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Citation for published version (APA):

Vuorikari, R., Berlanga, A., Cacia, R., Cao, Y., Fetter, S., Gilleran, A., Klamma, R., Punie, Y., Scimeca, S., & Sloep, P. (2011). *ICT-based School Collaboration, Teachers' Networks and their Opportunities for Teachers' Professional Development - a Case Study on eTwinning*.

Document status and date:

Published: 18/12/2011

Document Version:

Peer reviewed version

Document license:

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Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
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- The final published version features the final layout of the paper including the volume, issue and page numbers.

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ICT-based School Collaboration, Teachers' Networks and their Opportunities for Teachers' Professional Development - a Case Study on eTwinning

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Abstract. In this paper we first investigate how eTwinning and national and local teachers' professional development schemes interact. eTwinning is the community for schools in Europe that promotes teacher and school collaboration through the use of Information and Communication Technologies (ICT) under the European Union's Lifelong Learning Programme. The eTwinning Portal hosts more than 137,000 teachers who interact with each other on the European-scale. Second, using this authentic data, we discuss how novel research methods such as Social Network Analysis, information visualisation techniques and future scenario forecasting are used to study eTwinning in the Tellnet-project aiming to sustain and support dynamic teacher networks as a platform for formal and informal teachers' professional development in the future.

Keywords: school collaboration, information and communication technologies, teachers, professional development, social network analysis, information visualisation.

1 Introduction

In many ways, nowadays' teachers in schools can be considered caught with one foot in the future and another one in past [1]. On the one hand, developments of technologies, tools and the vast take-up of such applications imply that teachers need to keep abreast of technology developments in order to keep up with their students' knowledge of new technologies. On the other hand, most teachers still have to work in school environments where policies are outdated and curricula no longer cover the skills required for today's societies.

New opportunities brought about by networking tools are enabling teachers to network and collaborate with other teachers from anywhere, at any time. For example, [2] focuses on addressing professional development through the study of teachers' professional networks. Similarly, a survey conducted in the US found that teachers believe that collaborative professional development activities, such as networking with other teachers outside school, is more effective and helpful as professional development than traditional forms of training [3]. Recent studies have focused on eTwinning [4] as a possible professional development network for teachers [5, 6]. The eTwinning action is defined as the community for schools in Europe. It promotes teacher and school collaboration through the use of Information and Communication Technologies (ICT) allowing both formal and informal opportunities for professional development. For teachers who participate in the eTwinning action, it offers a high potential for up-skilling in areas of European key competences [7], e.g., communication in foreign languages, digital competence, and interpersonal, intercultural and social competences.

Therefore, it becomes interesting and important to gain deeper understanding on how such teachers' social networks actually support and foster teachers' professional development. Moreover, understanding how the dynamic and multidirectional flow of social influence within such networks could better be harnessed to engage a wider scale of practitioners. This would guarantee that new pedagogical practices and opportunities for professional development would not remain as isolated "islands of innovation" [8].

The main questions examined in this paper are two-fold. First, we focus on eTwinning and ask: What can eTwinning contribute to professional development, and what type of relationships can be found between eTwinning and teachers' professional development schemes at the local and national level? Second, we look into the social network aspect of eTwinning and explain how through Social Network Analysis (SNA), visualisation techniques and a number of other complimentary methods, it can be studied to better understand how to support in-service teachers in their changing role in teaching and learning, and how to encourage new forms of professional development.

For this paper, we adopt the following definition of teachers' professional development: "Professional development is defined as activities that develop an individual's skills, knowledge, expertise and other characteristics as a teacher. This definition recognises that development can be provided in many ways, ranging from the formal to the informal. It can be made available through external expertise in the form of courses, workshops or formal qualification programmes, through

collaboration between schools or teachers across schools or within the schools in which teachers work” [9, p.49]. Section 2 looks into eTwinning professional development opportunities, whereas Section 3 focuses on eTwinning as a social network giving some examples of the new study [10].

2 Multimodality of eTwinning Professional Development Opportunities

Since 2005, eTwinning has been one of the most successful actions of the school education programme (Comenius) under the European Union’s Lifelong Learning Programme. In autumn 2011, thirty-two countries in Europe participate in eTwinning and the eTwinning platform hosts more than 137,000 registered members.

As stated earlier, eTwinning is regarded as the community for schools in Europe. Teachers from all participating countries can register on the Portal and use the eTwinning online tools to find each other, meet virtually, exchange ideas and practice examples, team up in eTwinning Groups, learn together in Learning Events and engage in online-based projects. The eTwinning online tools are provided by the Central Support Service (CSS), the coordinating body of eTwinning run by European Schoolnet. Additionally, each country involved has a National Support Service (NSS) that represents and promotes the eTwinning action by providing training and support (face-to-face, by phone and online), organising meetings and national competitions, and running media and public relations campaigns.

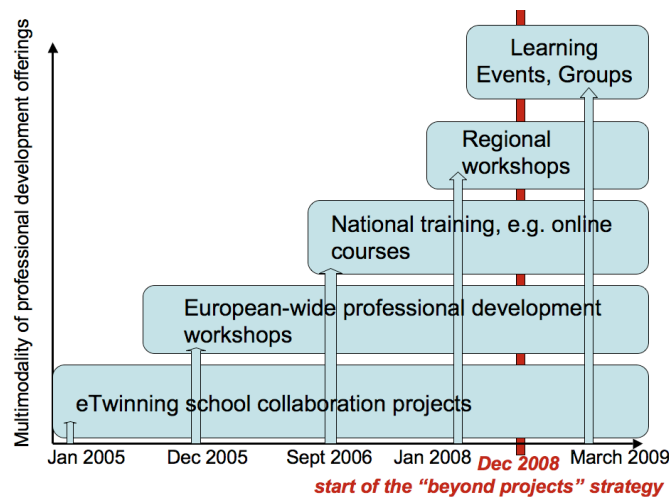


Figure 1. The development of eTwinning Professional Development offerings.

Since the beginning of eTwinning in 2005, creating an eTwinning project has been the main focus of the action. A minimum of two schools from at least two European

countries create a project and use ICT to carry out their work. As teachers and schools communicate and collaborate via the Internet, there are no grants or administrative conditions connected to the scheme and face-to-face meetings are not required. Such school collaboration is already a well-known concept and much practiced in many schools around the world. The novelty of eTwinning, however, is to offer an umbrella under which these widely scattered isolated practices are gathered under a solid framework, and thus allowing better opportunities for sharing practices and further networking.

Figure 1 depicts the evolution and multimodality of eTwinning professional training activities summarising the evolution of eTwinning and its opportunities for professional development. Since December 2005, European-wide Professional Development Workshops (PDW) have been offered to eTwinning teachers. They are aimed at individuals who want to learn more about eTwinning and develop their skills in European collaboration using ICT. Aims of these workshops also include tackling some of the key competences at the European level, e.g., communication in foreign languages, digital competence, and interpersonal, intercultural and social competences. The introduction of the eTwinning Groups on a pilot basis in late 2008 and online Learning Events in 2009 offered new opportunities in the area of professional development and brought together specific interest groups for networking and sharing purposes. This was part of a beyond school projects strategy with the aim of transforming eTwinning from a partnership tool to a virtual community for teachers in Europe [11].

Lastly, in 2006, some of the first national training session began taking place, mixing face-to-face with online methods. During the school year 2008-2009, all NSS were asked to report on their eTwinning professional training events and activities. It was estimated that more than 28,000 European teachers participated in these events in one way or another. They include all types of events, mostly face-to-face, ranging from half a day to three-day events such as PDWs, annual and national eTwinning conferences, eTwinning prize ceremonies, training workshops, lectures and presentations. This reflects that eTwinning is a blended network, a network which combines face-to-face interactions with online interactions taking place on the eTwinning platform and using ICT for communication and collaboration.

To study the relationship between eTwinning and professional development, the National Support Services were surveyed on synergies between the two schemes. Out of twenty-eight countries for which we were able to gather the information, in seven (7) countries eTwinning activities can be fully taken into account for formal professional development and in nine (9) countries, the situation was the opposite: there was no link between eTwinning and formal professional development. In eleven (11) countries, some synergies were found [6]. To summarise, we can conclude that in 58% of the twenty-eight eTwinning countries, eTwinning can be used at least to some extent to support the goals of professional development programmes.

A clearer picture can also be drawn of how eTwinning interacts with both *formal* and *informal* professional development opportunities. In this case, by *formal* professional development we mean that the needs and goals of a national and/or local professional development programme strongly interact with eTwinning. This results, for example, in an eTwinning online course that is offered to teachers as part of the other general professional development offerings. By *informal* professional

development we mean that teacher’s involvement in an eTwinning project, for example, is recognised to support the goals of a national and/or local professional development programme, and therefore teacher’s participation in such a project can count, in a way or another, towards *formal* recognition, e.g., career credits or advancement in the teacher’s career. These synergies are summarised in Table 1.

Table 1. Formal and informal recognition in eTwinning in synergies with formal and informal professional development in all participating countries.

	Formal professional development	Informal professional development
Formal recognition, e.g., career credits, fulfilment of professional duty	e.g., teachers who participate in an eTwinning online course provided by NSS get accredited career points.	e.g., teachers who participate in an eTwinning project get accredited career points.
Informal recognition e.g., peer recognition, intrinsic motivation	e.g., teachers’ participating in formal professional development programmes become voluntary eTwinning “mentors”.	e.g., peer recognition among colleagues resulting from a successful eTwinning project.

Apart from *formal* recognition, the value of *informal* recognition that teachers get from being part of eTwinning is also notable. This *informal* recognition manifests itself in different ways and is hard to measure. Most importantly, it seems that teachers participating in eTwinning activities can gain positive status within their own work environment (e.g., school), and also outside (e.g., parents’ interest in their project). *Informal* recognition can be personal self-fulfilment, for example, the satisfaction of learning new skills and perspectives through eTwinning. Moreover, it can be translated into behaviour in the work environment, e.g. a well developed and active professional development culture in the school makes it easy for a teacher to participate in eTwinning activities outside of the school. Lastly, intrinsic motivational factors such as “fun” to participate in eTwinning are notable and interplay with other issues such as recognition by colleagues and absence of bureaucracy in the process of participating.

Using the OECD definition of professional development as presented in the beginning, we can summarise that eTwinning can develop “individual’s skills, knowledge, expertise and other characteristics as a teacher”. Often teachers start an eTwinning project without thinking of it as a professional development activity, but in the course of the project they realise that they are gaining new skills and competences. Even if eTwinning is not a trigger for professional development, it is an added value. The challenge for the future is to find the means for eTwinning to become that trigger.

3. Getting to Scale - Growing Beyond Innovators

Since its inception, eTwinning statistics have been gathered on the eTwinning Portal using different methods such as user registration; the interaction of users with the different tools and website analytics to monitor visitors on the site [5]. The number of registered teachers, registered schools and participation in eTwinning projects has constituted the core statistics. Using such absolute figures it is easy to monitor how teachers engage in eTwinning projects; however, these figures give only a limited understanding of eTwinning's success and uptake within the entire teacher population of a given country.

Table 2. eTwinning reach = the registered users of a country / teacher population within this country.

Country	Teachers (OECD 2007)	Registered users on eTwinning in May 2010	eTwinning Reach	
			May 2010	May 2011
Austria	100,984	914	0.90%	1.06%
Belgium	189,930	1,382	0.70%	0.90%
Czech Republic	105,818	2,935	2.80%	3.73%
Estonia	17,423	1,320	7.60%	9.74%
Finland	68,442	1,472	2.20%	2.83%
France	707,609	9,298	1.30%	1.86%
Germany	835,980	4,606	0.60%	0.75%
Greece	148,627	3,225	2.20%	2.65%
Hungary	135,030	1,003	0.70%	1.01%
Iceland	6,218	274	4.40%	7.16%
Ireland	60,718	671	1.10%	1.43%
Italy	723,870	7,365	1.00%	1.36%
Luxembourg	6,973	103	1.50%	1.74%
Netherlands	245,876	1,684	0.70%	0.93%
Norway	89,480	1,042	1.20%	1.52%
Poland	521,037	9,895	1.90%	2.57%
Portugal	157,239	2,239	1.40%	1.90%
Slovakia	63,184	2,111	3.30%	4.46%
Slovenia	22,290	564	2.50%	3.70%
Spain	484,289	7,966	1.60%	2.23%
Sweden	140,326	1,992	1.40%	1.98%
Turkey	590,494	5,941	1.00%	3.62%
United Kingdom	788,575	8,549	1.10%	1.52%
Average:	-	-	1.90%	2.64%

As opposed to using the number of teachers who signed up on the eTwinning Portal as a point of reference, new perspectives can be gained by using the entire teacher population in a given country for this purpose (Table 2). This makes it

possible to see how eTwinning has been taken up in relation to the entire teacher population, giving more indication about the spread and success of the eTwinning action within the country. Therefore, we use *eTwinning reach* as a relative indicator of teachers who are knowledgeable about eTwinning in a given country, a manifestation of which is that they have signed up on the Portal.

The following method is used: *eTwinning reach* = the registered users of a country / teacher population within this country. eTwinning reach is rooted in the popular idea of Diffusion of Innovations [12], “a theory of how, why, and at what rate new ideas and technology spread through cultures.” To calculate eTwinning reach, the OECD data¹ from 2007 (OECD statistics of educational personnel) and the eTwinning data from May 2010 and May 2011 are used. Out of thirty-two eTwinning countries, OECD statistics can be found for twenty-three of them, which represent 86% of the entire eTwinning population, and covers the countries that have been part of eTwinning for about the same duration (i.e., not all participating countries joined eTwinning at the same moment). It should be noted that this leaves discrepancy in the accuracy of data; however, it serves as a good proxy for our purpose.

On the two right-hand columns of Table 2, the data for eTwinning reach are presented. On average, in May 2010, 1.9% of the teacher population in countries indicated in Table 1 had registered on the eTwinning Portal. In May 2011, the average had increased to 2.64% of the teachers’ population in Europe. In general, rather small countries show higher percentages: Estonia, Iceland, Slovakia, Slovenia and Finland, but also the Czech Republic have reached beyond 2.5% of their teacher population. Similar indicators can be calculated not only for teachers, but also for schools.

We can observe that on average, in May 2010, the eTwinning action concerns 2.64% of the potential teaching population within the participating countries. According to Rogers’ model of diffusion of innovation (1962), eTwinning in most countries still remains limited to teachers who are “innovators” in using ICT for cross-country school collaboration. Some countries have passed the 2.5% milestone of “innovators” (e.g., Estonia, Iceland, Slovakia, the Czech Republic, Greece, Slovakia, Slovenia, Finland and Turkey) and are currently targeting the segment of “early adopters” within their teacher population. Several of these countries have a relatively small population, although the Czech Republic has over 10 million and Turkey over 70 million inhabitants. If the premise is that teachers’ collaboration network such as eTwinning provide a suitable support for competence development [13], therefore, it is important to understand the dynamic and multidirectional flow of social influence within such networks.

3.1 Creating connections which did not exist before – between teachers in Europe

eTwinning is nowadays in a transitional phase, since 2008, its aim has broadened more towards the delivery and maintenance of a social network for teachers [4]. The eTwinning platform has also gone through major changes over the period and new social networking features have been added to the platform to allow new ways of interaction.

¹ <http://stats.oecd.org/>

The Lifelong Learning Project Tellnet [10] aims at exploring and supporting eTwinning as a lifelong learning system and studying it using novel tools such as network theory, Social Network Analysis (SNA) and scenario building to forecast alternative future visions. According to network theories, any social relationships can be seen consisting of nodes and connections [14]. In eTwinning, for example, an individual teacher or a school can be considered as a node and the various activities between them as connections. Information visualisation techniques, on the other hand, can be used to visually represent these connections. First studies using SNA and network visualisation of eTwinning were reported in [15] when the network consisted of 45,000 schools.

Table 3. eTwinning network clusters

Cluster size (N eTwinners)	N times identified
8807	1
3669	1
3175	1
1172	1
100-1000	9
10-100	136
2-9	2627
Total:	2776

Through these novel methods, the Tellnet project identifies the main networks, hubs and communities of practices that are effective in sharing practices, encouraging innovation and creativity at schools, and engaging new members. The eTwinning platform is used to extract data based on interactions between the participating teachers, currently more than 137,000 teachers in Europe, and various networks are detected where teachers are the nodes and the interaction among them create the ties: (1) Project Collaboration Network where the ties between nodes are eTwinning projects that eTwinners have collaborated on; (2) Contact-list Network where the ties between nodes are contacts that eTwinners have added to their contact-list for potential project partnerships; (3) Messaging Network where the ties between nodes are the messages that eTwinners have sent to each other using the internal messaging system on the platform. Moreover, different levels of intensity can be assigned to these relationships between participants.

First studies conducted on the eTwinning network aim at detecting and understanding its structure. In [16], the Project Collaboration Network was identified to consist of 2776 separate clusters (Table 3) that are formed through eTwinners' project collaboration. Four (4) gigantic clusters create the main core of the eTwinning Project Collaboration Network, the biggest cluster contains 8807 eTwinners, and there are a number of smaller clusters. The clustering formation shows that the biggest component is created by eTwinners who have collaborated with each other in a high number of projects over a long period of time. These partnerships create complex ties between participants. The modularity of the clustering was calculated based on density-based clustering algorithm by Newman [17], indicating the quality of the cluster; a fraction of any node's connections within its cluster (internal edges)

and its connections to other clusters [18]. Empirical observations indicate that a modularity greater than 0.3 corresponds to significant community structures. In our analysis, modularity of 0.4 was observed, corresponding to significant community structures.

Therefore, the first Tellnet studies show that whereas the eTwinning Project Collaboration Network is strongly dependent on a core group, it is nevertheless a large and well-interconnected group indicating some possibility of strong community of practitioners.

4. Conclusions and Future Work

In this paper we have focused on the potential of teachers' social network to support and sustain teachers' professional development using a case study of the eTwinning action. We discussed some novel research methods used to study eTwinning in the Tellnet-project such as SNA, information visualisation and future scenario forecasting, giving some first samples of that research.

The future research should focus on how such novel research could support both practitioners (e.g. teachers) and policy-makers to sustain and support dynamic collaboration networks as a platform for formal and informal teachers' professional development in the future.

Acknowledgements

The research for this paper has been partly funded with the support from the European Commission by the Lifelong Learning Project Tellnet, Teachers' Lifelong Learning Network. The views reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

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