TOWARDS A MORE BALANCED VIEW ON PCK DEVELOPMENT THROUGH COLLABORATIVE PROCESSES?

Jens Jakob Ellebæk
University of Southern Denmark, Odense, Denmark

It is widely accepted, that developing teacher pedagogical content knowledge (PCK) is a complex and none linear act. This proposal presents primary science and technology (S&T) teachers’ perspective regarding their own PCK development, after participation in a long term professional development program with a prominent focus on collegial collaboration. PCK is often characterized as highly topic, person and situation specific, and at the same time most professional development programs have a notion of teacher professional development as mainly initiated through collaborative processes and the intended building of sustainable professional learning communities (PLC). On the other hand, when looking at teachers’ actions in their daily practice the research in the field of PCK seems to lack focus of the more distributed and situated forms of knowledge these actions are embedded in. The results from the present study provide insights into the development of PCK through collegial collaboration as perceived by the S&T teachers. Here PCK development for some teachers are perceived as mostly a social, dialectic/synergetic matter but for others as a highly individual, context specific and personal matter. As such, the results from the study indicate, that the expected outcomes through collaborative processes in PLC projects regarding the teachers own PCK development, need to be balanced.

Keywords: PCK, PLC, Teacher Professional Development

INTRODUCTION

There has been a growing international interest for school development through collaborative processes in the recent years (Hargreaves & Fullan, 2012). The concept professional learning community (PLC) is widely accepted as a main goal in this field of teacher professional development, and in Denmark, school and science teacher development through collaborative processes, has gathered interest as well (Nielsen, Pontoppidan, Sillasen, Morgensen, & Nielsen, 2013). The research in the field of science teacher knowledge and pedagogical content knowledge (PCK) is well established and documented in the literature (Van Driel, Berry, & Meirink, 2014). But only few international projects and no existing Danish project, bring these concepts together and study the outcome of PLC projects regarding the development of science teachers PCK (Ellebæk & Nielsen, 2016; Van Driel & Berry, 2012). At the same time, when looking at PCK in context of the teacher’s actions in practice, there also in the newly developed consensus model of PCK (Gess-Newsome, 2015) seems to be a missing focus on the distributed and situated forms of knowledge teachers’ actions are embedded in.

The present study investigates the correlation between collegial collaboration and primary S&T teacher’s PCK development. The aim is to reveal the effects of collegial collaboration on the development of S&T teachers PCK, as perceived by the teachers. This leads to the following research question:

*How do primary Science & Technology teachers characterize effects from collegial collaboration regarding their own PCK development?*

METHOD

A conceptual framework and a survey was developed mainly based on the consensus model of PCK and the existing Danish research in the field of PCK (Ellebæk & Nielsen, 2016). Survey sections with open questions and closed 5 point Likert rating scale questions were developed. A sample of S&T teachers was taken from the group of teachers who had been involved in the Danish teacher professional development project QUEST in the four-year period from 2012-2015 (Nielsen et al., 2013). 103 of these teachers could be found to be S&T teachers when the questionnaire through the internet based survey system SurveyXact was distributed and collected through 2016. When possible, the researcher visited teacher network meeting to announce the project and meet with/connect to the local science teacher representative at each participating...
school. The science teacher representative at each school collected and returned relevant e-mail addresses, and all school administrations was contacted to ensure school leadership sanction and maximal interest in participation. The resulting cohort of 103 (= n) S&T teachers received the survey by e-mail from spring to autumn 2016. 27 teachers did not answer, 6 fulfilled it partly and 70 teachers completed it, and that consequently gave a response rate at 68% (RR= 68%). The survey responses in this dataset was gathered and the open categories was analyzed using thematic analysis as described by Braun & Clarke (2006).

RESULTS

In the analysis of the two datasets presented in this proposal, three different sub-themes (Braun & Clarke, 2006) could be found in the first dataset, where the teachers report collegial collaboration as being positive related to improvement of their PCK. The sub-themes, a short description and a corresponding exemplary quote from the first dataset is presented in table 1.

Table 1. Sub-themes, description and exemplary quote. Collegial collaboration as positive related to improvement of PCK.

<table>
<thead>
<tr>
<th>Sub-theme:</th>
<th>Description:</th>
<th>Exemplary quote:</th>
</tr>
</thead>
<tbody>
<tr>
<td>New ideas</td>
<td>The teacher’s arsenal of teaching strategies in teaching certain topics enhanced through collegial collaboration, a process of sharing and collaborative inquiry is indicated</td>
<td>Hands on with other colleges material, which can be discussed in plenum, whereby the “pallet of opportunities” in the same subject area increases.</td>
</tr>
<tr>
<td>Teaching goal and educational ends</td>
<td>The teacher’s curricular knowledge and knowledge of educational goals/ends enhanced through collegial collaboration</td>
<td>Sparring/collaboration with colleagues before and after joint teaching sequences of relevant subjects on team meetings, where developing and establishing goals for certain subjects and school levels.</td>
</tr>
<tr>
<td>Practical/organizational frames</td>
<td>Improvement of the teaching related practical/organisational frames, materials, artefacts and possibilities</td>
<td>For example, by avoiding and diminishing wasted time, when we for example in collaboration finds materials and organize collections of artefacts used in teaching certain topics.</td>
</tr>
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On the other hand, it was not all teachers who gave positive feedback on their improvement in PCK through collegial collaboration. Some teachers choose to give concrete examples of the missing relation, that is, “..why collegial collaboration in itself did not improve PCK”. Here four sub-themes from the first dataset, that could be found supportive of a more individualistic view on PCK development, are presented in table 2.

Table 2. Sub-themes, description and exemplary quote. Why collegial collaboration in itself did not improve PCK.

<table>
<thead>
<tr>
<th>Sub-theme:</th>
<th>Description:</th>
<th>Exemplary quote:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of time</td>
<td>Lack of time to collegial collaboration</td>
<td>Lack of time to really reach productive collaboration, which is more than a quick exchange of “by the way, I have done this and that…” and “Bye, bye to you…. I am of teaching class now…”</td>
</tr>
<tr>
<td>Personal responsibility</td>
<td>Teaching is a manly individualistic matter and responsibility, and therefore not insured improvement through collaborative processes</td>
<td>I believe personal development is a process, which happens “from the inside out”. It can be facilitated from the outside by support, sparring and collaboration with colleagues, and is diffidently a “sustainable factor”, but if I shall be better to something, - in the long run, - it is my own responsibility.</td>
</tr>
<tr>
<td>Authenticity</td>
<td>PCK is closely related to the teacher’s ability to “burn through to the children”</td>
<td>I believe, I am the one who must be able to “deliver/sell the goods”, and “burn through to the children”. Collaboration can’t help doing that.</td>
</tr>
<tr>
<td>Self-determination</td>
<td>Teacher autonomy and own interest as key elements in PCK development</td>
<td>I have a great interest in teaching S&amp;T, so to me, the interest for S&amp;T is very dependent on my subject matter knowledge and ability to teach this</td>
</tr>
</tbody>
</table>

In the second dataset, four sub-themes could be identified regarding the teachers own descriptions of the three most important factors/episodes in their life as a S&T teacher in order, to increase their PCK, which where: Collegial collaboration/QUEST: Collegial collaboration or the project QUEST mentioned explicit as one of the three most important factors/episodes correlated to own PCK development. Other education/
courses: Other education / courses besides the QUEST project. Own experience/ interest: Own teaching experience and interest in the science field. Physical/ organizational support: Teaching resources/facilities and leadership support.

The two datasets the appertaining sub-themes above give light to corresponding but different aspects of the teachers self-reported development of PCK through collegial processes and collaboration. Consequently, two overarching themes occurs where the first theme “PCK development as a social, dialectic/synergetic matter” and the second theme “PCK development as an individual, context specific and personal matter” forms separate criteria judging categories regarding internal homogeneity and external heterogeneity (Braun & Clarke, 2006).

DISCUSSION AND CONCLUSIONS

The findings in this study confirm that collegial collaboration has been effect full in developing PCK as perceived by some of the S&T teacher’s. The effect of collegial collaboration could according to these teachers be characterized as positive related to improving access and ability to use new ideas, improved knowledge of teaching goals and educational ends, and improved practical/organizational frames. On the other hand, besides lack of time, which indicates PCK must be analyzed in the complex contexts teachers action are embedded in, three sub-themes supported a more individualistic view on PCK: personal responsibility, authenticity and self-determination, and revealed a gap between the to overarching themes from above. When the teachers where asked to mention and rank the three most important factors/episodes in their life as a S&T teacher in order, to increase their PCK, this “gap” was confirmed.

Consequently, this research so far shows that PCK development for some of, - but not for all - S&T teachers are related to collegial collaboration, which could suggest, that the more distributed and situated forms of knowledge teachers action are embedded in, needs more attention than the consensus model of PCK indicate (Gess-Newsome, 2015). In the same time, as pointed by others (Van Driel & Berry, 2012), PLC projects do not necessarily support the more individualistic and more complex elements in PCK development, which are closely aligned to teacher professional practice. Therefore, the notion of expected outcomes through collaborative processes regarding PCK development need to be balanced.

REFERENCES


