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Title

Unpacking the dynamics of collegial networks in relation to beginning teachers' job attitudes

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Unpacking the dynamics of collegial networks in relation to beginning teachers' job attitudes

Previous research has pointed at the pivotal role of professional collegial support relationships to keep beginning teachers in the profession. In this study, we build on previous research by using follow-up mixed-method social network data to explore (1) to what extent, in what ways and for which reasons beginning teachers' work-related network (position) changes throughout a school year, and (2) how the network (position) of beginning teachers influences their job attitudes, as important precursors of teacher retention. Five follow-up case-studies of beginning teachers and their school teams were explored. The network data showed that some teachers had a central and stable position in their team, while others were more peripheral and showed considerable changes in their work-related relations. The interviews with the beginning teachers revealed several reasons for the formation, loss and retention of their work-related ties, such as physical proximity, network intentionality and the presence of a staffroom. Finally, the results indicated that the professional support in these work-related ties can play an important role in beginning teachers' job attitudes, or can act as a mitigating factor in case of experienced challenges. In this respect, the structural and cultural conditions needed for teachers to professionally connect require our attention.

Keywords: beginning teachers, professional collegial support, social network perspective, job attitudes, mixed-method research, follow-up design

Introduction

Researchers have underscored the increasingly demanding and complex nature of the teaching profession (Guerriero 2017). However, compared to other professions, immediately after their initial training, beginning teachers need to take on the same duties as their experienced counterparts (Tynjälä and Heikkinen 2011). An often-cited problem is the considerable number of teachers leaving the profession during these first years in practice (Ingersoll and Strong 2011). In the US and the UK, 30% to 50% of teachers drop out within the first years after graduating (Cooper and Alvarado 2006; Ingersoll 2003). In Flanders (Belgium) approximately 14% of primary school teachers and 22% of secondary teachers leave the profession during the first five years (Flemish Department of Education and Training 2013).

Job attitudes, known as teachers' feelings, thoughts, and beliefs regarding the profession and the workplace (George and Jones 1999), are found to be factors inhibiting teachers from early drop out (Struyve et al. 2016). In turn, receiving support from colleagues to grow professionally and to develop appropriate competencies (Snoeck et al. 2010) is considered to have an important influence on these job attitudes, and in extension, teachers' decision to remain in or leave the profession (Struyve et al. 2016).

By putting emphasis on professional collegial support, the literature has acknowledged the interactive nature of teachers' first years in the profession. However, up until now, limited research concerning this topic has made use of the social network perspective and its analytical tools, focusing on the interdependency between beginning teachers and their colleagues (Baker-Doyle 2012). From a social network perspective, collegial support is considered as a resource provided to beginning teachers through their relationships, which can then be used to achieve certain goals (Degenne and Forsé 1999).

Such relational information is pivotal to obtain a deeper understanding of beginning teachers' collegial support (Coburn et al. 2012), and their potential influence on how they feel and think about the profession.

Although there are quantitative studies highlighting the importance of social relations for beginning teachers (e.g. Struyve et al. 2016), to the best of our knowledge, not a single study has used a follow-up and mixed-method perspective on the dynamics of teachers' relations over time, and if and how they influence beginning teachers' job attitudes. Adding qualitative data to quantitative information can shed light on teachers' subjective meaning of ties, and the processes that constitute the dynamics of networks (Crossley et al. 2015). In this respect, the current study is inspired by broader educational literature examining social networks using a mixed method and dynamic approach (Cornelissen et al., 2015; Hubers et al., 2018). Specifically, the present study on primary school teachers' first years in the profession uses both qualitative and quantitative social network data, collected over a 1-school year timeframe. Hereby, the study aims to explore (1) to what extent, in what ways and for which reasons the network (position) of beginning teachers changes throughout the school year, and (2) how the network (position) of beginning teachers influences their job attitudes over time.

Theoretical framework

Beginning teachers' job attitudes

In organisational psychology, researchers have studied job attitudes (e.g. Lachman and Aranya 1986), which are described as employees' feelings, thoughts and beliefs regarding the profession and the workplace (George and Jones 1999). Overall, these studies highlighted the beneficial value of job attitudes for both the organisation and its employees (Lachman and Aranya 1986; Lawler and Hall 1970). The present study

focuses on three job attitudes. First, job satisfaction, which is outlined as teachers' judgements about their work and the teaching profession, is put forward (Skaalvik and Skaalvik 2011). Second, affective organisational commitment is studied, defined as positive feelings of identification with and involvement in the school (McInerney et al. 2015; Meyer and Allen 1991). Third, intrinsic motivation to teach, which concerns teaching because of enjoyment, is of interest (van den Broeck et al. 2009). These three job attitudes are included in the present study, as previous research (Meyer et al. 2002; Vansteenkiste et al. 2007) has proven that job satisfaction, affective organisational commitment and intrinsic motivation to teach are important precursors of employees' decisions to remain in or leave the job.

A social take on teachers' first years in the profession

Crucial in influencing these teachers' job attitudes, and their decisions to remain in or leave the job, are the professional relationships with and support from their colleagues (Fox and Wilson 2015; Struyve et al. 2016). Specifically, collegial support is found to be important to help beginning teachers deal with experienced difficulties in the first years of practice (Papatraianou and Le Cornu 2014; Struyve et al. 2016). Conversely, without support, beginning teachers often quit their job (Rippon and Martin 2006).

In the present study, professional collegial support is defined as support from colleagues wherein teachers are guided in their professional growth, and in the development of appropriate skills and competencies (Snoeck et al. 2010). This conceptualisation supposes that teachers are socially embedded in their school context (Baker-Doyle 2010; Vanderlinde and Kelchtermans 2013); beginning teachers interact with their colleagues, and through these interactions professional support becomes available. Taking account of this social embeddedness requires a distinctive approach

such as the social network perspective (Baker-Doyle 2010). In the social network perspective, the relationships between individuals (also known as ‘ties’) form the unit of analysis (Baker-Doyle 2010). Relationships have been conceptualised as ‘ties with potential’ (Moolenaar, Slegers, and Daly 2011), as they may contain (or be drained from) resources, and as such can provide (or constrain) actors’ opportunities. The resources that are available through teachers’ relationships are conceptualised as social capital (Bourdieu 1986). Applied to the present study, professional collegial support is seen as social capital, and beginning teachers’ relationships are seen as having the potential to influence their job attitudes through the support they may contain.

Using a social network perspective in the present study’s context means that by analysing the patterns of teachers’ relationships, their access to social capital (i.e. support) can be mapped (Burt 2000). Specifically, these patterns of relationships, also known as the network structure, are measured and expressed in structural properties. An extensively researched structural property in the context of an individual’s access to the network’s resources is *centrality* (Wasserman and Faust 1994). Centrality is about an individual’s network position (Burt 2000). The more central a teacher is positioned in the school’s network, the more possibilities (s)he has to access resources from the network (Borgatti, Everett, and Johnson 2013). Several studies (e.g. Ibarra and Andrews 1993; Struyve et al. 2016) have found that being socially tied and as such being central in the team, positively influences job attitudes and employees’ decisions to remain in the profession.

Moreover, next to centrality, several studies also refer to *network size*, defined as the number of people in an individual’s network, as a valid measure for a person’s access to certain resources (Crossley et al. 2015). Related to the present study’s context, previous studies have argued that teachers’ collegial network size is indicative for their possibilities to access information, support, and knowledge (Baker-Doyle 2012). In this respect,

researchers have argued that receiving resources from only a small number of colleagues may result in inadequate teacher development (Ericsson 2006; Smither, London, and Reilly 2005; Van Waes, Van den Bossche, Moolenaar, De Maeyer, et al. 2015), and cause negative attitudes about the job and decisions to leave the job (Anhorn 2008; Struyve et al. 2016).

However, to enable a thorough investigation of the influence of networks in general, and centrality and network size in particular, on beginning teachers' job attitudes, networks should be studied over time (Sasovova et al. 2010).

The dynamic nature of networks: reasons for the formation, loss and retention of ties

Researchers have increasingly recognised that social networks are not static, but constantly in flux (Sasovova et al. 2010). By researching networks over time, their dynamic nature can be captured, and their relationship with changes in the individual and the organisation studied (Sasovova et al. 2010). However, whereas the changes in the patterns of relationships and their influence on particular outcomes have received much attention, the identification of underlying processes of forming, sustaining, and dissolving ties has been neglected (Crossley 2010). Through qualitative data such as interviews, teachers' subjective meaning of ties and the complex processes that constitute network formation and changes can be acquired (Crossley et al. 2015). Following Emirbayer and Goodwin (1994) who propose that a more complete understanding of social action requires understanding how 'relationships are reproduced or reconfigured over time' (1447), in this study the individual and contextual reasons for the formation, loss and retention of ties are investigated by including teachers' perceptions on the network.

One important reason in the formation of ties is the similarity between people, also known as *homophily* (Coburn, Choi, and Mata 2010). In primary schools, homophily

is often conveyed as teachers reaching out to colleagues of the same gender or grade level (Moolenaar 2011). In contrast, *hierarchy* which supposes position dissimilarity has found to be a rather constraining factor for the formation of ties (Cross et al. 2005). *Access* to and distance between people (*physical proximity*), as well as *perception of expertise*, have also been considered crucial in tie development (Penuel, Riel, Krause, and Frank 2009; Spillane, Shirrell, and Sweet 2017). Regarding the latter, research has argued that forming a tie based on perceived expertise requires relational knowledge, i.e. knowing what the other person knows (Cross et al. 2005).

Additionally, researchers have increasingly paid attention to *network intentionality*, which is a type of agency whereby people consciously reach out to or disconnect relationships with others (Cohen et al. 2011; Moolenaar et al. 2014; Van Waes, Van den Bossche, Moolenaar, Stes, et al. 2015). The extent to which beginning teachers actively seek out colleagues to interact with might be an important mechanism underlying tie formation over the course of teachers' first years in the profession. *Trust*, defined by Mayer, Davis, and Schoorman (1995) as 'the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party' (712) has likewise been acknowledged as essential. Exposing one's vulnerabilities to others (Daly and Chrispeels 2008) can provide a base for teachers to ask for support, and share work-related issues (Moolenaar, Slegers, and Daly 2011). Finally, *natural turnover* (i.e. hiring new teachers, maternity leave) in a school is a mediator in the loss of and formation of ties (Van Waes, Van den Bossche, Moolenaar, Stes, et al. 2015).

Next to these individual reasons, Coburn, Choi, and Mata (2010) and Van Waes, Van den Bossche, Moolenaar, Stes, et al. (2015) have emphasised the organisational

embeddedness of teachers' networks, recognising the irrefutable importance of the school organisation and school culture in the formation, loss and retention of ties. The *school organisation*, with its structures and practices, for example, has influence on whom teachers are proximate with (e.g., how classes are grouped together, grade or cross-grade meetings) (Coburn, Choi, and Mata 2010). *School's culture*, in terms of the extent to which colleagues are open and willing to interact, also has an influence on tie formation (Van Waes, Van den Bossche, Moolenaar, Stes, et al. 2015). In this respect, previous research has shown that in schools with a collaborative school culture, tie formation is stimulated (Flores and Day 2006; Le Cornu 2013).

Research goal and questions

While the social network perspective has already proven its value by demonstrating the significance of teacher relationships, for example in (in)formal learning of professional development (Rienties and Kinchin 2014), and data use on a school-wide level (Hubers et al. 2018), it is rarely applied in the context of beginning teachers and their job attitudes. To fill this gap, this study explored the work-related interactions of beginning teachers during one school year by using a social network perspective. Follow-up network data facilitated an understanding of beginning teachers' collegial networks over time. Triangulating the quantitative information on collegial networks with qualitative data yielded insights into reasons for the formation, loss, and retention of ties and the relationship between the network, and teachers' job attitudes over time. The following research questions were put forward:

RQ1: To what extent, in what ways, and for which reasons does the network (position) of beginning teachers change throughout a school year?

RQ2: How does the network (position) of beginning teachers influence their job

attitudes throughout a school year?

Methods

In line with the plea held in previous research (e.g. Baker-Doyle 2012; Rienties and Kinchin 2014), the current study relied on a mixed-method follow-up case study design to yield a thorough understanding of beginning teachers' networks and their influence on job attitudes over time. Specifically, a sequential explanatory mixed-method design was used (Creswell and Clark 2011), wherein a quantitative phase exploring the changes in the network was followed by a qualitative phase to explore the reasons for the changes and the influences on beginning teachers' job attitudes. To facilitate analyses within and across beginning teachers, multiple case studies were analysed (Yin 2009). In the following paragraphs, the study's sample, research instruments and analyses are discussed thoroughly.

Sample

This study is part of a wider research project in Flanders (Belgium) exploring the professional collegial networks of beginning teachers. For this study, we defined beginning teachers as teachers with a maximum of five years of educational experience (Henry, Bastian, and Fortner 2011). To enable an investigation of these teachers over time, the beginning teachers had to teach in one primary school for an entire school year. Five beginning teachers from the broader project who met these criteria and whose primary school team agreed to participate, were followed through the school year 2016-2017. A primary school team was defined as school staff with a pedagogical and/or coordinative position, including e.g. primary school teachers, the principal, and the special educational needs coordinator.

Table 1 shows the age, years of educational experience, primary school, years of experience in the school and employment ratio of the five beginning teachers in our sample. As the table demonstrates, Alice and Nina both teach at West Bridge Elementary, and Millie and Faye both teach at Golden Oak.

[Table 1 here]

Research instruments

To answer the research questions, three research instruments were used three times over a period of nine months: (1) a whole-school survey for all primary school team members in which they were questioned about their work-related collegial ties, (2) job attitude scales for the beginning teachers, and (3) semi-structured interviews for the beginning teachers in which they were questioned about their work-related collegial ties, and specifically important for our research the reasons for the formation, loss and retention of these ties. The measurement moments were organised according to the three trimesters of the school year 2016-2017: T1 in December, T2 in March, and T3 in June. All participants (both the beginning teachers and all other primary school team members) were informed about the planned measurements and were asked to give approval to use their data for research purposes by means of informed consents.

Whole-school surveys

For each primary school team, online whole-school surveys were sent out to all of their members to probe for information on their work-related collegial ties. The participants were asked to respond to the following name generator question in a checkbox manner including all names of the primary school team members (Borgatti, Everett, and Johnson 2013): *'With whom did you have contact for work-related issues (in the form of, for example, advice, collaboration, work-related talks) within the last three months?'* For the

three measurements, an average response rate of 100% (T1/2), and 97% (T3) was established, which is in line with the recommended minimum of 80% (Huisman and Steglich 2008).

Job attitude scales

Data were gathered on the job attitudes of the five beginning teachers by means of three previously validated and often used Likert-type scales. For job satisfaction, the four-item scale of Caprara, Barbaranelli, Borgogni and Steca (2003) was used. An example item is: 'I feel good at work'. To measure affective organisational commitment, the three-item scale of McInerney et al. (2015) was used. An example item is: 'I do not feel emotionally attached to this school' (reverse scored). Intrinsic motivation to teach was assessed by using the four-item scale of Soenens, Sierens, Vansteenkiste, Dochy and Goossens (2012). An example item is: 'I find teaching enjoyable'. All items had a response scale from 0 (strongly disagree) to 4 (strongly agree).

Semi-structured interviews

The first part of the semi-structured interviews for the beginning teachers probed for information on their position in the team, in terms of being interconnected, and the reasons for the formation, loss and retention of work-related collegial relationships. Specifically, beginning teachers' answers on the social network question in the whole-school survey were visualised. More particularly, we drew beginning teachers' ego-network consisting of the beginning teacher (ego) and those colleagues (s)he nominated as work-related contacts (alters). The network map was used during the interview to elicit information on beginning teachers' work-related interactions (Crossley et al. 2015). At T2/3, the network maps from the previous measurements were also shown, facilitating a discussion on the reasons for network change (see theoretical framework: 'Reasons for

the formation, loss and retention of ties’). In the second part of the interview, beginning teachers were questioned about their (changes in) job attitude scores, and the influence of their network hereon.

Analyses

Quantitative analyses

For RQ1, particularly the investigation of the extent to and ways in which beginning teachers’ network (position) changes throughout the school year, individual level measures of the whole network as well as statistics of beginning teachers’ ego network were calculated using UCINET (Borgatti, Everett, and Freeman 2002).

In a whole-network approach, the relationships between all members of the primary school team are investigated (Borgatti, Everett, and Johnson 2013). As our unit of analysis is the beginning teacher, the whole-school survey was analysed in terms of individual level measures only. Specifically, to enable an investigation regarding beginning teachers’ access to the resources in the network, their centrality scores were calculated using the individual-level measures in-degree and out-degree. *In-degree* reflects the number of team members identifying the beginning teacher as a person with whom they had work-related contact, and *out-degree* is the number of team members whom the beginning teacher identifies as work-related contacts (Wasserman and Faust 1994). These scores were normalised to facilitate comparisons among the five cases, and as such range from 1 (nominations to/from all team members) to 0 (no nominations to/from any of the team members).

In an ego-network approach, the focus lies on the beginning teacher (ego) and the set of relationships the beginning teacher has with (and sometimes also between) his/her colleagues (alters) (Halgin and Borgatti 2012). In the current study, at the ego-network

level, descriptive statistics of network dynamics for beginning teachers' outgoing ties (i.e. the colleagues the beginning teacher has identified as work-related contacts) were calculated. Due to the protection of the confidentiality of team members' answers on the whole-school survey we focussed only on outgoing ties. Apart from a count of the number of beginning teachers' outgoing ties and how this changed over time (*network size*), the actual changes in their networks were further investigated using additional measures. Specifically, we used tie churn statistics (Sasovova et al. 2010) that measure *the number of new, lost and kept ties* separately. This enabled us to see whether teachers changed their network ties, even when the number of ties was the same at the different measurement moments (Halgin and Borgatti 2012). Moreover, to investigate the dynamics of beginning teachers' networks further, change and stability ratios were calculated (see Cornelissen et al. 2014). The *stability ratio*, which measures the extent to which a network remains stable, is calculated by dividing the number of kept ties at T2 by the total number of ties at T1. The *change ratio*, measuring the extent to which a network is dynamic, is calculated by dividing the sum of the new ties and lost ties at T2 by the sum of the total number of ties at T1 and T2. Both ratios vary between 0 and 1, whereby for the stability ratio 1 means that the network was completely stable, and for the change ratio 1 means that the network was entirely dynamic.

Qualitative analyses

The semi-structured interviews with the five beginning teachers were recorded, transcribed, and analysed using NVivo12 software. In the following paragraphs, the analyses of the interview transcripts in response to RQ1 are discussed, followed by the analyses conducted for RQ2.

For investigating RQ1 further, and in this respect gaining more insight in the extent to and ways in which beginning teachers' network (position) changes throughout the school year, a coding scheme was created based on the interview guide and theoretical framework. The data were organised into two themes: (1) (changes in) beginning teachers' position in the school network, and (2) reasons for the formation, loss, and retention of ties. In the latter theme, we started with several a priori codes based on previous literature on individual and contextual reasons for the formation, loss and retention of ties (see theoretical framework). Specifically, our deductive codes regarding the individual reasons were 'network intentionality', 'trust and friendship', 'access and physical proximity', 'hierarchy', 'homophily', 'perceived expertise and experience', and 'turnover'. For the contextual reasons, our a priori codes were 'school organisation' and 'school (collaborative) culture'. Apart from these a priori codes, during the analyses of the interviews, two emerging, inductive codes were included, namely 'necessity' and 'part-time work'.

To ensure reliability, first, the principal author coded a random selection of the interviews. The initial coding work was discussed with two of the co-authors via peer debriefings, whereupon the coding scheme was slightly adapted and provided with illustrative quotes. Second, the resulting coding scheme was used to evaluate interrater agreement (Cohen 1960). A random sample of 20% of the interviews was coded by the first author and by two other researchers trained to understand the coding scheme. This resulted in a Cohen's kappa of .93, which is considered to demonstrate excellent reliability. The remaining interviews were coded by the principal author. Via further peer debriefings, ambiguous fragments were reviewed until consensus on the code was reached.

The transcripts were analysed employing within-case and cross-case analysis (Miles and Huberman 1994). First, for each participant, the transcripts at T1, T2 and T3 were coded as single cases, looking for the earlier mentioned themes and codes. This within-case analysis was summarized in a schematic overview for each participant, in which the rows represent the two broad themes of '(changes in) beginning teachers' position in the school network' and 'reasons for the formation, loss and retention of ties' and the columns represent the measurement moments. Second, this within-case analysis was extended by conducting a cross-case analysis of all three interviews of one participant. Third, a cross-case analysis was conducted where the five participants were compared with each other (i.e. constant comparative method of Glaser and Strauss 1967).

For RQ2 exploring how the network (position) of beginning teachers influences their job attitudes throughout a school year, the principal author and one of the co-authors analysed the interview transcripts. Similar to RQ1, the results were summarised in a schematic overview for each participant (within-case). The rows of the schematic overview represented the three job attitudes and the columns the measurement moments. Based on the participant's schematic overview, every cell was analysed and compared over time (cross-case). Finally, a second cross-case analysis, looking at similarities and differences between participants (Glaser and Strauss 1967) was conducted. In these within- and cross-case analyses, an inductive approach was used whereby the authors openly coded the qualitative data for emerging themes. Afterwards, via peer debriefings the themes were compared and discussed. For member checking purposes, when questions arose regarding the analyses of the interview data for RQ1 or RQ2, the participants were asked to provide clarifications and/or check our interpretations.

Linking qualitative and quantitative data

In line with recommendations of Creswell and Clark (2011) concerning mixed-methods research, the corresponding quantitative results were included in the schematic overviews of RQ1 and RQ2, creating joint displays so both data sources could be compared. Specifically, in the schematic overview of RQ1, participants' centrality scores and results for the tie churn statistics as well as teachers' reasons for the formation, loss and retention of ties were included. The schematic overview of RQ2 contained both teachers' job attitude scores and their reflection on who and/or what influenced their job attitude scores.

Results

To what extent, in what ways and for which reasons does the network (position) of beginning teachers change throughout a school year? (RQ1)

Beginning teachers' position in the school network

In the theoretical framework it was discussed that an increase in beginning teachers' network position (also termed 'centrality') leads to more access to social capital. Table 2 entails the results for the individual level measures of normalised out-degree and in-degree. These measures were obtained from the whole-school survey in which the participants reported whom they had work-related interactions with in the past three months. Specifically, the measures reflect the extent to which beginning teachers nominate their team members as people they had work-related contact with (out-degree) and to what extent they are identified by their team members as a person with whom they had work-related contact (in-degree).

[Table 2 here]

The results in Table 2 demonstrate that the normalised out-degree and in-degree scores of our five beginning teachers show various patterns. For example, Nina and Danny's *normalised out-degree* showed only small changes, and Millie's *normalised out-degree* did not show any change at all (see Table 2). This means that the proportion of colleagues they nominated as work-related contacts was high and stayed (quite) stable. For both Nina and Millie this translated into a stable *ego network size* (i.e. the number of outgoing ties) over the course of the school year (Nina's network size=9; Millie's network size=12; Figure 1). For Danny, at T2, *network size* slightly decreased from 9 to 8 (Figure 1).

Furthermore, for Danny *normalised out-degree* and *in-degree* scores were similar throughout the school year, meaning that the proportion of colleagues he nominated as people he had work-related contact with was similar to the proportion of colleagues that identified Danny as a person they had work-related contact with (normalised in-degree T1/2/3: .89). For both Nina and Millie, however, these scores differed. Specifically, Nina's *normalised out-degree* stayed quite stable, whereas her *normalised in-degree* decreased steadily (T1=1.00; T2=.89; T3=.60). Even though the normalised in-degree was not communicated to the beginning teachers, the interviews revealed some insights in these figures: Nina mentioned that from T2 onwards a number of teachers had to spend time on training student and interim teachers, inhibiting them from engaging in contact with her and each other for collaborative or work-related talks. Despite the fact that they were busy, the interview data shows that Nina could still approach them when asking for work-related advice (which is also reflected in her high and stable normalised out-degree).

For Millie, the *normalised in-degree* scores decreased from T2 onwards (T1=.92; T2=.75; T3=.75) and were repeatedly lower than the *normalised out-degree* scores. A possible explanation based on Millie's interviews, is that while at the start of the school year a lot of colleagues approached her, towards the middle and end of the school year

this seemed to decrease a bit as they trusted that she had built up the necessary teaching expertise. However, the interview data also revealed that she could still ask all of them for advice if needed, which is reflected in Millie's stable *normalised out-degree* of 1.00.

[Figure 1 here]

In the case of Alice, *normalised out-degree* scores decreased from 1.00 (T₁) to .78 (T₂) and then slightly increased again to .90 (T₃). The qualitative data revealed that in the middle of the school year she had a student teacher who took a lot of her time, inhibiting her to connect with her team members. Translated into absolute figures, however, this decrease at T₂ was relatively small: Alice's *network size* decreased from 9 to 7 (see Figure 1). Similarly, her *normalised in-degree* was high and stayed quite stable throughout the school year (T₁=1.00; T₂=1.00; T₃=.90) showing that (most of her) colleagues indicated that they had work-related contact with Alice.

Finally, for Faye the *normalised out-degree* first increased from .33 to .58, and then decreased to .25. This means that the proportion of colleagues she nominated as work-related contacts increased at T₂, but then decreased again at T₃. To illustrate this, the network maps of Golden Oak wherein nodes are sized according to out-degree are shown in Figure 2: this figure shows that Faye's node increased from T₁ to T₂ and then at T₃ decreased again. The interview data showed that Faye's low *normalised out-degree* was due to her part-time position in the school, which inhibited her to professionally connect to her colleagues. She said, for example, '*Because I'm not often here, it makes it harder to connect with other teachers.*' In the second trimester she had a rather negative encounter with her principal, after which the team members started to support Faye emotionally, eventually leading to Faye seeking connections of work-related nature with

her colleagues. At T3 the need to connect to her colleagues decreased again because of the busy nature of the end of the school year. In terms of absolute *network size*, this translated into an increase at T2 from 4 to 7, and a decrease at T3 to three nominated colleagues (Figure 1). Interestingly, her network size was nearly twice as small as those of the other beginning teachers, all of whom worked full time at their school. Finally, Faye's *normalised in-degree* scores at T1 and T3 were considerably higher than her *normalised out-degree* scores (T1=out-degree=.33, in-degree=.67; T3: out-degree=.25, in-degree=.75), meaning that the proportion of colleagues whom nominated Faye as a work-related contact at these measurement moments was higher than the proportion of colleagues she nominated. Based on the analyses of the interviews, an explanation for the higher in-degree scores could be that even though Faye felt that she did not have time to connect to her colleagues because of her part-time job, her colleagues were always accessible and eager to help out.

[Figure 2 here]

The (reasons for the) dynamics of beginning teachers' ego network

Next to an examination of the position of beginning teachers in their school network, beginning teachers' ego network, consisting of their outgoing ties, was investigated in more detail. In doing so, more insight into the changes in beginning teachers' ego network could be obtained. Specific measures for the exploration of the dynamics of beginning teachers' ego network throughout the school year were calculated. Table 3 shows that Danny's ego-network remained stable (change ratios=.06; .00), whereas Faye's network clearly showed change (change ratios=.46; .60). Aside from the extent to which beginning teachers' ego networks were stable or dynamic, specific measures of new, lost and kept ties shed light on the ways in which the network had evolved. Below, the dynamics of the

five beginning teachers' ego networks are discussed more thoroughly, coupled with interview data concerning the reasons for these changes.

[Table 3 here]

Nina, Alice, Millie and Danny had a large ego-network, showing only small changes, reflected in the number of their new, lost and kept ties (Table 3). In their interviews, two reasons for tie formation were frequently mentioned: their **network intentionality**, namely their active role in purposefully connecting to colleagues, and the **accessibility of their team members** which further supported their network intentionality. Furthermore, they argued that their tendency to form ties is supported by the availability of an inviting staffroom (**school organisation**) increasing team members' accessibility. Alice, for example, said

There is a daily opportunity to have a professional talk. We sit together during the morning break, and over lunchtime, and during the afternoon break ... we then sit together in the staffroom (...) So, I think we have ample opportunities to have a conversation.

Moreover, team members' accessibility and beginning teachers' tendency to form ties was further stimulated by a **collegial and collaborative school culture**, or as Nina mentioned '*Generally, teachers' classroom doors are closed and remain closed. I think we have less of that here at school. Because the doors literally aren't closed.*'

The interviews with these four teachers uncovered several other reasons for the formation, loss or retention of ties and the in/decrease of collegial contact, such as **physical proximity**. Particularly, they argued that they mostly had contact with people whom are physically close; colleagues whose classrooms were located in another building

(Nina, Alice, Danny), or on another floor (Millie) were less likely approached. Danny, for example, said *'I will rather have a work-related chat with [teacher X, Y and Z], because we're in the same building. [Teacher A and B] are in another building. They're further away, physically. So we run into each other less.'*

Another frequently recurring reason was **homophily**. They mostly connected to colleagues who taught in the same or adjacent years (Nina, Alice, Millie, Danny), had similar views on didactics, pedagogy and authority (Nina, Alice, Danny), and were also in the beginning of their career (Nina, Alice). The latter, however, changed throughout the school year. Both Nina and Alice noted that, even though they still contacted one another for work-related issues, the frequency with which this contact took place diminished. The fact that they taught in different years had overruled their similarity in years of experience. Nina said for example

In the beginning we were close because we were both new. And in the meantime, we have found our own place in the school. She talks more about subject matter and didactics with the people from the lower years, and I talk about these things with the upper years. So that is why the contact has decreased.

Surprisingly, **hierarchy** was indicated by all four teachers as having a positive influence on interaction. Throughout the school year, the principal was included in their ego-network because of his/her ultimate responsibility for various work-related issues. Nina said *'But things of which you know that: 'That's a conversation with a parent, I need the support of the principal, a person higher up in the hierarchy in case the parent starts a confrontation.'*

Furthermore, for Alice and Millie, **trust and friendship** also influenced the presence of work-related ties. Alice argued *'I am not afraid to ask [teacher X] something.'*

And that is because I feel good around her (...) She is a warm person, she is trustworthy and I can be myself around her.'

Forming, losing and keeping ties was further explained by these four beginning teachers by reasons of **necessity** (e.g., Nina dropped the tie with the ICT coordinator at T3 as she did not have computer-related issues anymore), **perceived experience and expertise** (e.g., Millie connected with a particular colleague because of her expertise on class management) and colleagues' or their own **accessibility** (e.g., Alice lost ties at T2 because she was preoccupied with her student teacher). Repeatedly, the combination of these three reasons formed the basis for their (dis)connection with team members. Finally, **turnover** (pregnancy leave, substitute/new teachers, drop-out) was also frequently identified as the reason for the loss or creation of a tie.

In contrast with the other beginning teachers, Faye had a small and unstable network. The most frequent reasons for Faye in not forming ties with the team members were the **part-time nature of her job** and that she was a supporting teacher for one specific class of children. Because of lack of time on the one hand, and because she could always turn to the children's main teacher on the other hand, she did not have many professional connections with the team members.

I don't have my own class, I don't have the responsibility. So, in case – well, I can imagine – in case I had my own class or group for which I were responsible, then I would seek out the support of other colleagues a lot more than I have to now.

However, as the team members were accessible and as there was a staffroom wherein they met each other during breaks, she was convinced that her professional connections would grow as the school year progressed.

At T2, her network size increased from 4 to 7, consisting of four new ties and 1 lost tie. The lost tie was explained by the loss of **necessity** to connect with one of the

teachers (i.e. they did not have a shared assignment anymore). Apart from 1 new tie which was due to the entrance of a new teacher in the team (**turnover**) and whom she had contact with because she was also a beginning teacher (**homophily**), the other new ties stemmed from negative feedback Faye got from her principal. For her, this negative feedback was a confirmation of her suspicion that as a part-time teacher she could not prove her worth. As a response on this feedback, Faye mentioned several colleagues had started to support her emotionally. Because of the **trusting relationships** she had built up with these team members, she also started to approach them for work-related issues. Faye said

That [feedback from her principal] is a big reason that it [her ego-network] expanded. A lot of colleagues came to me to talk about it. Then I thought: 'What I do here, is appreciated', and since then it is easier to talk about everything and nothing. (...) Because of that I have more contact on a professional level now too.

At T3, she had one new tie because of **necessity** (i.e. decision-making about pupils with the special educational needs coordinator), and five lost ties. Apart from one lost tie, which was due to **turnover** (maternity leave), the other lost ties were ascribed by Faye to the busy nature of the end of the school year, and **her lack of need** to approach her colleagues for work-related issues. As the end of the school year approached, she did not always find it necessary anymore to have professional encounters with her colleagues. She said, for example, *'It's the end of the school year, so I know how everything works now'*. She knew, however, that she could connect to them if needed.

How does the network (position) of beginning teachers influence their job attitudes throughout a school year? (RQ2)

After investigating beginning teachers' networks throughout the school year, the interviews also shed light on their influence on job attitudes. Specifically, the data seemed to reveal that professional support retrieved via their work-related interactions (1) can explicitly play an important role in beginning teachers' job attitudes, (2) can act as a buffer or mitigating factor when challenges or a negative critical incident occurs, or (3) in some instances does not have a particular influence on the job attitudes. Below, these three situations are further discussed, illustrated with particular examples. Figure 3 shows the changes in beginning teachers' job attitudes throughout the school year.

A first finding is that professional support can have an influence on beginning teachers' job attitudes. Particularly, at T2, Alice, for example, argued that she felt professionally supported in that she had inspirational talks with several colleagues wherein they made her enthusiastic about the teaching profession by showing innovative tools and didactic strategies. Subsequently, this further seemed to be a part of the reason for the slight increase in her intrinsic motivation to teach ($T_1=3.00$; $T_2= 3.25$; $T_3=3.50$), as '*enthusiasm is immensely contagious*'.

Additionally, another interesting illustration of the importance of professional support is the case of Danny. His interviews revealed that his high and stable job satisfaction ($T_{1/2/3}=3.00$) and affective organisational commitment scores ($T_{1/2/3}=4.00$) were attributed to his connectedness to the primary school team members. In this respect, he mentioned that '*This job has many facets. And if you have to face them alone, if you have to deal with them alone... Well, that would be really difficult*'. He further emphasises the role of the principal, by stating that

The principal at school plays an important part in the atmosphere at school and how colleagues get along with one another. If he makes sure there's a nice staffroom, then this will influence all the colleagues. And, if he then also lends a

helping hand and stimulates the cooperation between colleagues, then this mixture of factors will create an atmosphere where you want to be. Then you can be happy, you like going to school, you feel involved and motivated to continue.

A final example to illustrate the point that professional support can have an influence on job attitudes is the case of Millie. In talking about her high job attitude scores, she mentioned professional support and the fact that she is highly professionally connected, as playing an important factor. She did remark, however, that for a beginning teacher to be able to have such a supportive collegial network, it is important to be able to spend time in the team. In this respect, she argued that interim teachers and part-time teachers can have a hard time building up a supportive collegial network. Specifically, she said that collegial support plays an important role in job satisfaction, and that she noticed that because:

Last year I had a part-time interim teaching job at another school. That's completely different than being present at the school fulltime. You don't know your colleagues that well, at least not as well as being around fulltime. You can ask things during breaks. [In that respect] I believe that job satisfaction depends on your team of colleagues

Secondly, the professional support retrieved via their work-related interactions also seems to be able to act as a buffer or mitigating factor ensuring that a negative incident or experienced challenge does not lead to a dramatic decrease in beginning teachers' job attitudes or even keeps them stable. This can be illustrated with the case of Faye. Because of the negative feedback of her principal at T₂ she felt that her fears about the influence of having a part-time job were confirmed. She said

It's [the classroom] not mine. So, I do what I have to do, and I try new things and I do a lot. But I often have the feeling: I could be doing more. But then I don't have the time. And that bothers me.

The incident made her feel nervous and anxious. She said she missed a classroom of her own even more, as she realised she could not show what she is capable of. This negatively affected her job satisfaction ($T_1=3.50$; $T_2=2.25$) and intrinsic motivation to teach ($T_1=4.00$; $T_2=3.00$). However, she still felt good in the team as she felt supported by them, which motivated her to keep going, and in this respect seems to have not led to a dramatic decrease in both her job satisfaction and intrinsic motivation to teach. Additionally, her affective organisational commitment stayed high and stable ($T_{1/2}=3.00$), which seems to indicate that the support she received from her colleagues mitigated the incident with her principal.

Another example of support as a mitigating factor can be found in Danny's case. Danny said that in the middle of the school year there was an incident with the parents of one of his pupils who questioned his capabilities as a teacher and questioned the new pedagogical project of the school. In the third trimester, parental issues still arose, however, he felt more professionally supported by the principal which seemed to cause him to regain more pleasure in teaching. This seems to be reflected in Danny's intrinsic motivation to teach, which first slightly decreased and then slightly increased again ($T_1=3.00$; $T_2=2.50$; $T_3=2.75$). He said for example: *'I must say that I feel supported by my principal (...) I had some difficult situations with parents sometimes. But now I have the feeling that he trusts me in these situations.'* This example appears to show that the support of one person, in this case the principal, can have somewhat of a positive influence on beginning teachers' job attitudes, despite the occurrence of negative situations or experienced challenges.

Finally, in some instances the interviews revealed that the increase or decrease in job attitudes was not particularly affected by professional support, but rather by other factors. In the case of Millie, for example, a shift in the nature of her collegial contact had taken place throughout the school year. Where at the beginning of the school year her collegial contact was purely professional, in the middle and towards the end of the school year, personal talks and emotional support were also present. This resulted in Millie feeling more part of the team, and explained her small increase in affective organisational commitment ($T_1=3.67$; $T_2=4.00$). Even though these personal contacts were mostly limited to small talk, they took her mind of work which she acknowledged as a pleasant experience. The increase in her affective organisational commitment was only small, but was an important change for Millie. She revealed that for her venting, as a form of emotional support, had become a necessity. Specifically, she said that

Being able to vent is important. You don't take it home with you, you don't have to worry about it, it's gone. And you hear that you're not the only one who sometimes has difficulties with that (...) If the contact with colleagues was purely professional that wouldn't work for me. For me, it's a necessity.

Another illustrative case is Alice. Her interviews revealed that the slight increase of her job satisfaction ($T_1=3.00$; $T_{2/3}=3.25$) can partly be related to the good news she received that she would be able to obtain a more secure position in the school. Particularly, Alice argued to be

Grateful to still be teaching at this school. It's only my third year of teaching, but I already almost have a permanent job. And that makes me happy to come to school. I have some sort of insurance here, I feel good here, I have a nice class, nice colleagues.

[Figure 3 here]

Discussion and conclusion

By combining follow-up social network data with semi-structured interviews, the present study aimed to explore to what extent, in what ways and for which reasons the network (position) of beginning teachers changed throughout a school year, and how this potentially influenced their job attitudes. In so doing, the study adds to existing studies on beginning teachers, by considering both the dynamic nature of networks (Sasovova et al. 2010) and the processes that constitute the formation of and changes in networks (Crossley 2010). This allowed us to provide a comprehensive, complex picture of the social aspect of teachers' first years in the profession.

The case-studies presented in this study primarily represent beginning teachers with positive experiences regarding professional collegial support. Following Hebert and Worthy (2001), we argue that presenting positive case studies has the potential to contribute helpful information to the organisation of teachers' first years in the profession, and offers an insight into those factors that positively influence beginning teachers' job attitudes. Several key topics based on the results, and suggestions for practice and policy are discussed.

The formation, loss and retention of ties

Four of the five beginning teachers had a large network size in their respective schools. This is in line with research from Van Waes, Van den Bossche, Moolenaar, De Maeyer, et al. (2015), showing that teachers with only limited experience demonstrate interest in professional collegial interactions as they are valuable for building up their teaching practices.

The findings suggest that, in accordance with previous studies in other educational contexts (see e.g. Van Waes, Van den Bossche, Moolenaar, Stes, et al., 2015 on university

teachers' professional networks), turnover, trust, homophily, and physical proximity, underlie beginning teachers' formation, loss, and retention of ties. When there was a trusting relationship, when colleagues were alike in some way, and when they were in close physical proximity, the likelihood of shaping relationships seemed to increase. Conversely, a lack of trust, heterophily, and a large physical distance might constrain relationships. The importance of physical proximity could be addressed by (a) providing beginning teachers with a classroom which is literally situated at the centre of their team, (b) locating teachers' classrooms, common rooms and facilities close to one another (Benbow and Lee 2018), and (c) providing an inviting staffroom as this has been found to be a crucial location for teacher interactions (McGregor 2001).

Surprisingly, and in contrast with organisational research from Cross et al. (2005), hierarchy was found to be a supporting factor for the formation of ties. For some situations, teachers explicated their need for support from the principal. In this respect, principals should be made aware of the importance of being accessible, especially since earlier research highlights the relatedness between principal's support and beginning teachers' job satisfaction and decision to stay (Ingersoll 2003).

An emerging reason in the formation, loss and retention of ties was necessity, or the (lack of) need to interact with certain colleagues. Frequently, this was related to positional affordance, meaning that work-related interactions with certain colleagues are simply part of their position (Benbow and Lee 2018). Moreover, necessity was often combined with reasons of expertise and accessibility. The beginning teachers had to connect with certain colleagues to align their teaching, for example with their parallel colleague. As the parallel colleagues taught in the same year, they could profit from their many years' experience. However, only when the parallel colleagues were accessible, beginning teachers could actually connect to them.

Another emerging – constraining – factor in tie formation was teachers’ lack of time to connect to their colleagues when working part-time in a school. Part-time teachers often simply lack the opportunity to connect (Brass et al. 2004). Following that professionally connecting to colleagues takes time, we plea for employing beginning teachers within one school for an entire school year, instead of short and/or part time teaching appointments across multiple schools.

Finally, the findings suggested that teachers’ agency in the formation of and change in collegial networks can be stimulated or inhibited by the accessibility of their team members (Haythornthwaite and De Laat 2012), which, seems to be influenced by the school’s structural and cultural reality (Kelchtermans 2017). The interviews, for example, suggested that beginning teachers’ tendency to actively and purposefully approach colleagues for support was facilitated by the presence of a staffroom, and a collegial and collaborative school culture as this increased their colleagues’ accessibility. Teachers could be trained in how to deal with the complex interplay of their agency and environment, as early as in teacher education (Kelchtermans 2017). Teacher education programmes could invest in courses on collegiality, collaboration, shaping relationships and interpersonal skills (Newberry and Allsop 2017). Following the ‘learning by doing’ theory, a starting point could also be to stimulate these skills by investing, for example, in collaborative work with their fellow students.

Influencing beginning teachers’ job attitudes

The study’s explorative findings seemed to confirm previous work that highlights the importance of the social aspect of teachers’ first years in the profession, and more specifically, links being professionally connected and supported to positive job attitudes, and keeping teachers in the profession (Fox and Wilson 2015; Struyve et al. 2016).

Additionally, the findings suggested that professional support can also act as a buffer or mitigating factor in the case of experienced challenges. This is in line with results from Newberry and Allsop (2017). Particularly, they stipulated that beginning teachers experience various challenges, but that the presence or absence of support for these challenges is a pivotal factor in the choice to stay or leave.

The importance of professional collegial support aside, the present study's findings recognise that in some instances other factors seem to be more influential concerning beginning teachers' job attitudes. In this respect, the results suggested that emotional support from and personal contact with colleagues also play a role. Emotional support, referring to lowering emotional distress and boosting self-confidence (Cole 1991), is crucial as it helps beginning teachers deal with the difficulties they face in the induction period (Newberry and Allsop 2017). Similarly, the significance of sharing personal matters, especially for beginning teachers, has also been highlighted in earlier research (Struyve et al. 2016). These findings suggest that time and space should be created for teachers to meet and connect in an emotional and personal way. The principal has an important role here, as (s)he can provide conditions facilitating the time (i.e. joint breaks) and space (i.e. staffroom) needed to carry out these emotional and personal conversations.

Limitations and further research

The present study is subjected to certain limitations that can guide future research. First, the study involved a small-scale sample of only five teachers which inevitably limits generalisability. The small sample, and the finding that some of the changes in the network and/or job attitudes are rather small, indicates that caution is warranted with respect to the study's results regarding the relationship between collegial networks and

job attitudes. Put differently, the findings of this study should be regarded mainly as indicative. Future research could test the study's findings using probability-based and larger samples of (Flemish) teachers. Despite its lack of generalisability, the study has enabled an in-depth understanding (Harrison et al. 2017) of the dynamics of networks and their influence on job attitudes, which until now has not received much attention. To put differently, instead of generalisability, by its in-depth nature, this study aimed to contribute to our current knowledge on the topic of beginning teachers' networks. The combination of quantitative and qualitative data enabled a more nuanced picture of the network and its relationship with teachers' job attitudes (see also Crossley 2010 on the advantages of mixed-method social network analysis). The quantitative network data on the changes in networks over time, for example, were supplemented by the qualitative data which revealed reasons for the aforementioned changes. Conversely, the qualitative data on teachers' perceptions of their relationships were confirmed by the quantitative measures which provide information on teachers' position in the network, and in this respect, the extent to which they are embedded in the school's social network. In sum, by combining both methods, a more comprehensive insight into teachers' networks is obtained (Jack 2010).

Second, teachers' networks were collected through self-survey instruments. This implies that the results must be interpreted carefully, as socially desirable behaviour might have influenced the findings. Future studies could avoid single source and self-survey data, by investing in, for example, observations of teachers' interactions (Coburn et al. 2012), archival data such as emails (Hollstein 2011), or socio-metric badges which enable automatic measurements of the amount of interaction people have and a person's physical proximity to others via vocal characteristics, movement, and location (Kim et al. 2012). However, we believe that in the present study our self-reported data is valuable.

Several studies have stated that networks constructed based on SNA techniques are good representations of actual social networks, especially in the case of high response rates and the addition of qualitative data (e.g., Hommes et al. 2012; Rienties and Kinchin 2014). Moreover, as Hommes et al. (2012) argue, a person's behaviour changes as a response to his/her perceived environment, justifying the use of that person's perception on the social network.

Third, only the beginning teachers were interviewed. The participation of the other team members was limited to reporting about the presence or absence of work-related interactions with their colleagues in the whole-school survey. This meant that the in-degree scores for the beginning teachers, referring to the number of team members that have nominated them as a person they had work-related contact with, could not be thoroughly explained. Based on the analyses of the interviews with the beginning teachers, hypotheses concerning the in-degree scores were formulated. In addition to these hypotheses gained from the interview data, from a social desirability point of view, it might also be likely that beginning teachers report that they are connected to a large extent, but that this is not reciprocated by their team members. To have more full closure about the interpretation of the in-degree scores, future research could build on the current study and include interviews with the other members of the team.

Despite these limitations, this study offers an important contribution to the research field on teachers' first years in the profession. Research using a single measurement might potentially over- or undervalue the dynamics of teachers' networks. The present follow-up social network study, wherein quantitative data on networks is supplemented with interview data, provides a unique insight into teachers' support relations over time, and their possible influence on teachers' job attitudes. To our knowledge, this is the first time that this issue is investigated using detailed follow-up

mixed method social network data. The findings revealed teachers' reasons in forming, losing or retaining ties, such as trust, physical proximity, expertise and agency. Furthermore, this explorative study showed that professional collegial support is important as it can influence beginning teachers' job attitudes, and seems to be able to serve as a mitigating factor in case of experienced difficulties or challenges. However, the results also suggested that while professional collegial support is necessary, it is not sufficient. Other aspects, such as emotional support from colleagues and having a secure position also play a vital role. Based on these results, in the discussion section some implications were formulated. Specifically, we argued for the importance of shaping the structural and cultural conditions for beginning teachers and their colleagues to connect.

Accepted

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