Teachers' informal professional development on social media and social network sites: when and what do they discuss?

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Abstract: In recent years, a digitally extended context for teachers' professional learning has arisen. Digital gadgets (smart phones, etc.) alongside the development of social media and social network sites change how people interact and work together, and, hence, teachers initiate and orchestrate their own professional development on the Internet. In this paper we report on an on-going three-year study and show some of the prospects of conducting research on mathematics teachers' informal professional development on social media and social network sites, and, furthermore, discuss the need for theoretical and methodological development.

Keywords: Teachers' professional development, Social media, Facebook, digital.

INTRODUCTION

In communities where digital gadgets (e.g., smart phones, applets, laptops, etc.) are in common use, people change how they work, interact and communicate. The arena for professional development has accordingly transformed and branched out into the Internet. In the literature we now find studies examining social media and social network sites as a means for teachers' professional learning and knowledge-sharing (e.g., Al-Oqily, Alkhatib, Al-Khasawneh, & Alian, 2013; Bissessar, 2014; Borba & Llinares, 2012; Hew & Hara, 2007; Liljekvist, 2014; Manca & Ranieri, 2014; Pepin, Gueudet & Trouche, 2013; Rutherford, 2010; van Bommel & Liljekvist, 2015). The findings show that teachers use different forums on the Internet, such as, Twitter, Web sites, personal blogs, and Facebook, as resources to share and develop pedagogical subject-matter knowledge, to ask for and give pedagogical advice, etcetera. Thus, the arena for professional development of teachers has changed. Teachers not only engage in traditional forms of professional development activities, such as, taking courses, reading books, and participating in the local school colloquium. They also engage in new forms of professional development made possible by the evolution of the Internet. Online courses, web-seminars and other formal professional development are widely spread nationally as well as internationally.

Another trend is also evident: Teachers initiate and orchestrate their own professional development on the Internet. This phenomenon promotes reflection upon social

media and social network sites as a means for teachers to regain ownership of their professional development (cf., Issa & Kommers, 2013; Ranieri, Manca & Fini, 2012; van Bommel & Liljekvist, 2015). Further, Issa and Kommers (2013) discuss the shift in educational practice of professional development: from a transfer role into a developmental role. They raise the question of how teachers will reposition themselves into learning communities for mutual learning – a question closely linked to the Call for this ERME Topic conference: What are the characteristics of professional development contexts that have a positive impact on teachers' professional learning? With this paper we want to encourage the ERME Topic Conference ETC3 to discuss the digitally extended context of teachers' professional learning. We argue for the need to know more of what kind of impact social media and social network sites have on, for instance, mathematics teachers' knowledge-sharing, and their meaning-making in relation to improvement of instruction and assessment. Drawing on an on-going three-year study, we show some of the prospects of conducting research on mathematics teachers' informal professional development on social media and social network sites, and, furthermore, discuss the need for theoretical and methodological development.

BACKGROUND

Teachers share their professional life with other teachers, that is, their colleagues. But, the forums on social media and social network sites suddenly give another meaning to who a colleague is and when a conversation with such a colleague can take place: "the current evolution of social media and social network sites transforms the day-to-day practice, the lived experience, and with whom we share similar experience" (Liljekvist, van Bommel & Olin-Scheller, accepted)

Discussing school-related issues together with colleagues is, of course, not a new phenomenon, neither is the reading of subject-related magazines or books, nor taking courses for professional development. However, social media and social network sites give new opportunities for (mathematics) teachers, that is: new sources to draw upon (Ruthven, in press). Courses previously given on a certain day, in a certain place and time, can now be taken online, at your own pace and place. Further, reading to acquire new knowledge can now imply reading books, but also, for instance, reading other teachers' blogs.

Professional development can take place in different ways, forums and arenas. In order to understand these different forms of professional development, including both digital and non-digital alternatives, we argue that it is of importance to take the issue of ownership into consideration. In the case of so-called monologic professional development (book, lecture, etc.) the author, or lecturer has the ownership of the content and form of the professional development whereas in more dialogical forms of professional development (courses, collegial dialogues) the participating teachers gain ownership of content and form (Issa & Kommers, 2013).

Besides the issue of ownership, we need to consider the source itself. Teachers use different sources to customize their professional development, that is, books, (online) courses, blogs. Ruthven talks about re-sourcing and explains that re-sourcing teaching not only should be thought of in terms of 'using conventional resources in new ways' (Ruthven, in press), but also could include drawing on new sources. New resources can incorporate ownership by the author (for instance webinars), but can also mean that teachers gain ownership by creating their own homepage or blog, by giving input in sites for teaching resources (e.g. lektion.se) or by using social network sites like Twitter or Facebook.

 As mentioned previously, professional development on social media and social network sites has been studied. However, our point is that we know hardly anything about professional development initiated by teachers themselves, about the informal discussions between teachers. Drawing attention to this lack, the call for the ERME Topic Conference ETC3 states: "We need to better understand the underlying characteristics of mathematics teacher education and the professional development contexts that have a positive impact on teachers' professional learning, even with respect to sustainability". As the previous invisible collegial dialogues now become visible (van Bommel & Liljekvist, 2015; van Bommel, Liljekvist & Olin-Scheller, 2015), the study presented here aims to focus on the non-researched online informal professional development.

THE ON-GOING STUDY

At CERME9, three suggestions for possible foci for our study were discussed. Mapping the arena of professional development of teachers on Facebook, inquiry into the collective knowledge, and issues regarding extended workplace learning (van Bommel & Liljekvist, 2015). All foci where considered to be of interest. As a start of our study we have argued for that these type of Facebook groups can be looked upon as an arena for professional development (Liljekvist, van Bommel, Olin-Scheller, accepted). Teachers use new technology, changing the arena for professional development. However, in this paper we will consider 'mapping the arena', as it is the focus of our three-year research project at this initial point. Mapping the arena was decided upon, as it would give clear insights into the informal professional development within the groups on social media and social network sites: 1) When do teachers discuss with others? and, 2) What do teachers discuss and reflect upon within such groups? We want to emphasize that all groups are initiated by the teachers, not by us as researchers. The overall question suggested at CERME was: In what way can our study inform our research community regarding the (informal) professional development of mathematics teachers?

Setting

Our study is conducted within the social network site Facebook. Studying teachers' communication in [Swedish] Facebook groups is of interest for different reasons. Firstly, teachers create and join groups initiated by themselves. They thereby create

an informal form of professional development where they themselves have initiated and formed the content of the professional development (Bissessar, 2014; Liljekvist, 2014; van Bommel & Liljekvist, 2015) A second reason to focus on the informal professional development on Facebook is the number of participants. Groups can exist with 45 participants up to 30 000 participants. The size of the groups is growing, as well as the number of groups. In Sweden, with around 130 000 teachers in total, such Facebook groups constitute a substantial part of the teacher population and studying this phenomenon is therefore of interest, as the large number of active teachers indicates an enduring professional development on the social network site.

Conducting a study on social network sites requires special attention to ethical issues. It is a matter of maintaining public trust in researchers as well as the possibility to conduct research in online environments in the future. The study has been approved in the local ethics committee of Karlstad University.

When the studied groups on social network sites are large, it is more likely that the members look upon the communication as public, and, hence the topic discussed may not be delicate, as, for example, physical and psychological health and socio-economical personal issues (Ellison & boyd, 2013; Knobel, 2009; Little, 2002; Roberts, 2015). The members of the Facebook groups in the study have chosen a specific domain in which to engage and the theme in the group is not on delicate issues (cf., Roberts, 2015). In this study, therefore, ethical considerations must also be given to how the intervention (i.e., exploring the group activity) per se disturbs the communication pattern, the trust and the evolving norms, the participation pattern, and so on, in the group studied (Ellison & boyd, 2013; Knobel, 2009; van Bommel & Liljekvist, 2015).

Taking the ethical issues into consideration, we have adopted both qualitative and quantitative methods in this study and this is explained and set out in the next section.

When do teachers discuss?

In order to detect when teachers discuss with others on the social network site, a quantitative method was applied. All status-updates were registered during one year (2015). The time of day when teachers posted their status was noted, with a distinction made between working and non-working hours. Holidays, weekends etc. were included as far as possible.[1] Furthermore, boundaries for working hours and non-working hours had to be set. We decided that working hours were between 08.00 and 17.00.

Arguments for which groups to choose were guided by two principles: The Facebook groups had to be in mathematics or Swedish, representing the two largest subjects at school. Furthermore, the groups should be large, with more then 2 000 members. All status-updates during one year (2015) were registered for all selected groups. In this paper the focus will be on the Facebook groups in mathematics.

In order to answer the question when teachers discuss, three different timeframes are of importance: (i) global frame – on a yearly basis, (ii) local frame – on a weekly basis, and, (iii) micro frame – on a daily basis, related to working hours in working days. For the micro frame we have to keep in mind that it is not merely the time of day that is of interest. That is, a status posted at 10:17 am on a Saturday is treated differently in this analysis then a status posted on a Thursday at 10:17 am. Below we present some facts about the groups that are under analysis: in total nine groups, with each between 2000 and 11000 members. Accordingly, the number of statuses vary between the groups: between 82 and 3048 statuses.

(i)   Globally the posts are spread over the year with some peaks, clearly corresponding to the school calendar. There is a peak in the weeks before the summer holidays. A similar peak is visible in the two weeks before the Christmas holidays. Likewise, the activity is low during the Easter, summer and Christmas holidays. Before school starts, at the end of the holidays, the activity in the groups goes up again and remains relatively stable.

(ii)   Locally, we see that Mondays–Thursdays score the highest number of posts (around 70%, just over 17% per day). Fridays and Sundays score a bit lower (12% per day) and the lowest activity appears on Saturdays (around 7% of the posts).

(iii)   On a micro level the data show what time of day teachers post their statuses. Around 35% of the posts are made during working hours, and just over 65% of the posts are made outside working hours. The groups have an activity of around 20% during weekends and holidays.

The above gives us an insight in the activity patterns of the teachers in these Facebook groups. These activity patterns raise new questions, given the large amount of activity outside working hours – to what degree do teachers feel free to use Facebook as part of their work? How legitimate is Facebook considered to be as a tool for professional development? It also raised questions concerning the content: are there specific topics that are discussed at certain instances during a year? In the next section, we cite some of the content discussed in the studied Facebook groups.

What do teachers discuss and reflect upon?

As the ERME call states, numerous frameworks have been developed "aiming at achieving a better understanding characterizing and/or evaluating the content of teachers' knowledge". In this study we have chosen Shulman's PCK-framework (Shulman, 1987) in order to categorize the content of the posted statuses regarding the second research question – what do teachers discuss and reflect upon? Hence, it is a way of characterizing the content in the posted statuses and comments, not a way to measure teachers' actual knowledge. PCK was seen as a framework that made it possible to categorize posts in all groups – irrespective of the school subject in focus. So far, we have looked at mathematics and the subject Swedish language, but in case the study will be scaled up, it will be possible to use PCK also in other subjects.

Shulman (1987) described different categories of teacher knowledge, of which three categories have been most influential: Pedagogical Knowledge, Content Knowledge and Pedagogical Content Knowledge (cf. Ball, Thames & Phelps, 2008). For each of the categories of Shulman's framework, some examples[2] taken from our data are given to show in what way the framework is used to categorize the content of the statuses. The statuses are analysed by the researchers and a comparison of the analysis is made to ensure intersubjectivity. During the coming months, a stratified sample will be taken from the groups and a categorization using all (under)categories of Shulman's framework will be made.[3]

Each specific Facebook group aims at a specific domain to engage in, and each of its members has actively chosen to become a member of that specific group. The groups of interest in this study are the groups with subject specific interests, and issues related to the subject (pedagogical content knowledge, and content knowledge) are therefore to be expected. The category pedagogical knowledge, however, addresses issues that are not related to any subject, but merely to teaching in general. Even though the groups in our study are subject-specific groups, pedagogical issues do come up. Status 1 below concerns teachers' preparation for upcoming national tests. What do teachers do to prepare for this non-routine teaching practice?

Status (1):   To all of you who will conduct the national tests. How do you prepare? Do you read the teacher's guide? What else?

The following status concerns the arrangement of the teaching of pupils with special needs. Just as in status 1, the experiences of others are asked for. A detailed description of the situation is given: 'we would like to get away from…', 'we would like to accomplish…' and a request concerning alternative teaching arrangements is posed.

Status (2):   We have had a discussion at school on how to organise the special needs support. We would like to avoid the phenomenon that some pupils get stuck once they start there. We would like to accomplish a more dynamic way of working where pupils get help for a limited period and then can go back to the regular classroom teaching. Does anyone know good models for organising such support?

Both status 1 and 2 are related to the *how* of teaching – and are classified as *pedagogical knowledge*. Some of the posted statuses do not address the how, but only address the what. Status 3 shows a post where a member wants to have help with a specific mathematical term and it purely concerns *content knowledge*.

Status (3):   I am familiar with a concept but don't know the Swedish name for it: 'interior angle'. How can I translate it into Swedish? I have looked on google, searched on the internet, tried google translate but cannot find anything suitable. Wikipedia is not useful either for a translation here.

Regarding the third category, pedagogical content knowledge, members post statuses asking for advice, for instance. The member in status 4 is asking for advice concerning technical tools appropriate for his/her pupils. A description of specific demands, as well as a description of the needs of the pupils are given. The teacher's qualified description indicates awareness of *pedagogical content knowledge*.

Status (4): I am looking for a calculator where all input appears and stays on the screen. Will use it with pupils with difficulties in mathematics. Can someone recommend a good model?

In the following status, the member also asks for advice, this time concerning the teaching of a mathematical topic (division). This status clearly belongs to the category *pedagogical content knowledge* as it concerns the teaching of a specific content.

Status (5): How do you introduce division in year 2?

It is interesting to note that the question in status 5 might seem to be a general question, but a closer look at the status reveals that the teacher is not asking for help regarding division in general, but only wants to know about the introduction of the topic. The teacher also specifies the age group (year 2). The comments on this post show a thread addressing different aspects. Comments 1 and 2 both relate to the mathematical content (multiplication and division), comment 1 through an example, and comment 2 through a more general description. Further, comment 2 gives advice on the *how*: laboratory work. Finally, comment 3 relates to pupils' difficulties when learning the topic: pupils can, but are not able to write it. All three responses are classified within the category *pedagogical content knowledge*.

Comment (1): Think first double and half; multiplied by 2 and divided by 2.

Comment (2): Show the relationship between multiplication and division. Laboratory work with blocks or other objects

Comment (3): Word problems, connect to math language. Pupils know, but are not able to write it, then demonstrate how multiplication and division are related. Most often challenging and a fun way of learning. Good luck!

Besides asking for help, members also share experiences and status 6 shows such a shared experience. The member starts with a clarification of the mathematical topic in focus and at what level it is treated (*pedagogical content knowledge*). Further, this member shows what was done in class and illustrates the results with a picture.

Status (6): Today I worked with definition, axiom, theorem and prove with my pupils who take course 1b at upper secondary school. To prove Pythagoras theorem with a 'puzzle' was an immense success and created understanding. (Followed by four illustrative pictures)

Statuses 1-6 above have been used to give an insight into the data and exemplify our categorization into the three categories described by Shulman. As stated before, the

results regarding the question on what teachers discuss and reflect upon are preliminary and will be adjusted in later versions of this paper. Furthermore, this part of the study will continue during 2016 and parts of 2017. In the next section, we raise some points for discussion, some processed, and some preliminary, and further study will show if these points are of relevance or not.

CONCLUSION

Social media and social network sites change the arena of professional development of teachers. This implies a changing role of teachers in learning communities (Issa & Kommers, 2013). Our study gives insights into the underlying characteristics of digital and informal professional development . The when and what of teachers' input in social media and social network sites have been exemplified in this paper in relation to Shulmans' framework (1987). We deceided to distiunguish between working hours and non-working hours and the activity patterns do raise a question: when do teachers have time to plan and reflect? The activity patterns within the groups indicate that teachers' professional development partly takes place outside working hours. Why? To what extend are teachers free to use this new arena? To what extend are social media included as part of a working day? We are aware of the fact that not all posts are to be looked upon as professional development, moreover posts differ in form, content and depth. As we have indicated, our study is on-going and we aim at deeper further insights later on, in terms of insights into the *quality* of the teachers' status and comments in the Facebook groups. Such quality for instance can be measured by looking at the coherence within a post (statuses and comments together). But maybe of greater importance are insights into the *impact* of Facebook groups and other professional development on social media and social network sites. Furthermore, it will be possible to look at the impact of formal professional development initiated by the state, through looking at the threads and topics addressed in the Facebook groups.

The quality of teachers' professional development has been the subject of other studies. The digitally extended context for teachers' formal and informal professional development, however, has not been taken into consideration and we want to invite the ERME Topic Conference ETC3 to discuss this extended context for teachers' professional learning through this paper. When digital gadgets are in common use, there is no longer a distinct border between teachers' interaction with their colleagues in their local school and their interaction with colleagues in social media and social network sites.

NOTES

1. School holidays sometimes vary between different regions and are therefore not always possible to account for.

2. In line with the conference theme, the examples given in this paper are taken from the Facebook groups related to the subject mathematics.

3. New results will follow during spring, meaning that an updated version of the results will be given in newer versions of the paper and during the conference

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