learning and social innovation:
 - ex.14 eTwinning (by top level authorities for cross-border collaboration), ex.7 (Innokas robotics' network with local hubs), ex.29 (Lighthouse network by authorities to provide support for local school to act), ex.16 iKlase (by teachers for teachers)
 - Embrace and recognise teachers' participation in networks: they are time sensitive and sustain practices for a longer period of time than courses or workshops and they may enable the exchange of innovative ideas across subjects too, ex.15 (Education Plaza)
- Local resources can be leveraged for mentoring and coaching – always keeping in mind support schemes, ex. 3 (Prof'Essor external school coaches), ex.7 (Innokas school coaches are remunerated), ex.19 (Swedish scheme for career progress), ex.29 (schools exchange these services)
- Adopt innovative and engaging methods and models from other fields, but carefully fine-tune them to education - they can only be successful when the needs of education are fully understood
 - LEAN-management approach (ex. 2 and 3), Design thinking (ex.18 Shadow-a-student, ex.20 Pedagogical Hackathons, ex.21 Escape Rooms)
- Alternative pathways to the teaching profession through degree programmes could offer inspiration for new content and delivery,
 - ex. 23 and ex.24

At institutional level (schools and teachers):

- Take advantage of schools as a place for job-embedded professional learning
 - ex.1, 2, 3, 4, 5, 6, 7, 14, 18, 19, 29, 30
- Fit professional learning activities and teacher collaboration in the work schedule and provide time and space for teachers to be inspired by one another. Build structures to support such activities and offer innovative leadership for collaborative education governance.
 - Tap into existing resources from within the school and those nearby, ex.7 (partnerships with external school stakeholders), ex.27 (use of native English speakers in class), ex.16 and ex.29 (visits to innovative schools nearby), ex.30 (collaboration with IIT)
 - Teacher peer learning can be enabled through school level organisation of peer-observation, job-shadowing and co-creation of learning activities, ex.1, ex.2, ex.3. Think of ways supporting, incentivising and recognising such activities.
- Teacher networks are a good place to enable and support teacher professional collaboration both onsite in school and across schools – find time for teachers to involve themselves in their teaching practices, ex. 7 (Innokas Network for robotics and 21st century skills), ex.14 eTwinning, ex.15 Education Plaza, ex.16 iKlase, ex.29 Lighthouse network

- Digital and new technologies can fill some gaps in local resources, e.g. use of video for peer observation, ex.11

3. On incentives, recognition

Education policy-makers and education authorities (education governance):

- Use professional learning and development to facilitate career progress and to contribute to making the teaching profession more personally rewarding, ex.19 (Swedish scheme for career progress). Informal personal growth also exists through becoming online tutors and mentors, or even micro-entrepreneurs, ex.16 and ex.17
- Teacher participation in Education Plaza activities through social networks are now officially recognised by education authorities (ex. 15), something for other countries to be inspired by:
 - eTwinning Quality Labels (ex.14) are recognised in some countries as part of professional development activities
 - Open Badges (ex.10) are awarded to those who finish all the course requirements, but this is not yet formally recognised for professional development by the Spanish Ministry of Education.
- Recognise and reward teachers who participate in activities that research has shown to be beneficial (see Table 4 and 5: incorporate active learning, keep content focus, support collaboration in job-embedded context, model effective practices, provide coaching and expert support, offer opportunities for feedback and reflection, sustain duration over a long period)
- Find complementarities between formally recognised professional development formats and those of less structured ones as long as research has shown them to be beneficial for teachers - more teachers can be reached this way and more students will eventually benefit

General education governance and policy issues:

- Participatory work on common guidelines for the provision, content, methods of delivery and how to measure participation could be envisaged, for example, using digital content delivery through MOOCs which could be taken advantage of from one country to the next. Voluntary work following European Credit Transfer and Accumulation System (ECTS) could be beneficial.
- Small countries might find the scarcity of resources to be a bottleneck for innovating and renewing their provision of professional development. This need not be the case as the example from Iceland shows (ex.15): teachers' participation in social networks where professional collaboration takes place online in social media outlets and onsite in school can be a powerful way to upskill.

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List of Textboxes, Figures and Tables

Textboxes

Textbox 1. Main elements and parameters of the study.....24
Textbox 2. List of the inventory: 30 examples.....25
Textbox 3. Outline of the analysis of the 30 examples in the 7 areas..27

List of figures

Figure 1. The main elements and a brief description of the data 3
Figure 2. Players who determine CPD needs and training plans by Eurydice17

List of tables

Table 1. The inventory collected for the study: 30 examples.11
Table 2. Two examples of teachers participating in different types of activities18
Table 3. The top level topics in professional development20
Table 4. Key elements of effective teacher professional development22
Table 5. The analysis of key features of the 30 examples.66
Table 6. 30 examples of innovative and emergent practices.....70

Appendix 1: Analysis of the key features of the inventory

Table 5. The analysis of key features of the 30 examples. Details of the key components are explained in Table 4.

Name of the example	1. Is content focused (discipline specific)?	2. Does it support collaboration in job-embedded context?	3. Does it use models and modelling of effective practice?	4. Does it provide coaching and expert support?	5. Does it offer opportunities for feedback and reflection?	6. Is it of sustained duration?	7. Does it incorporate active learning (adult learning theory)?
1. Matematiklyftet (SE): Content modules for collegial learning and peer tutoring	Yes, mathematics	Yes	Yes (self-study units)	Yes	Yes	A semester	Yes
2. LeerKRACHT (NL): Creating continuous improvement culture in schools	No	Yes	Yes, through collegial sharing	Yes	Yes	8-12 weeks of initial training - 2 years	Yes
3. ProfEssor (BE): a method for fostering in-school teacher collaboration	No	Yes	Yes, through collegial sharing	Yes	Yes	8-12 weeks of initial training after which embedded in organisation	Yes
4. Young Coaches for the Internet 2.0 (CY): empowering students to educate others	Yes, ICT and internet safety	Yes	Yes	Yes	Yes	Yes, a year	Yes
5. Oxfam intercultural mentoring programme (IT): tools for teachers to support migrant integration at school	Yes, multicultural education	No	Yes	No	Yes	5 day course	Yes
6. PopUp School (FI): a digital platform for creating communal learning events	Depends	Yes	No	No	No	No	Yes
7. Innokas Network (FI): Maker-space activities for cross-discipline learning	Yes, STEAM	Yes	Yes	Yes	Less	Depends	Yes
8. Improving the Quality of the In-Service Teacher Training System (HR): courses delivered online on topics teachers need	Yes, various subject areas	Some	Yes	No	No	4-6 weeks	Yes
9. MENTOR (PT): online in-service course with the focus on NEETs	Yes	Yes (Moolde)	Yes	Yes (Moolde)	Yes	Courses with a fixed period	Yes
10. Aprende INTEF (ES): Digital micro-learning opportunities to overcome time barriers	Yes, mostly ICT	Yes (online)	Yes	Yes	Some, less in focus	Courses with a fixed period	Yes

Name of the example	1. Is content focused (discipline specific)?	2. Does it support collaboration in job-embedded context?	3. Does it use models and modelling of effective practice?	4. Does it provide coaching and expert support?	5. Does it offer opportunities for feedback and reflection?	6. Is it of sustained duration?	7. Does it incorporate active learning (adult learning theory)?
11. Teaching Channel (US): professional videos for peer-observation in the classroom	Yes, various subject areas	Possibly	Yes	Yes, through community	Yes, through community	Depends on the individual's choice	Yes
12. E-competent teacher (SL): Blended online delivery with practical hands-on session	Yes, various subject areas	Yes	Yes	Some	Some	Courses with a fixed period	Yes
13. Mediacoach (BE): a programme to foster Media multipliers in educational organisations	Yes	Yes	Yes	Yes	Yes	A year	Yes
14. eTwinning (EU): mixing classroom practices and digital components to help acquire cross-curricular and multilingual competences	Yes, various subject areas but also across	Yes	Yes	Some, through Ambassadors	Some	Possibly, especially projects	Yes
15. Education Plaza (IS): connecting teachers in a sparsely populated country	Yes, various subject areas	Yes	Yes	No	Yes (informally)	Many courses and formats provided	Yes
16. iKlasé (LT): Informal teacher network providing professional learning opportunities	Possibly	Yes	Yes	Yes, but informal	Yes, but informal	Possible, depends on the individual	Yes
17. Best Practices Benchmarking course (ET-FI): Excursion to visit schools and observe practices	No	Possibly	Yes	Yes	Yes	Courses with a fixed period	Yes
18. Shadow a Student (US): a day-long challenge for school leaders	No	No	Yes, observation	Yes, through a community	Yes	No	Yes
19. Teacher career services (SE): Career building stipend for Swedish teachers	Yes	Yes	Most likely	No	No	Yes, 1 year	Yes
20. Pedagogical hackathons (FR): A course for fostering transversal competences	Yes, transversal themes	Yes	Yes	Yes	Yes	No	Yes
21. Escape rooms (FR): gamifying teacher professional development	Varies	Yes	Yes	Yes	No	Courses with a fixed period	Yes

Name of the example	1. Is content focused (discipline specific)?	2. Does it support collaboration in job-embedded context?	3. Does it use models and modelling of effective practice?	4. Does it provide coaching and expert support?	5. Does it offer opportunities for feedback and reflection?	6. Is it of sustained duration?	7. Does it incorporate active learning (adult learning theory)?
23. New Education Laboratory (ES): Degree programme challenging conventional courses	Yes, pedagogy, digitalisation	Yes	Yes	Yes	Yes	Study programme	Yes
24. Teach Live (CZ): Degree programme for future teachers	Yes, pedagogy, digitalisation	Yes	Yes	Yes	Yes	Study programme, min 1 year	Yes
25. Practical Entrepreneurship (DK): Supporting VET teachers to support entrepreneurial education	Yes	No	Yes	No	Yes	Yes, a semester. Periods of training and practice	Yes
26. EnglishOne (SK): Boosting English teaching through digital content	Yes	Yes	Yes	Yes	No	No	Yes
27. The Golinelli Foundation (IT): Accredited STEAM courses offered by a philanthropist	Yes	No	Yes	No	No	Courses with a fixed period	Yes
28. FYXXILAB (BE): Educational Makerspace for students and teachers	Yes	No	Yes	Yes	Yes	Courses with a fixed period	Yes
29. Lighthouse network (FI): peer to peer learning opportunities between schools	Focus on specific themes	Yes	Yes	Depends on the selection	Depends on the selection	Depends on school's choice	Yes
30. Staff exchange (FI): Teacher exchange for phenomena-based learning	Yes, transversal themes	Yes	Yes	No	No	Possible, depends on the school's choice	Yes

Appendix 2: Attributes of innovation of the selected examples

Five aspects of innovation in education

This study is inspired by the five trajectories of innovation for education used by Bocconi et al., 2012, which are the following.

1. **Nature of innovation** (incremental, radical, disruptive): this captures the progressive levels of change from the introduction of some new elements (incremental), then to a relevant number of innovative elements (radical), and lastly profound and comprehensive change (disruptive) (Leadbeater & Wong, 2010; OECD, 2010).
2. **Implementation phase** (pilot, scale, mainstreaming): this describes the stages of development, ranging from limited application (pilot) to more consolidated up-take (scale), or to established use (mainstreaming) (e.g. OECD, 2010).
3. **Access level** (local, regional/national, cross-border): this captures the geographical coverage of the innovation from a restricted area (local), to a broad realm (regional/national), up to an international/world-wide level (cross-border) (OECD, 2010).
4. **Type of innovation** (process, service, organisation, marketing innovation): this illustrates the extent of innovation following the Oslo Manual (OECD & Eurostat, 2018).
5. **Target** (single actors = individual teacher, multiple actors=whole school, a wide range of actors=stakeholders): this describes the actors targeted by the innovation from a specific group (single actors), to a diverse set of actors (multiple actors), up to a variety of stakeholders (wide range of actors).

Table 6. 30 examples of innovative and emergent practices in teacher professional development and learning with details regarding the attributes of innovation (e.g. nature of innovation, type of innovation).

Name of the example	Nature of innovation	Implementation phase	Access level	Actors	Type of innovation
1. Matematiklyftet (SE): Content modules for collegial learning and peer tutoring	radical	scale/ mainstream	regional-national	multiple actors; single actor	product/organisation
2. LeerKRACHT (NL): Creating continuous improvement culture in schools	radical	scale	regional-national	multiple actors; single actor	product/organisation
3. ProfEssor (BE): a method for fostering in-school teacher collaboration	radical	scale	regional-national	multiple actors; single actor	product/organisation
4. Young Coaches for the Internet 2.0 (CY): empowering students to educate others	radical	scale	national/cross-border	single actor; multiple actors; a wide range of actors	product/organisation
5. Oxfam intercultural mentoring programme (IT): tools for teachers to support migrant integration at school	radical	pilot	regional-national/cross-border	single actor; multiple actors	product/organisation
6. PopUp School (FI): a digital platform for creating communal learning events	radical	scale	regional-national	multiple actors; wide range of stakeholders	product/process/external relations
7. Innokas Network (FI): Maker-space activities for cross-discipline learning	radical	scale	regional-national	single actor; multiple actor; wide range of stakeholders	product/organisation/external relations
8. Improving the Quality of the In-Service Teacher Training System (HR): courses delivered online on topics teachers need	incremental	scale	regional-national	single actor	product
9. MENTOR (PT): online in-service course with the focus on NEETs	incremental	scale	regional-national	single actor	product/process
10. Aprende INTEF (SP): Digital micro-learning opportunities to overcome time barriers	radical	pilot	regional-national/cross-border	single actor	product/process/marketing
11. Teaching Channel (US): professional videos for peer-observation in the classroom	incremental	scale	regional-national/cross-border	single actor	product
12. E-competent teacher (SL): Blended online delivery with practical hands-on session	incremental	scale	regional-national	single actor	product/process
13. Mediacoach (BE): a programme to foster Media multipliers in educational organisations	incremental	scale	regional-national	single actor; multiple actors	product/process /organisation
14. eTwinning (EU): mixing classroom practices and digital components to help teachers and students acquire competences	radical	scale	regional-national/cross-border	single actor; multiple actors	product/process/ organisation (in some cases)

Name of the example	Nature of innovation	Implementation phase	Access level	Actors	Type of innovation
15. Education Plaza (IS): connecting teachers in a sparsely populated country	disruptive	scale	regional-national	single actor; (moving to) multiple actors	product/process/external relations
16. iKlasè (LT): Informal teacher network providing professional learning opportunities	radical	pilot	local/cross-border	single actor	product/external relations
17. Best Practices Benchmarking course (ET-FI): Excursion to visit schools and observe practices	radical	pilot	local/cross-border	single actor; multiple actors	product
18. Shadow a Student (US): a day-long challenge for school leaders	disruptive	pilot	regional-national	single actor; multiple actors	product/process
19. Teacher career services (SE): Career building stipend for Swedish teachers	radical	mainstream	regional-national	single actor; multiple actors	product/organisational
20. Pedagogical hackathons (FR): A course for fostering transversal competences	disruptive	pilot	regional-national /cross-border	single actor	product/process
21. Escape rooms (FR): gamifying teacher professional development	disruptive	pilot	regional-national	single actor;	product/process
22. Digi-teacher (FI): A post-graduate degree programme on digital education	incremental	pilot	regional-national	single actor	product
23. New Education Laboratory (ES): Degree programme challenging conventional courses	radical	pilot	regional-national	single actor	product/marketing
24. Teach Live (CZ): Degree programme for future teachers	radical	pilot	regional-national	single actor	product/marketing
25. Practical Entrepreneurship (DK): Supporting VET teachers to support entrepreneurial education	incremental	pilot	regional-national	single actor	product/external relations
26. EnglishOne (SK): Boosting English teaching through digital content	incremental	scale	regional-national	single actor	product/external relations
27. The Golinelli Foundation (IT): Accredited STEAM courses by a philanthropist	incremental	pilot	regional-national	single actor	product/external relations
28. FYXXILAB (BE): Educational Makerspace for students and teachers	radical	pilot	Local	multiple actors; wide range of stakeholders	product/process/external relations
29. Lighthouse network (FI): peer to peer learning opportunities between schools	disruptive	pilot/scale	regional-national	multiple actors; wide range of stakeholders	product/external relations
30. Staff exchange (FI): Teacher exchange for phenomena-based learning	disruptive	pilot	local	multiple actors; wide range of stakeholders	product/external relations

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