emerald**insight**

Journal of Professional Capital and Community

Teachers' intergenerational advice and information seeking: content matters!
Kendra Geeraerts, Jan Vanhoof, Piet Van den Bossche,

Article information:

For Authors

If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information.

About Emerald www.emeraldinsight.com

Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.

Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

*Related content and download information correct at time of download.

Teachers' intergenerational advice and information seeking: content matters!

Kendra Geeraerts, Jan Vanhoof and Piet Van den Bossche
Department of Training and Education Sciences,
Faculteit Politieke en Sociale Wetenschappen, Universiteit Antwerpen,
Antwerp, Belgium

Abstract

Purpose – The purpose of this paper is to investigate the role of generation in teachers' advice and information-seeking interactions in Flemish secondary school teams, and moreover how the content of advice shapes these interactions. Four content-related advice and information-seeking networks are investigated in this study: subject-matter knowledge, classroom management, innovative teaching methods and ICT.
Design/methodology/approach – Data were collected from 660 teachers in ten secondary education schools in Flanders (Belgium) by using an online socio-metric survey. Social network analysis was conducted, more specifically quadratic assignment procedure and multilevel P2 modeling.
Findings – The findings underline the importance of investigating content-related advice networks. Generation affects the formation of interactions. First, the results revealed that older teachers are less likely to ask advice on subject-matter knowledge, classroom management and innovative teaching methods. Second, the data showed that older teachers are more likely to be asked for advice on subject-matter knowledge. Third, young teachers are more likely to be asked for advice on innovative teaching methods and ICT. Fourth, homophily effects occurred for the youngest teachers when advice is about subject-matter knowledge, and for the oldest teachers for advice about classroom management.
Originality/value – This study is innovative due to its application of social network analysis to investigate intergenerational knowledge flows, and due to its clear focus on content-related advice-seeking interactions that go beyond the approach of general advice and information-seeking interactions.
Keywords Intergenerational learning, Social network analysis, Teacher development, P2 modelling, Teacher knowledge
Paper type Research paper

1. Introduction

Currently, the educational workforce is characterized by generational diversity in terms of chronological age (Edge, 2014; Edge *et al.*, 2016). There is increasing interest in understanding generational differences as an important step toward the development of a strong and sustainable professional teacher community (e.g. Stone-Johnson, 2011, 2017).

Generational diversity among teachers relates not only to age differences but also to differences in knowledge and skills (Geeraerts *et al.*, 2016). For instance, research has indicated that young teachers are valued for their well-developed ICT skills and use of innovative teaching methods, whereas older teachers are known to have extensive knowledge of subject matter and excellent classroom management skills (e.g. Geeraerts *et al.*, 2016; Wolff *et al.*, 2015). In order to benefit from generational diversity, intergenerational learning is relevant and can be obtained by knowledge sharing between different generations of teachers. Not all kinds of knowledge are easy to capture or to share, especially when knowledge is tacit. In this regard (informal) interactions between individuals are argued to be beneficial. Teacher interactions such as asking advice and information have shown to offer a way to share resources and contribute to (informal) learning (Baker-Doyle, 2015; Kwakman, 2003; Lohman, 2006). Asking advice and information interactions between teachers of different generations potentially result in intergenerational knowledge flows.

In order to investigate intergenerational knowledge flows through advice and information-seeking interactions, it is needed to capture first "who" is interacting with whom, and second "what" is the interaction about. The latter refers to the content of interaction. A research method that provides a bird's eye view on these interactions is social network analysis. Approaching advice and information-seeking interactions in a general way without uncovering what the advice or information was about has been mentioned as a shortcoming in previous network studies (e.g. Geeraerts *et al.*, 2017; Meredith *et al.*, 2017). Similar, Cross *et al.* (2001) underline the importance of going beyond the general advice network to reveal different dimensions of advice. Yet previous research on the exchange of advice and information in education did not examine whether patterns of advice seeking differ depending on the content of advice.

It is plausible to assume that the exchange of information and advice between generational cohorts depends on the content of the knowledge that is being exchanged (e.g. subject-matter knowledge, classroom management, ICT, innovative teaching methods). Therefore, in this study, we aim to investigate to what extent Flemish secondary education teachers' content-related advice and information networks give a different picture. Second, we examine the role of generation within teachers' content-related advice-seeking networks. We build on social network theory and apply social network analysis, more specifically quadratic assignment procedure (QAP) correlations and multilevel p2 modeling, as research methods to investigate teachers' intergenerational advice and information-seeking interactions.

2. Framing the research: conceptual and empirical anchors

2.1 Generational diversity among teachers

The increased retirement age of teachers results in more age-diverse school teams. One way to capture age diversity in school teams is taking the perspective of generations (Brücknerová and Novotný, 2016). A traditional conceptualization of generations, described by Mannheim (1952), defines a generation based on the similarity of chronological age and historical events during the lifespan of a group of individuals. Edge *et al.* (2016) recognize three approaches to define generations: a chronological approach, based on chronological age; a social approach, based on shared social experiences; and a political approach, based on shared historical experiences. Notwithstanding that chronological age is the most common way to investigate age and generation, it is often too narrow to be used in a workplace context since it also relates to performance, self-perception of age, seniority, job or organizational tenure, life stage or family status (Kooij *et al.*, 2008).

Within school teams, generations of teachers can be understood in terms of similarities in chronological age, years of experience within the school or within education, educational training, having perceived similar cycles of educational reform, etc. Also, within education, chronological age is mostly used to investigate generations because age has shown to be highly correlated with years of experience within the school and within education (e.g. Geeraerts *et al.*, 2017; Richter *et al.*, 2011). Building on previous research, we recognize three main generations of teachers based on their chronological age, labeled old cohort, a middle cohort and a young cohort. This division and boundary specification is in line with the often used distinction based on birth year: Baby Boomers (1946–1965), Generation X (1966–1980) and Generation Y (1981–2003) (Edge, 2014; Geeraerts *et al.*, 2016, 2017).

Generational diversity in school teams has been related to diversity in knowledge in school teams. This diversity is found in both knowledge demands and supplies of teachers. Previous research by Geeraerts *et al.* (2016, 2017) revealed that teachers of different generations are perceived to possess different kinds of knowledge. Whereas younger teachers were seen as a knowledge source for innovative teaching methods and ICT skills, teachers older than 50 were mainly associated with classroom management skills and subject-matter knowledge. These knowledge domains play a crucial role in teachers' daily practices. In terms of teacher learning, a review study of Kyndt *et al.* (2016) revealed that beginning teachers were more

oriented toward learning practical skills such as classroom management, while experienced teachers were more oriented toward learning new teaching methods. Challenges in terms of classroom management have been known to occur for early career teachers since many years (e.g. Kelchtermans and Ballet, 2002; Stokking *et al.*, 2003, Veenman, 1984). Regarding subject-matter knowledge, previous research indicated that young teachers face feelings of deficiency toward this topic (Boakye and Ampiah, 2017). This implies that also knowledge demands might differ across generations of teachers.

In order to benefit from generational diversity that is associated with diversity in knowledge, knowledge sharing is essential and brings the importance of interaction among different generations of teachers under attention.

2.2 Teacher interactions: the importance of advice and information seeking

A behavioral approach to knowledge management emphasizes the relational character of knowledge sharing and focuses on the importance of interactions (Argote *et al.*, 2003; Thambi and O'Toole, 2012). Through informal interactions resources such as information can be transferred (Argote *et al.*, 2003). Grangeat and Gray (2007) emphasized the relevance of professional interactions for teachers' professional development. Interactions such as asking advice are of major importance since they facilitate information and knowledge sharing, and are therefore deemed important for teacher learning (Baker-Doyle, 2015; Frank *et al.*, 2004; Kwakman, 2003; Lohman, 2006; Parise and Spillane, 2010). Research often distinguishes an explicit and implicit mode of knowledge (Billet, 2001; Eraut, 2000). Sharing of both explicit and implicit knowledge is seen as relevant for workplace learning and expertise development (Tynjälä, 2008). Interactions such as asking advice can initiate a process of externalization and, therefore, contribute to the conversion of implicit knowledge into an explicit mode (Geeraerts *et al.*, 2016; Nonaka and Takeuchi, 1995). In addition, these interactions among teachers provide access to knowledge (Choo, 1998; Penuel *et al.*, 2009). In other words, knowledge can be accessed through information-seeking interactions. Knowledge flows occur when information is exchanged through interactions (Borgatti *et al.*, 2013). This underlines the importance of social interactions among teachers and highlights the social component that is crucial in the light of intergenerational knowledge sharing. Therefore, we build on social network theory to further investigate teachers' advice and information-seeking interactions.

2.3 A bird's eye view on teachers' advice and information-seeking interactions: a social network approach

The current research takes a social network perspective in studying teachers' advice and information-seeking interactions. The strength of a social network approach is its emphasis on the relationships that connect individuals. These relationships are often referred to as "ties." Social network theory relies on three main assumptions (Degenne and Forsé, 1999; Wasserman and Faust, 1994). First, individuals within a social network are viewed as interdependent rather than independent as in conventional statistical modeling approaches. Second, relationships between individuals are seen as opportunities for the exchange of resources, for instance, advice and information. Third, the patterns of relationships, in other words, the "social structure," can both inhibit and facilitate individual action. Social network theory has a clear focus on relationships; however, when investigating advice and information seeking, we deliberately use the word "interaction" to refer to a type of relationship that is understood as a relational event rather than a relational state (Borgatti *et al.*, 2013).

2.3.1 The role of "content" within advice and information networks. It has been stated that social networks are shaped by the content of the social resources that are exchanged within the networks (Wasserman and Faust, 1994). The concept of "network multiplexity" refers to

the extent of overlap between different kinds of networks. Moolenaar (2010) found for example only limited similarity between professional and personal social networks of teachers. This implies that teachers' social networks differ depending on the content involved. Also, Geeraerts *et al.* (2017) revealed that different professional teacher networks provide a different picture. Previous research focused on teachers' advice and information networks (e.g. Meredith *et al.*, 2017; Spillane *et al.*, 2012); however, the specific content of advice is often neglected. In order to understand intergenerational learning within organizations, it is important to map the specific knowledge contents of employees of different generations since workers of different generations possess and exchange different types of knowledge (Gerpott *et al.*, 2016). This knowledge diversity has also been found for different generations of teachers, as described in the first part of our conceptual framework (Geeraerts *et al.*, 2016). Previous research within teacher network contexts has acknowledged the importance of teacher interactions about classroom practices (e.g. Darling-Hammond and McLaughlin, 1995; Lieberman and Wood, 2003). Accordingly, we adopt a thematic conceptualization of teachers' advice and information interactions and focus on four main content-related advice interactions: subject-matter knowledge, classroom management, innovative teaching methods and ICT. We assume that different content-related advice networks within schools represent a different social network among teachers. Based on this, we raise the following hypothesis:

H1. Teachers' advice and information networks differ regarding the content of advice and information (subject-matter knowledge, classroom management, innovative teaching methods, ICT) that is exchanged within these networks.

2.3.2 The role of "generation" within content-related advice and information networks. Interactions between teachers of different generations provide opportunities to learn (Novotný and Brücknerová, 2014). We distinguish between roles of sender and receiver of advice and information, in other words, "asking advice and information" (sender effect) vs "being asked for advice and information" (receiver effect).

Scholars already focused on differences between novice teachers and experienced ones (e.g. Grosemans *et al.*, 2015; Wolff *et al.*, 2015). Teachers in later career stages are less likely to receive advice and information from colleagues as compared to early career teachers (Moolenaar, 2010; Spillane *et al.*, 2012). Previous research on teachers' advice-seeking interactions revealed that older teachers are less likely to ask advice than younger teachers (Geeraerts *et al.*, 2017). Expecting that this tendency occurs within every content-related advice network, we hypothesize that:

H2a. Older teachers are less likely to ask advice and information within the four content-related advice networks (subject-matter knowledge, classroom management, innovative teaching methods and ICT).

As described earlier, previous research suggested that teachers of different age groups were seen as knowledge sources for different content (Geeraerts *et al.*, 2016). Classroom management knowledge is one of the main challenges of young teachers (Voss *et al.*, 2017; Wolff *et al.*, 2015). On the other hand, young teachers were seen as knowledge sources for innovative teaching methods and ICT, whereas older teachers were seen as a knowledge source for subject-matter knowledge and classroom management (Geeraerts *et al.*, 2016). Valuing someone's knowledge as relevant for your own work seems to increase the probability of seeking that person out for information (Borgatti and Cross, 2003). Expecting that the formation of advice and information interactions are shaped by age and content, we hypothesize that:

H2b. Older teachers are more likely to be asked for advice and information on subject-matter knowledge and classroom management.

H2c. Younger teachers are more likely to be asked for advice and information on innovative teaching methods and ICT.

2.3.3 The role of network homophily in terms of generational similarity. Rivera *et al.* (2010) described an assortative perspective on social interactions, which refers to the compatibility and complementarity between actors' attributes as a predictor for the formation of social relationships. This perspective is connected to the social process of network homophily, which is the tendency for individuals to interact with others who are similar to themselves on salient attributes such as age, race, gender, education and values, than with dissimilar individuals (McPherson *et al.*, 2001). Network homophily is also implied by social identity theory (Tajfel and Turner, 1986). This theory suggests that individuals have more positive perceptions toward people who are similar to them, compared to people who are dissimilar. This results in categorizations of in ("us") and out ("them") groups that can be labeled a social categorization perspective (Williams and O'reilly, 1998). Similarity of age characteristics can trigger these in- and out-group categorizations (Dencker *et al.*, 2007). Meredith *et al.* (2017) found a tendency toward homophily on the matter of teachers' experience within the schools for information-seeking relationships. Geeraerts *et al.* (2017) also found a homophily effect for the youngest group of teachers in terms of asking advice interactions. Based on these arguments we propose the following hypothesis:

H3. Teachers are more likely to engage in advice and information-seeking interactions with colleagues from the same generational cohort.

2.4 Other factors shaping teachers' advice and information-seeking interactions

Previous research on teacher networks acknowledged the influencing role of participating in learning activities such as mentoring, formal subgroups such as subject team meetings and having a formal designated role within the school (e.g. Baker-Doyle and Yoon, 2010; Spillane *et al.*, 2012; Meredith *et al.*, 2017). Spillane *et al.* (2012) found that individuals with formally designated school leadership positions were more likely to provide advice and information, as compared to classroom teachers who did not fulfill such a position within the school. Examples of these formal school leadership positions are assistant principals, mentor teachers, coaches, coordinators, etc.

Mentoring is often described as a method to transfer knowledge from employees of one generation to another (DeLong, 2004; Liebowitz, 2009). Nowadays, there is a growing understanding that mentoring is not only beneficial to young or novice teachers, but also for experienced teachers (Hargreaves and Fullan, 2000). Bringing teachers together by organizing learning activities advances physical proximity and therefore offers access to a variety of knowledge (Spillane *et al.*, 2017; Sun *et al.*, 2013). According to Baker-Doyle and Yoon (2011), teachers with high mentoring qualities are more often contacted for advice. Also, Geeraerts *et al.* (2015) found that teachers who participated in mentoring reported to be contacted more for advice by their colleagues than before their participation.

In addition to organized mentoring activities within the school, intergenerational interactions also occur within subject team meetings. Meredith *et al.* (2017) found that teachers are more likely to seek information from colleagues with whom they share membership on subject teams. However, leadership positions within the subject team were not taken into account. In line with our reasoning of "being a mentor," we expect that teachers with a leading role within the subject team are seen as a knowledge source to their colleagues.

3. Methodology

Within this study, a social network perspective offers a valuable lens to investigate the association between teacher knowledge, advice and information interactions and generations of teachers (e.g. Baker-Doyle and Yoon, 2011; Daly, 2010; de Lima, 2007; Moolenaar, 2010; Penuel *et al.*, 2009).

3.1 Participants

The sample contained 660 classroom teachers, from ten secondary education schools in Flanders (Belgium).

Three generational cohorts were distinguished based on chronological age. The young cohort contains 221 teachers aged 35 years old or younger. The middle cohort contains 279 teachers from 36 to 50 years old. The old cohort consists of 153 teachers older than 50 years old. Further sample demographics are summarized in Table I.

In line with findings of other studies (e.g. Richter *et al.*, 2011; Geeraerts *et al.*, 2017), we found high correlations between teachers' age and the number of years of experience within the school and within education, $r = 0.77$ and $r = 0.85$, respectively. Also, the correlation between number of years of experience within the school and within education was 0.86. These findings suggest that the number of teachers who enter the teaching profession at

Description of the measures		Valid %
Generational cohort		
Young	< 36 years	34
Middle	36–50 years	43
Old	> 50 years	23
Working fulltime		
No (0)	< 90% of a fulltime vacancy	37
Yes (1)	> 90% of a fulltime vacancy	63
Mentor		
No (0)	–	98
Yes (1)	Fulfilling a mentor role besides general teacher responsibilities	2
Head of subject team		
No (0)	–	87
Yes (1)	Being the head of a subject team	13
Additional formal role		
No (0)	–	94
Yes (1)	Fulfilling one of the following roles besides general teacher responsibilities: principal, student counselor, departmental coordinator, policy assistant or ICT coordinator	6
Participating in formal learning		
No (0)	–	74
Yes (1)	Participating in one of these activities: mentoring, induction sessions, collegial visitations	26
Expertise in		
Subject-matter knowledge		
No (0)		31
Yes (1)		69
Classroom management		
No (0)		65
Yes (1)		35
Innovative teaching methods		
No (0)		76
Yes (1)		24
ICT		
No (0)		78
Yes (1)		22

Notes: Schools: $n = 10$; respondents: $n = 660$

Table I.
Sample demographics and measures

later stages in their career is limited. In the Flemish teacher population, young teachers tend to be new teachers.

Data were collected in ten secondary education schools. School sizes ranged from 42 to 162 teachers. The average age of teachers was 41 years old. The average response rate was 88 percent, ranging from 78 to 98 percent. Blau's heterogeneity index was calculated as a measure of generational diversity. The index approaches 1 when teachers are more evenly spread over the three generational cohorts. This is the case in the schools we studied since the Blau index ranged from 0.79 to 1.

All secondary education schools in this sample did organize mentoring practices and subject team meetings in order to foster teacher collaboration and interaction.

3.2 Data collection

Data were collected by using an online survey. Socio-metric questions used in this study were.

Keeping in mind the last six months:

- Whom did you go to for advice and information on subject-matter knowledge?
- Whom did you go to for advice and information on classroom management?
- Whom did you go to for advice and information on innovative teaching methods?
- Whom did you go to for advice and information on ICT? (with ICT we refer to the digitalization of teaching materials, as well as the use of software, tablets, smartboards, etc.).

To answer these socio-metric questions, teachers were provided with a complete list or roster of their teacher colleagues. According to Marsden (2011), this list assists respondents to remember the alters in their network and so it minimizes measurement error. We used a free choice design, meaning that there was no limitation to the number of colleagues a respondent could nominate as part of his/her network (Wasserman and Faust, 1994).

3.3 Measures

Our dependent variable is the existence or the absence of an asking advice and information interaction between two teachers (a dyad). The mathematical representation of these interactions is an adjacency matrix composed by 0s and 1s (Van Duijn and Vermunt, 2006). A value of 0 indicates the absence of a tie between i and j, whereas a value of 1 represents an interaction between i and j (e.g. i asks advice to j). Thus, interactions are directional and dichotomous (Wasserman and Faust, 1994).

On the individual level, generation is measured by age in a numeric way. In our model we controlled for working fulltime, being a mentor, being a head of a subject team, having an additional formal role expertise, participating in formal learning and expertise. These control variables were earlier explained in Table I.

3.4 Data analysis

Regarding *H1*, we conducted a series of QAP correlations in UCINET to determine similarities between the four advice networks (Borgatti *et al.*, 2013). QAP correlations ought to be used to run correlational analysis on social networks since relations between individuals are nested and embedded within the same network. The QAP correlation procedure calculates a Pearson correlation coefficient for two corresponding cells of two rosters that contain network data.

Regarding *H2* and *H3*, we used the p2 package within the social network software Stocnet (Boer *et al.*, 2006). By using p2 modeling, we investigated dyadic ties as the

dependent variable. The model predicts the likelihood of the formation of a relationship between pairs of actors.

The p2 model is a model for the statistical analysis of directed binary relationship data with actor and/or dyadic covariates (Boer *et al.*, 2006; Zijlstra and van Duijn, 2003). This model focuses on complete networks, which implies that every actor within the network can have ties with all other actors; however, some observations from these complete networks are allowed to be missing in the p2 model (Van Duijn and Vermunt, 2006). Sender, receiver, density and reciprocity effects can be computed. The aim of this p2 model is to test the effects of actor and/or dyadic attributes on the observed directed network ties, when controlling for reciprocity and for differences between actors in sending and receiving relationships. P2 models can be seen as an extension of the p1 model, since p2 models are a type of logistic regression model that includes both reciprocity effects and random sender/receiver effects (Boer *et al.*, 2006; Zijlstra and van Duijn, 2003). The p2 model takes into account the dependency between relationships from one to another actor within the network (Lazega and van Duijn, 1997). The multilevel variant of the p2 model is used for the analysis of multiple networks. Parameter estimates of the (multilevel) p2 model derive from the Markov Chain Monte Carlo procedures (Boer *et al.*, 2006; Zijlstra *et al.*, 2006). A positive significant parameter estimate indicates a positive effect of the variable on the likelihood of forming a relationship.

In order to investigate homophily effects, the p2 software constructs dyadic matrices based on the absolute difference between two actors within the network. For instance, a dyad between a teacher of the youngest generational cohort and a teacher of the middle generational cohort represents a relationship between teachers of a different generational cohort. This absolute difference between being part of the youngest and oldest cohort (dummy variable = 0) and being part of the middle cohort (dummy variable = 1) is 1. In this example, a negative parameter estimate suggests that a difference in generational cohort is related to a lower likelihood of having relationships. In other words, teachers from a different generational cohort are less likely to form relationships. Homophily effects can be recognized in negative parameter estimates of dyadic relationships.

Regarding the significance level of the parameter estimates, an additional Wald test needs to be calculated by dividing the parameter estimate by the corresponding standard error. A ratio smaller than −2 or larger than 2 indicates a significant effect at 0.05 level.

4. Findings

4.1 Uniqueness of content-related advice and information networks (H1)

Our first hypothesis focuses on the uniqueness of content-related advice and information networks within school teams. Table II summarizes the average QAP correlations between the four advice networks. In general, results indicate that all the networks are correlated with varying degrees between 0.098 and 0.314. Asking advice on ICT and asking advice on classroom management seemed to show the weakest correlation. Asking advice on

	Subject-matter knowledge	Classroom management	Innovative teaching methods	ICT
Subject-matter knowledge	1	0.173	0.314	0.147
Classroom management		1	0.212	0.098
Innovative teaching methods			1	0.284
ICT				1
Note: $n = 10$				

Table II.
Average QAP
correlations

subject-matter knowledge and teaching methods shows the highest correlation. Due to the rather weak correlations, our findings suggest that overlap between our networks is limited. This implies that *H1* can be confirmed. Therefore, we conclude that asking advice networks should be investigated based on the different kinds of knowledge that is exchanged within the network as a consequence of the advice relationship. This finding underlines the importance of investigating advice and information networks separately.

4.2 Sending and receiving interactions in content-related advice networks (H2a–H2c and H3)

In order to gain insight in the influencing factors for the formation of content-related advice interactions, we used a multilevel p2 model. Parameter estimates of the multilevel p2 model are presented in Table III.

First, overall effects demonstrate negative density effects and positive reciprocity effects within the four networks. The negative density effect suggest that the advice networks are overall sparse; in other words each network has relatively few ties compared to the overall number of possible ties. The positive parameter estimates of reciprocity indicate a tendency of reciprocated ties instead of unidirectional ties for advice on subject knowledge, classroom management and innovative teaching methods. Within the network of advice on ICT, the negative reciprocity parameter estimate suggests a tendency of rather unidirectional ties within this network. Regarding the random effects, the positive and significant effects of sender and receiver variance indicate considerable variation

Asking advice networks	Subject-matter knowledge PE (SE)	Classroom management PE (SE)	Innovative teaching methods PE (SE)	ICT PE (SE)
Overall effects				
Density	*–3.81* (0.26)	*–4.41* (0.43)	*–3.98* (0.51)	*–6.06* (0.74)
Reciprocity	*4.04* (0.18)	*2.34* (0.30)	*3.36* (0.43)	–0.12 (0.65)
Sender covariates (asking advice)				
Age	*–0.0255* (0.0062)	*–0.030* (0.010)	*–0.0331* (0.0102)	–0.0199 (0.0104)
Working fulltime	–0.02 (0.12)	–0.13 (0.20)	–0.23 (0.23)	–0.05 (0.19)
Participating in learning activities	0.14 (0.12)	0.33 (0.18)	–0.07 (0.20)	0.08 (0.22)
Receiver covariates (being asked for advice)				
Age	*0.0127* (0.0044)	0.0025 (0.0054)	*–0.0152* (0.0075)	*–0.036* (0.0138)
Working fulltime	0.17 (0.09)	–0.02 (0.12)	–0.05 (0.15)	*0.85* (0.22)
Mentor role	–0.03 (0.25)	*0.92* (0.29)	0.51 (0.43)	0.55 (0.61)
Head of subject team	0.14 (0.11)	*0.39* (0.14)	*0.51* (0.20)	*1.14* (0.30)
Additional formal role	0.26 (0.13)	*0.81* (0.18)	*0.73* (0.26)	*1.95* (0.34)
Participating in learning activities	–0.18 (0.11)	–0.03 (0.13)	0.15 (0.18)	–0.25 (0.27)
Expertise in subject-matter knowledge[a]/classroom management[b]/innovative teaching methods[c]/ICT[d]	–0.05[a] (0.09)	*0.54*[b] (0.13)	0.16[c] (0.16)	*1.80*[d] (0.24)
Relationship covariates				
Youngest cohort	*–0.17* (0.06)	–0.14 (0.09)	–0.10 (0.11)	–0.31 (0.16)
Middle cohort	–0.05 (0.06)	0.07 (0.09)	–0.11 (0.12)	0.13 (0.17)
Oldest cohort	–0.01 (0.07)	*–0.21* (0.10)	–0.22 (0.16)	0.17 (0.20)
Random effects				
Sender variance	*0.69* (0.09)	*2.41* (0.30)	*1.96* (0.33)	*1.41* (0.29)
Receiver variance	*0.31* (0.06)	*0.56* (0.09)	*0.74* (0.16)	*2.20* (0.34)
Covariance	*–0.30* (0.06)	–0.19 (0.12)	–0.27 (0.18)	0.12 (0.33)

Table III.
The effect of sender and receiver demographic variables on the likelihood of forming advice and information interactions regarding subject knowledge, classroom management, innovative teaching methods and ICT

Notes: PE, parameter estimate; SE, standard error. Italic typeface refers to a significant PE. Parameter estimates of the multilevel p2 models. [a–d]The same letters denote the corresponding value

among teachers in the amount of ties they send and receive within the four networks. The negative sender–receiver covariance for advice on subject knowledge, classroom management and innovative teaching methods suggests that teachers who report to send more ties have a lower likelihood of receiving ties within their network, when allowing for differences between schools.

4.2.1 The likelihood of asking advice and information (sender effect). Looking at the sender covariates, we found significant negative effects for age on asking advice when the advice is about subject-matter knowledge, classroom management or innovative teaching methods. In other words, the older the teacher, the lower the likelihood to ask advice to their peers on the topic of subject-matter knowledge (−0.03), classroom management (−0.03) and innovative teaching methods (−0.04). Consequently, we found only partial support for *H2a*.

Interestingly, participating in learning activities and having a fulltime position did not affect the likelihood to ask advice within the four networks.

4.2.2 The likelihood of being asked for advice and information (receiver effect). Regarding the receiver covariates, we found a significant positive parameter estimate for age on being asked for advice and information on subject-matter knowledge (0.01), and significant negative parameter estimates for age on being asked for advice and information on innovative teaching methods (−0.02) and ICT (−0.04). These findings suggest that the older the teacher is, the more likely he/she will be asked for advice and information on subject-matter knowledge and the less likely he/she is asked for advice and information on innovative teaching methods and ICT. Our findings give only partial support to *H2b* and give full support to *H2c*.

Looking at the control variables in the multilevel p2 model, a variety of significant effects was found. Teachers who perceive themselves as a knowledge source of classroom management are more likely to be asked for advice and information on classroom management (0.54). Similarly, teachers who perceive themselves as a knowledge source of ICT are more likely to be asked for advice and information on ICT.

Regarding formally designated roles within the school, several significant positive parameter estimates were found. First, teachers with a mentor role seem to be contacted more for advice on classroom management (0.91). Also, the head of a subject team and teachers who combine their teaching position with an additional formal role seem to serve as an important source of advice regarding classroom management (0.39 and 0.81, respectively), innovative teaching methods (0.51 and 0.73, respectively) and ICT (1.14 and 1.95, respectively). The effect of additional formal role within the school is even stronger than the effect of being head of a subject team.

In line with the findings of sender effects, participating in learning activities did not affect the likelihood to receive advice within the networks. However, working fulltime within the school increases the likelihood to be asked for advice and information on ICT (0.85).

4.3 Generational homophily in content-related advice networks (H3)
Regarding the effects of the relationship covariates, two significant homophily effects were found. First, a significant homophily effect occurs for the youngest cohort within the network of asking advice and information on subject-matter knowledge (−0.17). This finding indicates that school team members of the youngest cohort are more likely to ask advice and information to colleagues of the same generational cohort than to colleagues of the middle or the oldest generational cohort. Second, a significant homophily effect was found for the oldest cohort in terms of asking advice and information on classroom management (−0.21). This implies that *H3* can only be confirmed for the youngest generation in advice and information networks on subject-matter knowledge, and for the oldest cohort when it comes to advice and information on classroom management.

5. Conclusions and discussion

In this study we have investigated teachers' information and advice-seeking interactions in Flemish secondary education teacher teams and approached it from an intergenerational perspective.

The main contribution of this study can be found in the addition of content to asking advice and information interactions. Four essential content-related advice and information networks in terms of teacher knowledge investigated in this study were: subject-matter knowledge, classroom management, innovative teaching methods and ICT. These four content-related advice and information networks appeared to give a different picture of interactions (*H1*). Teachers tend to approach different individuals for advice depending on the content matter on which they require advice. This underlines the significant role of content and, therefore, the importance of specifying what the advice and information was about (Cross *et al.*, 2001). Further research on the topic of teachers' advice networks might include other knowledge domains that might be relevant for teacher learning. For instance, a categorization of teacher knowledge by Shulman (1987) distinguishes content knowledge, pedagogical content knowledge, general pedagogical knowledge, curriculum knowledge, knowledge of learners, knowledge of educational contexts and knowledge of educational ends. The knowledge domains used in this study can be placed within content knowledge, pedagogical content knowledge and general pedagogical knowledge. According to Spillane and Hopkins (2013), also subject-matter differences can occur in teachers' information-seeking networks. Further research can add a more detailed description of content within the advice relationship for instance by providing examples that indicate the difference between content knowledge and pedagogical content knowledge. In this study, we provided additional information on ICT. Also, the facilitating role of other networks, for instance, physical proximity or friendship raises interesting questions for further studies (e.g. Spillane *et al.*, 2017).

The interactions within the networks of this study deliberately focused on "asking advice and information," since it establishes a necessary bridge between knowledge demands and supply of knowledge. This bridge, formed by interaction, distinguishes two directions: asking advice (demand) and being asked for advice (supply). Our results indicated that generation matters within the formation of these content-related advice interactions.

Regarding "asking advice," this study finds evidence that older teachers are less likely to ask advice and information to their colleagues when it comes to subject-matter knowledge, classroom management knowledge and innovative teaching methods (*H2a*). Teachers' age did not matter in terms of asking advice and information on ICT, meaning that teachers of all ages seem to show similar advice and information-seeking behavior when it comes to ICT. These findings connect to previous research indicating that beginning teachers are more oriented toward learning about classroom management and the subject matter (e.g. Kyndt *et al.*, 2016; Veenman, 1984; Wolff *et al.*, 2015). However, our findings contrast the finding that experienced teachers are more oriented toward learning new teaching methods (Kyndt *et al.*, 2016). Further research can dive more deeply into the reasons for this, for instance, older teachers might perceive asking advice on ICT as more "acceptable" for their generation as compared to other knowledge domains.

Regarding "being asked for advice," older teachers are more likely to be asked for advice and information on subject-matter knowledge, and less likely to be asked for advice and information on innovative teaching methods and ICT (*H2b, H2c*). This extends the findings of previous research indicating that young teachers are perceived as a knowledge source for innovative teaching methods and ICT, and older teachers for subject-matter knowledge, with the finding that these generations of teachers are actually found by their colleagues for advice and information on the corresponding topics (Geeraerts *et al.*, 2016, 2017). In terms of advice and information on classroom management, we expected to see that older teachers serve as a knowledge source; however, no significant age effect was found. Interestingly, teachers who combine the teaching with a mentor role have the highest likelihood to be asked for advice and information on classroom management.

Regarding "network homophily," teachers of the youngest cohort are more likely to interact within their own generational cohort when advice includes subject-matter knowledge (*H3*). Another homophily effect occurs for the oldest cohort of teachers in terms of advice on classroom management (*H3*). Our homophily effects provide additional insight in the homophily effects found by Meredith *et al.* (2017), indicating that teachers are more likely to interact with colleagues who have similar years of experience. Content matters when investigating age-related homophily effects in advice and information-seeking interactions. Our significant findings also suggest that social identity theory might be at play for these generations in these advice networks. Reasons for these tendencies might be found in the "sensitivity" of lacking knowledge or skills, combined with the feelings of being evaluated by colleagues on these topics. Young teachers face feelings of deficiency in subject-matter knowledge (Boakye and Ampiah, 2017). Kelchtermans and Ballet (2002) described that young teachers fear being perceived as incompetent or vulnerable by their more experienced colleagues. It might be that young teachers perceive problems in terms of classroom management as more "normal" or accepted in the beginning of their career, and therefore, interact with older teachers for this kind of advice. In contrast to this, older teachers might perceive the opposite, meaning that asking advice on classroom management to a younger colleague might feel as problematic or less accepted due to their status and experience. Therefore, further research might further investigate the impact of psychological safety and trust among teachers in this regard. Additionally, because of the connection between social identity theory and network homophily, further research might further investigate the formation of in- and out-groups in teacher teams. Also, insight in the reasons why teachers are not inclined to ask advice to a certain age group might contribute to the field of intergenerational learning. The revealed homophily effects in this study are solely based on generational cohorts; however, other homophily effects, for instance, similarities in teachers' beliefs or stereotypical beliefs, can be of interest for further research.

Reflecting on the significant effects we found, we state that age definitely plays a role in advice and information-seeking interactions. However, the strength of the age effects cannot be compared to the effects of our control variables since those are measured in a different way, numeric vs dummy variables. Furthermore, it should be noticed that many of our age effects remained significant after controlling for variables related to, for instance, formal roles.

Network homophily was investigated by generational cohort. As literature on generations lacks consistency in defining age boundaries of generational cohorts, we built on the boundaries that have been used in previous research within the context of teacher teams (e.g. Edge, 2014; Geeraerts *et al.*, 2016). Future research could look deeper into the impact of age boundaries that define generational cohorts. Given that age or generation can be seen as a multidimensional construct, researchers state that it might also include a component related to years of experience, self-perception of age, life stage or family status (Kooij *et al.*, 2008). Some of these dimensions cannot be unraveled within the teacher profession. Within different national contexts research showed that teachers' chronological age correlates highly with the number of years of experience teachers have within education and within a school which impedes the multidimensional approach (e.g. Geeraerts *et al.*, 2017; Richter *et al.*, 2011). Also in our data, age correlated highly with the number of years of experience within the school and within education which might cause problems of multicollinearity. Therefore, age and experience could not be included simultaneously in our p2 model. Our research did not include aspects related to self-perception of age, life stage or family status, which might offer interesting paths for further studies.

Based on this study, suggestions for practice can be formulated. The low density throughout all networks and the above-described homophily effects underline the importance of stimulating intergenerational teacher interactions. School principals should aim at creating an organizational culture that aims at valuing diversity, particularly in terms of age (Burmeister and Deller, 2016). Also, school principals or policy makers need to

pay attention to cultivating a formal structure as a fruitful context for both formal and informal intergenerational teacher interactions. Our data revealed that mentors serve as an important source of knowledge in terms of classroom management. This raises important questions on how to extend or further develop the mentor role in a way that also other themes of advice can be reached. Another role can be found in enhancing teachers' "network literacy," which refers to stimulating awareness of teachers' knowledge and the current (un) tapped knowledge sources within the school team. Expertise transparency is needed to strengthen teachers' professional development (Baker-Doyle and Yoon, 2010). It is a challenge for schools to create awareness on the "silent experts" within the school team (Baker-Doyle and Yoon, 2011). From a knowledge management perspective, it is important to unravel which teachers are "isolates" within their team since these imply that knowledge cannot be shared or leveraged (Cross and Borgatti, 2004). Thus, social network analysis can be used as an effective evaluation instrument or as a tool to support teacher interactions.

Limitations of this study can be found in the fact that we solely draw on quantitative research methods. There is an urgent call for more mixed method research in social networks, for instance, by combining network data with observations, interview data or the use of socio-metric badges (e.g. Bellotti, 2014). In this study, information on the length or frequency of interaction is not included. Also, we do not have insight in the quality of the interaction. Thus, little is known on the impact of the advice-seeking interactions on teachers' daily practice and student learning. Mixed method network studies offer possibilities for deeper investigations of intergenerational teacher interactions. Further research might focus on the impact on teachers' functioning and student outcomes. Also, our network data are cross-sectional. Networks can change over time, for instance, interactions in the beginning of the school year can be different from interactions later in the school year. Insight in the extent to which teachers go to the same person or generation again for similar kinds of advice can be useful. Longitudinal network data can provide more insight in the extent to which networks are evolving.

To conclude, we state that investigating teachers' intergenerational advice and information seeking is relevant when the content of advice is included in the networks. Generation seemed to play a role in the formation of content-related advice and information-seeking interactions. Social networks can be used as a valuable tool for understanding and supporting teachers' intergenerational learning.

References

Argote, L., McEvily, B. and Reagans, R. (2003), "Managing knowledge in organizations: an integrative framework and review of emerging themes", *Management Science*, Vol. 49 No. 4, pp. 571-582.

Baker-Doyle, K. (2015), "No teacher is an island: how social networks shape teacher quality", in LeTendre, G.K. and Wiseman, A.W. (Eds), *Promoting and Sustaining a Quality Teacher Workforce. International Perspectives on Education and Society*, Vol. 27, Emerald Publishing Limited, pp. 367-383, doi: 10.1108/S1479-367920140000027005.

Baker-Doyle, K. and Yoon, S.A. (2010), "Making expertise transparent: using technology to strengthen social networks in teacher professional development", in Daly, A.J. (Ed.), *Social Network Theory and Educational Change*, Harvard Education Press, Cambridge, pp. 115-126.

Baker-Doyle, K. and Yoon, S.A. (2011), "In search of practitioner-based social capital: a social network analysis tool for understanding and facilitating teacher collaboration in a US-based STEM professional development program", *Professional Development in Education*, Vol. 37 No. 1, pp. 75-93.

Bellotti, E. (2014), *Qualitative Networks: Mixed Methods in Sociological Research*, Routledge, New York, NY.

Billet, S. (2001), "Knowing in practice: re-conceptualising vocational expertise", *Learning and Instruction*, Vol. 11 No. 6, pp. 431-452.

Boakye, C. and Ampiah, J.G. (2017), "Challenges and solutions: the experiences of newly qualified science teachers", *SAGE Open*, Vol. 7 No. 2, pp. 1-10.

Boer, P., Huisman, M., Snijders, T.A.B., Steglich, C., Wichers, L.H.Y. and Zeggelink, E.P.H. (2006), *StOCNET: An Open Software System for the Advanced Statistical Analysis of Social Networks*, Version 1.7, ICS/Science Plus, Groningen.

Borgatti, S.P. and Cross, R. (2003), "A relational view of information seeking and learning in social networks", *Management Science*, Vol. 49 No. 4, pp. 432-445.

Borgatti, S.P., Everett, M.G. and Johnson, J.C. (2013), *Analyzing Social Networks*, SAGE Publications, London.

Brücknerová, K. and Novotný, P. (2016), "Intergenerational learning among teachers: overt and covert forms of continuing professional development", *Professional Development in Education*, Vol. 43 No. 3, pp. 397-415.

Burmeister, A. and Deller, J. (2016), "Knowledge retention from older and retiring workers: what do we know, and where do we go from here?", *Work, Aging and Retirement*, Vol. 2 No. 2, pp. 87-104.

Choo, C.W. (1998), *The Knowing Organization: How Organizations Use Information to Construct the Meaning, Create Knowledge, and Make Decisions*, Oxford University Press, New York, NY.

Cross, R. and Borgatti, S.P. (2004), "The ties that share: relational characteristics that facilitate information seeking", in Huysman, M. and Wulf, V. (Eds), *Social Capital and Information Technology*, MIT Press, Cambridge, MA, pp. 137-161.

Cross, R., Borgatti, S.P. and Parker, A. (2001), "Beyond answers: dimensions of the advice network", *Social Networks*, Vol. 23 No. 3, pp. 215-235.

Daly, A.J. (2010), *Social Network Theory and Educational Change*, Harvard Education Press, Cambridge.

Darling-Hammond, L. and McLaughlin, M.W. (1995), "Policies that support professional development in an era of reform", *Phi Delta Kappan*, Vol. 76 No. 8, pp. 597-604.

de Lima, J.A. (2007), "Teachers' professional development in departmentalised, loosely coupled organisations: lessons for school improvement from a case study of two curriculum departments", *School Effectiveness and School Improvement*, Vol. 18 No. 3, pp. 273-301.

Degenne, A. and Forsé, M. (1999), *Introducing Social Networks*, SAGE Publications, London.

DeLong, D.W. (2004), *Lost Knowledge. Confronting the Threat of an Aging Workforce*, Oxford University Press, Oxford.

Dencker, J.C., Joshi, A. and Martocchio, J.J. (2007), "Employee benefits as context for intergenerational conflict", *Human Resource Management Review*, Vol. 17 No. 2, pp. 208-220.

Edge, K. (2014), "A review of the empirical generations at work research: implications for school leaders and future research", *School Leadership & Management*, Vol. 34 No. 2, pp. 136-155.

Edge, K., Descours, K. and Frayman, K. (2016), "Generation X school leaders as agents of care: leader and teacher perspectives from Toronto, New York City and London", in Leithwood, K., Sun, J. and Pollock, K. (Eds), *How School Leaders Contribute to Student Success*, Springer International Publishing.

Eraut, M. (2000), "Non-formal learning and tacit knowledge in professional work", *British Journal of Educational Psychology*, Vol. 70 No. 1, pp. 113-136.

Frank, K.A., Zhao, Y. and Borman, K. (2004), "Social capital and the diffusion of innovations within organizations: the case of computer technology in schools", *Sociology of Education*, Vol. 77 No. 2, pp. 148-171.

Geeraerts, K., Vanhoof, J. and Van den Bossche, P. (2016), "Teachers' perceptions of intergenerational knowledge flows", *Teaching and Teacher Education*, Vol. 56, May, pp. 150-161, doi: 10.1016/j.tate.2016.01.024.

Geeraerts, K., Van den Bossche, P., Vanhoof, J. and Moolenaar, N.M. (2017), "Intergenerational professional relationships in elementary school teams: a social network approach", *Frontline Learning Research*, Vol. 5 No. 2, pp. 78-98, doi: 10.14786/flr.v5i2.293.

Geeraerts, K., Tynjälä, P., Heikkinen, H.L.T., Markkanen, I., Pennanen, M. and Gijbels, D. (2015), "Peer-group mentoring as a tool for teacher development", *European Journal of Teacher Education*, Vol. 38 No. 3, pp. 358-377.

Gerpott, F.H., Lehmann-Willenbrock, N. and Voelpel, S.C. (2016), "A phase model of intergenerational learning in organizations", *Academy of Management Learning & Education*, Vol. 16 No. 2.

Grangeat, M. and Gray, P. (2007), "Factors influencing teachers' professional competence development", *Journal of Vocational Education & Training*, Vol. 59 No. 4, pp. 485-501.

Grosemans, I., Boon, A., Verclairen, C., Dochy, F. and Kyndt, E. (2015), "Informal learning of primary school teachers: considering the role of teaching experience and school culture", *Teaching and Teacher Education*, Vol. 47, April, pp. 151-161.

Hargreaves, A. and Fullan, M. (2000), "Mentoring in the new millennium", *Theory Into Practice*, Vol. 39 No. 1, pp. 50-56.

Kelchtermans, G. and Ballet, K. (2002), "The micropolitics of teacher induction. a narrative-biographical study on teacher socialisation", *Teaching and Teacher Education*, Vol. 18 No. 1, pp. 105-120.

Kooij, D., de Lange, A., Jansen, P. and Dikkers, J. (2008), "Older workers' motivation to continue to work: five meanings of age. A conceptual review", *Journal of Managerial Psychology*, Vol. 23 No. 4, pp. 364-394.

Kwakman, K. (2003), "Factors affecting teachers' participation in professional learning activities", *Teaching and Teacher Education*, Vol. 9 No. 2, pp. 149-170.

Kyndt, E., Gijbels, D., Grosemans, I. and Donche, V. (2016), "Teachers' everyday professional development: mapping informal learning activities, antecedents, and learning outcomes", *Review of Educational Research*, Vol. 86 No. 4, pp. 1111-1150, doi: 10.3102/0034654315627864.

Lazega, E. and van Duijn, M. (1997), "Position in formal structure, personal characteristics and choices of advisors in a law firm: a logistic regression model for dyadic network data", *Social Networks*, Vol. 19 No. 4, pp. 375-397.

Lieberman, A. and Wood, D.R. (2003), *Inside the National Writing Project: Connecting Network Learning to Classroom Teaching*, Teachers College Press, New York, NY.

Liebowitz, J. (2009), *Knowledge Retention: Strategies and Solutions*, Auerbach Publications, Boca Raton, FL.

Lohman, M.C. (2006), "Factors influencing teachers' engagement in informal learning activities", *Journal of Workplace Learning*, Vol. 18 No. 3, pp. 141-156.

McPherson, J.M., Smith-Lovin, L. and Cook, J.M. (2001), "Birds of a feather: homophily in social networks", *Annual Review of Sociology*, Vol. 27, August, pp. 415-444.

Mannheim, K. (1952), *Essays on the Sociology of Knowledge*, Routledge & Kegan Paul, London.

Marsden, P.V. (2011), "Survey methods for network data", in Scott, J. and Carringston, P.J. (Eds), *The SAGE Handbook of Social Network Analysis*, SAGE Publications, Thousand Oaks, CA, pp. 310-388.

Meredith, C., Van den Noortgate, W., Struyve, C., Gielen, S. and Kyndt, E. (2017), "Information seeking in secondary schools: a multilevel network approach", *Social Networks*, Vol. 50, July, pp. 35-45.

Moolenaar, N.M. (2010), "Ties with potential. Nature, antecedents, and consequences of social networks in school teams", *Doctoral Dissertation*, University of Amsterdam, Amsterdam.

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge-Creating Company. How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York, NY.

Novotný, P. and Brücknerová, K. (2014), "Intergenerational learning among teachers: an interaction perspective", *Studia Paedagogica*, Vol. 19 No. 4, pp. 45-79.

Parise, L.M. and Spillane, J.P. (2010), "Teacher learning and instructional change: how formal and on-the-job learning opportunities predict change in elementary school teachers' practice", *The Elementary School Journal*, Vol. 110 No. 3, pp. 323-346.

Penuel, W.R., Riel, M., Krause, A. and Frank, K.A. (2009), "Analyzing teachers' professional interactions in a school as social capital: a social network approach", *Teachers College Record*, Vol. 111 No. 1, pp. 124-163.

Richter, D., Kunter, M., Klusmann, U., Lüdtke, O. and Baumert, J. (2011), "Professional development across the teaching career: teachers' uptake of formal and informal learning opportunities", *Teaching and Teacher Education*, Vol. 27 No. 1, pp. 116-126.

Rivera, M.T., Soderstrom, S.B. and Uzzi, B. (2010), "Dynamics of dyads in social networks: assortative, relational, and proximity mechanisms", *Annual Review of Sociology*, Vol. 36, August, pp. 91-115.

Shulman, L.S. (1987), "Knowledge and teaching: foundations of the new reform", *Harvard Educational Review*, Vol. 57 No. 1, pp. 1-21.

Spillane, J.P. and Hopkins, M. (2013), "Organizing for instruction in education systems and school organizations: how the subject matters", *Journal of Curriculum Studies*, Vol. 45 No. 6, pp. 721-747.

Spillane, J.P., Kim, C.M. and Frank, K.A. (2012), "Instructional advice and information providing and receiving behavior in elementary schools: exploring tie formation as a building block in social capital development", *American Educational Research Journal*, Vol. 49 No. 6, pp. 1112-1145.

Spillane, J.P., Shirrell, M. and Sweet, T.M. (2017), "The elephant in the schoolhouse: the role of propinquity in school staff interactions about teaching", *Sociology of Education*, Vol. 90 No. 2, pp. 149-171.

Stokking, K., Leenders, F., De Jong, J. and Van Tartwijk, J. (2003), "From student to teacher: reducing practice shock and early dropout in the teaching profession", *European Journal of Teacher Education*, Vol. 26 No. 3, pp. 329-350.

Stone-Johnson, C. (2011), "Talkin' bout my generation: boomers, Xers, and educational change", *Journal of Educational Change*, Vol. 12 No. 2, pp. 221-239.

Stone-Johnson, C. (2017), "Autonomy, professionalism, and the role of generation in professional capital", *Journal of Professional Capital and Community*, Vol. 2 No. 1, pp. 18-35.

Sun, M., Penuel, W.R., Frank, K.A., Gallagher, H.A. and Youngs, P. (2013), "Shaping professional development to promote the diffusion of instructional expertise among teachers", *Educational Evaluation and Policy Analysis*, Vol. 35 No. 3, pp. 344-369.

Tajfel, H. and Turner, J.C. (1986), "The social identity theory of intergroup behavior", in Worchel, S. and Austin, W.G. (Eds), *Psychology of Intergroup Relations*, Nelson-Hall, Chicago, IL, pp. 7-24.

Thambi, M. and O'Toole, P. (2012), "Applying a knowledge management taxonomy to secondary schools", *School Leadership & Management*, Vol. 32 No. 1, pp. 91-102.

Tynjälä, P. (2008), "Perspectives into learning at the workplace", *Educational Research Review*, Vol. 3 No. 2, pp. 130-154.

Van Duijn, M. and Vermunt, J.K. (2006), "What is special about social network analysis?", *Methodology*, Vol. 2 No. 1, pp. 2-6.

Veenman, S. (1984), "Perceived problems of beginning teachers", *Review of Educational Research*, Vol. 54 No. 2, pp. 143-178.

Voss, T., Wagner, W., Klusmann, U., Trautwein, U. and Kunter, M. (2017), "Changes in beginning teachers' classroom management knowledge and emotional exhaustion during the induction phase", *Contemporary Educational Psychology*, Vol. 51, October, pp. 170-184.

Wasserman, S. and Faust, K. (1994), *Social Network Analysis: Methods and Applications*, Cambridge University Press, New York, NY.

Williams, K.Y. and O'reilly, C.A. (1998), "Demography and diversity in organizations: a review of 40 years of research", *Research in Organizational Behavior*, Vol. 20, pp. 77-140.

Wolff, C.E., van den Bogert, N., Jarodzka, H. and Boshuizen, H.P.A. (2015), "Keeping an eye on learning: differences between expert and novice teachers' representations of classroom management events", *Journal of Teacher Education*, Vol. 66 No. 1, pp. 68-85.

Zijlstra, B.J.H. and van Duijn, M.A.J. (2003), *Manual p2. Version 2.0.0.7*, IEC ProGAMMA/University of Groningen, Groningen.

Zijlstra, B.J.H., Van Duijn, M.A.J. and Snijders, T.A.B. (2006), "The multilevel p2 model: a random effects model for the analysis of multiple social networks", *Methodology*, Vol. 2 No. 1, pp. 42-47.

Corresponding author
Kendra Geeraerts can be contacted at: kendra.geeraerts@uantwerpen.be