


# TEACHER NETWORKS

TODAY'S AND TOMORROW'S CHALLENGES AND  
OPPORTUNITIES FOR THE TEACHING PROFESSION





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## FOREWORD


THE RISE OF THE NETWORKED  
TEACHER

eTwinning was officially launched in 2005 with a dedicated conference in Brussels. At that time Facebook was still a US-centric website for university students; Twitter was addressing a few hundreds geeks and Google was still making money solely with search engines. eTwinning was born as a flexible initiative with the simple idea of making schools twin and collaborate.

Was it a hidden agenda, or rather an accidental spin off, that teachers, whilst talking to each other to find a partner and to set up a project, started feeling part of something bigger than a twin? Teachers started networking in a multilateral dimension. People began recommending one another, talking about “that colleague who is really good,” sharing experiences and peer learning. It was only a question of time before

the community and networking elements emerged from mere bilateral connections. As the first keynote speaker at the opening conference, Professor Derrick de Kerckhove, put it, “it’s all about connected intelligences”. From this point of view, eTwinning was driven by what was happening, and simply provided teachers the tools and space to network and become part of what has since become the community for schools in Europe.

Parallel to the process described above, the research community started to wonder whether this new phenomenon called social networking could be applied to education. The more people communicated and collaborated, the more data was produced. The project Teachers Lifelong Learning Network, Tellnet, has been the first



– and so far most successful – attempt to bring some order to the millions of data records produced by the platform. Indeed a huge amount of data is available in eTwinning (and Chapter 3 in this book is a good demonstration of what one can make out of it).

But the main questions remained and still pervade the research community – not to mention policy makers: do teacher networks make for a better education? My point of view is that we should look both at the big picture (the networks and their trends) and at the individuals, whom we call networked teachers. My experience in talking (and listening) to hundreds of eTwinners shows that a networked teacher has an individual and blended approach (both online and offline) to professional development. This teacher is certainly a richer, proud, more complete, more interesting and more interested teacher. But, at the end of the day, does this mean better teaching? Do pupils learn better, or more, or both? From this standpoint, much more work must be carried out, probably also in the definition of what “better learning” is all about.

As this book will detail, schooling is changing as much as society is changing. Except that society goes faster, and schools are traditionally slower to accept and incorporate novelties. The digital divide is now present at a new level: networked teachers vs. “the others”. In other

terms, the networked teacher might sometime feel isolated in his/her school, but at the same time, has thousands of colleagues online as a sounding board.

We do not know what society will look like next year; and thinking ahead to 2025 makes your head spin. From this point of view, the effort of this book to foresee scenarios in more than 10 years’ time is amazing and stimulating. No matter how different we shall all be in 2025, one thing can be regarded as certain: we shall all be more connected. Or, rather, more networked.

This book provides data, analysis, scenarios, reflections and evidence that education can change, and, to certain extent, has changed and it has become more connected.

And it's a train that we cannot afford to miss.

Happy reading!

**Santi Scimeca**

Project Manager of the eTwinning Central Support Service  
European Schoolnet



# INTRODUCTION

This book deals with the evolving role of the teaching profession and the role of teacher networks in response to changing skills needs in society. It argues that teachers can be the main change agents for reforms of education, provided that they are well supported and enabled to do so. Recently, various teacher networks have emerged at the local and international scale, and questions around their role in supporting teachers, both in their Initial Teacher Training (ITT) and Continuous Professional Development (CPD), have been raised.

**What are teacher networks?** In this book, we consider teacher networks as *learning networks*: technology-supported communities through which learners share knowledge with one another and jointly develop new knowledge (Sloep & Berlanga, 2011). The ultimate aim of teacher networks is to contribute to both the quality of the teaching profession and the learning experience of students, by encouraging collaboration and knowledge exchange at both teacher and student level.

The construct of teacher networks contains various elements. Teacher networks can exist on many levels, e.g. within a school and across-schools at regional, national and international level. Moreover, thanks to the use of technology-supported communication tools and social media, we can observe that the intersection between online and offline cooperation is changing and that the physical world is increasingly mixed with the digital one. Such blended experiences are becoming the new *norm*, they are now more common than previously

studied “online-only experiences” (Haythornthwaite & Kendall, 2010). This trend is also acknowledged in our definition of learning networks. Finally, various forms of teacher cooperation can take place in teacher networks. According to the TALIS study, teacher cooperation implies teachers working together in groups or teams to improve educational processes and outcomes (OECD, 2009). Teacher cooperation includes both teachers' exchange and co-ordination for teaching, e.g. exchange of learning material and professional collaboration, as in the project collaboration that takes place in networks like eTwinning<sup>1</sup>.

### How to support teachers as an agent for change in education?

One of the key factors in supporting and enabling teachers as change agents is the need to upskill them in order to help them respond to changing skill needs in society. It is important to continue investing in both teachers and learners to support them in acquiring the necessary new competences and transversal skills (21st century skills) that are required in a digital, networked society. Both Initial Teacher Training (ITT) and Continuous Professional Development (CPD) play a crucial role.

Teachers, however, feel that they are not receiving enough professional development opportunities. In the TALIS study, a significant proportion – over half of teachers surveyed – reported wanting more professional development than they had received during the previous 18 months (OECD, 2009). Today, for example, teachers report that the most common form of Information and Communication Technology (ICT) related professional development that they undertake is “personal

learning on ICT in their own time” and only one out of three students in Europe are taught by teachers for whom participation in ICT training is compulsory<sup>2</sup>. At the end of 2009, a project called Teachers' Lifelong Learning Networks ([www.tellnet.eun.org](http://www.tellnet.eun.org)), supported under the Lifelong Learning Programme<sup>3</sup>, started a three-year long investigation to better understand the construct of teacher networks and how they can offer informal ways to support teachers' competence building and personal and professional development.

**Why this book and who should read it?** This book presents a number of the final outcomes of the Tellnet-project and outlines the main challenges and opportunities for the development of teacher networks today and in the future. It is intended for policy and decision makers in education as well as for teachers and other educational practitioners. It attempts to offer both reflective tools and means to build policies that support and enable teachers in the role of **change agents in reforming education**.

<sup>1</sup> [www.etwinning.net](http://www.etwinning.net)

<sup>2</sup> *Digital Competences in the Digital Agenda* (Digital Agenda Scoreboard 2012). (2012). Retrieved from <https://ec.europa.eu/digital-agenda/>

<sup>3</sup> [http://ec.europa.eu/education/lifelong-learning-programme/doc78\\_en.htm](http://ec.europa.eu/education/lifelong-learning-programme/doc78_en.htm)



# 1 CONTEXT OF THE STUDY

The *Teachers' Lifelong Learning Networks* (Tellnet) project used eTwinning as a case study example of a teacher network. The aim was to identify the main structures and mechanisms that are effective in sharing practices and encouraging innovation and creativity among teachers.

**What is eTwinning and where to find more information about it?** eTwinning, defined as “*the community for schools in Europe*”, promotes school collaboration through the use of ICT. Started in 2005, the eTwinning platform today has more than 180,000 registered members. There is a strong international and multi-cultural aspect to all interactions and exchanges: the actors involved represent many language and cultural contexts, and are subject to different (regional or national) educational policies.

The main actors of the platform, eTwinners, are teachers from 32 different European countries that currently participate in the initiative. The platform is also used by the National Support Services (NSS) that function in each participating country and support local users in eTwinning. The platform is managed by the Central Support Service (CSS), which is responsible for implementation, and is considered a service provider. The CSS, run by European Schoolnet, is in a position to collect and process data according to the data protection rules defined in the eTwinning privacy statement. It also observes all communications and interactions among eTwinners (i.e. it is the data processor). The platform is run under a service contract

for the European Commission, whereas the ultimate data controller is the Education, Audiovisual & Culture Executive Agency.

eTwinning offers teachers three main streams of activities:

- Teachers can find schools from other countries to run school collaboration projects using Information and Communication Technologies (ICT) provided by the platform<sup>4</sup>.
- Various *formal and informal* professional development (PD) activities are offered. These include online Learning Events,<sup>5</sup> a distance course for teachers, and more informal PD activities such as online Interest Groups<sup>6</sup> and Teachers' Rooms on topics of interest.
- Additionally, participating teachers have a set of *social networking* tools available. These include a profile page with personal and professional information<sup>7</sup>, the possibility of displaying connections with friends (i.e. Contacts) and posting on a personal journal (e.g. status updates), and also posting updates and comments on Contacts' journals.

<sup>4</sup> [http://www.etwinning.net/en/pub/tools/twinspace\\_tools.htm](http://www.etwinning.net/en/pub/tools/twinspace_tools.htm)

<sup>5</sup> [http://www.etwinning.net/en/pub/professional\\_development/learning\\_events.htm](http://www.etwinning.net/en/pub/professional_development/learning_events.htm)

<sup>6</sup> [http://www.etwinning.net/en/pub/professional\\_development/etwinning\\_groups.htm](http://www.etwinning.net/en/pub/professional_development/etwinning_groups.htm)

<sup>7</sup> [http://www.etwinning.net/en/pub/tools/desktop\\_tools.htm](http://www.etwinning.net/en/pub/tools/desktop_tools.htm)

The development of eTwinning and its community-building aspects are described in Crawley et al., 2009, Crawley et al., 2010 and Wastiau et al., 2011. We call these micro-level studies, focusing on the actions of individual teachers and students. These studies deal with active members and interesting cases that may not represent the larger community. On the other hand, there are also studies on eTwinning on the macro-scale: Vuorikari et al. (2011a) focus on the growth of the network using measurements such as **eTwinning Reach** to understand the spread of action within each country and Vuorikari et al. (2011b) elaborate on synergies between eTwinning and national teachers' Professional Development schemes. These macro-scale studies also include the use of Social Network Analysis (SNA) and information visualisation to study eTwinning (e.g. Breuer et al., 2009, Song et al., 2011, Berlanga & Vuorikari, 2012 and Vuorikari & Scimeca, 2012). The Tellnet studies also fall into this category.

**Who are we?** In the Tellnet project, the studies were carried out by four partners: **European Schoolnet** (EUN Partnership AISBL, short name "EUN") as a coordinator and three research institutes, namely

the **Institute of Prospective Technological Studies** (IPTS) /Joint Research Centre/, **RWTH Aachen University** and **the Open University of the Netherlands** (OUNL). The consortium represents one of the main strengths of the project: it has initiated new collaboration among leading organisations which have gained major knowledge in their own area of expertise, and which are keen on taking up new challenges to deepen their understanding. Each expertise is complementary to the other: OUNL runs a research and development programme into learning networks for professionals (e.g. communities, peer-support, knowledge-sharing policies), RWTH has gained in-depth knowledge about large-scale networks and their visualisation, IPTS has strong expertise in analysing trends and creating foresight studies for European policy, and European Schoolnet has extensive experience of school and teacher networking.

The opportunity to work together on the Tellnet project has given an impetus not only to a new field of empirical research that is still emerging (e.g. Schlager et al., 2009), but also possible new processes and services that can be used to help any other networks to achieve their goals in non-formal and informal education and training.

## 2

# STRUCTURE OF THE BOOK

This book is in five parts and starts with an introduction. The second chapter outlines the main trends and drivers for educational change in the future, addressing key issues such as the role of teaching,

teacher training, the role of schools, re-skilling, formal and informal learning, and the increasing development of new technologies. A number of these key issues have been further developed into



five scenarios aimed at discussing different possible futures of the **teaching profession and the use of teacher networks in compulsory education in 2025**. The scenarios are short stories of possible futures, imagining how the teaching profession could look after 2025, in order to challenge assumptions and stimulate thinking about current and future practices. The end of the chapter summarises the major findings of this foresight exercise, which was carried out by the Institute of Prospective Technological Studies.

The third chapter presents the case study of eTwinning through the application of information visualisation techniques and **Social Network Analysis**. SNA can potentially help understand the underlying mechanisms for the transfer of good practices and

innovation within a network such as eTwinning. The aim was to study the connections between teachers who use the eTwinning platform, applying the above-mentioned techniques to data gathered over six years. The research aimed to identify social roles in teacher networks that can help understand teachers' use of the network and their behaviour in a networked environment, and therefore also enhance teachers' Professional Development (PD) opportunities. Three main research questions are outlined here and some conclusions on the potential of such networks are also presented. The work was carried out by the Tellnet partner RWTH Aachen University.

The fourth chapter focuses on another angle of teachers' participation in eTwinning, namely how to design complementary support and services for better and more targeted lifelong PD within a teacher network such as eTwinning. It investigates the drivers of teachers' engagement in networks, and aims at investigating the **“blended network,” combining the online platform with integrating face-to-face activities**.

The fifth chapter contains a short **overview of the project's results and policy recommendations for more effective teacher networks**. Recommendations are given at local, national and European level, acknowledging that teacher networks can play an important role in supporting the educational transformation needed for a digital world.

Finally, **the last part contains all the annexes and lists all the references** that are used in this publication. Moreover, it also gives pointers to further reading of the Tellnet project reports and relevant research papers.





# THE TEACHING PROFESSION AND TEACHER NETWORKS IN 2025

This chapter outlines the main trends and drivers for educational change in general and for the future of the teaching profession (Section 1) and outlines how, against this background, teacher professional development and teacher networks such as eTwinning may evolve by 2025 (Section 2). Section 3 summarises the major findings of this foresight exercise.

**Key elements for the future of education and of the teaching profession** relate to the changing role of teachers and teacher training, the role of schools, the need for re-skilling within the context of 21<sup>st</sup> century skills, the role of formal and informal learning, technological innovation and the rapid development of new technologies, and the increasing importance of personal data protection and privacy issues (Tellnet D4.3.1, 2012). Some of these key issues have been further

developed into five scenarios aimed at discussing different possible futures for the **teaching profession in compulsory education in 2025**. The scenarios are short stories of possible futures, imagining how the teaching profession could look after 2025, in order to challenge assumptions and stimulate thinking about current and future practices.

Scenario 1 (**eNET**) describes a centralised, controlled and secure teacher network as being part of a wider education network, while Scenario 2 (**MyNetwork**) highlights a more decentralised, liberalised and personal social networking approach. Scenario 3 (**Intelligent Agents**) adds an Artificial Intelligence element to support teacher

collaboration. Scenario 4 (**Diversified Teaching Career**) has an emphasis on the role of teachers as mentors and of student-led learning. Scenario 5 (**Informal Learning Camps**) draws attention to alternative teacher training methods which are bottom-up, informal, face-to-face and entirely self-organised by teachers.

## 1 KEY ISSUES FOR THE FUTURE OF EDUCATION

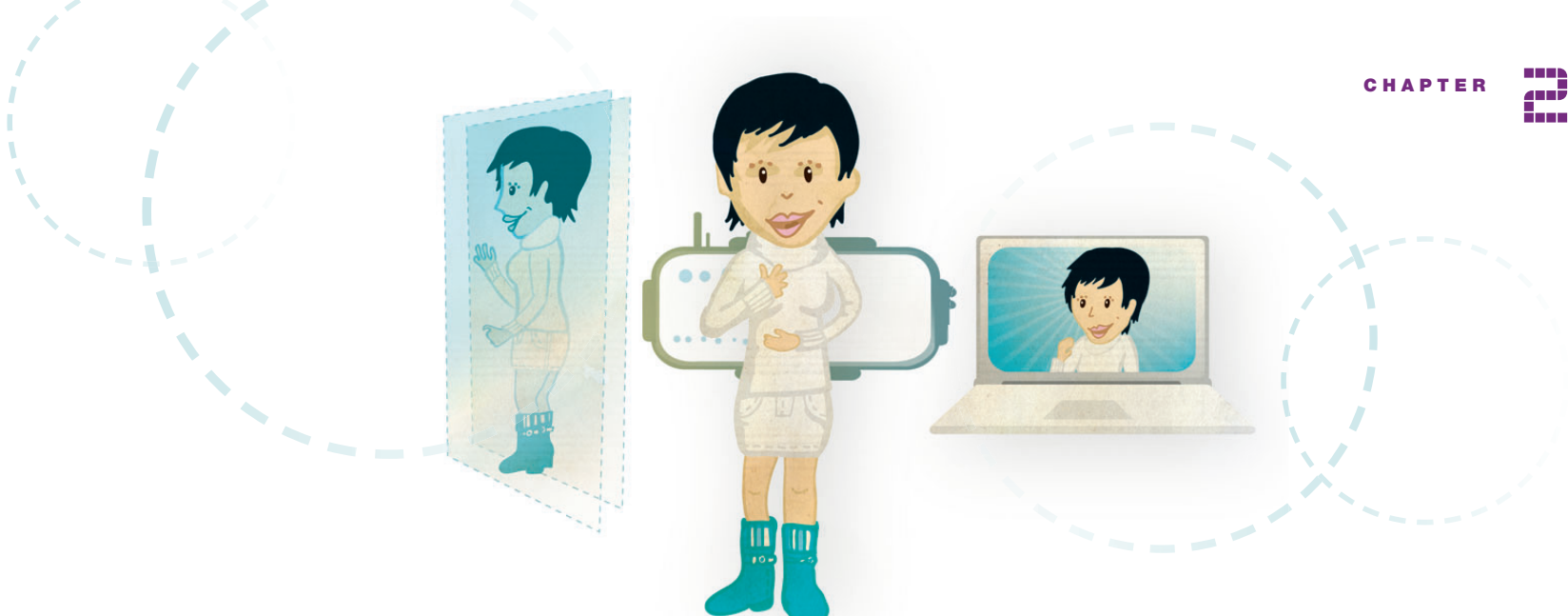
### The role of teachers

The important role of teachers as major stakeholders in shaping the future of learning is highlighted in various studies. As learning becomes more personalised, the one-size-fits-all teaching method is becoming more and more outdated (Redecker et al., 2011). Teachers will be required to learn to design learning experiences which reflect the growing importance attributed to innovation and creativity in our societies (Cachia et al., 2010; Johnson et al., 2011).

Teachers will be in a situation where they are faced with adapting their teaching practices to a rapidly changing global society in which transversal skills such as creativity, flexibility and learning to learn are becoming increasingly important. Furthermore, teachers might need to focus more on enabling students to maximise the potential of their formal and informal learning. They should also be ready to facilitate learning in multiple modalities: embracing a greater diversity of

spaces, times, resources, media and methods for learning, as well as 21<sup>st</sup> century environments which are synchronous and asynchronous, face-to-face and virtual, local and global (Caroll & Resta, 2010). The role of the teacher in the learning process will evolve and it could become closer to that of a mentor (Redecker et al., 2011).

The emergence of open content has resulted in a vast array of education material posted online to be shared and re-used free of charge (Open Educational Resources). Openness, sharing and collaboration are having a profound impact on the way students study and learn (Johnson et al., 2011) and on the way teachers teach and learn. Teachers will need to work as effective members of learning teams, made up of novice and accomplished educators, students and subject-matter experts, which will turn schools into hubs of networked learning ecology (Caroll & Resta, 2010).



## Teacher training

In 2002, Edwards et al. predicted that by 2010 teacher education staff in universities would retire without being replaced, as Initial Teacher Training would have become a thing of the past. However, today Initial Teacher Training is still a major aspect of education. Teacher training has been recognised as a key element in the Lisbon agenda for the creation of an effective “knowledge triangle” which consists of education, research and innovation (Council of the European Union, 2010). In a recent study on creativity and innovation in school, teacher training has been highlighted as an area to which educational policies should devote more effort and attention (Cachia et al., 2010).

Teacher training must go beyond the present paradigm of teacher preparation (Caroll & Resta, 2010). Prospective teachers need to experience a wide array of learning environment – observe how students learn in non-school environments, how learning take place in formal and informal contexts, how students engage in socially networked informal learning and how they collaborate among themselves (Caroll & Resta, 2010). Unfortunately, as argued by these authors, diverse policy contexts and a lack of shared vision among stakeholders are limiting the reinvention of teacher education.

## Teacher networks

The unprecedented opportunities brought about by networking tools enable teachers to network and collaborate with other teachers from anywhere, at any time. Such development in the profession of teachers is a significant aspect which cannot be ignored when discussing the future of education. Teachers tend to feel isolated in their own schools and are often confined to a single school experience (Gatt, Pereira Cunha & Costa, 2009). Tight timetables and overloaded curricula do not allow them much time to explore innovative pedagogies (Cachia et al., 2010).

Various literature sources in education have explored a vast array of research addressing teachers' professional development. Recently, some focus on alternative approaches of addressing professional development can be observed. For example, Hofman & Dijkstra (2010) looked into the issue through the study of networks. Another survey conducted in the US found that teachers believe that collaborative professional development activities, such as networking with other teachers outside school, are more effective and helpful as professional development than traditional forms of training (US Department of Education, 1999). Similarly, OECD's report finds that involvement in a "professional development network" ranks high as regards the perceived impact on teachers' professional development (OECD, 2009). Moreover, the same study points out that "informal dialogue to improve teaching" is mentioned as the most common activity for professional development (participation rate of over 90%) and teachers report that it has a moderate or high level of impact on their professional development.





A study by Carroll & Resta (2010) explores how networks developed by prospective teachers can act as a form of support and mentoring during their careers and also as a means to access new research-based teaching practices and resources. Networks have been proposed to be an organisational answer to the diversity and complexity of educational needs (Bienzle et al., 2007). As Bienzle et al. (2007) argue while the expectations of the potential of networks is often exaggerated, networks can have an important role in education in providing a structure for teachers' professional development and in integrating the diverse and fragmented lifelong learning landscape. Moreover, they provide platforms where resources can be shared, hence reducing teachers' workloads as teachers do not need to create resources from scratch (Johnson, Adams & Haywood, 2011).

## 21<sup>st</sup> century skills

Literature on the future of learning highlights the emergence of new skills and a need for all people to continuously update their skills and re-skill. The future of education will be influenced by a need to foster skills that are "generic, transversal and cross-cutting", through which learners will be able to actively and responsibly engage in lifelong learning (Redecker et al., 2011). Thus, the focus of school education will shift from knowledge to competences, such as, in particular: problem-solving, reflection, creativity, critical thinking, learning to learn, risk-taking, collaboration and entrepreneurship. In addition to these competences, in a world where information is everywhere, mentoring and preparing students to be able to assess credibility of information and make sense of it should be high on the

education agenda (Johnson et al., 2011). It has also been argued that learning will become more active and hence, there should be more skills focusing on learning by doing and through interaction and collaboration with others (Ala-Mutka et al., 2010).

As a consequence of the changed learning needs of students, teachers training and professional development needs change as well. Teachers will need to be able to upgrade their competences, so as to keep updated with changes and be able to respond to fast changing working environment. In parallel, school policies need to better align learning objectives with societal needs mainly because in the future European societies will be more intercultural and students need to become better active citizens.

## The role of schools

The role of the school as the major source of knowledge transmission has for a long period of time been taken for granted. Schools became so important that political intervention made school attendance obligatory in most Western societies between the second half of the nineteenth century and the beginning of the twentieth century (Murtin & Viarengo, 2008). However, recent developments in education suggest that, as learning can take place anywhere, the role of schools further evolves. The traditional link of "learning" within specific spaces, such as "classrooms", is broken as time and place constraints for connectivity are abolished (Miller et al., 2008). The same is true for learning materials, which were previously only accessible from one single physical place for those present at that place at a dedicated



point in time. Now, many learning materials are accessible anywhere and anytime, by different learners from different places. Information is increasingly stored outside school servers, and acceptance and adoption of cloud-based applications and services is changing the way information is conceptualised in education (Johnson et al., 2011).

## Formal and informal learning

Another related trend in terms of how education will evolve is the shift between formal and informal learning. With the emergence of innovative technologies, learning is no longer confined to the classroom. Learning is becoming a continuous activity that is not bound to educational institutions or dedicated periods in life. Lifelong learning will span from pre-school to post-retirement and will increasingly take place at the workplace, in non-formal contexts and during leisure time.

Thus, some scenarios on the future of learning foresee the de-institutionalisation of schooling, where learning will take place inside school, outside school, at home and online. For instance, in one scenario explored by Williams (2005), learning networks and powerful solutions of Information and Communication Technologies are created as alternatives to the publicly-run school sector, which is no longer able to deliver learning tailored to individual needs. However, schools remain an important institution in other future scenarios, as they are seen as instrumental in maintaining social capital (OECD, 2001). In more recent studies, it has been argued that schools need to be repositioned within the emerging learning landscape, both in terms of new formats and strategies for learning

and of offering relevant, effective and relevant learning experiences (Redecker et al., 2011).

Schools have to be situated within the context of future labour market requirements, so as to be flexible in responding to individual learners' needs. The role of schools is considered to be to guide students in getting the best learning opportunities; to monitor progress; and to manage assessment, certification and accreditation mechanisms (Redecker et al., 2011). Controlling the cost of schools will also bring about the development of new models to serve students, such as providing open content through the network (Johnson et al., 2011).

### **Technological innovation and widespread use of new technologies**

Various studies demonstrate that a major driver influencing the future of education is the increasing development of new technologies and their appropriation in everyday life in most Western societies. It is difficult to imagine the future of learning environments without ICT, at the forefront or in the background (Ala-Mutka et al., 2010). Portable applications such as tablets and mobile phones and new communication applications (e.g. collaborative and social networking sites) are empowering users to access information from anywhere at any time. Technological applications are not only facilitating access, but have also amplified diversity of resources; they allow users to connect through online content and they have become models of collaboration (Ala-Mutka, 2009). In the future, learning is expected to be supported by flexible and dynamic virtual environments and by

a range of tools which facilitate learning within and outside school (Redecker et al., 2011).

Findings from the same study also show that teachers envisage a shift in education to complex digital competences juxtaposed with new communication skills, such as 24-7 online connection and management of different online identities. Another aspect discussed widely in relation to the future of learning is personalisation of learning: learners will be able to choose their own learning paths encompassing different types of content and tools, e.g. mobile telephones, video, social media tools (Johnson et al., 2011; Miller, Shapiro & Hilding-Hamann, 2008; Redecker et al., 2011).

Johnson et al. (2011) also predict that learning analytics, which refers to a group of tools that will allow teachers to monitor student engagement, performance and progress, will also be part of the future of learning. Within such a context, attainment of digital competence, that is, the competence needed to efficiently, confidently and critically use the technologies of the future in an efficient and targeted way, becomes a priority (Ala-Mutka et al., 2010; Ferrari, 2012).

### **Data protection, data privacy and trust in the networks**

Data protection regulates control over how personal data as a commodity is exploited by third parties, e.g. social networking sites. Privacy, on the other hand, is the right of the individual to be oneself, undisturbed and unobserved (Guerses, 2011). In the future, as already

today, issues around data protection and individual privacy concerns in the field of education will gain more and more importance.

It can be argued that personal data protection and privacy issues constitute one of the main challenges to be addressed for a wider take-up of social networking in education and training, even more so when the personal data of minors are at stake. Unanswered questions range from data protection to commercialisation of education services. Whereas a number of social networking tools can be freely used by anyone on the Internet and are based on mutual trust of people's

identity, there are also some teacher networks that are based on verification of members' identity. The eTwinning community and its platform, for example, are only accessible for teachers who work in a school in one of the eTwinning countries. This aspect can be related to the trust in the network; members use their real names and the National Support Service in the given country verifies their status in the school. Even if this guarantees a high level of trust in the network, the future argumentation of data protection and privacy should not be used instrumentally to advocate only for closed systems in education networks.

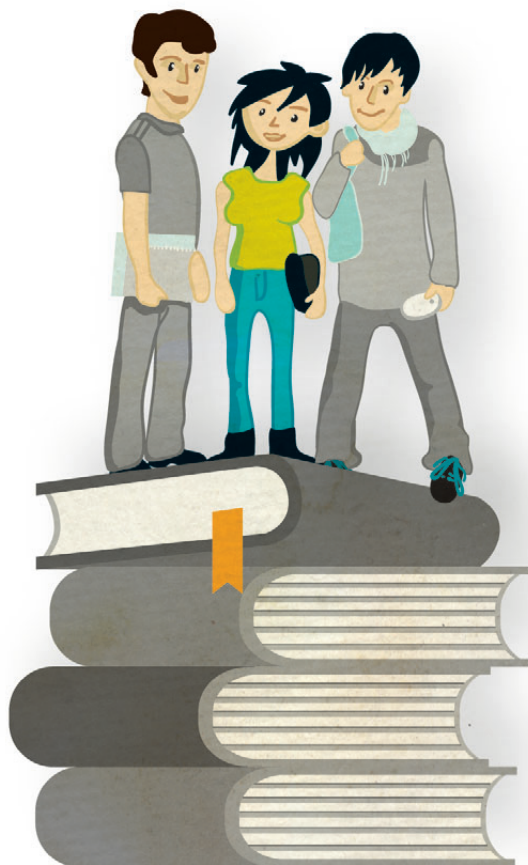
## 2

# SCENARIOS ON THE TEACHING PROFESSION AND TEACHER NETWORKS IN 2025

As we have just seen, in the future, learning is expected to be more personalised, collaborative, informal, competence-based and supported by flexible and dynamic virtual environments and a range of tools which facilitate learning within and outside schools. As a result, the role of teachers and instructors is also expected to change. Not only the way of teaching and learning will change but also the training and professional development of teachers, as well as their use of online networking and collaboration tools. Thus, current teacher networks like eTwinning will need to undergo changes to remain an important tool for teachers and even

better seize the benefits of technologies for teachers' Continuous Professional Development.

Prospective scenarios are stories of possible futures devised to challenge assumptions and stimulate thinking about current and future practices. The intent of these scenarios is to highlight key aspects of possible future developments and different models of how the teaching profession in formal education might evolve in the future – not to predict the future. While 2025 might seem a long way ahead in the future, it is good to remember that children starting school in 2012 will be



finishing their obligatory schooling or entering tertiary education in 2020. Identifying and discussing different models enables stakeholders and experts to discuss challenges and opportunities, and to better understand current and future practices and policies.

### Consulting teachers and experts on the future of teacher networks

Dedicated consultations with eTwinning teachers during 2010-2011 revealed a number of specific trends and challenges for the future evolution of teacher networks. First of all, teachers consulted emphasised that the **formal recognition** of participating in teacher networks is very important. Participants felt that unless teachers using networks such as eTwinning are formally recognised for their work (after all, teachers often do this kind of work outside official working hours), it could result in diminishing motivation in the long run, and, even more, to difficulties in engaging a larger audience of teachers.

Teachers' opinions were more divided concerning the purpose of teacher networks. While some educational stakeholders felt that the main purpose of systems like eTwinning should be teachers' own **professional development**, others felt that the main objective for usage should be for the benefit of the pupils, as a means of **improving the quality of school education**. This can suggest that the development of networks for teacher collaboration can serve many simultaneous goals; however, participants should have a clear purpose for usage scenarios communicated to them.

From a technological point of view, education stakeholders emphasised the need for flexible applications. Teachers would like to be able to interact and collaborate across different networking applications. The versatility of current platforms such as eTwinning does not necessarily provide for this. While teachers understand and value the fact that security and privacy are of utmost importance for teacher collaboration, they hope that such limitations can be overcome in the future. Hence, when it comes to education networks, it seems that a **balance between flexibility and security** is the most apt model for collaboration.

Discussion on technology adoption cannot ignore users who are unwilling or less willing to engage in using technology for learning and teaching. Stakeholders felt that more effort should be focused on this group of teachers, because the use of ICT for teacher collaboration in Europe still remains limited (see “eTwinning reach” in Vuorikari et al., 2011). Experts suggested that only providing access to technology is not sufficient. There should be more effort at encouraging teachers and students to team up with other teachers and students who could guide one another on how to use technology effectively, through **peer learning and cooperation** possibilities.

**Participation and involvement of students** is also seen as an important evolution of current education networks. Teachers would like to see learning applications where students take the initiative and develop their own projects. This does not mean that teachers would be taking the passenger seat: they would remain involved in new ways such as **teaching courses at a distance** (e.g. MOOCs: Massive Open Online Courses) and sharing more material online with their students.



## Introducing the five “mini-scenarios”

The above elaborated focus areas, together with the general trends for the future of learning as they have been outlined above, were used as a starting point for the development of five diverse scenarios for the future of teacher collaboration and professional engagement and

development in 2025 (Table 1). The departure point of these scenarios is the development and expansion of eTwinning ([www.etwinning.net](http://www.etwinning.net)), the community of schools in Europe with more than 170,000 participants (August 2012).

	Name of the scenarios	Emphasis
Scenario 1	eNet: European Education Network	Expansion of eTwinning as centralised network
Scenario 2	MyNetwork	User-centred social network approach
Scenario 3	Intelligent Agents	Technology-focused approach
Scenario 4	Diversified Teaching Career	Autonomous learning and teachers as mentors
Scenario 5	Informal Learning Camps	Bottom-up peer learning

Table 1. Five scenarios for the teaching profession in 2025

The scenarios have been developed by the Institute of Prospective Technological Studies, one of the seven Research Institutes of the European Commission. They have been validated in collaboration with European Schoolnet (e.g. Policy Innovation Committee in November 2011) and eTwinning stakeholders (e.g. eTwinning Conferences in 2011 and 2011).

The scenarios are labelled “mini-scenarios” as they are short stories – deliberately short – and considered as an evolving piece of work. A version of these scenarios with instructions and teamwork activities is also made available to teachers on the eTwinning Portal in all eTwinning languages and is sharable under Creative Commons License (a short version of the activity available in the annex).







## SCENARIO 1

## ENET - EUROPEAN EDUCATION NETWORK

According to this scenario, in 2025, eTwinning has evolved into a **European Education Network (eNet)**, a centralised network of networks which brings different education stakeholders together. The platform is funded and managed on behalf of the European Commission and is available in all the **official languages**. eNet has become part of Initial Teacher Training (ITT) and an eTwinning “licence” is given to all teachers. As **safety and security** are of paramount importance for eNet, all other users are requested to undergo an identification and verification process when requesting access to the network.

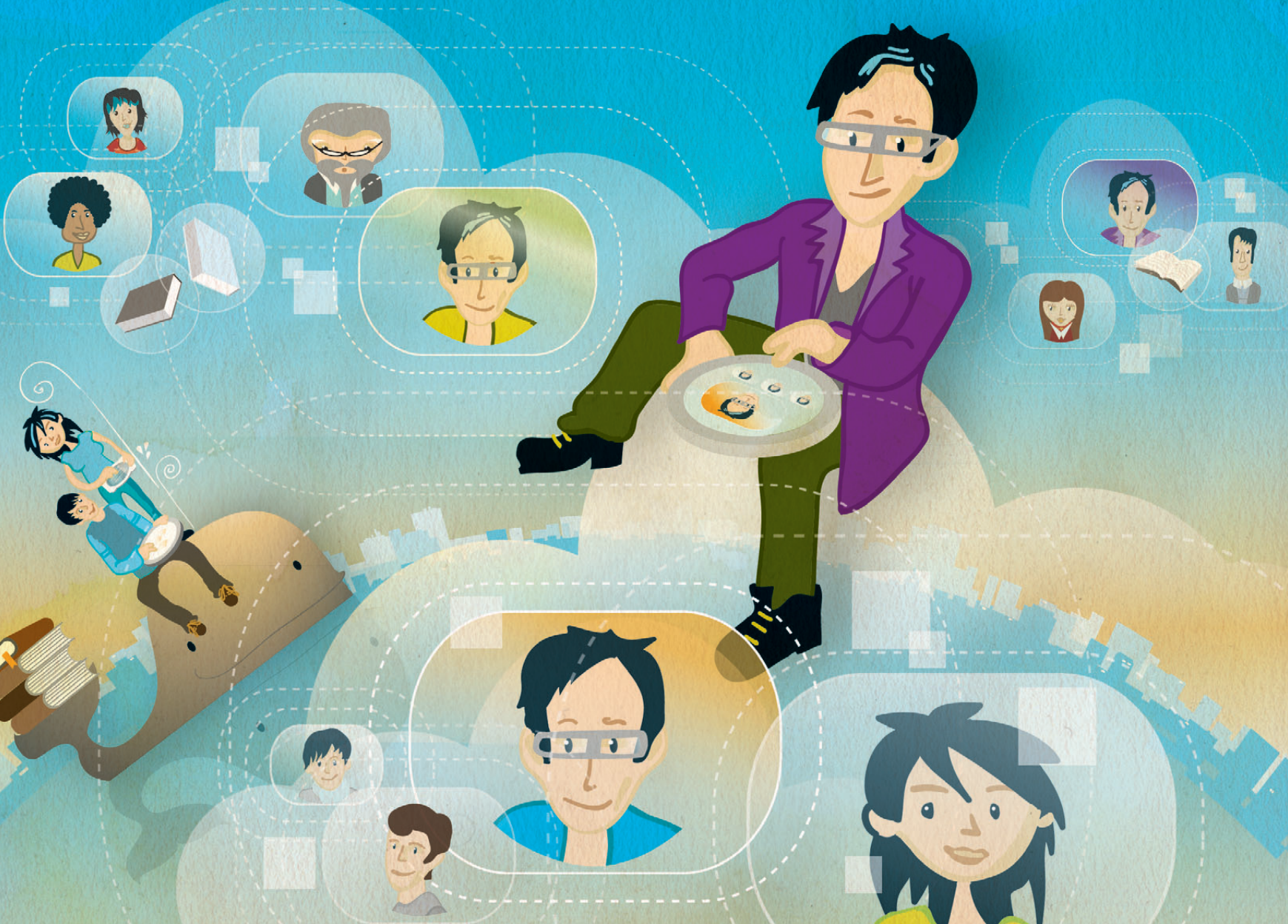
eNet is the main working tool for any teacher in Europe, through which their **Personal Teaching Record** is developed. This is linked to a career recognition system. eNet enables teachers to share and access high-quality resources free of charge (through an open content licence) in different European languages, prepare classes, document their work, assess their students, connect with other teachers through projects, look for jobs, search and apply for training and be active in suggesting changes in the curricula.

**Students** have their own pages on this new tool, but their activity can be monitored at any time by their teacher. Students feel it is a fun way of maintaining a form of “diary” of their school work and collaborating with students from other schools. **Parents** are also able to log-in to specific areas to view their children’s progress.

**Education researchers** have a section where they share articles which could be useful for teachers and students, but can also participate, conducting research projects in collaboration with teachers and learners.

*The eNet scenario can be seen as an expansion of the current eTwinning network towards other educational practitioners and stakeholders. It acknowledges teachers’ need to get (formal) recognition for their networking activities as a means of Continuous Professional Development. It also addresses security and privacy concerns and creates a safe environment for teachers, students and parents to interact.*

*The common platform and standardised format make it easier for less technology-enthusiastic users to seize the benefits of networking. The European involvement is there to guarantee sustainability and independence of the network. The eNet scenario may raise some concerns, however, related to its centralised governance and structure, and might be less favourable in terms of flexibility, openness and interoperability with other networks and spheres of life.*



## SCENARIO 2

## MYNETWORK

The **MyNetwork** scenario presents a personalised social networking approach to diverse and fragmented networks that exist alongside one other. This scenario is the opposite of eNet in terms of structure and governance.

In 2025, teachers are able to manage their networks through a single application. **MyNetwork** enables teachers and students to create multiple profiles through a single log-on, whereby they are able **to manage their personal data, its visibility and their list of contacts**.

Teachers are able to link to different external applications. A **complex identity management system** allows users to **change from one profile to another at the click of a button**. For the school profile, the teacher enters a **secure environment** which is compliant with the school's policies. Teachers can also connect with teachers outside Europe to share ideas and resources. As an application which **runs from the cloud**, it allows them to log on from anywhere, at any time. Students also have their own profile on MyNetwork, and there is no need for them to compromise their personal freedom because they are in control of what their teachers are able to see: their school profile. The teacher can observe how active the students are and if they take sufficient initiative for learning. In general, teachers find that students are **more involved in active learning**.

*The MyNetwork scenario consists of a personalised social networking approach based on features of decentralisation and federation across different networks. Users, depending on their role (e.g. student, teacher, etc.), can regulate the degree of visibility and display of learning-related data. When compared to the eNet scenario, MyNetwork is more flexible and able to suit teachers' more diversified exchange needs and objectives regarding their professional development. Teachers can choose between different applications which are offered on the market, some free, others paid for. One of the clear advantages of this scenario is that teachers can personalise all available technological tools – not just the ones available for them as teachers – in such a way as to more efficiently and effectively organise their professional life, reducing their workload, while ensuring that they dynamically develop and improve their teaching strategies.*

*Such a decentralised, liberalised network allows for wide variety and choice. However, the lack of structure might translate into a lack of orientation, making it more difficult for less technology-enthusiastic teachers to seize the benefits of the application. Also, students and parents might find it difficult that each teacher follows a different approach for interacting through the system. A further possible drawback of this scenario is that teacher engagement cannot (and should not) be monitored, so that it is not possible for teachers to receive formal recognition for their engagement.*





## SCENARIO 3

## INTELLIGENT AGENTS

In 2025, teachers are now connected 24/7 through different mobile devices. Given that teachers often feel isolated and overwhelmed by the sheer amount of teaching material and ideas available online, an **Intelligent Agent (IA)** has been created to **assist them in their work, help them rummage through extensive pools of information** and **enable them to stay connected with other teachers**.

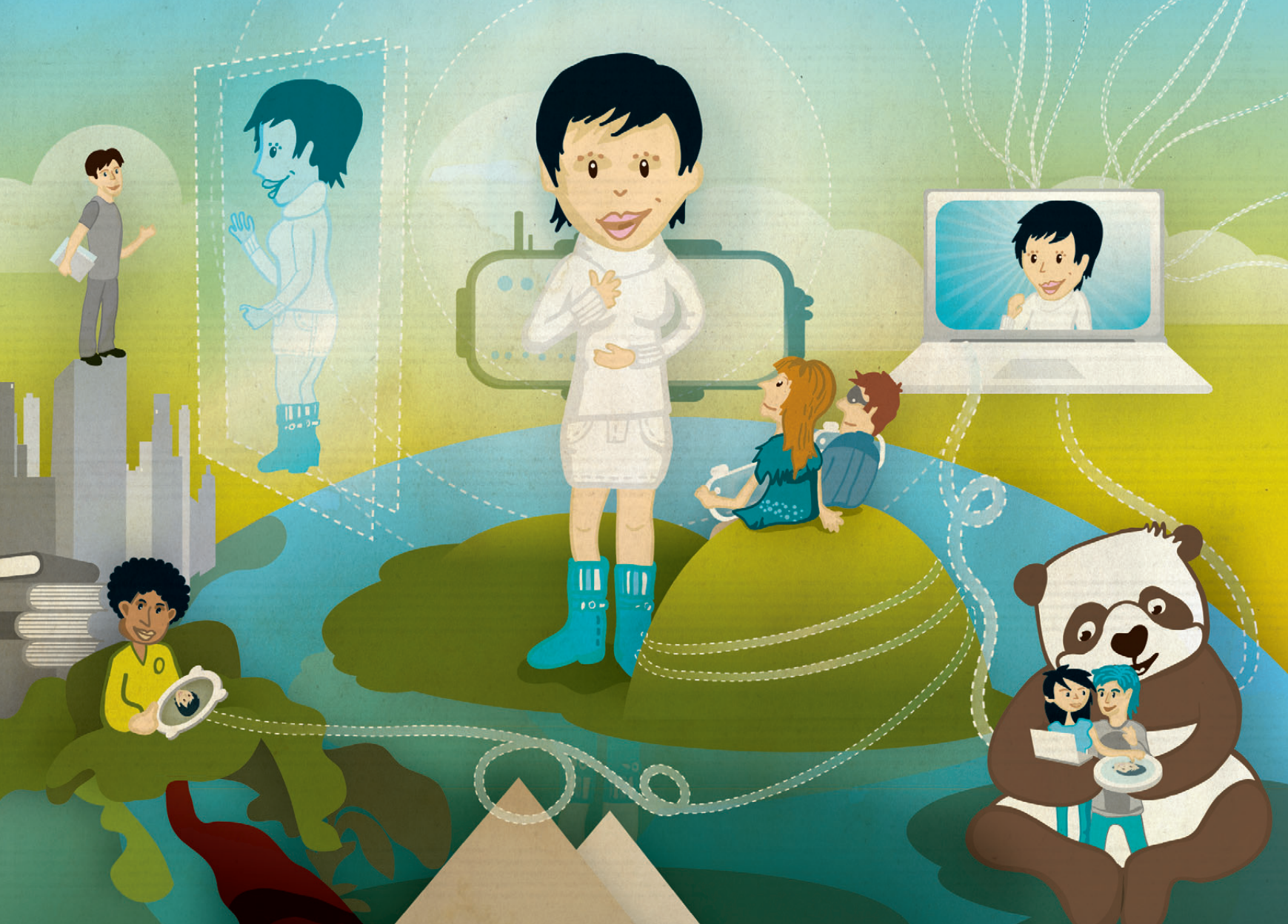
The IA is programmed to perform searches, identify resources, present draft lesson plans and suggest a number of **buddies** who are also working in similar areas. This solution is provided by a private company and is paid for by the school. Several companies offer competing solutions.

The IA frees up time for the teachers which can be dedicated to **preparing lessons** and **attending Continuous Professional Development (CPD)**. This should lead to an improvement in terms of quality of teaching, since, for instance, the IA helps to **keep lesson plans diverse** and through CPD, more creative and innovative activities can be developed in the classroom. The IA can also identify buddies in the local area; these are **other teachers teaching the same subject in other schools**, so that teachers can maintain contacts with peers in the same geographical area, too.

*The IA scenario is highly dependent on technology performance. According to the experts and teachers consulted, the possibility of relying on Intelligent Agents that provide assistance with peer networking and with the identification of interesting educational resources is an attractive option as it could reduce teachers' time investment and workload of repetitive activities. Issues of trust, security, privacy, dependability and reliability of automated interactions, suggestions and decision-making have to be dealt with, however.*

*This scenario focuses on teachers' need to more efficiently sieve through information and contacts available online. In this sense it addresses a problem that confronts any further evolvement of a network such as eTwinning: complexity. This scenario should therefore be considered as a possible add-on to, for example, the eNet or MyNetwork scenario. Stakeholder feedback suggests that whether such a tool will be useful or not depends heavily on the technologies available in the future. There might also be a group of teachers reluctant to trust suggestions and decisions given by new technology solutions such as artificial intelligence.*





## SCENARIO 4

## DIVERSIFIED TEACHING CAREERS

In 2025, students are accustomed to **personalised learning**. Students go to school every day but, two days per week, they are expected to be **autonomous** in choosing how they want to learn. The school is responsible for providing **different methods** to enable each student to receive different lessons.

Lessons are available in three different modes: (1) **in situ with the physical presence of teachers**, (2) **virtual in real-time learning with online presence of teachers**, and (3) **virtual learning in play-back mode** or by an **interactive application with the presence of a teacher**. It is up to the students to decide how they want to attend the class, in which order, where they want to do it and in which language. Within such a student-centred system, Initial Teacher Training is now divided into different career paths: **teaching in class, teaching virtually or student mentoring**.

The role of the teacher as **mentor** and guide has become indispensable for any student. Students are given various options **to personalise their learning paths**. Teachers will be trained to remotely mentor the group of students for whom they are responsible. This takes place through a digital network which links students' activities to the mentor. While students' mentors will be alerted if the student has not completed his/her task for the month, at the same time students may refer to their mentor whenever they encounter a difficulty in their work.

*This scenario addresses the question of how the teaching profession will change if, in fact, learning on the whole changes and formal education and training become de-institutionalised. It acknowledges the move towards personalised learning pathways, which require different roles for teachers including a new role, that of mentor. The network is conceived as a means of making it possible for students and teachers to interact effectively when there is less face-to-face contact. Thus, the main focus of the network is to allow learners to follow more personalised learning pathways without having to lose the guidance and help of their teachers. At the same time it is a means for teachers to give students more freedom in their choices, while remaining informed of their students' engagement, progress and performance.*

*The scenario is highly dependent on the availability and implementation of digital technologies for learning and for the organisation and administration of learning, supported by high capacity infrastructures and learning analytics. It will require significant investment in teacher training, especially CPD, to cater for the different roles teachers have to assume in such a diversified learning environment. It also requires students to become more autonomous learners.*







## SCENARIO 5

## INFORMAL LEARNING CAMPS

This scenario assumes that, by 2025, conventional teacher training has failed in many respects. In the last five years, teachers have spent substantial amounts of time learning new networking applications for teacher collaboration, but they increasingly criticise the lack of face-to-face contact and learning. An alternative group of teachers has emerged who come together a couple of times per year for a full weekend, to learn and train each other. These face-to-face learning “boot camps” are completely bottom-up, unstructured and shaped by the participants themselves.

In these informal **teachers’ collaboration and networking events**, teachers get an opportunity to co-operate, e.g. through collaborative projects with other teachers. As technology is expected to be ubiquitous by 2025, for teachers it is important to have specific teaching materials and applications that meet diverse teachers’ needs. Thus, teachers will, for example, jointly develop new applications for teaching, all based on **open technologies, open source software and Open Educational Resources**. These applications can be modified and applied in each individual’s teaching practice, as well as shared freely with students and parents.

According to this scenario, the face-to-face learning events are at the core of teacher cooperation and CPD. Technologies and networking applications are only considered as a means of increasing the quality of the produced learning materials and on the other hand, increase the effectiveness of the teachers’ interaction and communication in-between boot camps.

*This scenario is characterised by bottom-up, informal face-to-face learning organised by teachers themselves as a reaction against centralised, top-down training and teacher professional development. Teachers prefer to learn from their peers, meeting face to face. This scenario depends, however, on teachers’ personal motivation, due to the lack of institutional and school support. Since not all teachers can be expected to engage voluntarily in these learning activities in their spare time and on their own account, this scenario might reinforce the digital divide between teachers who engage in CPD on technology and those who do not.*

*As these learning events emerge as grassroots activities, attendance is, at least initially, not recognised as Continuous Professional Development. Local schools may also disregard or even oppose these activities and may prevent teachers from using the outcomes in their teaching. However, if this model starts to spread and there is a strong support from teachers, it could eventually become an established and recognised element of CPD, with teachers being encouraged to take part in the events, which will become officially organised and subsidised.*

## CONCLUDING REMARKS

As in all sectors of society, the use of ICT is enabling changes in education and training, and in particular, increasingly affecting the teachers' work and professional development. A number of key trends have been identified in this chapter. In the future, learning is expected to be more personalised, collaborative, informal, competence-based and supported by flexible and dynamic virtual environments and by a range of tools which facilitate learning inside and outside school. It is less clear, however, how this will affect the role of teachers.

The five short scenarios developed above illustrate how the teaching profession and teacher networking could evolve over the next 15 years. The scenarios are not mutually exclusive, but focus on specific trends, which enable us to identify and highlight key dimensions and major issues raised by experts and practitioners when discussing the future of teacher networks. The aim of the scenarios is not to predict but to better understand current and future practices and policies. The scenarios outline how the interaction among the different players in the learning process could be structured from the point of view of the teacher. Moreover, a particular emphasis is placed on the teachers' need to keep abreast of change and engage in CPD for the benefit of all parties involved.

All the scenarios highlight the fact that the future of teacher networks does not only involve mainly teachers, but should also take account the roles and inputs of students, parents, head

teachers, schools, mentors, as well as educational researchers and policymakers. The clear message here is the opening-up of education networks towards other practitioners and stakeholders. Teacher training and especially the formal and informal recognition



of teacher's involvement in teacher networks are also important drivers of change. Teachers' ITT and CPD are directly affected by teacher networks. All these activities should enhance the quality not only of teacher training but also teaching and learning.

At present, teacher networks such as eTwinning are used by many teachers in different ways but such practices are not yet widespread within the whole teacher population and not widely accepted in the current school context. However, with the preponderance of ICT in the future, the virtual interaction of teachers, students and parents will become a crucial ingredient in school education. The scenarios also highlight the importance of school management and educational policies.

**Ownership and control** of personal data, user profiles and of educational networks are important issues to be considered today and in the future. Similarly, **privacy, security** and **identity management** issues are paramount for teachers and learners, as well as for other stakeholders. A comparison of Scenarios 1 (eNET) and 2 (MyNetwork) shows that the decision whether to have a centralised or a federated network has significant implications for the purposes the network can serve. Scenarios 3 (Intelligent Agent) and 5 (Informal Learning Camps) emphasise the need to deal with the increasing complexity of expanding teacher networks and the importance of suitable technological solutions; Scenario 4 (Diversified Teaching Career) illustrates the consequences that personalised learning pathways have for the teaching profession.

Teachers and the networks they can draw upon are an important part of the evolution of European school education. Only if we equip teachers with the necessary resources, skills and connections to diversify their teaching strategies will we be able to address the impending societal changes and to equip future generations with the necessary competences in an increasingly complex society. Teacher networks are a key element for the necessary modernisation of schools in the 21<sup>st</sup> century.

## This research brings to light five discoveries based on social network analysis methods:

- 1 SNA (Social Network Analysis) methods can be well applied to the study of eTwinning networks. The existence of a complex network and its underlying community structures can be detected in all the four eTwinning networks through power-law distribution of node degree in eTwinning.
- 2 Teachers' professional development paths can be revealed in various eTwinning networks. This is done through using dynamic analysis and time-series analysis of teachers' various communication and project networks.
- 3 There are different roles in eTwinning networks. SNA is able to evaluate social capital and various roles through calculation of node and network properties. SNA can help eTwinners and eTwinning administrative staffs to promote and maintain an effective eTwinning network for better professional development purposes.
- 4 There are gatekeepers in eTwinning networks. The position of gatekeepers in the eTwinning networks corresponds to that of active eTwinning teachers who are involved in more projects with more activities and more contacts. These are teachers who connect different communities. They have more social capital than those who are located within only one community.
- 5 The eTwinning network proves to be still a young network and has great potential for further development. Time-series analysis shows that the development of the eTwinning network follows a network development model based on different phases from born, through bonding, to emergence.



# SOCIAL NETWORK ANALYSIS METHODS FOR TEACHER NETWORKS

In order to better understand and eventually improve cooperation among European school teachers, we can explore how teachers use social networks to cooperate and assist their professional development. According to network theories, any social relationship can be seen as consisting of nodes and connections, also called edges. In eTwinning, for example, an individual teacher or a school can be considered as a node and the various activities between them as edges connecting the two.

The RWTH Aachen University, one of the Tellnet partners, used eTwinning as a case study to understand teachers' use of the various networks and their behaviour in such a networked environment. They applied Social Network Analysis (SNA) techniques to the eTwinning data that was gathered over a period of six years. This technique can potentially help understand the underlying mechanisms for the transfer of good practices and innovation, and therefore also enhance teachers' professional

development opportunities. In addition, they aimed to identify social roles in teachers' collaboration networks so as to observe the evolution of the teachers' professional development over time. Understanding such mechanisms can have benefits for all stakeholders involved, e.g. teachers (we call them "eTwinners"), eTwinning National Support Services and Central Support Service, eTwinning Steering Committee and other stakeholders such as education authorities and other policy-makers.

In the following text, we explain our three main research questions and what kinds of answers were found. For further reading on the methodology, techniques applied and the final results, we refer to

the report “Social Network Analysis Methods for Lifelong Learning Communities”D2.2, see References.

## 1 THREE MAIN QUESTIONS TO STUDY

One of the main goals of the eTwinning platform is to support teachers' cooperation and collaboration across borders in Europe. At the time of this analysis (November 2011), there were 146,105 eTwinners. By studying the digital traces of the teachers using the platform, we were able to find correlations between activity statistics on usage of eTwinning, the distribution of eTwinning Quality Labels and a number of SNA measures<sup>1</sup>. Only the combination of these measures gives us indicators for teachers' attaining **social capital** and lets us explore further our questions about the usefulness of networks for teachers' professional development.

First, it is important to understand the main **properties of eTwinning**: what types of networks can be studied, how actively those networks are used, what kinds of community structures are found within them and how time-series analysis can be applied over the whole period of eTwinning, which started in 2005. Secondly, we are interested in understanding the notion of social capital within eTwinning networks: what types of it exist, where teachers can attain it and how it changes over a long period of time. Finally, we are interested in **development patterns over a long period of time** and how teachers can enhance their professional development. All

data analysis research is conducted on the anonymous data set extracted from the eTwinning portal to guarantee eTwinning teachers' data privacy.

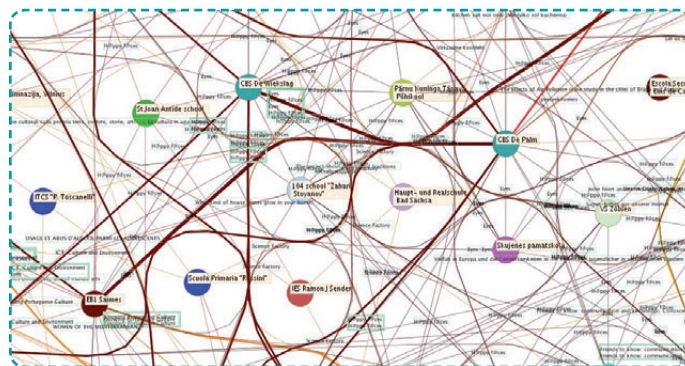


Figure 1a. Project network: each node is a teacher working in an eTwinning school (colour of the node indicates the country of the school), whereas the edge represents project collaboration. This represents a close-up of the giant component shown in Figure 1b.

<sup>1</sup> E.g. degree, betweenness, centrality and local clustering coefficient; see Table 2.

## 2 PROPERTIES OF ETWINNING NETWORKS

First, it was important to understand what kinds of different networks were formed by eTwinners. From hereafter, when we refer to the term *network*, it is used as understood in network theories: any social relationship consisting of nodes and edges. In this study, we can only focus on networks that are formed using the various digital tools of the eTwinning portal, which is, of course, a simplification compared to the multiple means of communication that can be used in eTwinning environments (both physical and online). *My Journal* and *Contacts* are part of the social networking tools offered to eTwinners; they allow simple status updates and adding colleagues to a contact list. eTwinning projects, on the other hand, offer deeper professional collaboration opportunities and *Project Diary* is one of the tools to support that. From the beginning of eTwinning in 2005, we were able to extract digital traces of various interactions to create the following four networks.

### Networks created through social networking tools:

- **Contact network:** nodes are teachers (eTwinners) and there is a connection (edge) between two teachers if at least one teacher has been requested to be in the contact list of the other. Both approved contacts and the pending ones are included. Edges are undirected and unweighted.

- **My Journal network:** nodes are teachers and there is an edge between two teachers if one teacher has posted or commented on the wall of the other. Edges are directed and weighted by the number of messages.

### Networks created through professional collaboration:

- **Project network:** nodes are teachers and there is an edge between two teachers if they collaborate in at least one project. Edges in the network are undirected and weighted by the number of projects in which the two teachers collaborate. Figure 1a shows a visualisation of such connections.
- **Project Diary network:** nodes are teachers and there is an edge between two teachers if one teacher has commented on at least one blog post created by the other. Edges are directed and weighted by the number of comments.

Network	#nodes	#edges	Age of the network in months	Largest component size	Number of disconnected components	Clustering coefficient	Average path length
Contact	109,321 (75%)	573,602 (0.01%)	n/a	108,140 (99%)	506	0.1135	4.32
My Journal	43,863 (30%)	56,138 (0.006%)	37	37,179 (85%)	2,789	0.028	6.55
Project	37,893 (26%)	804,825 (0.11%)	82	31,480 (83%)	2493	0.7308	3.95
Project Diary	3,162 (2.2%)	3,211 (0.06%)	37	2,032 (64%)	453	0.1317	6.43

Table 2. Properties of eTwinning networks

Various properties that are commonly used in SNA are shown in Table 2 for our selected networks. This includes number of *nodes* (eTwinners) and number of *edges* (connections) within the network; the age of the network; the number of *components*, to measure the of nodes that are connected or disconnected, the *clustering coefficient*, to measure the community structure; and *average path length*, which indicates, for example, the number of people a person has to communicate through, on average, to contact a complete stranger.

First, Table 2 shows that a large number of eTwinners are engaged in using social networking tools; the biggest network, comprising 75% of all eTwinners, connects individuals in the same network through contacts (both approved and pending ones). My Journal, on the other hand, connects 30% of all eTwinners in the network that is created through its use on the Desktop. On the other hand, when inspecting professional collaboration aspects of eTwinners, we find that 26% of all eTwinners are connected to the same network through project collaboration. Finally, 2.2% of eTwinners are connected to one another through writing on Project Diary.



Project and Contact networks are better connected than other networks, as is shown by properties such as the average path length, the number of disconnected components and the size of giant component in these networks. The giant component, also called the largest connected component, measures the fraction of nodes that are connected to one another in the largest sub-networks. Such a giant component exists in all four networks, but it is bigger in the Contact network (99%) than in the other networks. The average path length in Contact and Project networks is about 4. This means that three intermediary contacts, for example, are usually enough to introduce anyone in the network to a random stranger (e.g. in relation to another eTwinner in the Contact network, on average a contact of your contact knows a contact of their contact). Last, regarding the nature of the network, eTwinners in the Contact network might not have much further interaction with one another. Therefore, it can be seen as a

tool to build weak ties. In terms of network structure, weak ties expose the importance of the gatekeepers (see 3.3 on gatekeepers).

The second set of observations is related to the Project network. It includes 26% of all eTwinners (37893 eTwinners) and reveals a strong community structure with the clustering coefficient of 0.7308, much higher than for the other networks.

By using a clustering algorithm we detect that there are 3,086 clusters in the Project network including both connected and disconnected components. Moreover, we can also inspect the quality of clusters: empirical observation indicates that a modularity greater than 0.3 corresponds to significant community structures. The eTwinning Project network receives the modularity of 0.47, corresponding to a significant clustering of this network.

Cluster size (number of eTwinners)	10,567 (LC1)	6,277 (LC2)	4,362 (LC3)	2,372 (LC4)	100- 1,000	10- 100	2-9	Total	# of connected
Number of times identified	1	1	1	1	12	166	2,904	3,086	593

Table 3. eTwinning Project network clusters

Table 3 details the size of clusters of which the Project network is composed. It includes 3086 components, of which 593 are connected and 2,493 disconnected. What emerges as an interesting finding is

the fact that the main core of the network is composed of four large communities ranging from the size of 10,567 eTwinners to 2,372 (see LC1 –LC4 in Table 3). This means that 16% of eTwinners (23,578) are

part of the core of the eTwinning Project network, which has been formed over a long period in a high number of projects. Moreover, the remaining 589 small communities are connected to the core of four clusters via many gatekeepers and therefore also part of the giant component (see 3.3 on gatekeepers). The entire giant component comprises 83% of eTwinners in this network. Figure 1b. is a visualisation of the giant component of eTwinning teachers with disconnected components displayed at the bottom and top right of the screen.

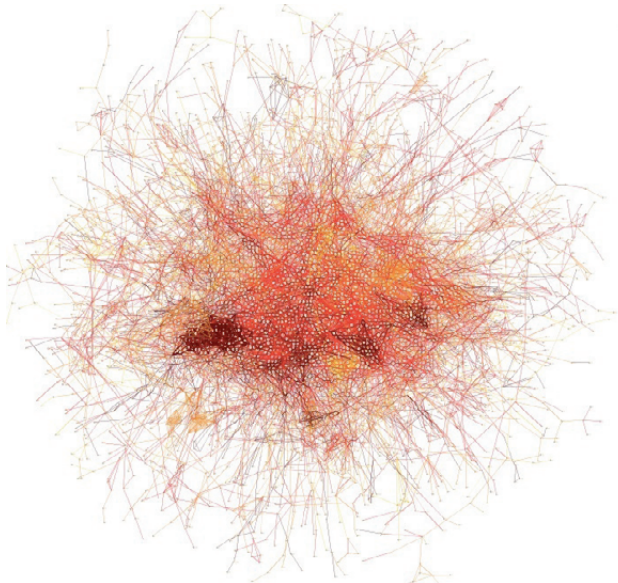


Figure 1b. Visualisation of eTwinning teachers' network (Breuer et al. 2009).

Finally, regarding the disconnected components within the Project network (2,493 components, Table 2), these mostly represent project partnerships of teachers who are engaged in project collaboration for the first time. We can speculate that none of them has yet collaborated with eTwinners who are part of the giant component, and therefore they still remain disconnected from the core (note, they might be connected to other eTwinners via other networks). They count for 17% of eTwinners in the Project network.

## Dynamic properties of the eTwinning network

Researchers have developed a model to analyse the development of a community of practice; this model is depicted in Figure 2. We can use the same model to better study and understand our various networks in eTwinning. In general, in the beginning of a community formation, there are only a few connections between nodes (i.e. teachers). This is called “*born*” stage. After a period of time, groups start becoming apparent in the network by communicating and collaborating with one another (e.g. projects). This is called the “*bonding*” stage. Consequently, these groups are gradually integrated, in our case for example through projects that involve teachers from more than one group. This stage is called the “*emergence*” stage. Over time, the teacher network may form a network topology that features a strongly connected core group of teachers that is connected to other smaller groups (focused stage). Alternatively, the network may develop towards an *interdisciplinary* typology where several groups are connected via some gatekeepers, but where there is no core group. It may also develop towards a hierarchical

topology in which some “super gatekeepers” connect a hierarchy of groups together.

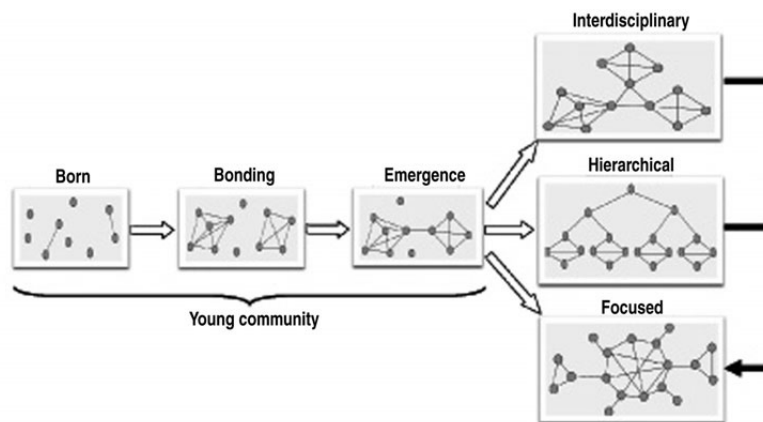


Figure 2. Community development model (Pham et al., 2011).

To track the development of eTwinning networks, we analyse the network parameters of each network over time. At each time point, we have taken a snapshot of each network and computed its parameters. We plot these parameters over the course of observation, called “Age of the network”. The age of the Project network is the longest (82 months), whereas others are rather younger (see Table 2). This allows us to observe the evolution of the networks and the stage towards which they are tending to develop, according to the model depicted in Figure 2.

The time-series analysis shows that the Project network is developing well. We find that it is becoming densified at a very high speed, while other networks are densifying at a much slower pace. A closer look at other parameters reveals that the Project network was developing towards a cohesive and well-connected network quite early, by around month 9. In fact, the Project network developed to the focused stage by month 25, as depicted in the model in Figure 2. This means that it is now mature and with time, it most likely to continue to evolve in the same way.

## Summary of network properties

eTwinners are more engaged in Project collaboration and Contact networks than in Project Diary and My Journal networks. This can be related to the nature of the networks identified: Contacts and Project networks are more functional for networking purposes, whereas Project Diary and My journal can be seen as a tool for professional collaboration. We observe that the Project network exhibits a strong community structure, while other networks are clustered into disconnected components and not well so connected. The community structure analysis of Project network shows that the network depends on a core of five large clusters, with a large number of small clusters connected to the core via many gatekeepers. This giant component connects 83% of nodes in that network.

In terms of applying SNA to studying the properties of a lifelong learning network such as that of eTwinning, we identify the following measures and properties as important. The emergence of the

giant component (largest connected component) indicates the cohesiveness of teacher networks, while the betweenness shows the existence of the gatekeepers and their importance. The clustering coefficient measures the extent to which the network is clustered

into sub-communities. Other parameters like diameter and average shortest path length show whether the community is still developing or whether it is stable. The densification law shows the speed at which the network is densified.

### 3

## HOW TO STUDY SOCIAL CAPITAL IN THE TEACHER NETWORKS?

Social roles are reflected through social capital, which changes over time. In this report, we focus on the use of dynamic SNA methods to explore eTwinning teachers' social capital via various interactions among them. First, we explain what is meant by social capital and present two different types that can be found in eTwinning. Then we advance the research in two parts with the following questions: what types of social capital exist in eTwinning in general, and in project partnerships in particular?

### **What is social capital and what types of social capital exist?**

Social capital is a concept that stands for the ability of actors to derive benefits from their membership in social networks or other social structures (Coleman, 1988). Social capital can be viewed as a property of a group, where some groups are more effective than

others because of their social structure. Social capital can also be viewed as a property of an individual, where a person can have more or less social capital depending on their position in the network (Borgatti, 1998). We study social capital in eTwinning networks from two points of view: as a property of the teachers and as a property of the working groups (i.e. eTwinning projects).



In social network research, studies are concerned with the identification of network structures that are the most effective factor for creating social capital.

- Being embedded in densely connected groups has benefits such as confidence, trust and secured relationship in the community (Coleman, 1988). This form of social capital is referred to as *closure*.
  - If a node is in a dense cluster, for example node A in Figure 3, its local clustering coefficient is very high. In eTwinning, if a teacher collaborates with teachers who have already collaborated with one another before, her local clustering coefficient in the Project collaboration network is high.
- On the other hand, the benefits of social capital can be seen arising from the ability to “broker” interactions at the interface between *different* groups (Burt, 2001). We refer to the form of brokerage as *structural hole*, or sometimes referred to as *gatekeepers*.
  - Node B in Figure 3 has more power to control the information flow in the network and it is normally these actors who connect several dense groups together. For example, in eTwinning, if a teacher has collaborated with teachers in different projects and those teachers have not collaborated with one another before, her betweenness is high and she is considered a gatekeeper.

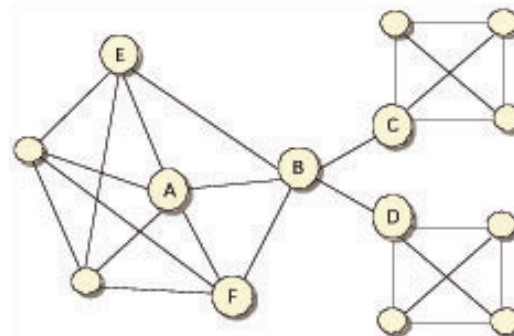


Figure 3. Structural property of social capital: node A shows a closure and node B a typical structure of gatekeeper.

### Social capital in eTwinning: do structures such as gatekeepers and closures exist in eTwinning networks?

Here we study *gatekeepers* and closure as properties of teachers (individuals) as well as of projects (groups). We use the above-explained model in Figure 3 to describe and explain the development of teacher networks.

First, we find that all four networks that we study are so-called *scale-free* networks with a power-law degree distribution, more specifically that of a fat-tail distribution. The power-law degree distribution indicates that super-connectors, so called hubs, exist.

Hubs are nodes that connect many nodes or communities. They play an important role in ensuring connectivity, information spreading and behaviour cascading in networks. They also have more power and control over the network than the other nodes which lie in the tail of the distribution.

So what is the structure of these hubs in terms of social capital? There is a clear trend: teachers in Project and Contact networks with high degrees of centrality are positioned at the interface of different communities, meaning that their structure represents that of gatekeepers. In terms of social network measures, in the Project, Contact and My Journal networks these *gatekeepers* with *high degree* possess *high betweenness* and *low clustering coefficient*.

What about the structure of the project partnership (or local) networks? For this question and calculation, only projects with more than two members were considered, although small project partnerships in eTwinning are as much encouraged as bigger ones. We can conclude that the projects studied in eTwinning present either closure or gatekeeper properties. Projects in the focused stage (Figure 2) present a dense and well-connected community structure and are therefore closures. They can benefit from the secure and trusting relationship among members. On the other hand, projects in the bonding stage are described as unconnected communities: they can have many new ideas from different groups when they are brought together (identified as gatekeepers). Next, we will consider those forms of social capital based on the “Quality Label” as an indicator of the recognition of teachers’ project work within the Project network.

## Local network structure and teachers’ performance in terms of Quality Labels

A Quality Label recognises and rewards good practice, and each partnership can apply for it through its National Support Service. There are currently some common guidelines, but practices can vary from country to country. With the Quality Label indicator, we are able to find the correlation between the teachers’ “performance” and their positions in the eTwinning network.

We find clear evidence from the properties of eTwinning projects and the local network structure of nodes that being positioned at **the interface between communities has a big advantage**. In other words, eTwinners with a high number of Quality Labels have a very high betweenness and a low local clustering coefficient, which indicates the structure of *gatekeeper* connecting different communities together. On the other hand, eTwinners with a low number of Quality Labels are clustered and located within the communities. In SNA terms, they have low betweenness and very high local clustering coefficient, which indicates the structure of a closure (see Figure 3). It is good to note that the simple number of activities on the platform (e.g. contacts, project, Project Diary posts, comments, My Journal posts and comments) and the degree of a node also correlate with the Quality Label.

This observation suggests that the structure of gatekeeper is more effective than closure in attaining recognition of project collaboration in terms of Quality Labels. Based on the simplified patterns of



interaction and communication through our studied networks, we have some evidence to suggest that eTwinners who are gatekeepers benefit from the diversity of information and knowledge sources from different communities, also known as information advantage. This diversity gives them more options in finding out projects, partners and novel ideas. **Therefore, the gatekeepers also have more power over information flow between communities in eTwinning.** In other words, they are the ones who can spread positive and innovative pedagogical practices in eTwinning.

As we correlate the social capital attaining process with the community development model of Figure 2, we also find that those projects that have received Quality Labels have the partnership network in the bonding stage of community structure. This shows that those projects that have received Quality Labels favour the *gatekeepers* and that *diversity in the partnership* is part of the success factor. Membership in the bonding stage has two advantages. On the one hand, members in densely connected groups have close and trusting relations with other members of the group. On the other hand, when the project is carried out, it brings these groups together and combines their ideas, resources and information. This behaviour is in line with the goals of eTwinning platform and projects: to facilitate the communication and collaboration of teachers through the means of ICT.

Finally, we also find evidence that those projects that have partnership networks in the focused stage or *hierarchical* stage are less effective in receiving Quality Labels. We can conclude that memberships in the *focused* stage do not gain so much benefit



and new knowledge when they carry out a project together; this is because they have known or collaborated with one another before.

## Summary of social capital

We studied social capital as a property of individuals (i.e. teachers) and as a property of groups (i.e. projects) in eTwinning. Four networks in our study (the Project, Contact, Project Diary and Journal networks) are complex networks (scale-free networks) with a power-law degree distribution, indicating the existence of super-connectors (hubs) in the networks.

Further analysis of the local structure of the hubs shows the co-existence of two forms of social capital in eTwinning: the *gatekeepers* and *closure*. Connecting the local structure of teachers and their achievement as manifested by Quality Labels, we find that the structure of gatekeepers is more effective in terms of diversity of choices in selecting partnerships and what is called informational advantage. This form of social capital, that of the gatekeeper, is also confirmed for the projects. Projects that connect partners from several groups together in their partnership achieve higher quality in terms of Quality Labels, partly thanks to the diversity of the membership as well as the trust relationship in each group.

## 4

# TRACKING “TEACHER ROLE MODELS”

The correlation between teachers’ positions and their achievements in eTwinning (e.g. project collaboration, awards) helps to confirm the role of social capital in the eTwinning Project network, as illustrated above. Furthermore, it helps to identify possible role models in the network. By the dynamic analysis of teachers’ centrality measures in the network over a period of time, we can track and monitor their development pattern and further give suggestions for their future development paths.

With the above mentioned centrality measures, we are able to identify the position of teachers in the eTwinning network and how it relates

to carrying out projects and eventually gaining recognition such as Quality Labels and other awards. This additional information may help us learn about teachers’ professional development paths through eTwinning over a period of time.

For this part of the study we are interested only in teachers who have over time been part of projects that have gained a Quality Label. We call these teachers “potential role models”. We find that the basic strategy that these teachers exhibit is to **join first in project collaboration and build up a strong and densely connected community**. This is shown by the early increase in teachers’ local clustering coefficient.

Then these “*potential role models*” **start to collaborate across the communities**. This is shown by the increasing betweenness in both networks.

There are also differences among teachers: those with fewer Quality Labels seem to stay closer to their local community, while teachers who have more Quality Labels have a good balance of communication with many communities. This is confirmed by the change of SNA measures:

teachers with more Quality Labels are in line with those teachers who possess higher betweenness and lower their clustering coefficient earlier. These observations suggest that “potential role model” teachers with a high number of recognitions can quickly align themselves in their local community and then quickly connect to other communities.

Further exploration of these findings is required: for example, it would be interesting for teachers to be able to compare their own development pattern with “potential role models” within or outside their community.

## Summary and further reflections

Access to the longitudinal data from over five years on teachers’ professional collaboration in terms of eTwinning projects opens up new ways to understand how teachers gain social capital in networks such as eTwinning.

In this part of the study, we have identified teachers’ “potential role models” within the Project network. We find that the basic strategy that these teachers exhibit is to **join first in project collaboration and build up a strong and densely connected community**. Then these “potential role models” **start to collaborate across the communities**. We believe that within a network such as eTwinning, identifying and showcasing such “role models” could have benefits for community cohesion, and on the other hand, it could help teachers create their own strategies that could lead to their gaining more social capital within activities and interactions taking place within the network.



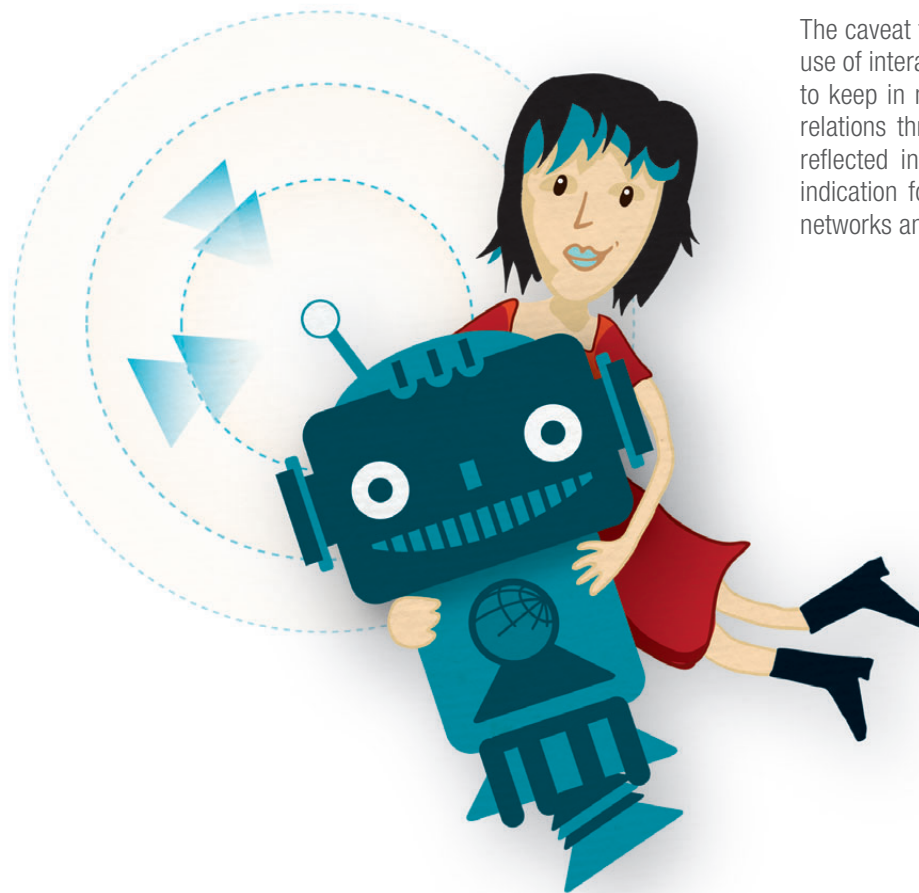
We have reported on the SNA of eTwinning network performed in the Tellnet project and proposed several SNA methods to deepen understanding of the structure, characteristics and dynamics of the eTwinning network as well as teachers' social capital in the network.

Our research results reveal three significant aspects of SNA for professional development networks in eTwinning. First, in all four networks that were studied, the degree distributions follow the power law, which indicates the existence of a complex network structure and its underlying community structures. In this regard, the Project cooperation network is most interesting because it has a better connectivity than other networks studied, as illustrated in Table 2. The existence of complex networks assures the effective employment of SNA methods to assess the roles and positions of individual nodes.

Secondly, teachers' positions in the network can be an indicator or a predictor for their performance in eTwinning projects, one index of which is the Quality Label. Lying on the border of different communities has an advantage: teachers in this position have more control and power over the network as well as more sources for new information. This form of social capital is that of the gatekeeper, and it can be studied through calculation of node and network properties.

Thirdly, a dynamic analysis of teachers' development paths, especially those called "potential role models", reveals an important pattern. The basic strategy is to engage and build a strong community through project collaboration first, and then start collaborating through projects with other communities. This finding has two important implications. On the one hand, teachers might be interested in tools that allow them to monitor their current stage within the network and to better learn from other teachers. On the other hand, such tools could help teachers in building their local community and define their strategy by suggesting projects and contacts, and therefore also contribute to enhanced professional development.

In addition, beside subjective factors such as languages, subject, country and institution, the quality of a project depends greatly on the previous collaboration between the members of the projects. SNA methods applied to the member networks of projects give us an insight into the strategy of forming the membership. The most significant finding is that diversity in the membership of a project has a great impact on its quality. Projects that are able to bring together members from different communities have a big advantage regarding the diversity of information sources and ideas and the trust relationship in each community. This finding again confirms the role of gatekeepers – one form of social capital in eTwinning.



The caveat to the studies presented in this section is the simplified use of interactions that these models can build upon. It is important to keep in mind that teachers maintain a multiplicity of roles and relations through various online and offline means which are not reflected in these models. However, these findings give a clear indication for the need for further studies in the area of teacher networks and SNA.





# DESIGNING PEER-SUPPORT STRATEGIES FOR BLENDED TEACHER NETWORKS

The eTwinning network is a blended network: its activities are both online and face-to-face in a real physical setting. This means that eTwinners can participate and communicate online, through the eTwinning platform, but also offline, through the many local, national and international professional development workshops, seminars and conferences. Similar phenomena are seen in other parts of everyday life too: the increasing use of ICT and social media in general has made them become intertwined with the everyday life. They are no longer seen as a separate realm but as one that **merges and overlaps with our daily activities** (Haythornthwaite & Kendall, 2010). From the individual's point of view, offline and online networks and interactions are used complementarily and with a particular purpose (Subrahmanyam et al., 2008; Brandtzaeg, 2012; Reich et al. 2012).

For people within a network, such as eTwinning, this **intersection between online communication and the offline world** can present a rather mixed image. It is difficult to get a complete picture of the actual activity within the whole network for several reasons, which can be outlined as following:

- The online network, due to its virtual nature, is more data-rich and measurable. However, to understand the actual stage of the network and its success, it is necessary to consider the activity rate of the whole blended network.
- Offline events, i.e. face-to-face activities in a real physical setting, as part of a blended network, lack the measurability of online activities. This can result in a possibly skewed understanding of the network and how it functions.
- All the activities in a blended network that intertwine online and offline activities face the challenge of an “uncharted territory”. Current platform designs for teacher networks seldom take this new requirement into account.
- The advantages of having a blended network may also be diminished due to the lack of online participation of members who otherwise interact offline.

The Open University of the Netherlands, one of the partners in the Tellnet project, aimed to design complementary support mechanisms and services for a better and more targeted lifelong professional



development within a teacher network such as eTwinning. The main research problem was **to understand the hurdles and drivers in participating in such networks**, and what kind of support mechanisms and services would be needed to enhance community formation among all the participants in order to invigorate the overall network structure.

In Chapter 3, it was shown that teachers who had signed-up on the eTwinning platform had varying levels of connections within the network structures that were studied. Whereas 75% of eTwinners are connected to one another through undirected contacts in the Contact network, 26% had connections through the Project network. Secondly, it became clear that the eTwinning core group (i.e. the giant component in the Project network) creates a very



strong base for eTwinning. However, getting connected to the existing networks is not straightforward and we can observe a large number of eTwinners who do not yet take part of any of the networks. Therefore, an increase in connections among the teachers within the online networks would allow for more cooperation and collaboration options, and more individual learning possibilities. This

chapter gives an overview of the research conducted by OUNL. A number of studies and interventions were designed to encourage teachers to connect and interact more online and also to bridge the gap between the online and offline realms. Details of the studies are found in the final report called *Social capital and peer support in learning networks* (D3.2), see References.

## 1 CONNECTING eTWINNERS ONLINE

The first intervention starts from the concept of Ad Hoc Transient Groups (AHTG). These can be defined as **private online groups of a temporary nature that exist to solve a single question or problem**. In our intervention within eTwinners, such tools were implemented as a Question & Answer (Q&A) system. A typical example of a Q&A system is *Yahoo! Answers*. The difference between regular Forum-tools and Q&A systems is that the latter are more geared towards quick question and answer sessions.

In the group that we studied (AHTG group), the participating eTwinners who have a question are helped by another eTwinner in a dedicated private space (*ad hoc*) and for a limited amount of time only (transience), as depicted in Figure 4. The nature of the question depends on the participant's needs as well as the network. Requests may be questions about factual knowledge or best practices. But requests might also be related to an actual issue, for example a

school collaboration project, or just to reaching out to others purely from a socialisation point of view. In our experiment, the AHTG group was piloted and tested against the performance of a regular Forum tool and a No-Intervention group.

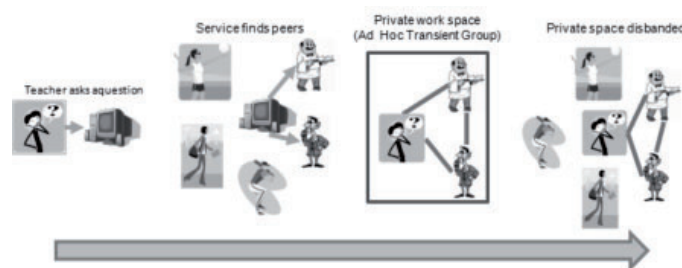


Figure 4 – Ad Hoc Transient Groups

This experiment showed that the AHTG group using the Q&A system had an increase in the number of strong relationships. More importantly, these new connections spread out in a decentralised way, showing a clear promise that a tool based on the AHTG approach has the potential to involve new eTwinners in activities. Additionally, we asked the participating eTwinners about their sense of connectedness (SOC), i.e. how well someone feels connected to others and how the person feels about being part of a community (Rovai, 2002). Before the experiment, a test was administered where the majority of the respondents reported an average sense of connectedness of 6.65 on a 9-point scale. According to Rovai's definition, this means that they "feel connected to others" and they "feel they are part of a community". Interestingly, SOC is positively correlated with the number of projects in which responding

eTwinners were involved, also indicating that they were already part of the Project network. Regarding this part of the study, the final results were less clear: SOC decreased in all groups, indicating some other factor at work. Finally, the results clearly showed a strong increase in mutual support when using tools based on the AHTG approach, as compared with using a Forum. Of special note was that more individual participants got involved.

Taken together, the results of the experiment on peer-support mechanisms for connecting eTwinners online mean that eTwinning has a large stable core group of users who feel they are part of eTwinning and have many mutual supportive interactions. However, outside of this core group, eTwinners are likely not to share these characteristics yet.

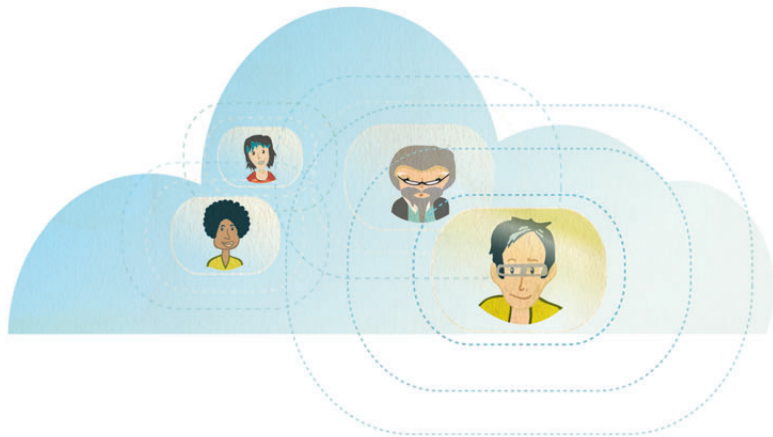
## 2

# INTERSECTION BETWEEN THE ONLINE AND THE OFFLINE WORLD

To better understand the intersection between online interactions and offline ones, we first turned to investigating what are the qualitative drivers of teachers' engagement in teacher networks and what is the pull of face-to-face networking activities. The aim was to understand what value the network members experience from their participation in the network activities, beyond the obvious reasons such as

meeting new people and forging new connections. Secondly, by better understanding these connections, our aim was to create tools to support the link between eTwinners' activities online and offline.

Through the analysis of interviews with members of a teacher network, we learned that members of a network value the complex connection



between five factors constituting their professional environment. They experience and understand their interactions with other participants at the conference through these factors, which are derived from Conklin's description of the social complexity in the treatment of wicked problems (Conklin, 2006). They are the following:

- **Domain:** including job-related domain, activity-related domain, other
- **Context:** including personal context, participants context, situational context, other
- **Network:** including new contacts, existing contacts, other
- **Goals:** including personal goals, common goals, vision, other and
- **Strategy:** including personal strategy, strategy of activity, other strategy

These five factors play a role in each interaction that occurs between participants in a network. Each individual member has their own goals, strategy, context and network, and has their own domain interests. Additionally, this individual's complex space within a network in general (and at the conference in particular) creates a situation in which the participants engage actively in sense-making. This is giving meaning, individually and collaboratively, to the things they see and hear. In other words, for an individual participant, it is this combination of being part of a complex space, together with their own active sense-making, that creates value in their participation in the network.

We designed an intervention starting from the concept of **combining offline interactions between eTwinners in a physical space with an online activity**, with the aim to naturally stimulate a further activity online. As the eTwinning network is a blended network, it is useful to strengthen the links between online and offline networking through targeted technology that stimulates these connections. This concept was implemented through the design of a mobile application that allowed teachers to assign self-chosen tags to their conversations with other eTwinners. These tags were the starting point for an online reflection exercise, in which tags could be grouped together and then elaborated on. It is expected that this scaffolded activity would encourage the teachers to actively construct knowledge across conversations and to continue their networking activity online. A proof-of-concept of this approach was tested with a paper-based activity in a workshop at the annual eTwinning conference in Berlin in 2012.

The results of the paper-based proof-of-concept showed that the use of the tool encouraged active knowledge creation with the linking of concepts extracted from different conversations. The workshop also showed the necessity for an online version of the tool, as the

workshop participants wanted to see and work with the tags created by the others. In its current design, such a mobile tool will prompt bursts of online reflection, interspersed with offline interactions and active individual and collaborative sense-making in the online space.



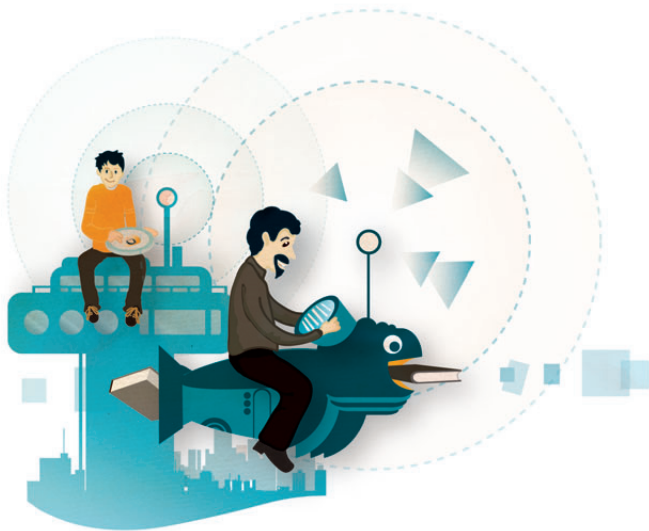
## SUMMARY

With the experience gained from the studies and interventions done during the Tellnet project, we can formulate the following recommendations for teacher networks. They are all based on the argument that getting teachers connected should be the primary focus for teacher networks. The initial interaction would allow for more cooperation and collaboration possibilities, and therefore also for more individual learning possibilities.

- The strength of the online platforms of teacher networks lies in the fact that they are data-rich when members are active, they bridge space and time, and they create a shared space where all members of the network can meet. Due to the high cost of resources, face-to-face events in a physical setting can hardly be envisaged for all members of the network.
- Networks in general are becoming more and more blended networks, something that we are also seeing within eTwinning. This represents a new design challenge for teacher networks. Designing

tools for this intersecting area of online and offline should come more into the focus of design priorities for teacher networks.

- The strength of offline activities in a physical setting should be used to encourage and support online activity. For example, every offline face-to-face event could use a blended working format, which creates immediate activity by the participants on the eTwinning platform. This could encourage new eTwinners to get familiar with the platform, and to see it as a natural extension of their face-to-face networking.
- Specific tools should be designed to accommodate the intersecting area of online and offline, e.g. mobile applications and tools might be suitable for such purposes. In an offline setting, online agency can be triggered through reflection activities that create immediate value (e.g., through knowledge creation). It is important to incorporate online ways of working in face-to-face activities (e.g. the use of tags for sense-making).



- The technology and data-rich environment of the online platform should better target scaffolding users with finding other members, partnerships and tools to encourage relevant interactions.
  - A matching system for eTwinners could be designed to find more relevant partnerships based on proactive recommendations. With the number of users, finding someone through a search engine can become cumbersome.
  - Connecting newcomers to existing networks (e.g. Contact and Project networks) is important in order to enable a better and more targeted information flow and to further support through

peer-activities. Providing new eTwinners with relevant project partners and/or mentors with whom to start interacting is an important first step.

- Online platforms can become too cluttered with many tools and functionalities. The purpose of the tools on the online platform needs to be clear for members of the network. Often, a multitude of tools on the platform contributes to the complexity of the platform, thereby making it harder for newcomers to become active in the network.
  - One strategy that teacher networks could use is to limit the number of tools on the online platform, and make a clear distinction between the purposes of the different tools used.
  - For example, on the eTwinning platform, a clear divide can be made between a forum (meant for discussion and deeper topics, mainly experienced eTwinners) and the Q&A tool. The Q&A tool should be fast and easy to use and would preferably use a type of matching.
  - Another strategy that teacher networks could use on their online platforms is to scaffold the use of tools. For example, a new user or a user with limited activity only has access to a limited number of tools. The more active a user becomes, the more access she receives to different tools.





# FINAL REMARKS AND OUTLOOK TO THE FUTURE

The Teacher Lifelong Learning Network project had an unprecedented opportunity to study a living teacher network called eTwinning for a period of three years. Since the project was first envisaged in 2009, more than 100,000 teachers in Europe have signed-up on the platform, and now, at the end of the Tellnet project in 2012, there are close to 180,000 eTwinners on the platform. In this chapter, we first discuss the value of the project in general terms and outline its main results. Then, we present a number of policy recommendations for more effective teacher networks based on the work presented in this book.



# SUMMARY OF THE PROJECT'S VALUE AND OUTCOMES

In short, our aim in the project was two-fold: on the one hand, we wanted to understand the processes related to identifying the main networks, hubs and communities of practices that are effective in sharing practices, encouraging innovation and creativity at schools. On the other hand, we wanted to understand the drivers and challenges for teachers to be part of these networks to enable the provision of better support and services. We believe that this will result in more needs-focused lifelong opportunities for teachers.

## The value of the Teachers Lifelong Learning Network project

Schlager et al. (2009) stressed the need for **a new set of tools and methods to deepen our understanding of online teacher networks**. The authors outline a long-term research agenda emphasising the urgency of finding “reliable evidence of how, when and why online social networks do, and do not, advance learning”. The Tellnet project has contributed to this body of scientific knowledge, but also helped practitioners and policy-makers in the field of education and training in general.

The project applied Social Network Analysis (SNA) methods, which views social relationships in terms of network theory as consisting of nodes and ties, also called edges or connections. The structure

of ties defines the importance of the network for individuals within it, as they can obtain information, expertise and resources from the other members of the network (social capital). Previous studies using SNA methods on education communities have been conducted both online and in a physical setting, showing the value of such methods in supporting and promoting school change (e.g. McDonald et al., 2005; Daly, 2010) and for a better understanding of how innovation is diffused within communities of educators (e.g. Penuel & Riel, 2007; Penuel et al., 2006).



First, we can say that the Tellnet project has gone **a step further both in methods and techniques but also in scope**. Few of the previous studies in the field have had such unprecedented longitudinal data available on teacher networks. The closest studies have been conducted on the TappedIn community that was started in 1997 and has more than 150,000 education professionals. Schlager et al. (2009) present a study on TappedIn, which sampled data from a period of five months on a subset of users (about 4,300). Therefore, it is worth mentioning that technique-wise, **the Tellnet partners have been able to apply the methods to the data on all the eTwinners, not only a subset of them**. They have also applied long-term time-series analysis on data over a period of five years, which starts to reveal patterns that are more likely to represent real-life conditions of teacher participation in teacher networks. This argument takes into account that teachers' professional development goals span throughout their teaching career.

Secondly, the combination of massive data and the use of SNA do not take us that far, if it is not fed back to make the network function even better. **Here the collaboration with the eTwinning Central Support Service has been indispensable**. Interventions and strategic thinking have taken place at all levels from decision making (e.g. Steering Committee, Management group, the National Support Service) to technical implementations and teacher workshops. In the world of business such investigations are more common. One well known example is Facebook's Data Science Team, a kind of Bell Labs for the social networking era. But still in our days, they are few and far between in the field of education.

Finally, **real advances have been made in understanding how to interpret the SNA results in this new context of teacher networks**. Tellnet's strength here has been the multidisciplinary consortium comprised of scientists from the domains of computer science, educational science and professional development, but also designers of new technological tools and practitioners who actually host and maintain a vibrant teacher network. The challenge of applying existing methods in a new environment is in how to interpret the results: what do certain network properties really mean for the field of education and training? What do they mean for advancing computational methods and techniques? What about those who host teacher networks? And what is the value for users and the wider group of stakeholders, such as learners, schools and policy-makers? The Tellnet consortium hopes that after having read this book, you also feel that we are one tiny step closer to answering these questions than when the project started in 2009.

### **Summarising results: Identifying the main networks, hubs and communities of practices**

Related to the challenge of identifying the various network structures within eTwinning, digital traces from the platform were captured from the beginning in 2005. They were turned into usable data for the studies presented in Chapters 3 and 4. The data represent simplified models of networks based on elementary forms of interactions harvested from the platform. The interactions are cre-

ated by eTwinners using various social networking and professional collaboration tools on the eTwinning platform.

**The interactions create network structures among users and they change over time as people keep interacting.** These network structures function as conduits, for example, for sharing practices. We acknowledge that they are simplified, especially when compared with the multiplicity of relations that exist in blended teacher networks that combine both online and offline realms. Nevertheless, they represent **the first steps towards capturing such analytical large-scale data from users**. Another important outcome is that, so far, we have successfully identified which **interactions and relations can actually be meaningful in answering various research questions**. The combination of both large-scale data-crunching and more qualitative knowledge of the teacher network in question leads to the following interesting results.

First, the results show **that existing methods from SNA and the field of social capital can be applied to a teacher network** such as eTwinning. We identified four separate sub-networks. Two networks are for social networking purposes, whereas the others are based on project collaboration. Together, they constitute the main eTwinning network. The results are interesting: time-series analysis from over six years shows that the development of the eTwinning network follows a network development model similar to other communities. In the heart of the Project network, for example, there is **a giant component which connects more 30000 eTwinners** in the same network through professional collaboration activities

in school projects. In general, our results show that the eTwinning network proves still to be a young network and has great potential for further development.

Secondly, we also established that SNA methods are able to evaluate social capital and various roles in eTwinning through calculation of node and network properties over a period of time. This can potentially help the transfer of good practices and innovation within networks. For example, we identified that in Project and Contact networks there are teachers who are positioned at the interface of different communities, meaning that their network structure represents that of *gatekeepers*. **Gatekeepers are in a position to benefit from the diversity of information and knowledge sources from different communities**. This diversity gives them more options in finding out about interesting projects, partners and novel ideas, in other words, they have more power over information flow between communities in eTwinning. Those eTwinners are in potential positions in the network, for example, to spread positive and innovative pedagogical practices to other eTwinners. Overall, we have shown that SNA tools can help promote and maintain an effective eTwinning network for better professional development purposes.

## **Summarising results: Drivers and challenges for teacher participation**

When it comes to understanding the drivers and challenges for teachers to be part of teacher networks, the project used various methods. In Chapter 4, the existing data was used in conjunction





with intervention studies including individuals (as opposed to only using data in Chapter 3). Additionally, Chapter 2 presents outcomes of studies using future foresight methods including trends analysis, expert workshops and future scenarios as tools to derive policy recommendations for decision-makers in the field of education and training. Therefore, combining the results from the above-mentioned studies, we find that **drivers and challenges for participating in teacher networks can be found at various levels**. They include those on a personal and professional level as well as those related to the platform and to a wider context such as conditions in school and other policy-level factors.

From a network point of view, getting connected to a network and building ties with other participants is important in order to invigorate the overall network structure. We identified, however, that not all the

members participate in several activities and thus also in creating network structures at the same level. This is identified as one of the major challenges. Consequently, **designing new types of peer-support mechanisms and services to enhance community formation among all the participants of the online environment can play an important role**. One of the outcomes in this regard is a peer-support service called a Question&Answer tool. The tool is based on the Ad Hoc Transient Groups (AHTG) approach. After the intervention where the AHTG tool was compared with other groups, we have positive results in connecting new eTwinners to one another and in involving new eTwinners in activities in a decentralised way. This is a very positive outlook in terms of eliminating hurdles to participation in online environments for teacher networks.

Another design challenge for teacher networks is the **blended environment** in which teachers cooperate and collaborate. Chapter 4 also focused on the current phenomenon: the separation between online and offline realms becomes less clear. This is seen especially in networks like eTwinning where many offline events are organised at the local, national and European level. If teacher networks are studied only by taking into account the data from an online platform, the real significance and function of a blended network is hard to capture. Offering **tools that link between the online and offline realms** becomes important, as it allows better use of this “new frontier” by triggering an online agency through activities in a physical online environment. One of the design challenges looked into this by encouraging active knowledge creation through linking of concepts extracted from offline conversations in a physical space

(e.g. a conference). The prototype design of a mobile tool prompts bursts of online reflection engaging the participants actively in sense-making that can help them cope with the emerging space, intersecting offline and online spaces.

Lastly, regarding drivers and challenges for participation in teacher networks, the topic has been explored through the **future scenario planning exercise**. Whereas our previous studies concentrated on the eTwinning platform and the data extracted from it, this part took a more holistic view including teachers in their school environment with all involved stakeholders such as students, school heads, parents, policy-makers and even researchers. The trend analysis looked into key elements for the future of education and of the teaching profession. They are related to the changing role of teachers and teacher training, the role of schools, the need

for re-skilling within the context of 21st century skills, the role of formal and informal learning, technological innovation and the rapid development of new technologies, and the increasing importance of personal data protection and privacy issues.

Some of these key issues have been further developed into five scenarios taking place in 2025. The scenarios are aimed at discussing different possible futures for the teaching profession in compulsory education in 2025. They all emphasise the changing role of teachers and take into account various development paths for teacher networks. The goal is to challenge assumptions and stimulate thinking, but also to offer recommendations regarding current and future practices, which are elaborated in the following part.

## 2

# POLICY RECOMMENDATIONS FOR MORE EFFECTIVE TEACHER NETWORKS

This section presents a number of policy recommendations for more effective teacher networks based on the work being undertaken by the Tellnet project and summarised in this booklet. It starts with

general recommendations for policy-makers and educational decision-makers at all levels and then shifts towards the European level and to Member States, regional and local level.

## General (all levels)

Changing skill needs and new ways of learning require educational authorities, schools and teachers to revise teaching and learning approaches. Policy should support practitioners as change agents for educational transformation needed for a digital world:

- **Raise awareness** that **education and learning are changing in a digital society** and that, with these and many other changes, the role of teachers is shifting, which has implications for the teaching profession and for teacher education (Initial Teacher Training, ITT, as well as Continuous Professional Development, CPD).
- **Recognise the key role of teachers, amongst other stakeholders**, in guiding and implementing educational transformation. Teachers need support to enable change but all actors (e.g. Ministries, headmasters, parents, students, industry) need to take up their responsibility towards educational transformation.
- As a result, continue **investing significantly in updating Initial Teacher Training** (including candidate admission process) and CPD programmes, including the education of teacher educators, to ensure that both teachers and learners acquire the competences (21st century skills) that are required in a digital, networked society.

- Additionally, **support research** and evidence gathering on the changing role of teachers and develop mechanisms for bringing research and practice closer together, in a continuous exchange and mutual learning process. The issues raised in this section are some of the topics that research could concentrate on.

**Teacher networks can play an important role in enabling teachers to drive, support and implement the needed modernisation of school education. A number of challenges need to be addressed to improve the effectiveness of teacher networks:**

- **Clarify and recognise the multifaceted nature and value of teacher networks.** The aim of teacher networks is to contribute to both the quality of the teaching profession and the learning experience of students, by encouraging collaboration and knowledge exchange. Teacher networks can exist on many levels, e.g. within a school and across schools at the regional, national and international levels. These networks increasingly combine the physical and digital worlds. Blended experiences are more common for learners and teachers than “online-only experiences”.
- **Encourage research and data collection** on the ways in which teacher networks foster continuous professional development and innovative practices.
  - There is some evidence that teacher networks can enhance the quality of teaching by enabling teachers to expand their capacity in a wide range of dimensions. These

include subject matter knowledge, general pedagogy and pedagogical content knowledge, curriculum and educational context knowledge, knowledge about learners' characteristics, about educational aims, purposes, values and their philosophical and historical influences.

- However, there is a need for more solid and systematic empirical evidence on when, how and under what conditions teacher networks have impact on these dimensions. Such analysis – taking into account the multifaceted nature and value of teacher networks – would allow policy-makers to better understand how effective and innovative practices become successful and could be further disseminated and mainstreamed across the teacher population. Such analysis would also be useful to design teacher support strategies that adequately and appropriately fit in with current ways of working and CPD practice, in order to maximise the effect of such support.
- Based on these research findings, **develop recommendations and provide guidance** which enable teacher networks to better seize the benefits of collaboration for their professional development and the quality of school education as a whole.
- **Promote open access and standards**, free and open software solutions, data portability, as well as use of Open Educational Resources (OER). In order to reap the full benefits of networking and sharing applications for innovation in Education and Training

(E&T) systems, experts believe that policies should ensure that the technological solutions adopted in teacher networks follow open strategies and open teaching practices which encourage collaboration and learning.

- Encourage the development of **technological solutions** which improve the effectiveness and quality of teacher networks. These solutions should, in particular, ensure that the network members are in control of their personal data.
- **Develop evidence-based research** and support policies **on the structure of teacher networks** to increase effectiveness and quality, taking into account the following findings of the Tellnet study:
  - Scenarios 1 (eNET) and 2 (MyNetwork) show that it matters how teacher networks are structured. A centralised network structure such as eTwinning with controlled access requirements might offer a secure, private and safe environment for learning but could be less flexible, open and interoperable with other networks and spheres of life. Decentralised, liberalised networks on the other hand (E.g. Twitter, Facebook) allow for greater variety and choice but might be less clear in terms of purpose, privacy and security. Looking for a balance between flexibility and security might be the most apt model for collaboration.

- Support the development and use of **Social Network Analysis** and **network visualisation** applications enabling teachers and other users to better understand their role and position in the network (see Chapter 3). This could lead to identifying change agents in the network. Teachers and other users should also be provided with sufficient support to interpret and apply the results of these social network analyses and visualisations to their personal situation in order to make real changes to their networking activities.
- eTwinning should explore how the platform, or certain layers of it, can be made **interoperable** with other networks, which would allow users to export and import personal information from other networks and share specific information across different networks, without affecting the existing community elements based on trust and peer confidence.
- The issue of commercial and **private interest** in learning networks and applications should be further examined.
- In general, teachers need support to learn continuously in order to stay **up-to-date** on changing requirements from society and economy.
  - ITT and CPD should take into account the growing importance attached to **transversal skills** such as innovation and creativity, entrepreneurship, learning-to-learn, informal learning outside the school context, adaptability to change, etc. This also includes so-called anytime, anywhere and anyhow learning.
  - The **use of digital media, platforms and ICT devices** should be fully integrated into the learning objectives, methods and teaching practices of ITT and CPD.
  - Teachers require competences in accessing and using Open Education Resources (OER) adequately and effectively. **Learning materials** were previously only accessible from one single physical place for those present in that place at a dedicated point in time. Now, many learning materials are accessible anywhere and anytime, by different learners in different places.
  - Teachers could benefit from competences in methods such as “**learning analytics**” which allow them to continuously monitor and personalise learning processes and to allow learners to better stay in control of their own learning.

## Revising teacher education and Continuous Professional Development

- Both **Initial Teacher Training programmes (ITT) and CPD activities need to be revised** in order to respond to changing skills needs in society and the opportunities offered by new ways of learning. The following changes need to be taken into account:



- Include the practice of **participation in professional networks** and communities of practice, both physical ones and online as part of ITT and CPD. Teachers should be introduced to a range of relevant cross-border, internal and multi-cultural networks, such as eTwinning, as well as other subject-specific online communities and special interest groups.

## EU level

- Use the **Open Method of Coordination**. Responsibility for education and skills lies with the Member States (MS) but the EU has an important role to play within the Open Method of Coordination in identifying common challenges and opportunities, supporting peer learning among the MS to identify and exchange the key factors in effective policies and practices.
- **Support MS in revising Teacher Education policies and provision so that teachers acquire the necessary digital competences.** This should take account existing guidelines such as those already published by UNESCO.
- Increase **support to European networks** and platforms such as eTwinning which are already working across borders and encourage MS to recognise teacher participation in such networks as part of CPD. In this respect, EU and MS policy should also develop long-term sustainability strategies for teachers' networks in Europe.

- Support a more widespread **use of ICT for teacher collaboration** in Europe. The current reach of teachers' networks is limited to innovators and early adopters. Given the positive impact of social learning networks, the wider take-up of such networks is a desirable goal, which should be actively pursued, in particular by:

- Creating organisational “scaffolds” to drive take-up of teacher networks (e.g. teacher education, expert advice, technical support, visualisations of where teachers are in the network, a translation application, etc.). This should include sharing of good practices amongst teachers, learning from peers.
- Fostering quality control mechanisms (e.g. reputation-based) to enhance the value of being part of the network.
- Facilitating the sharing and re-use of OER for open teaching practices and promoting the use of open licences such as Creative Commons.

## Member States, regional and local level

- **Support and motivate teachers** to disseminate educational practices that use ICT towards a wider range of stakeholders (students, parents, community, business, etc.).
- **Recognise, motivate and incentivise the participation of teachers in teacher collaboration networks.** This can be done at MS and school policy level, formally, in terms of curriculum

integration, career paths and as part of CPD, and also informally, in terms of support and recognition. The following insights should be borne in mind:

- eTwinning teachers consulted in this study emphasised that **formal recognition** (e.g. career paths, CPD opportunities, quality and other reputation mechanisms) for participating in teacher networks is very important. Participants felt that unless teachers using networks such as eTwinning are formally recognised for their work, their motivation might diminish in the long run, especially since teachers often do this kind of work outside working hours.
- Integrating the use of ICT and school collaboration with the current curriculum to enhance uptake.
- **Incentives** for teachers should include reducing teachers' workloads, e.g. avoiding over-loaded curricula which can prevent teachers from dedicating time to their own professional development.
- Teacher networks do not necessarily and should not solely rely on ICT. In addition, as Scenario 5 (Informal Learning Camps) illustrates, **alternative teacher education methods** based on collaboration and peer learning should be encouraged, as they can arise bottom-up, informal, face-to-face and entirely self-organised by teachers.

- Give the opportunity to all teachers to participate in teacher networks, both physical ones like school teams and online ones, and make sure no teacher is left behind involuntarily. However, **recognise the diversity of teacher involvement** and the variety of possible uses of teacher networks. Enforcing standardised, stereotypical uses of teacher collaboration networks should be avoided.
- **National and regional authorities** should support the development of national and transnational inter-linked portals to aggregate learning opportunities on a large scale (e.g. teachers' mobility, relevant online courses) and learning resources for teachers' professional development.
- **School leaders** should **encourage and support innovation** with and through ICT by facilitating teachers' participation in pilot initiatives and sharing their practices with peers. Active participation in and contribution to such networks should be acknowledged in fulfilment of ongoing professional development requirements. Moreover, school leaders play an important role in sustaining successful **pilots** and ensuring their up-scaling and **sustainability** in the long and medium term.





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## VARIOUS RESEARCH PAPERS RELATED TO eTWINNING AND TELLNET

<http://www.mendeley.com/groups/2372641/papers-on-etwinning-and-other-teacher-networks/>



## ANNEX

# EXERCISE WITH SCENARIOS: YOU DECIDE ABOUT YOUR FUTURE IN 2025

Here below an exercise for teachers and educational practitioners. Participants are encouraged to discuss the five scenarios in small groups and explore different ideas of how the teacher profession could be in the future. The aim is to make the participants to think of themselves as an actor in their own future.



<b>Type of activity:</b>	teachers' professional development
<b>Tools and method:</b>	group work, common discussion
<b>Target audience:</b>	teachers and educational practitioners
<b>Level:</b>	intermediate/difficult
<b>Duration:</b>	2 hours
<b>Material:</b>	Make a print of the scenarios for each participant

## Other support material:

### Video on YouTube

[[http://www.youtube.com/watch?v=YNIRhoNirkl&feature=player\\_embedded](http://www.youtube.com/watch?v=YNIRhoNirkl&feature=player_embedded)]

### Presentation on Slideshare

[<http://www.slideshare.net/europeanschoolnet/teachers-profession-in-2025-workshop-12214485>]

**Outcomes:** Each group of teachers is requested to summarise its own thinking and present it to the other groups. The final outcomes can be collected as PowerPoint presentations, bullet points, short text or just an oral presentation. After the presentation groups can debate among themselves and exchange their thoughts, especially considering which scenarios have been most criticised or appreciated.

**Tips:** Each group is encouraged to choose one scenario and decide whether it is likely to take place or not. Teachers can list advantages, disadvantages, compare the scenario with the current situation, refer to their own experiences and make suggestions for the scenario to be more likely to happen or desirable.

## Objectives:

1. Understanding current situation of teachers' work and professional development
2. Exploring what could happen
3. Debating what teachers would like to happen
4. Deciding what should happen in the near future

The final aim is to challenge assumptions and stimulate thinking about the possible evolutions of the present situation.

**Process:** The participating educational professionals will first get familiar with five scenarios after which a group exercise and discussion is planned. The full process is explained here below:

- 1. Assign one person as a chair to lead the discussion.** You can use the support material (video and slides) to present the idea of working with future scenarios.
- 2. Split the participants in groups. Each group has to be formed with 3 to 5 people.**
- 3. Choose scenarios for the group, either Group A or Group B.**
  - Group A has to work on Scenarios 1, 2, 3
  - Group B has to work on Scenarios 1, 4, 5
- 4. Start with individual work: first everyone reads alone. (15 min)**

Everyone has 3 scenarios to read. Read each of the scenarios and consider whether you think this scenario is realistic and is likely to happen by 2025? Answer the questions after each scenario on your own.

- 5. Group discussion: after reading the scenarios, each group starts a discussion (10 min)**

Discuss with your colleagues, do you see yourself as a teacher in any of these scenarios? Think of the aspects that you find desirable or not.

- 6. Within the group choose ONE SCENARIO. (20 min) The group can also choose to merge 2 or more scenarios into one.**

- a. Decide whether your group wants the scenario to take place in 2025 or not.
- b. Discuss what should happen now in order for the scenario to realise/ not to realise. Think of the following dimensions:
  - Teacher training (initial and PD),
  - Quality of teaching and learning;
  - Participation of different stakeholders;
  - Data management and privacy.

- 7. Each group summarises their thinking in 3 short statements to share them with the other groups.**

- 8. Feedback and common discussion session. All participants together (30 min)**

- How realistic are the scenarios? Take one scenario at the time. Start with Scenario 1. Ask everyone who thinks that it is realistic to raise his/her hand. Ask everyone who thinks it is likely to happen in 2025 to raise his/her hand. Then, ask the groups who chose Scenario 1 to present their statements. Allow time for others to comment and discuss.





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# TEACHER NETWORKS

## TODAY'S AND TOMORROW'S CHALLENGES AND OPPORTUNITIES FOR THE TEACHING PROFESSION

This book deals with the evolving role of the teaching profession and the role of teacher networks in response to changing skills needs in society. It argues that teachers can be one of the main change agents for reforms of education, provided that they are well supported and enabled to do so.

Recently, various teacher networks have emerged at the local and international scale, and questions around their role in supporting teachers, both in their Initial Teacher Training (ITT) and Continuous Professional Development (CPD), have been raised.

At the end of 2009, a project called **Teachers' Lifelong Learning Networks** ([www.tellnet.eun.org](http://www.tellnet.eun.org)), supported under the Lifelong Learning Programme, started a three-year long investigation to better understand the construct of teacher networks and how they can offer informal ways to support teachers' competence building and personal and professional development.

**Who should read this book?** This book presents a number of the final outcomes of the Tellnet-project and outlines the main challenges and opportunities for the development of teacher networks today and in the future. It is intended for policy and decision makers in education, and attempts to offer both reflective tools and means to build policies that support and enable teachers in the role of change agents in reforming education.

