

DEAD WOOD OR UNTAPPED EXPERTISE ?

Intergenerational knowledge flows in school teams

Kendra Geeraerts

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**DEAD WOOD OR UNTAPPED EXPERTISE?
INTERGENERATIONAL KNOWLEDGE FLOWS IN SCHOOL TEAMS**

DOOD HOUT OF ONAANGEBOORDE EXPERTISE?
INTERGENERATIONELE KENNISSTROMEN IN SCHOOLTEAMS

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Introduction



1. Setting the scene: age demography and generational diversity in school teams and beyond

Nowadays, societies experience major changes that have a crucial influence on the demography within organizations (van Knippenberg & Schippers, 2007). One of these demographic developments is related to the change in age structure of populations which goes along with an increased level of age-diversity in organizations (De Meulenaere, 2015). As populations are aging, for instance due to longer life expectancies, societies are challenged to sustain health, welfare, and retirement systems (CEDEFOP, 2012; Compton et al., 2014). One way to tackle this challenge is increasing the retirement age and, therefore, encouraging active aging (OECD, 2017). Besides the fact that employees are expected to stay longer in the workforce, many of these older workers also retire in the near future. These large outflows of older employees can lead to potential loss of critical organizational knowledge and experience, especially when these older workers are an ‘untapped’ source of knowledge when they leave. Therefore, taking advantage of the knowledge and skills of older employees, are challenges for many organizations. On the other hand, perceptions on older workers are not always positive, for instance the label of *dead wood* has been used in workplace literature to refer to stereotypes of older workers in terms of their low energy level, little potential and low performance within the organization (e.g. Costanza & Finkelstein, 2015; Pitt-Catsouphes & Matz-Costa, 2008). In order to cope with the growing trend of age diversity in teams, organizations need to support the implementation of new dimensions of knowledge management and conditions that improve intergenerational learning (CEDEFOP, 2012).

In this dissertation, the delineated organizational context for the investigation of intergenerational learning are school teams in Flanders (Belgium) and the Netherlands. The need to increase the retirement age of teachers is a topical issue nowadays in both countries and the debate is still ongoing. This implies that educational institutions are also characterized by a tendency of growing age-diversity. On one side, effective strategies are needed to retain teachers in the profession, given the high rates of beginning teachers’ dropout (Ingersoll & Strong, 2011). On the other hand, teachers close to retirement have developed relevant expertise throughout their career that better not stays ‘untapped’. Moreover, other dynamics are at play in the contemporary educational world. Societal changes such as increased multiculturalism, developments in educational policies such as more demands for inclusive education (e.g. ‘M-decreet’ in Flanders, ‘Passend Onderwijs’ in the Netherlands) have resulted in more diverse backgrounds of pupils and students in classrooms. Also, innovations in information and communication technologies are rapidly increasing and evoke that knowledge and skills of teachers need

to be updated continuously. These developments and changes have transformed the competence requirements of teachers and have shaped their current knowledge demands. Furthermore, this highlights the urgent need for teachers to professionally develop themselves continuously throughout different stages of their careers, meaning from entering the teaching profession to retirement.

Research in other contexts revealed that employees of different generations exchange different types of knowledge (Gerpott, Lehmann-Willenbrock, & Voelpel, 2016). A review study of Kyndt, Gijbels, Grosemans, and Donche (2016) revealed that beginning teachers and experienced teachers differ in terms of their informal learning outcomes. The chosen cut-off point for being considered as experienced in that review study was having more than three years of teaching experience. Beginning teachers were found to be more oriented towards learning practical skills such as skills related to classroom management and handling of discipline, whereas more experienced teachers were to a greater extent oriented towards learning new teaching methods as compared to novices (Kyndt, Gijbels, et al., 2016). Also, experienced teachers were more concerned with changing their beliefs and conceptions about teaching (Hoekstra, Korthagen, Brekelmans, Beijaard, & Imants, 2009; Kyndt, Gijbels, et al., 2016). Kyndt, Gijbels, et al. (2016) concluded that beginning teachers and experienced teachers have different needs in terms of learning outcomes. Therefore, we expect that knowledge demands and knowledge supplies of teachers of different generations might vary too. Schools are challenged to optimally deploy this diversity of knowledge within their team and need to search for solutions to create a bridge between knowledge demands and supplies. This challenge brings intergenerational learning to the front.

Intergenerational learning has been described as an interactive process between individuals from different generations that resulted in learning for one or both parties (Ropes, 2011, 2013). According to Gerpott et al. (2016) intergenerational learning involves individuals' joint construction of knowledge through exchange of information with one or more individuals from different generations. Both definitions clearly emphasize the interaction component involved in intergenerational learning. These interactions facilitate the occurrence of flows between knowledge demands and knowledge supplies of different generations of teachers.

Interest in intergenerational interactions and intergenerational knowledge sharing is emerging in different fields such as families, communities, and workplaces (Franz & Scheunpflug, 2016). There is a growing body of literature on intergenerational learning in workplaces (Gerpott et al., 2016; Ropes, 2011, 2013; Ropes & Ypsilanti, 2016), however, there is a clear gap in the current knowledge base of teachers' intergenerational learning (Brücknerová & Novotný, 2016; Novotný & Brücknerová, 2014). Previous

studies on teacher learning mainly focused on differences between beginning and experienced teachers in terms of learning activities and learning outcomes (e.g. Kyndt, Gijbels, et al., 2016; Richter, Kunter, Klusmann, Lüdtke, & Baumert, 2011). Concrete examples of intergenerational learning were mainly found within research on teacher induction and mentoring practices. During the last decade, ideas about traditional mentoring practices in which the older teacher serves as a knowledge source for a young beginning teacher, have been questioned due to the one directional character of this learning process. Consequently, these practices have developed towards more reciprocal forms of learning in which the value of bidirectional learning, meaning learning from both young and older teachers or beginners and experienced ones has been acknowledged (e.g. Heikkinen, Jokinen, & Tynjälä, 2012; Patrick, Elliot, Hulme, & McPhee, 2010). This tendency has been referred to as reverse intergenerational learning in other organizational contexts (Baily, 2009).

Research that focusses on generations of teachers and teachers' intergenerational learning is limited. Studies on this topic have been published during the last years synchronous with the development of this dissertation. A study of Edge (2014) reviewed evidence for the existence of generational differences at work in modern organizations, and discussed the implications of these differences for school leadership. Studies within Czech school contexts did investigate teachers' intergenerational learning and approached it from an interaction perspective by solely relying on qualitative data (Brücknerová & Novotný, 2016; Novotný & Brücknerová, 2014).

Given the limited amount of research on teacher generations, this dissertation aims to contribute to the conceptualization of teacher generations and to deepen our understanding of teachers' intergenerational knowledge flows. Negative perceptions on colleagues of other generations can negatively affect interactions at the workplace (Hedge, Borman, & Lammlein, 2006), whereas positive perceptions are beneficial for facilitating intergenerational interactions (Fowler & Gasiorek, 2018). In order to understand the broader picture of intergenerational learning of teachers, it is important to first gain insight in how teachers of different generations perceive each other within school teams. As such, this dissertation is shaped around three main questions: (1) How do teachers perceive their colleagues of different generations in terms of knowledge, skills, and attitudes? (2) How do teachers' intergenerational knowledge flows occur? And (3) What is the role of generation in the formation of teacher interactions? To answer these questions, four empirical studies were conducted based on both qualitative and quantitative data collections.

In the following, we present the theoretical frameworks and concepts that served as a background for this dissertation. More specifically, we start with providing information on the concept of generations. Furthermore, we provide a conceptual framework on teacher learning seen from intergenerational perspective. Additionally, we describe the four empirical studies, connect them to the conceptual framework and explain how these studies are related to each other.

2. Generations of teachers

Rooted in sociology, generations were defined as groups of individuals that have experienced mutual social conditions and shared historical events during their lives (Mannheim, 1952). Accordingly, generations have a similar way to interpret their environment. A variety of labels has been used to name a generational cohort, for instance, Baby Boomers, Generation X, Generation Y, Digital Natives, Millennials, etc. (e.g. DeLong, 2004; Schullery, 2013). These classifications are usually based on a chronological dimension of age, meaning that individuals' birth year is taken into account. The topic of generations based on chronological age receives a lot of attention in popular literature. In this literature, generational cohorts are mainly presented in a stereotypical way, meaning that major generalizations are made about individuals of different generations. While popular literature mainly highlights differences between generational cohorts, empirical evidence does not always support these differences (e.g. Appelbaum, Serena, & Shapiro, 2004; Dencker, Joshi, & Martocchio, 2008; Wong, Gardiner, Lang, & Coulon, 2008). As individuals might base their behaviour on these stereotypes, these might also affect behaviour in workplaces, and therefore school teams.

According to Edge (2014) the current generational mix in school teams includes members of three main generational cohorts: Baby Boomers (born between 1946 and 1965), Generation X (1966-1980) and Generation Y (1981-2003). This implies that school teams are characterized by a certain level of age-diversity and generational diversity. It can be said that school teams can be divided in 'the young ones', 'the old ones', and 'a middle cohort'. This division can lead to social categorization processes in a way that in-groups and out-groups are formed within a team based on being similar or dissimilar, for instance on features such as age. With this, we mean that individuals tend to define their identity by comparing themselves to others. Social identity theory of Tajfel and Turner (1986) asserts that the perceptions that individuals have towards each other are a result of these in- and out-group categorizations. In order to achieve positive self-esteem and a positive self-image, in-group members favour the in-group at the expense of the out-group. Thus, teachers of different generations might have more positive perceptions on colleagues from their own cohort as compared to colleagues of another generational cohort. When

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beliefs about generational cohorts within school teams are generalized, age-related stereotypical beliefs and labels as 'dead wood' might occur. Both in- and out-group categorizations as well as stereotypical beliefs can affect interactions within and across generational cohorts (Manolis & Levin, 1997).

In addition to answering the three previously mentioned main questions, this dissertation aims to contribute to the conceptualization of generations within the context of teacher generations.

3. Conceptual framework on teacher learning seen from an intergenerational perspective

Figure 1 represents a visualisation of our conceptual framework and positions the four studies within this framework in order to clarify the main focus of these studies. In the following, we give a brief overview of the different concepts and studies in this dissertation. A more detailed description of the different concepts is provided in the next chapters.

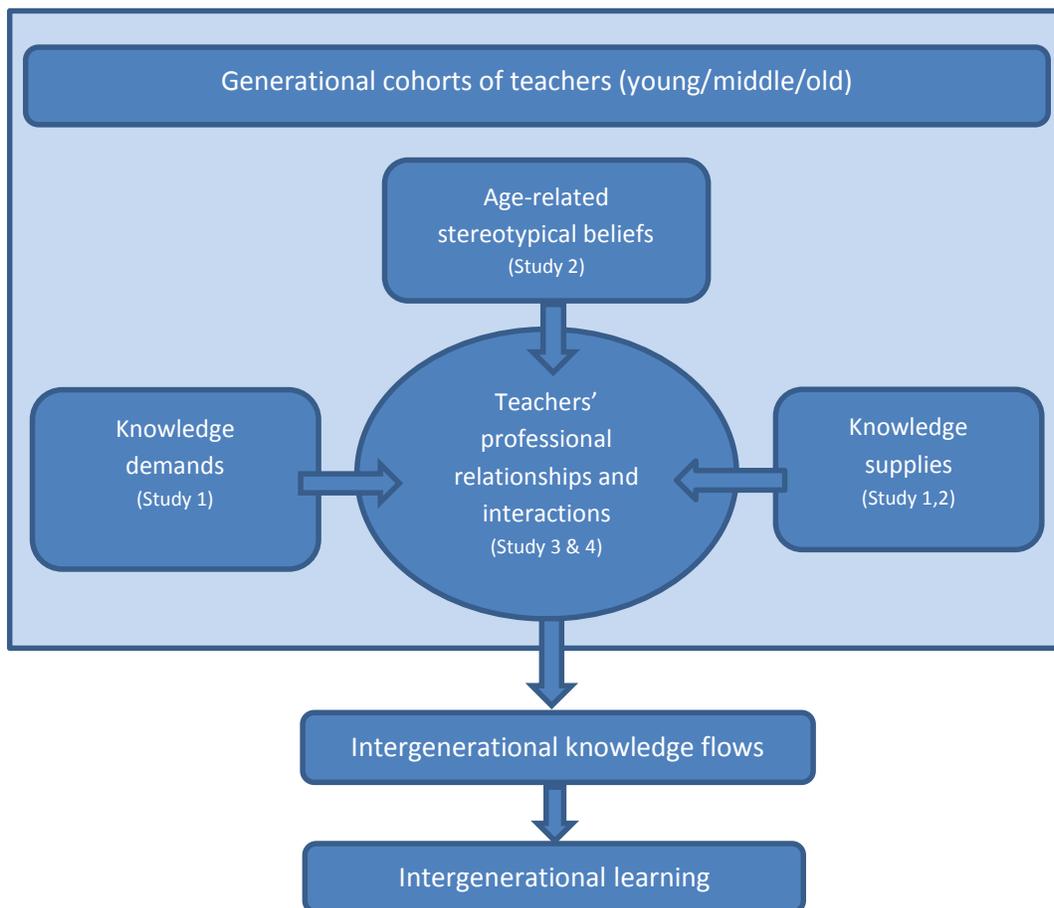


Figure 1. Conceptual model on intergenerational teacher learning

The first question we wanted to answer with this dissertation is: 'how do teachers of different generations perceive colleagues from their own generation and from other generations in terms of knowledge, skills,

and attitudes?'. On one side, these perceptions cover perceptions on knowledge demands and knowledge supplies. On the other side, these perceptions include teachers' age-related stereotypical beliefs.

Our conceptual framework, as presented in Figure 1, is based on the idea that different generations of teachers have specific knowledge demands and supplies. *Knowledge demands* are interpreted as the knowledge needs that teachers have in order to reach their professional goals. *Knowledge supplies* refer to the sources of knowledge a teacher has available through his/her expertise. These knowledge demands and supplies meet each other through teachers' professional relationships and interactions.

We started exploring teachers' perceptions by adopting a qualitative approach.

Study 1, entitled "Teachers' perceptions of intergenerational knowledge flows": describes how teachers perceive colleagues from other generations in terms of knowledge demands and knowledge supplies. Furthermore, the occurrence of knowledge sharing processes among teachers of different generations was explored. This exploration provides answers to our second main question: 'how do teachers' intergenerational knowledge flows occur?'

Then, the revealed perceptions of teachers from different generations in study 1 were further investigated by using a quantitative approach in study 2. Perceptions in terms of knowledge demands and supplies were extended with perceptions on attitudes from age stereotypes literature. We defined age stereotypes in teacher teams as generalized beliefs teachers have about the knowledge, skills, and attitudes of their colleagues of a certain age group. We were interested in gaining more insight in the occurrence of teachers' age-related stereotypes since these might affect interactions in teams.

Study 2, entitled "Teachers' age-related stereotypes": focusses on the extent to which teacher's attribute characteristics in terms of knowledge, skills, and attitudes to a certain age group of teachers, and therefore the existence of age-related stereotypical beliefs in school teams. Furthermore, differences between teachers of different generations in terms of attributing teachers' characteristics (knowledge, skills, and attitudes) are investigated.

The central part of our conceptual framework (Figure 1) includes teachers' professional relationships and interactions. *Professional relationships* among teachers are essential since they have the potential to provide access to social resources such as information, knowledge, and expertise (Borgatti, Everett, & Johnson, 2013; Carolan, 2014). Relationships can refer to being colleagues, being friends, being preferred partners for collaboration or discussing work, etc. However, teachers can only benefit from social

resources when they have access to them through social interactions for instance through asking and providing advice. As such, professional relationships should be seen as facilitators for the occurrence of interactions (Borgatti et al., 2013). The importance of interactions has been emphasized for information and knowledge sharing within the broader picture of knowledge management in organizations (Argote, McEvily, & Reagans, 2003). Also, within the context of teachers' professional development, teacher learning and knowledge management in school teams, scholars have highlighted the relevance of interactions since they facilitate information and knowledge sharing among teachers (e.g. Baker-Doyle, 2015; Grangeat & Gray, 2007; Kwakman, 2003; Lohman, 2006). These interactions include, for instance, discussing work, collaborating, asking and providing advice. From an intergenerational perspective, this raises questions on the role of generation in the formation of teachers' professional relationships and interactions. More concretely, to what extent are there differences between generational cohorts of teachers in terms of asking advice? Which generational cohort is the preferred group to collaborate or discuss work with? Or, to what extent are teachers more likely to interact with colleagues of their own generational cohort instead of colleagues from other generational cohorts?

According to Borgatti et al. (2013) knowledge flows occur when information is exchanged through interactions. Accordingly, *intergenerational knowledge flows* are the potential outcomes of interactions between different generations of teachers. These flows of knowledge provide a fruitful basis for *teachers' intergenerational learning*. The concepts of intergenerational knowledge flows and intergenerational learning are displayed outside the box in figure 1 since these are not directly measured in our studies. It should be noticed that intergenerational knowledge flows are potential outcomes of teachers' intergenerational relationships and interactions, and teachers' intergenerational knowledge flows potentially result in intergenerational learning. The word 'potential' highlights that these outcomes are expected but not guaranteed.

Different approaches to learning can be found in workplace learning literature (Lee et al., 2004; Paavola, Lipponen, & Hakkarainen, 2004). A rather traditional approach describes 'learning as acquisition' and mainly focusses on individual learners and their individual knowledge acquisition (Sfard, 1998). A more recent approach to learning describes 'learning as participation'. Within this approach, knowledge has been conceptualized as "produced and continually reconstructed through the relationships and interactions between individuals, rather than as an object which is acquired, internalized and owned" (Lee et al., 2004, p. 9). A review of Kyndt, Gijbels, et al. (2016) on the topic of informal teacher learning also distinguishes two main groups of informal learning activities that teachers undertake in their daily practice.

The first group refers to individual learning activities and can be framed within the above described 'learning as acquisition' approach. The second group includes a social component and relates to learning activities that involve other people. These social learning activities connect to the 'learning as participation' approach. Teachers' individual learning activities include for instance learning by doing, experimenting, reflecting, and consulting information sources, whereas teachers' social learning activities contain for instance collaborating, discussing, sharing information, and observing (Kyndt, Gijbels, et al., 2016). Kyndt, Gijbels, et al. (2016) also discuss that individual and social learning activities are not exhaustively separated since teacher learning benefits from the interplay between both kind of activities. However, research on the topic of teacher learning shifted towards this social side of learning. This shift from a focus on the individual towards a more social approach has contributed to the popularity of social network research methods within the field of teacher learning (e.g. Baker-Doyle, 2015; Meredith, Van den Noortgate, Struyve, Gielen, & Kyndt, 2017; Moolenaar, 2010; Van Waes, De Maeyer, Moolenaar, Van Petegem, & Van den Bossche, 2017). Social network analysis allows to investigate the formation of intergenerational teacher relationships and interactions.

Whereas study 1 and 2 provide insight into how teachers perceive their colleagues in terms of knowledge (demands and supplies), skills, and attitudes, study 3 and 4 dive deeper into teachers' intergenerational and intragenerational relationships and interactions. These relationships and interactions can provide occasions for intergenerational knowledge flows and can therefore be relevant for intergenerational learning. In order to capture these relationships and interactions, a social network approach was used in study 3 and 4.

Study 3, entitled "Intergenerational professional relationships in elementary school teams: a social network approach": investigates the extent to which school team members' professional relationships are affected by being part of a certain generational cohort. Professional relationships in this study refer to discussing work, asking and providing advice, and collaborating.

The last study in this dissertation clearly builds on the gained insights of the three previous studies. Whereas study 3 investigates advice seeking behaviour in its general form, study 4 goes a step further and includes the content of advice and information that is shared. This implies that besides revealing 'who' is interacting with whom, this study also reveals 'what' the interaction is about. As such, the focus of the fourth study is the following:

Study 4, entitled “Teachers’ intergenerational advice and information seeking: content matters!”: examines the role of generation in teachers’ advice and information seeking interactions, and moreover how the content of advice shapes these interactions. Four content-related advice and information seeking networks in this study specifically relate to: subject-matter knowledge, classroom management, innovative teaching methods, and ICT.

Given the social side of learning which is crucial when knowledge needs to be shared among teachers of different generations, we strongly believe that our choice for social network analysis is valuable. This social network approach offers a bird’s eye view on the formation of intergenerational teacher relationships and interactions. This method is key in this dissertation and will therefore receive more attention in the next section.

4. Social network analysis: a birds’ eye view on intergenerational teacher relationships and interactions

A social network can be defined as a group of individuals and the relationships that connect these individuals (Wasserman & Faust, 1994). A social network consists of three core elements: (1) a set of actors (nodes); (2) the attributes of these individual actors; and (3) a set of ties that defines at least one relation among the actors (Carolan, 2014). Therefore, the analysis of social networks focuses not only on the individual, but also on the relations (ties) that connect these individuals (Carolan, 2014). Social network theory relies on three main assumptions (DeGenne & Forsé, 1999; Wasserman & Faust, 1994). First, individuals within a social network are viewed as interdependent rather than independent which is the case in conventional statistical modelling approaches. Second, relationships are viewed as opportunities for the exchange of resources such as advice and information. Third, the patterns of relationships also referred to as the ‘social structure’, can affect individual action in a constraining or facilitating way. Social network theory offers a building block for social network studies.

Two fundamental kinds of social network research designs can be distinguished: whole network designs and personal network designs (Borgatti et al., 2013). The latter are also known as ego-network studies. Personal network studies assess focal nodes (egos) and their ties to one or more others (alters). Whole-network studies focus on the set of ties among all pairs of nodes (dyads) in a given group. This group can refer to for instance, teachers in a school team, students in class groups, ... Given that the focus of this dissertation is on knowledge flows between teachers of different generations within school teams, we

adopted a whole network approach. The most common way to collect whole-network data is through a socio-metric survey instrument (Carolan, 2014). This instrument requires that each actor (i) within the network provides information on his/her relationships (a) with alters (j) within the network. For instance, “Whom did you turn to for advice?”. Most socio-metric surveys provide a list of possible alters in the network for respondents to indicate; however, relying on respondent’s free recall is possible as well. This results in a binary matrix in which 1 represents the existence of a relation or tie between actor (i) and alter (j), and 0 refers to the absence of a relation. The biggest challenge in collecting whole-network data is related to the high response rate.

A whole network approach enables analysis on the level on the node, the dyad, or the broader structure of the network. On the individual node level, *degree centrality* is the most commonly used network concept (Borgatti et al., 2013). Degree centrality refers to the number of relations or ties a node has to other nodes. The number of ties a node receives can be interpreted as a measure of individual popularity (in case of a positive formulated tie), in network terms also known as *indegree centrality*. To give an example, a teacher can be contacted by 11 colleagues for advice, while another colleague is only asked for advice by one colleague. The other type of degree centrality is *outdegree centrality* and refers to the number of outgoing ties of an actor within a network, which suggests a measure of individual activity (Borgatti et al., 2013). More concretely, a teacher turns to 6 colleagues for advice which results in an outdegree of 6.

The flow of resources within a social network can be explained by various mechanisms. One of these mechanisms is *homophily* (McPherson, Smith-Lovin, & Cook, 2001). Homophily is often referred to by the adage ‘birds of a feather flock together’ and captures the tendency for individuals to have positive ties to others who are similar to themselves on attributes such as age, race, gender, education, and values. This mechanism of network homophily is also supported by the previously described ideas of social identity theory (Tajfel & Turner, 1986). Consequently, network homophily refers to similarities between individuals and therefore focuses on the dyad level within networks. In this dissertation, the mechanisms of homophily are used to gain insight in the extent to which belonging to a similar or dissimilar generational cohort affects the formation of relationships and/or interactions within a school team.

In terms of data analysis, multilevel p2 modelling is used. P2 models allow to predict the likelihood of the formation of social relationships between pairs of actors (e.g. teachers and principals) based on individual and dyadic attributes (e.g. belonging to a certain generational cohort) (Boer et al., 2006; Zijlstra & van Duijn, 2003; Zijlstra, Van Duijn, & Snijders, 2006). This implies that the likelihood of sending a relationship

(cfr. outdegree), receiving a relationship (cfr. Indegree), and the likelihood of engaging in a relationship based on dyadic similarity (cfr. Homophily) can be computed. This model allows for statistical inferences, which means that the model provides information whether the formation of a relationship between pairs of actors is more commonly observed within the networks than what we would expect by chance.

5. Content structure of the dissertation

To summarise, this dissertation investigates intergenerational knowledge flows of teachers by using a multimethod approach, meaning that both qualitative and quantitative research methods were involved to answer our research questions. Given the limited amount of research that approached teachers and teacher learning from the perspective of generations, this dissertation started in an explorative way (study 1 and 2). This explorative phase included both qualitative (study 1) and quantitative (study 2) methods. Findings of these explorative studies were descriptive in nature and were used to conduct rather explanatory research questions in which more advanced statistical methods were used. The application of social network analysis, more specifically multilevel p2 modeling (study 3 and 4), as a method to investigate intergenerational knowledge flows contributed to the innovative character of this dissertation.

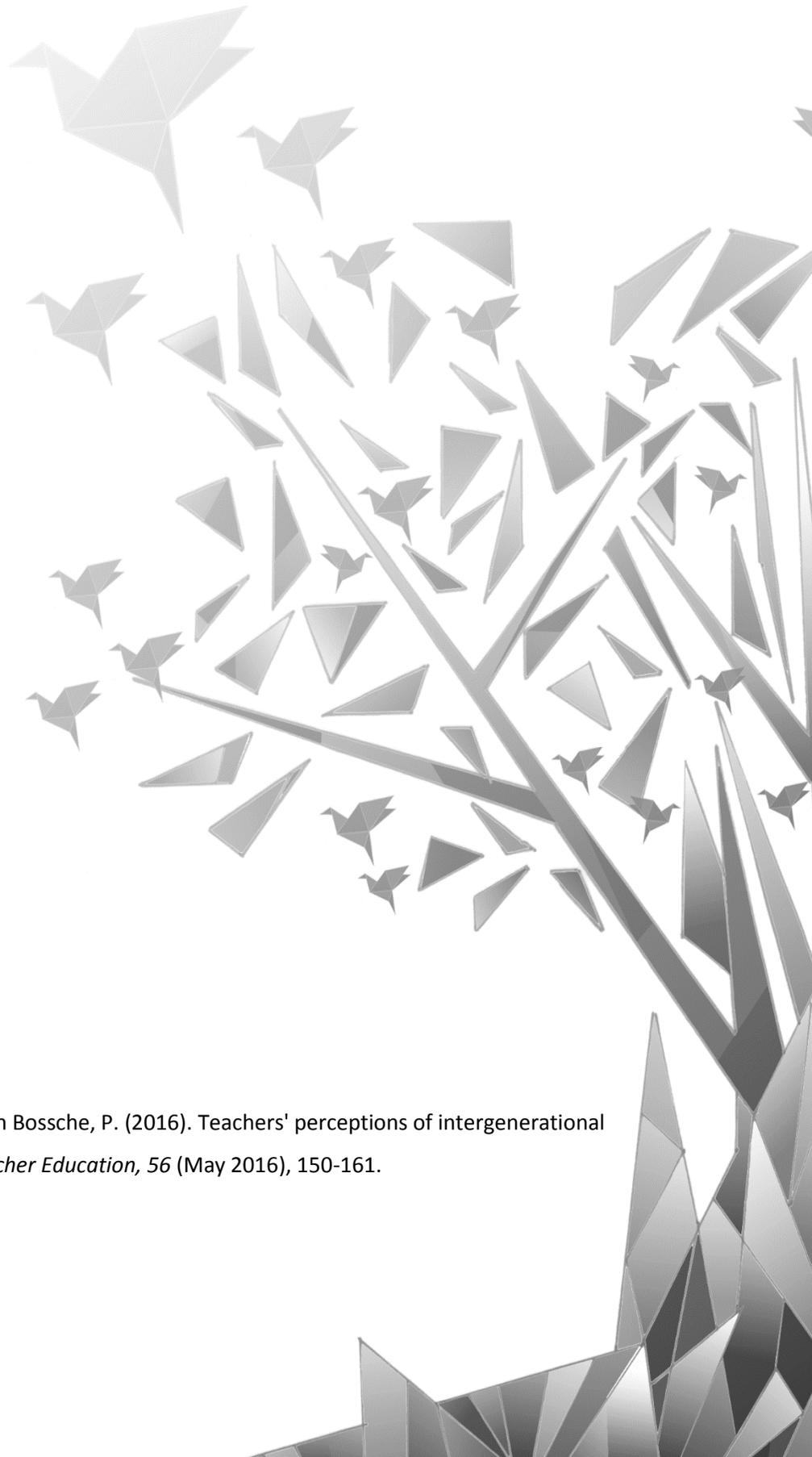
In the following four chapters, we include the four studies:

- Study 1: Teachers' perceptions of intergenerational knowledge flows
- Study 2: Teachers' age-related stereotypes
- Study 3: Intergenerational professional relationships in elementary school teams: a social network approach
- Study 4: Teachers' intergenerational advice and information seeking: content matters!

The last chapter contains general conclusions taking into account the findings that were formulated in the previous chapters. In addition, these conclusions are discussed, and implications for research and practice are formulated. That way, we hope to encourage researchers to further unravel the complexity of teacher generations, and to support practitioners in building strong intergenerational teacher communities. Moreover, we aim to convince both researchers and practitioners of the value of social network analysis as a method to capture intergenerational teacher interactions.

INTRODUCTION

Study 1. Teachers' perceptions of intergenerational knowledge flows



This chapter is based on:

Geeraerts, K., Vanhoof, J., & Van den Bossche, P. (2016). Teachers' perceptions of intergenerational knowledge flows. *Teaching and Teacher Education*, 56 (May 2016), 150-161.

Abstract

In this qualitative study we look at knowledge brokering from an intergenerational teacher perspective. This study aims at describing how teachers perceive colleagues from other generations in terms of knowledge demands and knowledge supplies, and how processes of knowledge-sharing across teachers of different generations take place. Our findings suggest that teachers' perceptions about skills and knowledge of colleagues from other generations can be understood as knowledge demands and supplies and that knowledge flow between knowledge demands and supplies can be affected by perceptions about teachers' attitudes. Furthermore, our findings exemplify the occurrence of intergenerational knowledge brokerage processes within school teams.

1. Introduction

Nowadays, labor markets are characterized by a large outflow of older employees due to the retirement of the so-called Baby Boom generation. On the other hand, active ageing and working longer is necessary to sustain health, welfare and retirement systems (CEDEFOP, 2012; Compton et al., 2014). Therefore, facing the difficulties of potential loss of critical organizational knowledge and experience when employees retire, and taking advantage of the knowledge, skills and competences of older employees, are challenges for many organizations. In order to cope with the growing trend of age diversity in teams, organizations need to support the implementation of new dimensions of knowledge management and conditions that improve intergenerational learning (CEDEFOP, 2012).

This is also true within the context of educational institutions in Flanders (Belgium). Although schools have been collecting and sharing knowledge for many years, it has not been until recently that the potential power of knowledge management for school and class improvement has been discovered (Messelt, 2004). The concept of 'knowledge brokerage' refers to moving knowledge from one place or group of people to another (CHSRF, 2003; Vanhoof & Mahieu, 2013). Whereas older teachers are described by some as workers who have little potential and a low level of performance (Baugh & Sullivan, 2008; Stam, 2009), others argue that the explicit and implicit knowledge of the workers close to retirement is largely underestimated (Duval, 2003; Nonaka, Kohlbacher, & Holden, 2006; Nonaka & Takeuchi, 1995; Vaiman, 2008). Meanwhile, schools are confronted with a large outflow of older employees. It is argued that the ability to retain knowledge of employees close to retirement and to learn intergenerationally becomes a key feature of successful schools (Bender & Fish, 2000; Sutherland, 2005).

Intergenerational knowledge brokerage in school teams contains components of knowledge and learning of different generations of teachers. According to Shulman (1987) teachers' knowledge includes content knowledge, general pedagogical knowledge, pedagogical content knowledge, curriculum knowledge, knowledge of learners, knowledge of educational contexts, and knowledge of educational ends. Sternberg and Horvath (1995) looked at the differences between novice and expert teachers regarding their knowledge base. For instance, expert teachers are said to have more knowledge that enables them to solve problems within their domain, as compared to novices. Besides, the expert teacher has knowledge of the organizational context in which teaching takes place and is competent to adapt to certain limitations within their teaching practice (Sternberg & Horvath, 1995). While prior research focused on differences between novices and expert teachers with regard to knowledge and teacher learning (e.g. Grosemans,

Boon, Verclairen, Dochy, & Kyndt, 2015; Richter et al., 2011), the current study aims to contribute to this field by examining knowledge sharing from an intergenerational perspective.

Ropes (2011) defines intergenerational learning as an interactive process between people from different generations through which one or both parties learn. Intergenerational knowledge brokerage in school teams facilitates knowledge sharing between knowledge demands (needs) and knowledge supplies (sources) across the younger part of the teaching workforce and the older part of the teaching workforce. In order to describe this knowledge sharing processes, we build our conceptual framework on the work of Nonaka and Takeuchi (1995) that includes socialization, externalization, combination and internalization. Brokerage processes can occur at the workplace or during other learning activities, in other words, on the job and off the job. Three types of workplace learning can be distinguished: (1) formal learning; intentional and taking place in organized training and learning activities, (2) nonformal learning; usually intentional, taking place at the workplace, and (3) informal learning; usually unintentional, as a part of everyday life (Heikkinen et al., 2012; Merriam, Caffarella, & Baumgartner, 2007; Tynjälä, 2008). Nowadays, two opposite processes seem to occur within teachers' professional learning (Tynjälä & Heikkinen, 2011). On one hand, there is a growing trend towards the formalization of informal and nonformal learning. On the other hand, processes of informalization of formal learning take place. Since both processes are intertwined, the three types of learning also converge and the lines between them are fading (Heikkinen, 2015; Heikkinen et al., 2012). Tynjälä and Heikkinen (2011) state that teacher learning should be seen as a continuing professional development process that combines formal nonformal and informal learning throughout the career from initial training to retirement. Notwithstanding that many knowledge brokerage activities take place implicitly (Vanhoof & Mahieu, 2013), a variety of methods can be used in order to transfer knowledge from employees of one generation to another one, e.g. face-to-face meetings, communities of practice, knowledge databases, mentoring, coaching, job rotation, storytelling, orientation, after action interviews, interviews, phased retirement, videotaping and training (DeLong, 2004; Liebowitz, 2009; Nonaka et al., 2006; Wamundila, 2008).

Intergenerational relationships support intergenerational learning, reduce barriers and result in a decrease of negative stereotyping (Ropes, 2011; Spanring, 2008). Abrams, Eller, and Bryant (2006) support the idea that stereotype-threat can be decreased by creating more understanding among different generations. Understanding the framework of values, beliefs and work ethics of each generation is needed in order to build relationships that lead to co-operation and job-satisfaction (Swearingen & Liberman, 2004). Moreover, this understanding supports team cohesion and prevents conflict among team members

(Lipscomb, 2010). Negative feelings between employees of younger and older generations can have a negative impact on organizational climate (Kunze, Boehm, & Bruch, 2011). Thus, teachers are supposed to have a certain level of understanding about each generation in order to cope with an increase of age diversity within their school team.

Previously, we referred to younger and older employees in terms of generations. As stated by Cekada (2012), not everyone can be placed in one group of a generation. Kuyken (2012) assumes that each generation contains different identities and sub-cultures. Individual differences have been denied in the categorization of generations. Therefore, we consider the conceptualization of generations as complex.

Given that reciprocal understanding among generational cohorts is seen as an important condition for decreasing stereotyping and enhancing collaboration, we are interested in how different generations of teachers look at each other. The way that individuals understand colleagues from other generations might influence how people act at the workplace. Consequently, it might also impact processes of knowledge sharing between teachers from different generations. The purpose of this article is to examine how teachers perceive their colleagues from other generations and how intergenerational knowledge brokerage (IKB) processes take place within school teams. The following set of research questions (RQ) is set forward:

RQ 1. How do teachers perceive colleagues from other generations in terms of knowledge demands and knowledge supplies?

RQ 2. How do intergenerational knowledge brokerage processes take place within school teams?

In the following, we open with a discussion about the conceptualization of a generation. After that, we explain our model to describe IKB processes. Finally, we present the results of a study about the perceptions teachers have about their colleagues of another generation, and the occurrence of IKB processes within school teams.

2. Theoretical framework

2.1 The concept of a 'generation'

Mannheim (1952) suggested that members of a generation have a similar point of view to interpret their environment as a result of mutual social experiences and shared historical events during the formative years of their lifespan.

There is no general acceptance of the labels of generations; many different names have been used as well as a variety in years of birth that indicate the span of one generational cohort. The three major generations currently in the workplace include Baby Boomers; Generation X; and Generation Y (DeLong, 2004; Edge, 2014; Stone-Johnson, 2011). The latter are also known as Millennials, Generation Me, or Digital Natives (Schullery, 2013). Hereby, the conceptualization of generations is mainly based on chronological age and is therefore related to employees' calendar age. Although 'chronological age' is the most dominant way to understand age, some researchers suggest that this approach is not adequate enough to use in a work context (Kooij, de Lange, Jansen, & Dikkers, 2008). According to Sterns and Doverspike (1989) age can also be understood as a multidimensional concept, distinguishing 'functional age', 'psychosocial age', 'organizational age' and 'lifespan age' in addition to 'chronological age'. These different approaches to age are often interrelated (Kooij et al., 2008).

Murray, Toulson, and Legg (2011) argue that there is no clear picture of the features of generational cohorts that include chronological age and lifespan age. Many articles in the popular press highlight stereotypes of generational cohorts and focus especially on differences between them. However, empirical evidence for these ideas cannot always be found in research literature (Macky, Gardner, & Forsyth, 2008; Murray et al., 2011). While some studies were able to identify differences between the different generational cohorts (e.g. McGuigan, 2010; Smola & Sutton, 2002), other studies have identified more similarities than differences between generational cohorts (Ferres, Travaglione, & Firns, 2003; Wong et al., 2008). Some studies conclude that more differences can be found within generational cohorts than between them (e.g. Dencker et al., 2008; Murray et al., 2011). Nevertheless, these findings do not suggest completely ignoring the portrayals in popular literature, as individuals may possibly base their behaviors on these stereotypes (Manolis & Levin, 1997).

In addition to the importance of not ignoring the perceived stereotypes of employees, we should also not overlook dynamics that occur in work groups. For that reason, we take into account principles of social identity theory (Tajfel & Turner, 1986). This theory asserts that the perceptions and behaviors of

individuals towards others are a result of in-group (“us”) and out-group (“them”) categorizations. It is based on the idea that individuals seek to achieve positive self-esteem and a positive self-image, therefore, members of the in-group favor the in-group at the expense of the out-group. According to Dencker, Joshi, and Martocchio (2007), social identity theory predicts that in-group/out-group dynamics can be caused by similarity of age. This implies that younger teachers will rate teachers of the same age group more positively than their older teachers do. Also, perceptions of older teachers about colleagues from their own generational cohort might be more positive than their perceptions about younger teachers. Hence, young teachers might see older teachers as ‘out-group’ members, and so they might have less favorable beliefs about them, possibly on the basis of stereotypes.

Intergenerational differences affect how teachers and leaders experience and constitute their work and careers (Edge, 2014). Accordingly, the above described categorizations might affect dynamics of intergenerational knowledge brokerage.

2.2 Intergenerational knowledge brokerage

The process of knowledge sharing is defined by H.-F. Lin (2007) as the way in which employees share their professional experience, expertise, know-how, and contextual information with colleagues. Knowledge sharing also involves shared understanding in terms of providing access to relevant information, and constructing and using knowledge networks within organizations (Hogel, Parboteeah, & Munson, 2003). van den Hooff and de Ridder (2004) define the process of knowledge sharing as a process where individuals mutually exchange their (implicit and explicit) knowledge and create new knowledge together. In this study, we look at the process of knowledge sharing from an intergenerational teacher perspective. Therefore, we build on the work of Arif, Egbu, Alom, and Khalfan (2009) and Nonaka and Takeuchi (1995) to propose a model to describe the process of IKB, as displayed in figure 1. We are aware that Nonaka and Takeuchi’s model of knowledge creation has been criticized by some authors (e.g. Bereiter, 2002; Gourlay, 2006; McAdam & McCreedy, 1999) for not taking into account understanding and depth of understanding; and for not comprehensively covering the complexity of knowledge transfer in organizations. However, other authors considered Nonaka’s model as promising within educational contexts such as student learning and teacher development (Tammets, Pata, & Laanpere, 2012, 2013; Tee & Karney, 2010). To our knowledge, this study is the first to explore the application of Nonaka’s model within the context of intergenerational teacher learning.

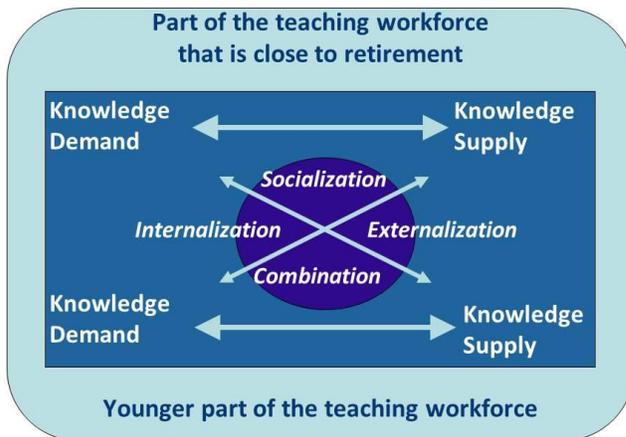


Figure 1. Intergenerational knowledge brokerage processes

2.2.1 Knowledge flows

Both the younger part of the teaching workforce and the part of the teaching workforce close to retirement are included in Figure 1 to represent two generations of teachers. In order to develop towards a lifelong learning culture in an organization, it is important to capture a two-way flow of knowledge (Liebowitz, 2009). This flow of knowledge from young employees to older employees and vice versa has been named by Liebowitz (2009) the 'bidirectional knowledge flow'.

Also, flows between knowledge demands and knowledge supplies are part of IKB processes. Intergenerational knowledge brokerage facilitates the sharing of knowledge between knowledge demands and knowledge supplies across generations. These concepts of knowledge demand and supply have been previously used by Ardichvili, Page, and Wentling (2003). Literature provides a variety of concepts that are closely related to those of knowledge demand and supply. Weggeman (2000) explains that knowledge sharing involves a 'knowledge source' and a 'knowledge receiver'. van den Hooff and de Ridder (2004) state that the process of knowledge sharing contains a knowledge donating and a knowledge collecting component. Whereas 'knowledge donating' refers to communication to others about the content of one's intellectual capital, 'knowledge collecting' refers to the consultation of colleagues in order to make them share their intellectual capital and learn from them. Both components, knowledge donating and knowledge collecting, are interconnected. Knowledge collecting has a positive influence on knowledge donating and can therefore be seen as a condition for knowledge donating. The more knowledge an

individual can collect, the more this individual is willing to donate knowledge (van den Hooff & de Ridder, 2004). We interpret knowledge demand as the knowledge needs that employees have in order to reach their professional goals. Knowledge supply refers to the sources of knowledge that are already available or that can be made available within the organization.

The knowledge involved in knowledge brokerage processes needs to be perceived as relevant and needs to respond to actual information demands (Van Petegem & Vanhoof, 2007). Our conceptual framework highlights explicit and implicit modes of knowledge. Explicit knowledge requires another IKB approach than implicit knowledge (Arif et al., 2009; Dankbaar, Oprins, & Andriessen, 2002; Eraut, 2000; Nonaka & Takeuchi, 1995). The implicit knowledge of individuals forms a basis for organizational knowledge creation. Therefore, the knowledge creation process starts with a focus on implicit knowledge, as an untapped source of knowledge. The transfer of this personal, implicit knowledge to other individuals in the organization is a challenging process since this type of knowledge is gained through experience and is hard to verbalize. The sharing of implicit knowledge between individuals with different backgrounds, perspectives and motivations is crucial in order to start knowledge creation on the organizational level (Nonaka & Takeuchi, 1995). The interaction and integration between explicit and implicit knowledge seems to be an important factor to improve workplace learning and expertise development (Tynjälä, 2008).

2.2.2 Key processes of intergenerational knowledge brokerage

To discern the key processes of IKB, we rely on the four core processes of knowledge creation: socialization, externalization, combination and internalization (Arif et al., 2009; Nonaka & Takeuchi, 1995). These concepts are central to the social reciprocal intergenerational conversion of implicit to explicit knowledge (and vice versa). During the process of *socialization*, individuals share their implicit knowledge with others through discussions, chats, face-to-face meetings, and also by observing and imitating others. This is the process in which knowledge creation begins (Nonaka & Takeuchi, 1995). *Externalization* is a process in which the conversion of implicit knowledge into explicit knowledge occurs through documenting meetings and forums. Hereby, individuals share their mental models and reflect on them. Some authors claim that not all tacit knowledge can be made explicit; an underlying component remains tacit (e.g. Collins, 2001; Tsoukas, 2003). The third process, *combination*, combines explicit knowledge with other explicit knowledge. This process also refers to the collation and compilation of knowledge in the organizational memory, for instance, through the use of databases, online networks, and documentation.

Consequently, this archived and saved knowledge is accessible for future use. In the last process, *internalization*, explicit knowledge becomes implicit. This process concerns the retrieval of stored knowledge. After retrieval and use of this previously stored knowledge, new and more up-to-date knowledge can be added (Arif et al., 2009).

2.2.3 *The value of intergenerational knowledge brokerage*

Intergenerational knowledge brokerage is a valuable process for competence building and knowledge retention between generations (Ropes, 2011). Both older and younger learners can benefit from intergenerational learning opportunities. The outcomes of this process can be complementary or shared. Whereas older learners feel gratification for their contribution to the community and a deeper understanding of the younger generation, the outcomes for younger learners are related to a higher level of self-esteem and self-confidence, and a deeper understanding of older adults (Newman & Hatton-Yeo, 2008). Besides feeling valued, both generations will also feel accepted and respected. Moreover, intergenerational learning will improve knowledge and skills as well as the creation of meaningful intergenerational relationships (Newman & Hatton-Yeo, 2008). This might imply that teachers that engage in intergenerational learning perform better in their jobs. Besides the advantages of intergenerational learning for individuals, benefits of this learning process can also be found for organizations (Ropes & Ypsilanti, 2012). Intergenerational learning leads to a higher level of social capital (Newman & Hatton-Yeo, 2008). This increased level of social capital has in turn the potential to enhance knowledge flows between workers in an organizational context (Inkpen & Tsang, 2005).

3. Methodology

In the current study, qualitative research methods were used. Data were collected through semi-structured interviews in March and April 2014. Participants of this study were selected by using purposive sampling techniques. Four Flemish secondary education schools participated in this study. In each school, four teachers that are expected to collaborate in a subject team were interviewed, including two teachers under 33 years old and two teachers over 50 years old. In order to capture a broad view, the selected schools varied in different ways. Regarding the school network, both private and public schools were included. Regarding the school structure, both upper and lower secondary education schools were selected which implies that teachers can own a bachelor or master's degree. With regard to the educational programme of the schools, both vocational, technical and general education schools were

present in the sample. In every school, the school principal received an informative email about the study. Then, the school principal was asked to provide us with the contact details of teachers that fit within the appropriate age groups of this study. Afterwards, invitation emails for interviews were sent to the teachers, however, participation was voluntary. The subject matters of the teachers were diverse and included languages, mathematics, behavioral sciences, economics, religion, physical education, biology, geography, history and ICT. None of the teachers had a foreign background. The youngest teacher was 22 years old, and the oldest 68. Looking at the years of experience within education, the years of experience of teachers from the youngest cohort ranged between one year till eight years of experience within education. For the oldest cohort, this number ranged from 25 to 47 years of experience within education. Within this oldest cohort, three teachers served as a mentor for novice teachers. Both female and male teachers were included. The interviews took approximately 50 minutes per interviewee and took place during the second semester. Interviews were audiotaped and transcribed verbatim.

The interview data were analyzed thematically using the six-stage approach of Braun and Clarke (2006). Qualitative analysis software Nvivo 10 was used to support the process of moving from inductive to deductive analysis. Hereby, the perceptions of the respondents could be linked to the principles of the theoretical framework. First, the author listened repeatedly to the interview recordings while reading the interview transcripts in order to get familiar with the data. During this process of active reading, the author paid attention to patterns and meanings in the data and took notes of interesting ideas for further coding and analysis. Second, initial codes were generated by coding interesting features of the data across the entire data set. Third, codes were collated into potential themes which are broader than the codes. According to Braun and Clarke (2006), these themes capture important information related to the overall research questions of the study. A theme delineates a certain level of patterned response or meaning within the data, but it depends not necessarily on quantifiable measures (Braun & Clarke, 2006). Fourth, themes were reviewed by checking if they were suitable for the coded extracts and the whole data set. Hereby, a thematic map of the analysis was generated. Fifth, themes were refined and working titles of themes were now modified in names that cover the meanings of the themes. Sixth, the report was produced. Hereby, vivid and convincing extract examples were selected to illustrate the findings and they were linked to the research questions and theoretical framework.

4. Findings

4.1 Teachers' perceptions about colleagues from the same and another generational cohort.

In order to answer our first RQ, we start explaining for each theme how the oldest generation is perceived by the youngest participants in this study. After that, we mirror these ideas to the self-perceptions of the oldest participants. Next, we describe for each theme how the youngest generation is perceived by the oldest participants of our study, followed by the self-perceptions of the youngest participants. This linkage between how a generation perceives colleagues from other generation, and how generation members perceive colleagues from their own generational cohort, enables us to discover matches or mismatches in perceptions through which we can reach deeper conclusions.

Three main themes were discussed by our participants. The first theme was related to the knowledge of teachers. This knowledge refers specifically to content knowledge. The second theme was related to the skills of teachers. Hereby, subthemes such as classroom management, teaching methods and ICT were distinguished. A third theme was related to the attitudes of teachers. Personality features, motivation and engagement can be seen as important subthemes.

4.1.1 *Perceptions about the knowledge of teachers*

In terms of content knowledge, the majority of young teachers were convinced of the fact that their oldest colleagues have a high level of expertise in their subject field. Descriptions such as *'they possess the content of their teaching subject'*, *'they are real experts in their subject'* and *'they are kind of a walking encyclopedia'* exemplify the subject matter knowledge of older teachers perceived by young participants. Therefore, the knowledge of old teachers about their teaching subject can be seen as a knowledge supply.

The oldest generational cohort is familiar with the content of their subject matter and therefore they are able to provide accurate answers to students' questions. Some participants of the oldest group confirmed this idea:

"... also because of our age, ... after all these years, you can expand your knowledge. If you keep your ears and eyes opened during your life, you will gather a lot of knowledge" (Simone, 50+)

Regarding the content knowledge of young teachers, some older participants reported to perceive an insufficient knowledge base of their youngest colleagues:

"... sometimes, we have the idea that the knowledge of young teachers is rather poor, they start teaching with insufficient knowledge about their subject field." (Simone, 50+)

One of the teachers who recognized this lack of knowledge explicitly points at the role of the school principal in this respect:

"... we have an excellent school principal. New teachers who don't have sufficient knowledge or who make mistakes related to their subject, they can only keep their teaching position for one year. Our school principal is very accurate with this problem ... " (Daisy, 50+)

Mirroring these ideas to the thoughts of the youngest generation, we noticed that some young participants confirm feelings of uncertainty about themselves and the content of their teaching field. This implies that they cannot always respond to the questions of their students in an appropriate way. Now and then they need to search for additional information because they do not have the right knowledge yet, partly due to their limited work experience.

"When preparing my lesson plan, I still need to look up quite many things. Older teachers can more rely on their previous experiences." (Ben, -33)

Whereas subject specific knowledge can be seen as a knowledge supply of older teachers, it can also be understood as a knowledge demand of young teachers within a school team. This theme has the potential to evoke a knowledge stream between both generations of teachers.

4.1.2 *Perceptions about the skills of teachers*

4.1.2.1 *Classroom management*

There was a general acceptance among the youngest group of participants about the positive impact of the long-term experience of older colleagues on their classroom management skills. Firstly, some young participants observed that the classroom management of older teachers runs smoothly. This is closely related to some young respondents' perceptions that older teachers radiate more respect and authority, as the following quote exemplifies:

"From older teachers you never hear that they have problems with their classroom management, since they have a certain level of maturity. What I see is, the more years you are working as a teacher, the more tools you have in order to keep a class group under control." (Scott, -33)

This classroom discipline results in a quiet and orderly class environment in which student learning can take place more easily.

Secondly, several young participants mentioned that the working experience of their older colleagues leads to a higher level of self-confidence, interconnected with both the teaching subject, dealing with the individual student and the class group dynamics. The majority of young participants highlighted that older teachers react in a more appropriate way to student behavior.

“A beautiful thing about the teaching profession is that you can grow and develop yourself as a human being and therefore also as a teacher. At the age of 25 you have a different way of teaching then, for instance, at the age of 40 or 50. You will feel more and more convenient and self-confident about your job, I guess... Because after all those years, you really own your teaching subject.” (Ben, -33)

Many participants of the older age group confirmed these ideas:

“I think that the job experience of our older colleagues can certainly be seen as a plus. They are very familiar with the school as well as their subject matter and curriculum. Additionally, most of them have a good relationship with their students... Also, a certain level of authority. Usually, our older colleagues have less problems with classroom management.” (James, 50+)

This implies that classroom management skills can be seen as a possible knowledge supply of older teachers and a knowledge demand of the youngest teachers in a school team.

4.1.2.2 Teaching methods

Some young participants discussed the issue of teaching methods in which they perceived that teachers of the older generation are using rather traditional teaching methods such as lecturing with a handbook and an outmoded chalkboard. However, a young participant emphasized that it is somehow incorrect to generalize the issue of traditional teaching methods to all teachers older than 50:

“it is kind of tricky to put everyone under the same umbrella, because I can also give a few examples of older colleagues with a rather progressive teaching style As compared to younger teachers, older teachers are more sticking to traditional teaching methods.” (David, -33)

When looking at the perceptions of the older participants, some teachers also agreed that their generational counterparts make use of outmoded school materials and rather traditional teaching methods.

“Whereas younger teachers generally use teaching materials that are more up-to-date, or for instance digital tools, older teachers make too frequent use of old-fashioned handbooks.” (James, 50+)

Many older participants highlighted creativity and innovation with regard to the teaching methods of younger colleagues. Many of them expressed positive feelings towards the ability of young teachers to come up with new teaching ideas and methods.

“Younger teachers create a totally different classroom atmosphere. I even don’t want to try that one... with a lot of noise and rumble... students that are walking through the classroom etc. And yes, they are able to do it that way. It is something that we admire but I don’t feel the need to act the same way.” (John, 50+)

This indicates that innovative teaching methods can be perceived as a knowledge supply of younger teachers. Some older teachers might see these new approaches on teaching as a knowledge demand in order to further develop their teaching methods and keep themselves up-to-date.

4.1.2.3 ICT

Teachers of both generations perceived the existence of a gap between them with regard to ICT skills. There was a general perception among teachers of the youngest generation that the oldest group of teachers in their school team has lower ICT skills. Furthermore, they also think that older colleagues make less use of ICT during their lessons:

“On the topic of the use of computers, technology is changing so rapidly that even for us it is hard to keep ourselves up to date! But the youngest generation is very open towards it. I think that teachers at the end of their career might think that they won’t waste their time using tablets during their lessons. For our generation, this is different. We are aware of the fact that those ICT tools have many opportunities and we believe that we can reach different goals with it.” (Eve, -33)

The ideas of these young participants about the ICT skills of their oldest colleagues were quite similar to the ideas that older colleagues had about their own generational cohort. The majority of older teachers explained their lack of digital skills by the fact that they did not grow up with a lot of technology and that they had to learn those skills on their own. Furthermore, some older participants stated that the use of ICT is very time consuming for them. This might explain why this older generational cohort is less motivated to make use of ICT.

*“ICT, that’s something people from my generation are struggling with. Of course, we did not grow up with it. Many things that look so obvious for the younger generation are very difficult for us.”
(Daisy, 50+)*

The older participants expressed very positive feelings towards the well-developed ICT skills of their younger colleagues. They perceived that the young ones frequently use ICT in their teaching and they highly appreciate their fluency in making all kinds of presentations.

“A thing which I really appreciate in our novice teachers is their knowledge and skills of new information technology. Not that we don’t know anything about this, but still... the ease with which they make use of presentation software, ... for me it is extremely time consuming. ... They are so proficient in this field, and that evokes a thankful collaboration. I am very pleased when I say: ‘I will elaborate this if you can visualize it’.” (Marge, 50+)

Participants of both generational groups were conscious of their strengths and weaknesses in terms of digital skills. From one perspective, this digitalization is responsible for a gap between those generations. From another perspective, it is a key for collaboration since one needs to help another in improving and developing ICT skills. Another kind of collaboration can also be found in the division of tasks; e.g. teamwork emerges when young teachers visualize the information that older colleagues have already gathered. Consequently, knowledge about ICT can be seen as an obvious knowledge supply of young teachers and a knowledge demand of the oldest generation of teachers.

4.1.3 *Perceptions about the attitudes of teachers*

Besides perceptions about the knowledge and skills of teachers, respondents in this study also talked during their interview about themes related to attitudes of their colleagues. In particular, the following

themes emerged from the interview data: taking things easy, resistance to change, self-confidence, teacher churn, and interaction with students.

4.1.3.1 *Taking things easy*

Older colleagues were described by some young participants as *'burned out'*. Hereby, they noticed that their oldest colleagues were less likely to provide themselves with a leading role in school activities. Regarding the preparation of lesson plans, older teachers were less inclined to make modifications and updates of their course materials. A young participant explained this by the fact that older teachers want to get some years of benefit of the work already done before.

"I have noticed that the older generation of teachers feel that they have already done so many things for so many years, and that new colleagues should now take turns to organize things at school. Older teachers will just participate." (Scott, -33)

Nevertheless, not all participants of the younger generations were pessimistic about this attitude of taking it easy and slowing down by older colleagues. Some young participants have nuanced this perception and stated that there are still older teachers that commit themselves for activities at school. They perceived that colleagues close to retirement want to finish their career in a beautiful way.

Half of the participants older than 50 observed that some of their generational counterparts are exhausted and slowing down, although they did not want to put everyone under the same umbrella.

"I think that colleagues of my generation are all slowing down. It is a long career..." (Daisy, 50+)

"We cannot deny that some of our older teachers are just too tired. They feel that they have seen it all before and they are done." (Marge, 50+)

4.1.3.2 *Resistance to change*

The majority of young participants believed that older teachers often stick to their own approach. This oldest generational group of colleagues was also perceived as more critical and skeptical towards changes and innovations. A reason can be found in the fact that older teachers can compare with previous experiences in their teaching occupation. An attempt to innovate can evoke resistance of older colleagues because of witnessing failed innovations in previous stages of their career.

"I feel that older teachers are sticking more to their own style and methods. I also realize that the last mile is the longest one for our oldest colleagues... and as it is the same every year, they don't put in much effort in, e.g. preparation of exams." (Sarah, -33)

Half of the older participants confirmed the idea that teachers over the age of 50 are less likely to change their teaching traditions. One participant gave a similar reason as the youngest teacher, that is, a rather conservative attitude of older teachers is caused by witnessing failures in previous stages of the career.

Some participants older than 50 expressed positive feelings towards the high level of enthusiasm of their youngest colleagues. This enthusiasm is also related to 'eager to learn', 'highly motivated to experiment with things', as perceived by the older participants.

"Enthusiasm is typical for beginning teachers." (Marge, 50+)

Some participants of the youngest generation have similar optimistic perceptions about the enthusiasm of their equals.

"Typical for young teachers is that they like to try out new things." (Sarah, -33)

Another attitude of older teachers, as perceived by the young ones, is the attitude of 'complaining'. Two reasons for this were given by the youngest group of participants. First of all, complaining occurs when young teachers are not following the rules for students and for themselves. Secondly, the youngest generation believes that the oldest teachers do have difficulties in dealing with today's youth mentality.

Participants of the oldest generation described their attitude of complaining more in terms of 'being annoyed' about the fact that the core business of their profession, which is supposed to be teaching, is getting less attention due to an overload of administrative tasks and other activities within the school.

"Some older colleagues feel more like 'let me just do my teaching job, don't bother me with all those extra activities, I just want to teach my students!' This is something that we perceive less in our young colleagues." (Marge, 50+)

4.1.3.3 Self-confidence

The positive impact of a high level of self-confidence on classroom management skills has been discussed already in the section 'perceptions about the skills of teachers'. In this section related to the attitudes of

teachers, we refer to self-confidence more as a general attitude. Half of the young participants expressed their impression that older teachers were more calm, relaxed and confident. Whereas young participants explained this calm attitude more by experience with the teaching subject, older participants explained it more by the fact that they can relativize more. One older participant mentioned that employment security due to permanent positions makes older teachers feel more calm and therefore more self-confident.

4.1.3.4 Teacher churn

Several older participants experienced that their youngest colleagues are more likely to leave the teaching profession at the beginning of their career. One reason is named by some older teachers as 'job hopping', where teachers are dropping out to pursue careers in other settings outside education. This attitude is enforced by the high workload, lack of perseverance, and practice shock. On the other hand, older participants noted that young teachers like to enjoy life, keeping the high retirement age in mind, and decide to go travelling and seeing the world.

"New teachers face difficulties... several of them drop out at the beginning of the school year, after the first week, or after the first month. Especially the workload makes them feel helpless." (Simone, 50+)

"I think that beginning teachers lack perseverance, that's quite obvious nowadays. After half a year, they feel that they had underestimated the job. It is tougher than what they expected, and then it's hard to get them motivated Some will search for other professions. Every year, some young teachers quit their job and decide to travel" (Daisy, 50+)

The youngest group of participants also perceived their own generation as a cohort that is dropping out more easily. In this regard, they referred rather to feelings of employment uncertainty and underestimation of workload in their teaching job.

"In my opinion, many beginning teachers underestimate the teaching profession. I had exactly the same feeling at the beginning of my career. It's a struggle of the fittest in the beginning, and you have to deal with that." (Scott, -33)

"It can be frustrating, because, year after year you cannot be sure of your teaching position on the 1st of September ... therefore, I can really understand that many young teachers are leaving the teaching profession" (Ben, -33)

4.1.3.5 Interaction with students

Many older participants shared the perception that the distance between young teachers and their students is too close. They experienced that young teachers want to become friends with their students in order to give a popular and likeable impression. According to participants older than 50, this attitude of many young teachers is a pitfall, since it will lead to disciplinary loss.

*"Young teachers usually make the mistake that they want to be popular with their students."
(John, 50+)*

Some young participants also mentioned having a close connection with students, whereby the boundary between teacher and student is quite small. They permit close interaction with students and prefer to engage in dialogue, and also in conflict situations. This way of interaction with students is perceived by some young participants as a generation gap between old and young teachers.

"I want to make students aware of their behavior, so that they understand what they did wrong and why I, as a teacher, am not pleased with his or her actions. I want to engage in dialogue, while older teachers are more likely to refuse this. They give a note, followed by a sanction, and that's the end of the story!" (Scott, -33)

As reported earlier, knowledge demands and knowledge supplies have been clearly recognized in the perceptions about knowledge and skills of teachers. Although these knowledge demands and supplies did not clearly occur within the sub-themes of perceived attitudes, they might have the potential to influence the stream of knowledge between knowledge demands and knowledge supplies across generations of teachers in a supportive or constraining way. For instance, when young teachers believe that their oldest colleagues are not willing to change their teaching methods, are conservative and are sticking to their own approach, they might feel less encouraged to share their knowledge about new and innovative teaching methods. Another example is related to the drop-out of young teachers. When old teachers experience their youngest colleagues as 'job-hoppers', it might make them less willing to share their subject specific knowledge or classroom management skills with their younger counterparts. High rates of teacher churn may therefore affect knowledge-sharing behaviour. This implies that the perceptions about the attitudes of colleagues might somehow restrict the knowledge flow between knowledge demands and knowledge supplies across different generations of teachers.

Both generational cohorts were aware of the fact that they can learn from each other. In the light of intergenerational knowledge brokerage processes this is a positive finding.

“I think we could move a big step forward if we could combine the knowledge of our older colleagues with the teaching methods of our youngest colleagues.” (David, -33)

4.2 Intergenerational knowledge brokerage processes within school teams

4.2.1 Opportunities for IKB processes

Our results confirm that intergenerational knowledge sharing can take place in a variety of activities. Examples of these activities given by our respondents are: subject team meetings, informal moments, classroom visitations, mentoring sessions, digital learning platforms, training sessions, pedagogical seminars, collaboration with colleagues. Consequently, these activities are opportunities for IKB processes to occur.

As described in the theoretical framework, the processes of socialization, externalization, combination and internalization play an important role in IKB. The afore-mentioned activities contain usually more than one process of IKB, as some overlap can occur. In the following section, we give examples of how these processes take place.

4.2.1.1 Socialization

This process occurs prominently when teachers chat with each other, for instance, in the coffee room or just in the corridor. Knowledge sharing happens spontaneously, sometimes people are just talking without realising that they are actually sharing knowledge. This process also occurs when people watch their colleagues when doing their job. For instance, a young teacher mentioned that he learns from his older colleagues when he just sees other colleagues dealing with student behaviour. This socialization process can be mainly found in informal meetings, subject team meetings, collaboration with colleagues, mentoring, or pedagogical seminars.

“Just by chatting with each other and having a drink together and doing things together... That way, a lot of knowledge is transferred spontaneously. You are not explicitly saying ‘now I am going to explain something to you’, but you’re just talking.” (Daisy, 50+)

“...just by seeing each other working, you can learn a lot.” (Scott, -33)

In this process, some teachers mentioned that the personality features and a personal match or positive relationship between teachers are of major importance. More specifically, teachers need to have an open attitude towards each other and the value of teambuilding activities may not be underestimated.

4.2.1.2 Externalisation

In the phase of externalization, tacit knowledge of the earlier socialization phase is made explicit (Nonaka & Takeuchi, 1995). This conversion of implicit to explicit knowledge can be obtained by language or documents. When language is the facilitator of knowledge sharing, active questioning is a way to achieve externalised knowledge of colleagues. According to many of our participants, teachers should not hesitate to ask specific questions about their colleagues' knowledge, specifically across generations. Hereby, a certain level of assertiveness is needed.

"Of course, I already asked an older colleague things like: 'this topic, how do you deal with that? And how do you evaluate that part of the exam? ... and then I always get an answer'" (Ben, -33)

"When the older teachers are preparing a document on their computer in the teacher room, and, for instance, they have troubles creating a table, .. then it happens that they ask me: ooh could you have a look at it? How can I fix this? ..." (Lily, -33)

Also, in mentoring activities, mentors externalise their knowledge in documents or during mentoring sessions. During these sessions, mentors give information about educational activities that might be school specific. For instance, how are parental evenings organized? How does the evaluation system work? What is the vision of the school in terms of evaluation? Most of the young teachers affirmed that their mentor was a teacher from the oldest generational cohort.

"We organise guidance for new teachers. We organise meetings and sessions about problems, deliberations, reports, grading, parent meetings, classroom management, ..." (Simone, 50+)

"My mentor recently visited my classroom in order to form an opinion about how I am doing. After that we also had supervision, we bring a case in which we discuss a problem or experience in group." (Sarah, -33)

Many examples of externalization can be found in the use of the digital learning environment. Within this, a big variety of documents can be uploaded, shared and used by colleagues. The process of externalization focuses specifically on verbalizing tacit knowledge and documenting it, after which this explicit knowledge can be uploaded.

"When we attend a training session, we write a short report about it. Then, we publish it on our digital learning platform so that members of our subject team can have a look at it. The goal is to

have a look at each other's reports. Also, by reporting it, you can have some reflections on it, and you share it with colleagues." (Diana, 50+)

In this process of externalization, school principals and subject teams play an important role in the conversion of implicit knowledge into explicit forms. A young teacher mentioned that school principals might ask or even oblige teachers to upload information on a digital learning platform. Otherwise, it can be an agreement among teachers that collaborate in a subject team, as described by an older teacher.

The fact that knowledge is made explicit does not mean that it is eventually also retrieved and used by colleagues. Therefore, activities related to the next process of combination are important.

4.2.1.3 Combination

In this process, teachers gather explicit knowledge from their colleagues and rework it, by including their own explicit knowledge. Consequently, different explicit knowledge bases are used to develop new explicit knowledge. Thus, information and communication technology can facilitate the process of combination. Teachers of both age groups specifically referred to the use of digital learning platforms as a useful tool for intergenerational learning within their subject teams.

"We do have a community for French, it is an online platform where you can find lots of documents such as study guidelines, tests, etc. With this I have at least an idea about what some documents should look like. This was a really difficult thing for me in the beginning, like 'how can I create a good test?' "(Sarah, -33)

"Someone creates something new and then sends it to colleagues, and says: 'what do you think of it?' "(James, 50+)

This process can also occur without technology, simply by teachers of different generations sitting together while explicitly sharing their knowledge about a subject in order to acquire new explicit knowledge.

"For instance, with the use of tablets, colleagues get together and search for apps and other functions together. During these events you can easily share your knowledge." (Lily, -33)

Subject team meetings might be appropriate activities for stimulating this process of combination, but the quality of the subject team or the steering role of the head of this subject team might affect the content and outcomes of this process, as exemplified by an older teacher:

"If you are part of a good subject team, you can learn a lot from each other. I suppose that the head of this subject team will stimulate this learning. Otherwise it will be a tough process. In my opinion, everything stands or falls with your subject team..." (Marge, 50+)

4.2.1.4 Internalisation

During the process of internalization, explicit knowledge becomes a part of teachers' practice, whereby knowledge becomes routinized and turns into a tacit mode. Through applying explicit knowledge, teachers internalise this knowledge. Learning by doing is an essential action within this process. Opportunities can be found in, e.g., workshops, mentoring sessions and classroom visitations. Teachers can reflect on their performance and put their assumptions into practice.

"This is really something I had to learn... In my lessons, pupils always had to be completely silent... but through visiting lessons as a mentor, I could see that other ways were working too. It made me understand that a noisy lesson doesn't always mean that it is a bad lesson and that student learning does not take place There are other things as well that I noticed by attending mentees' lessons and that incited me to act the same way." (Daisy, 50+)

"This especially occurs when an older colleague and a young one have a parallel class, for instance, when exam files need to be created, I often hear them say 'I reached this chapter, and I am now going to do this test' So, this is something that they discuss with each other and it permits them to learn a lot from one another, because the old teacher might say 'last year I reached a further point in the course material' or 'I got less far'. Hereby, teachers learn somehow how to plan." (Maria, 50+)

Typically, classroom visitations take place within mentoring systems. Usually, an older teacher visits the lesson of a young or beginning teacher. While the young teacher gets tips and tricks that can be applied in further practices, mentor teachers can also learn from their youngest counterparts when witnessing good practices that can be applied in their own practices as well. Almost all interviewed teachers in this study confirmed that visiting the class of a colleague from another generation could be a valuable method in order to improve their own teaching practices.

"I think it would be very interesting to attend a lesson of an older colleague. I would learn a lot from that. If I could attend the geography lesson of my colleague, I think I would react like 'ooh yes, of course, if I do it that way'... or 'oh yes, that's interesting'" (Kate, -33)

In practice, this method is not self-evident since participants in this study expressed feelings such as ‘it is a threshold’, ‘it is awkward’, ‘you feel observed’, ‘you feel evaluated’, ‘I would feel like a controller’, ‘teachers are afraid of failure’. These negative feelings mean that classroom visitations, which were almost unanimously perceived as a valuable method for intergenerational learning, are not put into practice.

5. Discussion and conclusion

In the present study we have focused on the question of how teachers perceive their colleagues from other generations and how IKB processes take place within school teams. Given the rather poor conceptualization of this research domain so far, we adopted an explorative approach.

As regards the perceptions of teachers about colleagues of other generations, we distinguished three major themes: knowledge, skills, and attitudes of teachers. According to young participants in this study, the knowledge supplies of older teachers are mainly related to their high level of content knowledge and their classroom management skills. The knowledge supplies of young teachers, perceived by the oldest participants in this study, are related to their creative and innovative teaching methods, and their well-developed ICT skills. When associating our findings of knowledge supplies and demands with Shulmans’ categorization, we mainly recognize content knowledge, general pedagogical knowledge and pedagogical content knowledge. This suggests that those forms of knowledge play the biggest role in teachers’ daily practices. The occurrence of flows, in which knowledge supplies and knowledge demands of teachers across different generations interact, might be affected by the perceptions about teachers’ attitudes. Previous research has shown that generational cohorts differ in their attitudes towards work (Edge, 2014). Whereas the attitudes of older teachers were perceived by young ones as taking things easy, complaining, conservative, and self-confident; attitudes of young teachers were perceived by old participants as dropping out easily, enthusiastic, and in close interaction with students. Accordingly, these perceptions constrain or support the intergenerational flow of knowledge demands and supplies. Despite the fact that many young teachers perceived some of their oldest colleagues as slowing down and unmotivated, they are still convinced of the fact that they can learn a lot from their oldest colleagues. Both generational cohorts expressed positive feelings towards intergenerational learning. Further research can investigate the variation in motivation for intergenerational learning in different generational teacher groups.

To answer the question about how IKB processes take place within school teams, our findings are consistent with those of previous studies (e.g. DeLong, 2004; Liebowitz, 2009). We found a wide variety of

examples of IKB activities including subject team meetings, informal moments, classroom visitations, mentoring sessions, digital learning platforms, training sessions, pedagogical seminars, and collaboration with colleagues. The three types of learning: formal, informal and nonformal learning, can be recognized in these examples. Consequently, these activities offer opportunities for IKB processes to occur.

Regarding the four key IKB processes: socialization, externalization, combination, and internalization (Nonaka & Takeuchi, 1995), we found that the first three processes were prominently available in our data. However, the last process, internalization, was mostly absent. Only few examples were given by teachers about which knowledge they could internalise after knowledge-sharing with colleagues from another generational cohort. This finding might suggest that teachers share their knowledge but that they do not always reach the level of implementation of their newly created knowledge in their own teaching practice. Another explanation can be that participants in this study were not aware of their new routines and therefore did not mention examples about the process of internalization. Further research is needed to elicit this issue and can specifically focus on the phase of internalization in order to identify why this phase is rather scarce.

The above described IKB processes emphasize the socio-constructive nature of intergenerational learning. It is assumed that teacher knowledge is created and constructed through dialogical processes between younger and older teachers. For this reason, the initial used metaphor of knowledge brokerage, referred to as 'moving knowledge from one place or group to another' (Vanhoof & Mahieu, 2013), should be interpreted in a more comprehensive way by taking a social constructivist point of view.

We also found that many IKB activities are not intentionally aiming at knowledge-sharing between young and old teachers, with the exception of mentoring practices. The fact that knowledge sharing can be considered as an intergenerational activity is often an accidental consequence of the composition of the subject team. Further research might therefore focus on how IKB processes are intentionally and/or unintentionally stimulated by the school principal.

In this light, future work needs to look more deeply into influencing factors of the earlier described IKB processes. Four categories of influencing factors can be recognized which affect intergenerational learning and that therefore can explain differences between generational approaches in different contexts. The individual level refers to the personality features of teachers; for instance, their openness and assertiveness. The team level is more related to trust, social interactions and team cohesion between team members. Specifically, subject teams, and how this team is managed by a head teacher, might play a

prominent role. Also, the length of relationships and hierarchical position within the school might affect IKB. The third level is the school level, in which the school principal can be seen as a facilitator of IKB processes. The extent to which school principals intentionally integrate 'age diversity' or 'intergenerational knowledge-sharing' in their policies, as well as the created school culture and policy-making capacities can be part of this level. In addition to these three levels, we should not overlook the importance of available resources like physical space, time, and information and communication technology, including digital learning environments. Further studies can concentrate on these factors and how they influence intergenerational knowledge flow in school teams.

As stated in the theoretical framework, we expected to see social identity theory (Tajfel & Turner, 1986) at play, meaning that teachers value their own generational cohort more highly than their colleagues of another generational cohort. We conclude that this in/out group dynamics did not seem to play a prominent role in our data. When mirroring the perceptions of teachers about a generational cohort to the self-perceptions of this cohort, we found that these perceptions are somehow similar. This means that teachers have a common idea about each other and that they can draw honest conclusions about their own generational cohort.

To conclude, we believe that intergenerational learning is an important focus within school teams. Shedding light on teachers of different generations has an added value because of the different knowledge and skills these cohorts possess, as explained by our responses to RQ1. Other reasons can be found in demographic changes, but also in change and innovation in educational institutions.

6. Implications of the study

Within schools, teachers need to perceive the development of a knowledge sharing attitude as a part of their continuous professional development. This goes along with the importance of making their knowledge explicit in such a way that knowledge of teachers of different generations can be combined. Efforts are needed to stimulate teachers' reflection on knowledge demands and supplies in order to create awareness of where knowledge can be found. Paying attention to the entire teaching team as an intergenerational learning community is essential in this regard. Teachers might feel more encouraged to participate in intergenerational learning when there is an optimal mix between knowledge demands and supplies. School principals can play a role in supporting both formal and informal opportunities for intergenerational learning. Besides creating face-to-face interactions, digital learning platforms can

stimulate knowledge sharing processes particularly within the phase of externalization and combination of knowledge. As knowledge about ICT appeared to be a weakness of older teachers, school principals should be aware of this potential difficulty. The challenge will be to further develop the (digital) learning environment in a way that it facilitates knowledge sharing for the entire school team. Intergenerational learning can also be incorporated within teacher education programmes. As student teachers are mostly young teachers, they can also be seen as a source of knowledge for the school during internships. The implications for teacher education lie in revealing the importance of facilitating interactions between student teachers and mentor teachers of different generations. Teacher educators might take into account that mentor teachers of different ages contain different bases of knowledge and skills. Therefore, student teachers might be combined during their internship with a mentor teacher who is in a way complementary in order to optimise learning and knowledge sharing. Another challenge for teacher education lies in creating a knowledge sharing attitude by their students so that IKB processes maintain in their further professional development.

7. Limitations of the study

Like every study, this study also has some limitations that need to be considered in evaluating the findings. A limitation of this study is related to the selected respondents. Only teachers of the youngest and the oldest cohort were included, but the middle group might also have an interesting view on intergenerational learning since they might collaborate with both elder and younger colleagues. Regarding the subject matter, teachers of different subjects were included in order to capture a broad view. Further research might look more deeply in knowledge sharing of teachers within a particular subject team. Another limitation of this study is related to the definition of generational cohorts that we used, based on chronological age only. Further research on this topic might consider using a more comprehensive definition, taking into account such characteristics as work tenure, life span and psychological age in order to improve generalizability (Sterns & Doverspike, 1989). In Flanders, teachers of different ages might have permanent or temporary positions within the school, this might also influence their knowledge sharing behaviour. Also, the concept of a generation should be elaborated further. New teachers are not always young teachers; the increasing number of Flemish teachers that enter the teaching profession at a later stage in their working life makes the concept of a generation within school teams even more complex. Hereby, we suggest to taking into account the years of experience within the teaching job. The national context might be a challenge for the broader international application of this study (Edge, 2014). As

generational cohorts are shaped by mutual social experiences and shared historical events (Mannheim, 1952), they also involve, for instance, educational reforms which are inextricably linked to national contexts. Although the current study was done in Flanders, it is relevant for an international audience since demographic changes are a global trend and continuous professional development is seen as an objective in many national policies and educational reforms.

Study 2. Teachers' age-related stereotypes



This chapter is based on:

Geeraerts, K., Vanhoof, J., & Van den Bossche, P. (submitted). Teachers' age-related stereotypes.

Abstract

This quantitative study examines the existence of teachers' age-related stereotypical beliefs and investigates differences between generational cohorts (N=558). Results indicated that being interested in technological change, making use of ICT, having creative and innovative ideas, and considering another profession was by all generational cohorts attributed to young teachers. Taking a leadership role, being loyal, being confident, being conservative, smooth classroom management skills, and having extensive knowledge of the subject-matter, was by teachers of all cohorts perceived as a characteristic of older teachers. Many characteristics in terms of attitudes were not clearly attributed to a certain age group of teachers.

1. Introduction

The aging workforce is an increasingly important topic. Older workers need to remain longer in the workforce to sustain our retirement systems. Also, workplaces have undergone considerable changes during the past 40 years, for instance due to technological innovations (Kicheva, 2017). The so-called “digital natives” recently entered the workforce which in combination with the aging workforce leads to a more age-diversity within work teams. In organizational contexts, it becomes increasingly important to understand and deal with age stereotypes at the workplace in order to prevent from negative outcomes of age diversity in organisations (Fasbender, 2016; Fasbender & Deller, 2017). Also within the context of school teams, the topic of age-diversity in terms of teacher generations recently received more attention (e.g. Brücknerová & Novotný, 2016; Geeraerts, Van den Bossche, Vanhoof, & Moolenaar, 2017; Geeraerts, Vanhoof, & Van den Bossche, 2016; Novotný & Brücknerová, 2014). Within these age-diverse school teams, a process of social categorization as described by Tajfel and Turner (1986) can be at play, meaning that teachers tend to group together with colleagues who are supposed to be similar, for instance based on age. This also relates to literature on generations of teachers that groups teacher teams into different age cohorts based on chronological age (Edge, 2014).

A qualitative study indicated that young and old teachers have certain beliefs about their colleagues of the same and another generational cohort, and distinguished perceptions in terms of knowledge, skills, and attitudes of teachers (Geeraerts et al., 2016). These beliefs about teachers of certain age-groups can both have positive or negative consequences for intergenerational teacher interactions (Geeraerts et al., 2016). When beliefs about characteristics, attributes, and behaviours of members of a certain group are generalised, these beliefs can be labelled as stereotypes (Hilton & von Hippel, 1996). Stereotypical beliefs generate expectations that can lead to self-fulfilling prophecies. This might evoke that individuals behave or act conform these stereotypes, which in turn, potentially reinforces stereotypes (Fasbender, 2016; Fasbender & Deller, 2017; Levy & Leifheit-Limson, 2009). For instance, when older teachers are perceived as being more conservative and less likely to make use of innovative teaching methods, teachers of this age group might base their behaviour on these beliefs. By doing so, age stereotypes also affect how individuals interact at the workplace (Hedge et al., 2006). In the given example, the consequence might be that young teachers are less likely to share their innovative teaching ideas with the oldest generation of teachers within the school team.

Many researchers create awareness on the fact that generational stereotypes are often lacking sufficient empirical evidence (e.g. Costanza & Finkelstein, 2015; Lyons, Urick, Kuron, & Schweitzer, 2015; Twenge,

2010). Some studies found more similarities than differences across generations (e.g. Ferres et al., 2003; Wong et al., 2008). In addition, age stereotypes are often associated with negative feelings between workers of different generations which in turn can negatively affect organizational climate (Kunze et al., 2011), however, positive stereotypes do exist as well. For instance, the belief of older workers being more loyal, committed, and reliable (Posthuma & Campion, 2009). A recent study of Fowler and Gasiorek (2018) showed that positive stereotypes are beneficial for facilitating intergenerational interactions. Understanding and recognizing differences between generations is key to the development of a successful multigenerational workforce (Kicheva, 2017). Considering different generations of teachers and paying attention to differences in how these generations experience their work is important in order to develop towards a strong and sustainable professional community of teachers (Edge, 2014; Stone-Johnson, 2017). In order to deal with this issue, studies with a main focus on age are urgently needed (Truxillo, Cadiz, & Hammer, 2015).

Notwithstanding that research on age stereotypes already exists within organizational contexts (e.g. Chiu, Chan, Snape, & Redman, 2001; Henkens, 2005), there seems to be a clear gap in research on age stereotypes within school teams. Previous research investigated teachers' perceptions about the knowledge, skills, and attitudes of their colleagues by using a qualitative research method (Geeraerts et al., 2016). In this study, age stereotypes within teacher teams are seen as generalized beliefs teachers have about the knowledge, skills, and attitudes of their colleagues of a certain age group. By using a quantitative research approach, this study examines the extent to which teacher's attribute characteristics in terms of teachers' knowledge, skills and attitudes to older or younger teachers, and therefore aims to capture the existence of stereotypical beliefs in school teams. In addition, differences between teachers of different generations in terms of attributing teachers' characteristics (knowledge, skills, and attitudes) to a certain age-group are investigated.

2. Theoretical Framework

2.1 Generational diversity

The first conceptualisation of generations was provided by Mannheim (1952) suggesting that members of a certain generation are characterized by a similar way to interpret their environment as a consequence of mutual social experiences and shared historical events during their life. Eyerman and Turner (1998) modified Mannheim's original conceptualisation of generations by defining a generation as "*a cohort of*

persons passing through time who come to share a common habitus, hexis and culture, a function of which is to provide them with a collective memory that serves to integrate the cohort over a finite period of time”. A generation can be seen as a group of individuals that moves through stages of life within a certain historical context (Ropes & Ypsilanti, 2016). Generation is a multidimensional construct which is context specific (Ropes & Ypsilanti, 2016). A difficulty in defining generational cohorts is that there is no agreement in the boundaries of a cohort (Lyons & Kuron, 2014; Ropes & Ypsilanti, 2012). Within the context of school teams, three main generations of teachers coexist together and are referred to as Baby Boomers (1946-1965), Generation X (1966-1980), and Generation Y (1981-2003) (Edge, 2014). Other studies on generations of teachers used similar boundaries but labelled these generational cohorts as old, middle, and young teachers (e.g. Geeraerts et al., 2017; Geeraerts et al., 2016; Novotný & Brücknerová, 2014). The fact that different generations of teachers operate together within school teams leads to a certain level of generational diversity. Generational diversity is closely related to age diversity since age is a key aspect of how a cohort is defined (Ropes & Ypsilanti, 2016).

On one hand, it is argued that generational diversity leads to a broader range of expertise and knowledge within a team (Gerpott et al., 2016). These knowledge supplies refer to the variety of knowledge that teachers of different generations possess, and these domains of knowledge might differ depending on the generational cohort (Geeraerts et al., 2016). On the other hand, generational diversity can also lead to misunderstandings between individuals of different generations, and therefore, result in intergenerational conflict and the formation of in- and out-group categorizations and stereotypes (Kicheva, 2017).

2.2 Young and old, “them” and “us”?

The idea of how individuals perceive members of their own generational cohort and members of another generational cohort is related to a process of group categorization. Tajfel and Turner (1986) referred to this process of group categorization by social identity theory, also known as the self-categorization theory (Oakes, Haslam, & Turner, 1994). This theory asserts that the perceptions and behaviours of individuals towards themselves and towards others are an outcome of in-group and out-group categorizations. In order to achieve positive self-esteem and a positive self-image, members of the in-group have more favourable beliefs about their in-group members and more negative beliefs about out-group members. Dencker et al. (2007) apply these in- and out-group dynamics into age groups within a work context. Consequently, individuals might also identify themselves with others based on age features. This implies

that members of the same age groups will be perceived as in-group members, and members of the other age groups are considered as out-group members. Hassell and Perrewé (1995) found that older workers do have more positive beliefs about older workers than young workers do, but also young workers seemed to have mainly positive beliefs. The older the worker, the more favourable beliefs about older colleagues regarding adaptability and work effectiveness (Chiu et al., 2001). According to Finkelstein, Burke, and Raju (1995) young workers seemed to have less favourable beliefs about older workers, especially when they concurrently rated old and young workers, and when specific information about the workers was missing. This implies that teachers might also think in 'them' and 'us' when it comes to age, and that teachers might have more positive beliefs about colleagues of their own generation (in-group) as compared to colleagues of other generations (out-group).

2.3 Age-related stereotypes in the workplace

Research literature provides different conceptualizations of stereotypes. Hilton and von Hippel (1996) define stereotypes as beliefs about the characteristics, attributes, and behaviours of members of a particular group. McGarty, Yzerbyt, and Spears (2002) refer to stereotypes as perceptions of groups. Age stereotypes are also defined as "simplified, undifferentiated portrayals of age groups that are often erroneous, unrepresentative of reality, and resistant to modification" (Schulz, Noelker, Rockwood, & Sprott, 2006, p. 43). In contrast to the first definitions, the latter definition questions the accuracy of stereotypes. In terms of the accuracy of stereotypes, Judd and Park (1993b) found that stereotypes of in-groups are more accurate than stereotypes of out-groups. Stereotypes of out-groups are found to be more exaggerated and overgeneralized (Judd & Park, 1993b). However, the accuracy of stereotypes is often neglected in the definition of it. Stereotypes are mostly described as beliefs of groups held by individuals, without taking the accuracy of these stereotypes into account (Judd & Park, 1993b; McGarty et al., 2002).

Stereotypes can be seen as socio-cultural and group-level phenomena, and, are also linked to attitudes and prejudices. Age stereotypes are generalizations based on age-group membership of individuals, such as believing that older workers in general are less flexible or are more dependable (Cadiz, Pytlovany, & Truxillo, 2017). A reason that individuals form stereotypes can be found in the idea that treating individuals as groups members is energy-saving since all diverse and detailed information related to these individuals can be ignored (McGarty et al., 2002).

The majority of research on the topic of age stereotyping in work context refers especially to older workers (e.g. Finkelstein, Ryan, & King, 2012; Henkens, 2005; Ng & Feldman, 2012; Posthuma & Campion, 2009). Research focussing on stereotypes of younger workers is still underexplored (Cadiz et al., 2017). Stereotypes do often refer to perceptions on attitudes and have negative connotations. Posthuma and Campion (2009) describe the stereotype that older workers have a lower ability, are less motivated, and are less productive than younger employees. Another stereotypical belief relates to the idea that older workers are less adaptable, less flexible, more resistant to change, and have a lower energy level, as compared to their younger counterparts (Posthuma & Campion, 2009; Taylor & Walker, 1994). Also, older workers appear to be perceived as having a lower ability to learn than younger colleagues and less willing to participate in training and career development activities (Ng & Feldman, 2012). On the other hand, literature suggests that there are also positive stereotypes associated with older employees, such as, being more stable, dependable, honest, trustworthy, loyal, reliable, and committed to their job (Bal, Reiss, Rudolph, & Baltes, 2011; Marcus, Fritzsche, Le, & Reeves, 2016; Posthuma & Campion, 2009; Taylor & Walker, 1994). Stereotypes of younger workers are often found to be more positive than those of older workers (Perry, Hanvongse, & Casoinic, 2013).

The above described stereotypes mainly cover perceptions or beliefs about the attitudes of older or younger workers in the workplace, however, also beliefs about knowledge and skills attributed to certain generational cohorts might exist within workplaces. For instance, within teacher teams which is the context of this study, a qualitative study of Geeraerts et al. (2016) revealed that old teachers were perceived by young ones as colleagues with a high level of subject matter knowledge and classroom management skills. These knowledge domains were labelled by Shulman (1987) as content knowledge, general pedagogical knowledge, and pedagogical content knowledge. Attitudes of older teachers were perceived as taking things easy, low motivated, complaining, conservative, and self-confident. Skills of young teachers were characterized by the use of creative and innovative teaching methods, as well as highly developed ICT skills. Young teachers' attitudes were perceived by older ones as dropping out easily, enthusiastic, and in close interaction with students (Geeraerts et al., 2016). Consequently, also within the context of teachers, both positive and negative perceptions on different generational cohorts could be identified. The above described study of Geeraerts et al. (2016) used a qualitative approach, more specifically interview data, to investigate teacher's perceptions of different generations. In the present study a quantitative approach is used to unravel the extent to which age-related stereotypical beliefs exist among teachers. Therefore, the following research questions (RQ) are set forward: RQ1. To what extent do teachers attribute characteristics in terms of knowledge, skills, and attitudes to young or older

colleagues? RQ2. To what extent do generational cohorts differ in attributing these characteristics of teachers' knowledge, skills and attitudes to a certain age group?

3. Methodology

3.1 Sample

Data were collected in Spring of 2016 in 10 secondary education schools in Flanders (Belgium). Quantitative research methods were used. 558 teachers completed an online survey of whom 199 teachers were younger than 36, labelled as 'young cohort', 230 teachers were between 36 and 50 years old, and labelled as 'middle cohort'. The 'oldest cohort' consists of 129 teachers older than 50. These sample demographics are displayed in Table 1. The boundaries of the generational cohorts used in this study are in line with previous research on teacher generations (e.g. Geeraerts et al., 2017; Geeraerts et al., 2016).

Table 1 Sample demographics

Generational cohort	Number of teachers	Percentage
Young (<36 yrs old)	199	35,66%
Middle (36-50 yrs old)	230	41,22%
Old (>50 yrs old)	129	23,12%
Total	558	100,00%

3.2 Measures

In our survey, we included 18 items on stereotypes based on previous research of Henkens (2005) and Geeraerts et al. (2016). The original set of items of Henkens (2005) consisted of likert type questions that particularly referred to older workers. (e.g. "Older workers are less creative") Given the idea that stereotypes might exist for teachers of all age groups, and the lack of research on stereotypes of younger workers (Cadiz et al., 2017), we reframed the items into age neutral characteristics. Examples of these items are: "being loyal", "being reliable", "being interested in participating in professional development programs". In addition, we included characteristics that derived from a qualitative study on the perceptions of knowledge supply and demands of different generations of teachers (Geeraerts et al.,

2016). Examples of these items are: “making use of ICT”, “having extensive knowledge of the subject matter”, “smooth classroom management skills, easily radiating respect and authority”. This resulted in a set of 18 characteristics that covered both knowledge, skills, and attitudes of teachers. Consequently, respondents were asked to indicate the extent to which a characteristic was applicable to younger or older colleagues. Concretely, the items were measured by using a slider scale from 0 to 10, in which 5 indicated a ‘neutral’ position, meaning that the statement could not be attributed to younger or older colleagues. Completely attributing the statement to young colleagues could be done by moving the slider to 0, whereas 10 indicated attributing the item clearly to older colleagues. In other words, the more to the extreme sides of the slider scale, the more the item can be attributed to a certain age group. The more to the middle point 5, or neutral point, the less the item will be attributed to a certain age group.

3.3 Data analysis

Firstly, to examine the extent to which teachers attribute features of knowledge, skills, and attitudes to young or older colleagues we performed descriptive analyses (RQ1), by using the software of IBM SPSS Statistics 24. Means and standard deviations were calculated.

In order to further discover the data, we calculated Intra Class Correlations to investigate whether there were differences between schools. Intra Class Correlations (ICC) of the items are displayed in Table 2. ICC of the items range from 0.00 to 0.06. This implies that the effect of the school where teachers are being part of is small and even negligible. The school in which the research took place does not explain variance in stereotypical beliefs. Consequently, secondary education schools in Flanders (Belgium) seem to have similar stereotypical beliefs. These findings provide support to our choice of data analysis ANOVA instead of multilevel regression models to respond to our second research question.

Table 2 Intra Class Correlations (ICC)

Item	ICC
Being confident	0.00
Being collegiate	0.00
Being socially skilled	0.01
Exchanging course materials	0.01
Being interested in technological change	0.01
Being flexible	0.01
Being motivated	0.02
Classroom management skills, radiating respect and authority	0.02
Being conservative	0.02
Considering another profession	0.02
Being interested in professional development programs	0.03
Being loyal	0.03
Having creative and innovative ideas	0.03
Having extensive knowledge of the subject matter	0.04
Making use of ICT	0.04
Being enthusiastic	0.05
Taking a leadership role in activities	0.06
Being absent/ on a sick leave	0.06

By performing a one-way-ANOVA analyses with post-hoc procedures for multiple comparisons, differences between teachers of different generational cohort were investigated (RQ2). The post hoc tests Tukey and Games-Howell were used for comparisons of the mean scores among the different generational cohorts, depending on the significance of the Levene Test. Welch F was calculated for Items with a significant Levene Test.

4. Findings

4.1 The existence of teachers' age related stereotypical beliefs

Our first research question investigates the extent to which teachers attribute teacher characteristics in terms of knowledge, skills, and attitudes to young or old colleagues. The means and standard deviations of items on teacher characteristics are displayed in Table 3. Looking at these mean values, teachers believe that young teachers are 'being interested in technological change' (M=3.42; SD=1.48), 'making use of ICT' (M=3.82; SD=1.27), and 'having creative and innovative ideas' (M=4.02; SD=1.34). These items were found to be to a greater extent attributable to young teachers. Accordingly, these characteristics can be labelled as stereotypes of young teachers. Teachers believe that 'being conservative' (M=6.05; SD=1.32), 'classroom management skills (radiating respect and authority in the classroom)' (M=6.34; SD=1.43), and 'having extensive knowledge of the subject matter' (M=6.56; SD=1.51) are to a greater extent related to older teachers. In addition to the items that can be clearly attributed to a certain age group of teachers, there are also items that seem to be neutral since the mean values are closer to five. Non-age related items are: 'being flexible' (M=4.48; SD=1.56), 'being motivated' (M=4.70; SD=1.22), 'being enthusiastic' (M=4.70; SD=1.05), 'exchanging course materials' (M=4.87; SD=1.28), 'being interested in professional development programs' (M=4.96, SD=1.33), 'being collegiate' (M=5.19; SD=1.29), 'being socially skilled' (M=5.22; SD=1.32), 'being absent/on a sick leave' (M=5.28; SD=1.45), 'taking a leadership role' (M=5.43; SD=1.37), 'being loyal' (M=5.64; SD=1.55), and 'being confident' (M=5.86; SD=1.40). This implies that within the context of school teams, stereotypes do not really exist when it comes to the studied teachers' attitudes, except for being conservative and being interested in technological change.

Table 3 The extent of teachers' age-related stereotypical beliefs (N=558)

	Knowledge (K), Skill (S), Attitude (A)	M	SD	To a greater extent attributed to...
Being interested in technological change	A	3,42	1,48	Young (0)
Making use of ICT	S	3,82	1,27	
Having creative and innovative ideas	K, S	4,02	1,34	
Considering another profession	A	4,39	1,55	
Being flexible	A	4,48	1,56	
Being motivated	A	4,70	1,22	
Being enthusiastic	A	4,70	1,05	
Exchanging course materials	A	4,87	1,28	
Being interested in professional development programs	A	4,96	1,33	Neutral (5)
Being collegiate	A	5,19	1,29	
Being socially skilled	A, S	5,22	1,32	
Being absent/ on a sick leave	A	5,28	1,45	
Taking a leadership role in activities	A	5,43	1,37	
Being loyal	A	5,64	1,55	
Being confident	A	5,86	1,40	
Being conservative	A	6,05	1,32	
Classroom management skills, radiating respect and authority	S	6,34	1,43	
Having extensive knowledge of the subject matter	K	6,56	1,51	Old (10)



4.2 Differences between generational cohorts

Differences between generational cohorts in terms of attributing characteristics of teachers' knowledge, skills, and attitudes to a certain age group are displayed in Table 4. A one-way Analyses of Variance (ANOVA) was conducted on each characteristic. The main effect analysis did not indicate a statistically significant generational cohort difference with regard to 'considering another profession', 'taking a leadership role in activities', 'being confident', and 'being conservative'. Teachers of different generations seemed to agree that 'considering another profession' is a characteristic of younger teachers, whereas 'taking a leadership role', 'being confident', and 'being conservative' was attributed to older teachers.

Looking at the characteristics that are clearly attributed to younger teachers (meaning that different generational cohorts have a mean value below 5), it can be noticed that young teachers do attribute these characteristics even more to their younger colleagues than teachers of older cohorts do. More specifically, in terms of 'being interested in technological change', mean values of teachers of the youngest cohort ($M=2.89$, $SD=1.51$) were found to be significantly lower than mean values of their colleagues of the middle cohort ($M=3.68$, $SD=1.34$) and the oldest cohort ($M=3.75$, $SD=1.45$). No statistically significant differences were found between the middle and oldest cohort. A similar trend was found for 'having creative and innovative ideas'. The mean values of teachers of the youngest cohort ($M=3.64$, $SD=1.58$) were significantly lower than mean values of teachers of the middle cohort ($M=4.15$, $SD=1.12$) and oldest cohort ($M=4.36$, $SD=1.15$). No significant differences were found between the middle and oldest cohort. These findings suggest that teachers of the youngest cohort attribute 'being interested in technological change', and 'having creative and innovative ideas' to a larger extent to young teachers as compared to their older colleagues. Regarding 'making use of ICT' young teachers ($M=3.59$, $SD=1.36$) were only found to have significantly lower mean scores as compared to teachers of the middle cohort ($M=3.97$, $SD=1.16$). This finding indicates that teachers of all cohorts perceive 'making use of ICT' as a characteristic of young teachers, however, young teachers perceive it to a larger extent as a characteristic of young, as compared to teachers of the middle cohort.

The bottom of table 3 contains teacher characteristics that are by teachers of all generational cohorts attributed to older colleagues since the mean values by all cohorts are above 5. Regarding 'having extensive knowledge of the subject matter', the mean values of the oldest ($M=6.94$, $SD=1.54$) and middle cohort ($M=6.65$, $SD=1.51$) are significantly higher than the mean value of the youngest cohort ($M=6.22$, $SD=1.42$). Besides the fact that teachers of all cohorts agree that this item is a characteristic of older teachers, this implies that older teachers attribute this characteristic to a larger extent to older teachers

as compared to the youngest ones. A similar trend was found for 'being loyal'. The mean values of the oldest ($M=6.16$, $SD=1.49$) and middle cohort ($M=5.80$, $SD=1.42$) are significantly higher than the mean value of the youngest cohort ($M=5.11$, $SD=1.59$). No significant differences were found between the middle and oldest cohort. These findings suggest that teachers of the youngest cohort attribute 'being loyal', and 'having extensive knowledge of the subject matter' to a lesser extent to old teachers as compared to their older colleagues. With respect to 'classroom management skills, radiating respect and authority', the mean value of teachers of the oldest cohort ($M=6.69$, $SD=1.54$) is significantly higher than the mean value of the youngest cohort ($M=6.12$, $SD=1.32$). No other significant cohort differences were found. This means that the oldest group of teachers perceives classroom management skills to a larger extent as a characteristic of older teachers than the youngest cohort does.

In the middle of Table 4, teacher characteristics with mean values that vary across cohorts from above and below the neutral value of 5 are displayed. Regarding 'being flexible', 'being enthusiastic', and 'being socially skilled' the mean values of the youngest cohort are significantly lower than the mean values of the middle and oldest cohort. In addition, the middle cohort has a significant lower mean value than the oldest cohort.

Concretely, for 'being flexible' mean values are $M=3.74$, $SD=1.65$ for the youngest cohort; the middle cohort $M=4.71$, $SD=1.31$, and the oldest cohort $M=5.20$, $SD=1.35$. For 'being enthusiastic' the youngest cohort ($M=4.34$, $SD=1.25$), middle cohort ($M=4.79$, $SD=0.84$), and oldest cohort $M=5.10$, $SD=0.85$. For 'being socially skilled' the youngest cohort ($M=4.85$, $SD=1.42$), middle cohort ($M=5.29$, $SD=1.15$), oldest cohort ($M=5.67$, $SD=1.31$).

Then, four teacher characteristics showed significant differences between the youngest cohort and the middle on the one hand, and oldest cohort on the other hand, but did not show significant differences between the middle and oldest cohort. This was the case for 'being motivated', 'exchanging course materials', 'being interested in professional development programs', and 'being collegiate'. Mean values of teachers of the youngest cohort were significantly lower than those of both teachers of the middle cohort and the oldest cohort. For 'being motivated' the values were the following: $M=4.22$, $SD=1.35$ for the youngest cohort; $M=4.88$, $SD=0.97$ for the middle cohort; and $M=5.11$, $SD=1.20$ for the oldest cohort. For 'exchanging course materials', $M=4.45$, $SD=1.27$ for the youngest cohort; $M=5.03$, $SD=1.20$ for the middle cohort; $M=5.26$, $SD=1.26$ for the oldest cohort. For 'being interested in professional development programs', $M=4.61$, $SD=1.43$ for the youngest cohort; $M=5.05$, $SD=1.31$ for the middle cohort; and $M=5.31$, $SD=1.07$ for the oldest cohort. In terms of 'being collegiate', the values were the following: $M=4.76$,

SD=1.25 for the youngest cohort; M=5.33, SD=1.25 for the middle cohort; and M=5.59, SD=1.26 for the oldest cohort. It must be noticed that the mean values of the youngest cohort were lower than 5, and that the mean values of the oldest cohort were in all characteristics above 5. This means that young teachers perceive these positive attitudes more as a characteristic of their own cohort, while old teachers have the same reasoning for their own generational counterparts.

In general, there is a clear tendency that young teachers have the lowest mean value throughout all the items. Given the fact that the items are mainly positive teacher characteristics this suggests that teachers attribute those characteristics to a larger extent to their generational colleagues 'the young ones', as compared to their colleagues of other generational cohorts. Therefore, our findings provide support to the so-called social identity theory in a way that teachers have more favourable beliefs about their own generational cohort.

Table 4 ANOVA of perceptions on age-related teacher characteristics in terms of knowledge, skills, and attitudes (N=558)

To a larger extent attributed to ...	Teacher characteristics in terms of knowledge (K), skills (S), attitudes (A)	Young (1)		Middle (2)		Old (3)		Anova main effect		Post hoc test	
		M	SD	M	SD	M	SD	F	P		
 Young	Mean values of all cohorts < 5	Being interested in technological change (A)	2.89	1.51	3.68	1.34	3.75	1.45	20.77	0.000	1<2 ^b 1<3
		Making use of ICT (S)	3.59	1.36	3.97	1.16	3.89	1.29	5.07 ^a	0.007	1<2 ^c
		Having creative and innovative ideas (K,S)	3.64	1.58	4.15	1.12	4.36	1.15	12.13 ^a	0.000	1<2 ^c 1<3
		Considering another profession (A)	4.32	1.70	4.51	1.41	4.29	1.53	1.21	0.300	/ ^b
		Being flexible (A)	3.74	1.65	4.71	1.31	5.20	1.35	40.12 ^a	0.000	1<2 ^c 1<3 2<3
	Mean values varying below and above 5	Being motivated (A)	4.22	1.35	4.88	0.97	5.11	1.20	22.98 ^a	0.000	1<2 ^c 1<3
		Being enthusiastic (A)	4.34	1.25	4.79	0.84	5.10	0.85	21.78 ^a	0.000	1<2 ^c 1<3 2<3
		Exchanging course materials (A)	4.45	1.27	5.03	1.20	5.26	1.26	19.04 ^a	0.000	1<2 ^c 1<3
		Being interested in professional development programs (A)	4.61	1.43	5.05	1.31	5.31	1.07	12.90 ^a	0.000	1<2 ^c 1<3
		Being collegiate (A)	4.76	1.25	5.33	1.25	5.59	1.26	19.58	0.000	1<2 ^b 1<3
		Being socially skilled (A, S)	4.85	1.42	5.29	1.15	5.67	1.31	16.34	0.000	1<2 ^b 1<3 2<3
		Being absent/ on a sick leave (-) (A)	5.68	1.33	5.19	1.40	4.81	1.54	15.66	0.000	1>2 ^b 1>3 2>3
		Taking a leadership role in activities (A)	5.32	1.43	5.53	1.36	5.43	1.31	1.18	0.308	/ ^b
	Mean values of all cohorts > 5	Being loyal (A)	5.11	1.59	5.80	1.42	6.16	1.49	19.58	0.000	1<2 ^b 1<3
		Being confident (A)	5.87	1.23	5.84	1.42	5.88	1.60	0.05 ^a	0.956	/ ^c
Being conservative (-) (A)		6.07	1.47	6.03	1.15	6.06	1.38	0.06 ^a	0.942	/ ^c	
Classroom management skills, radiating respect and authority (S)		6.12	1.32	6.34	1.43	6.69	1.54	6.02 ^a	0.003	1<3 ^c	
Old	Having extensive knowledge of the subject matter (K)	6.22	1.42	6.65	1.51	6.94	1.54	9.74	0.000	1<2 ^b 1<3	

5. Conclusion and discussion

Our study examined to what extent teachers attribute characteristics in terms of knowledge, skills, and attitudes to young or old colleagues, in other words, we investigated whether stereotypical beliefs exist among teachers. In addition, we used one-way ANOVA to examine whether differences between generational cohorts could be found in terms of attributing characteristics to a certain age group.

We conclude that being interested in technological change, ICT use, having creative and innovative ideas, and considering another profession are found to be more applicable to young teachers, whereas extensive subject matter knowledge, classroom management skills, being conservative, conservative, and loyal, as well as taking a leadership role in activities are more likely to be attributed to older teachers. These findings confirm previous findings of Geeraerts et al. (2016) that described innovative teaching methods and ICT skills as perceived knowledge supplies of young teachers, and subject knowledge and classroom management skills as perceived supplies of old teachers. It can be concluded that knowledge and skills related to the teaching profession are more clearly attributable to a certain age group while perceptions on attitudes are mainly neutral, and therefore less likely to be age-related. This finding is in contrast with previous research in other workplace settings suggesting that older workers are seen as for instance less flexible, less motivated, and less interested in professional development (e.g. Ng & Feldman, 2012; Posthuma & Campion, 2009; Taylor & Walker, 1994), however, we did find support within our teacher context for older workers being perceived as loyal and conservative. Our quantitative results also support the qualitative findings of Geeraerts et al. (2016) indicating that considering another profession is seen as a characteristic of young teachers, and being confident and conservative as a characteristic of older teachers. The fact that certain knowledge domains are related to a certain age group of teachers raises interesting questions on the consequences of these perceptions for knowledge searching and providing among teachers. In other workplace contexts, research suggested that the decision to search information from another colleague was informed by for instance, knowing what that person knows, and valuing this knowledge (Borgatti & Cross, 2003). Previous research on advice seeking behaviour of teachers revealed that older teachers were less likely to ask advice, as compared to the young ones; and that older teachers are more likely to provide advice as compared to young colleagues, however the content of advice was neglected in this study (Geeraerts et al., 2017). Based on our findings we expect that older teachers are more likely to be contacted for advice and information on the subject matter, and classroom management skills, whereas we expect young teachers to be sought out for advice and information on innovative

teaching methods and ICT. These expectations can be a starting point for further research on teacher generations and intergenerational learning.

Regarding differences between generational cohorts in attributing teacher characteristics to young or old colleagues, our results revealed that for the majority of characteristics differences between generational cohorts exist. In almost all cases, significant differences were found between the youngest and oldest cohort, in a way that positive characteristics were attributed to a larger extent to the own cohort. These findings indicate that social identity theory (Tajfel & Turner, 1986) is at play, at least to some extent. Further research might further investigate which other features besides chronological age can be a trigger for social categorization processes among teachers, for instance, the number of years of experience within the school.

We urge to use the label of 'stereotype' with caution. According to our definition of teachers' age-related stereotypes it refers to major generalizations teachers have about the characteristics of knowledge, skills, and attitudes of young or old colleagues. In this study, we only made statements on the extent to which stereotypical beliefs exist. The question remains whether stereotypes are just inaccurate perceptions of teacher characteristics or whether they are reality. Future research might dive more deeply in the accuracy of teachers' age-related stereotypes and unravel to what extent stereotypical beliefs touch upon reality.

Furthermore, it must be acknowledged that the teacher characteristics in this study were mainly formulated in a positive way. While previous research of Perry et al. (2013) suggested that stereotypes of young workers are more likely to be positive than stereotypes of older workers, our findings reveal that stereotypes of both young and older teachers can be positive. Future research must have the ambition to focus on negatively formulated age-related stereotypes within the context of teachers. Another interesting encounter in this study was the lack of differences between different secondary education schools in Flanders, as shown by our intra class correlations. Teachers in different schools in Flanders seem to have similar beliefs on attributing characteristics to younger or older colleagues. This raises questions on the impact of the broader culture. Further research might compare these findings to other national contexts.

In sum, the contribution of this study lays in the fact that we investigated stereotypes within the context of teachers, which encloses a clear research gap. In addition, age-related stereotypes in this study were not limited to attitudes but also included knowledge and skills. Furthermore, we did not only approach stereotypes from a negative connotation but used a mostly positive formulation of teacher characteristics.

The findings of this study also offer suggestions for practice. In order to develop towards a strong intergenerational teacher community within schools, school principals can do efforts to decrease negative stereotyping by focussing on the strengths of teachers as an individual and as a group. Hereby, a pitfall to be avoided is to perceive the positive features of a certain generational cohort as a negative feature of the opposite generational cohort. To give an example, our findings indicated that older teachers were perceived to have extensive knowledge of the subject matter and classroom management skills. This should be emphasized as a strength of older teachers and not directly be interpreted and emphasized as a negative feature of young teachers in a way that the youngest cohort lacks this knowledge and skills. Positive characteristics that were seen as features of young teachers relate to technological knowledge and innovative ideas, which should be emphasized as a positive characteristic of this age group rather than as a negative feature of the oldest cohort. A climate in which positive characteristics of all generational cohorts are emphasized contributes to a strong professional teacher community (e.g. Stone-Johnson, 2017). Also, focussing on positive stereotypes rather than negative ones positively affects intergenerational interactions (Fowler & Gasiorek, 2018). The importance of stimulating interactions between teachers of different generations is twofold. First, it might contribute to a decrease of stereotyping (Fasbender & Deller, 2017). On the other hand, it enables sharing of relevant knowledge and skills between different generations of teachers, which might contribute to intergenerational learning within the school team. Moreover, creating awareness on the risks of stereotyping, referring to stereotype threat, might result in decrease of stereotypical beliefs and behaviour based on these beliefs.

Study 3. Intergenerational professional relationships in elementary school teams: a social network approach



This chapter is based on:

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Abstract

This paper examines the extent to which school team members' professional relationships are affected by being part of a certain generational cohort. These professional relationships provide opportunities for intergenerational knowledge flows and can therefore be relevant for intergenerational learning. Nowadays these topics have gained more attention due to worldwide demographic changes such as increased retirement rates and high levels of teacher dropout. Data were gathered through a survey with socio-metric questions among 299 school team members in 15 elementary schools in the Netherlands. Using social network analysis, in particular p2 modelling, we analysed the effect of being part of a generational cohort on teachers' likelihood of having professional relationships in networks such as discussing work, asking and providing advice, and collaboration. Findings indicate that generational cohorts based on chronological age do matter in the formation of work related ties. These findings also support the importance of focusing on different professional networks since different age dynamics can be at play. Our findings also show that school team members of the youngest cohort tend to form intra-generational relationships, whereas older generational cohort members prefer inter-generational relationships. This study is innovative due to its application of social network analysis to investigate intergenerational knowledge flows.

1. Introduction

Nowadays, the role of knowledge management within schools as an organizational context has received more attention due to its potential to encourage innovative practices and to avoid knowledge loss within school teams (Thambi & O'Toole, 2012). Knowledge loss can occur when workers leave the profession without sharing their knowledge or without turning implicit knowledge into an explicit mode. Similar to other countries, schools in The Netherlands are confronted with a large outflow of older teachers and a challenge to retain young teachers into the teaching profession. As compared to secondary school teams, elementary schools are often smaller organizations and characterized by a more cohesive organizational culture (Johnson, 1990). Also, the tasks of elementary school teachers show more similarities than for secondary school teachers. Therefore, we assume elementary school teams to be a fruitful context for exchange of knowledge which offers an interesting case to investigate how professional relationships are shaped. Facilitating intergenerational learning interactions seems to be a promising way to prevent knowledge loss within organizations (Gerpott et al., 2016; Ropes, 2013; Starks, 2013). Intergenerational learning in school teams is mainly conceptualised as an interactive process between teachers of different generations that results in learning from one or both parties (Novotný & Brücknerová, 2014; Ropes, 2011). In this study, we refer to generations of teachers by using the term generational cohort, which in turn refers to being born in the same chronological time period. Individuals of generational cohorts are found to possess different kinds of knowledge (Gerpott et al., 2016). Previous research within the context of school teams showed that teachers' knowledge varies depending on their generational cohort or level of experience. For instance, young teachers are perceived to possess innovative teaching methods and ICT skills, while teachers of the oldest generational cohort are perceived to have excellent classroom management skills and content knowledge (Geeraerts et al., 2016). Simultaneously, classroom management skills are known to be a challenge for beginning teachers (Wolff, van den Bogert, Jarodzka, & Boshuizen, 2015). These findings make age diversity and intergenerational learning within school teams relevant.

Moolenaar (2010) highlighted the importance of interactions between school team members to facilitate knowledge sharing and learning. Consequently, intergenerational knowledge sharing can be understood as a socio-constructive process in which interaction plays a facilitating role (Geeraerts et al., 2016; Novotný & Brücknerová, 2014). This implies that school team members must be aware of resources such as information, knowledge and expertise of their colleagues, and make use of their social relationships to access these assets. Dynamics of sending and receiving professional relationships between or within

generational cohorts have the potential to facilitate knowledge flows within school teams. These flows can be influenced by the fact that different generations of teachers also differ in life and work experiences or feelings. For example, a great number of early career teachers face a practice shock that is accompanied by feelings of uncertainty (Pillen, Beijaard, & den Brok, 2013; Stokking, Leenders, De Jong, & Van Tartwijk, 2003). In addition, young teachers fear being perceived as incompetent or vulnerable by their more experienced colleagues, also described as feeling evaluated (Kelchtermans & Ballet, 2002). On the contrary, older teachers or experienced teachers are perceived to have a high level of self-confidence in their profession (Geeraerts et al., 2016). Consequently, we expect that teachers of different generations show differences in the formation of professional relationships.

In this study, we examine the formation of relationships in elementary school teams in The Netherlands, focusing on discussing work, asking and providing advice, and collaboration. We label these relationships as professional relationships and question them from an intergenerational perspective, meaning that these relationships can be formed within or across different generations of school team members. Hereto, we apply methods from Social Network Analysis (SNA) enabling us to investigate social relationships and to look more deeply into interactions among school team members. When investigating professional relationships we focus on sending and receiving relationships. Specifically, this study investigates to what extent school team members of different generational cohorts differ in the number of professional relationships they send and receive, and secondly, how being part of the same generational cohort affects the likelihood of engaging in professional relationships. In the following, we start with framing our work within the literature of generations, and school team members' social relationships. The latter part builds on social capital theory and social network theory.

2. Theoretical framework

2.1 Generational diversity among school team members

The concept of generations was first introduced by Mannheim (1952) and referred to a generation as a group of individuals who share mutual social and historical events during their lifespan. According to Edge (2014) school teams include three generations of teachers and leaders: Baby Boomers (1946-65), Generation X (1966-80) and Generation Y (1981-2003). In literature, there are a lot of inconsistencies concerning the labels of these generational cohorts and the boundaries used to determine a generational cohort. Brücknerová and Novotný (2016) relied in their study on intergenerational learning of teachers on

teachers' own perceptions of themselves as a member of a particular generation. Most studies used the chronological dimension of age to frame school team members' generational cohorts (Edge, Descours, & Frayman, 2016; Geeraerts et al., 2016).

Looking at school teams through a generational lens sheds light on the level of age diversity within school teams (Brücknerová & Novotný, 2016). Previous studies in other contexts have already recognized the benefits of age diversity in teams since individuals contribute different kinds of information, knowledge, skills, and expertise to the team (Gerpott et al., 2016; Williams & O'reilly, 1998). The traditional point of view in which older workers are perceived as experts is questioned nowadays. Fuller and Unwin (2004) acknowledged that young workers have already developed different kinds of knowledge and skills, and also have higher educational levels than many of their older counterparts with whom they interact in the workplace. This finding brings the importance of the bidirectional character within the learning process under attention. Previous research by Geeraerts et al. (2016) showed that teachers of different generational cohorts are perceived to possess different kinds of knowledge. Whereas young teachers were seen as a knowledge source for innovative teaching methods and ICT skills, teachers older than 50 were rather associated with classroom management skills and subject knowledge. Many studies have focused on differences between novice teachers and experienced ones (Wolff et al., 2015), but studies in which the interactions between both parties are investigated are rather scarce.

Thus, interactions between teachers of different generations can provide opportunities to learn from each other's knowledge, especially when these learning processes are characterized by bidirectional interactions instead of unidirectional ones. These findings underline the added value of the formation of relationships across different generations of teachers for the construction and transfer of knowledge, and raises important questions on knowledge management within school teams.

2.2 The social side of learning across generations

In this paper, we argue that professional relationships between teachers of different generations may provide opportunities to learn from each other. This notion builds on a more 'social' interpretation on how learning takes place. Lee et al. (2004) highlight that learning is a complex concept due to different approaches to learning. The traditional approach to learning describes 'learning as acquisition' and builds on cognitive psychology and behaviorism (Sfard, 1998). This learning as acquisition approach focusses mainly on the individual. A more recent approach refers to 'learning as social participation' and focusses on learning through social relations and participation of individuals within communities of practice (Lave

& Wenger, 1991; Sfard, 1998). This implies that learning can be understood as a social, interactive process of co-construction. Learning in the workplace is mainly informal and involves learning from colleagues on the job (Eraut, 2004). Knowledge acquisition and access to information from others are equally important contributors to learning processes in workplaces (Ashton, 2004). Therefore, many researchers in the field of workplace learning emphasize the importance of social relationships for informal learning (Doornbos, Bolhuis, & Simons, 2004; Eraut, 2004; Tynjälä, 2008). Also in terms of teacher learning, the social side of learning is emphasized based on the idea that cognition is situated in nature (e.g. Kwakman, 2003; Lohman, 2000, 2006; Meredith et al., 2017; Van Waes, Van den Bossche, Moolenaar, De Maeyer, & Van Petegem, 2015). A shift from a focus on the individual towards a more social approach contributed to the popularity of social network research methods to investigate relationships of teachers (Baker-Doyle, 2015). We will now further explore how knowledge sharing among generational cohorts may contribute to intergenerational learning by first zooming into teachers' relationships, and then, into some relevant social network concepts and dynamics.

2.3 School team members' social relationships

The attention for social relationships between teachers is underpinned by research on the importance of social capital for school improvement and instructional reform (Spillane, Kim, & Frank, 2012). Social capital within an organization reflects an investment in social relationships through which valuable resources such as knowledge, information and expertise can be accessed, borrowed, or leveraged (Daly, 2010; N. Lin, 1999). The general concept of social capital provides a framework to conceptualize how individuals have access to resources (e.g. information, expertise) by the web of social relationships surrounding them, thereby offering (or hindering) opportunities for (intergenerational) learning.

Borgatti et al. (2013) distinguish two main types of relations: relational states and relational events. Relational states refer to continuously persistent relationships between individuals (e.g. being a colleague, teacher or friend), whereas relational events refer to discrete events such as interactions (e.g. asking a colleague for advice). The outcomes of interactions are flows, and can contain, for instance, information, knowledge, and expertise (Borgatti et al., 2013). We build on earlier work, suggesting that social relationships offer opportunities for knowledge creation, knowledge retention, and knowledge transfer (Argote et al., 2003). In school teams, collegial relationships have the potential to initiate occasions to learn from each other within or between generational cohorts. Informal learning interactions between teachers occur in the form of engaging in dialogue, collaborating, sharing resources such as information,

lesson materials, ideas, advice, etc. (Baker-Doyle, 2015; Kwakman, 2003; Lohman, 2006). Accordingly, knowledge flows are the result of interactions between two teachers through which information is exchanged.

In addition, social relationships can be described in terms of the content of the relationship. Ibarra (1993, 1995) distinguishes between expressive and instrumental relationships. This distinction also applies to school teams (Moolenaar, 2010). Whereas expressive relationships do not directly aim at work related issues (e.g. friendship), instrumental relationships do aim to achieve organisational goals. For instance, work related discussions and asking questions are interactions that enable exchange of expertise (Gerpott et al., 2016). Furthermore, Spillane et al. (2012) see advice and information seeking relationships as critical for teachers' professional development and for knowledge development. Also, relationships in terms of teacher collaboration can be seen as an indicator of informal learning within school teams (Richter et al., 2011). All of these relationships: discussing work, asking advice, providing advice, and collaboration, provide opportunities for intergenerational learning and can be labelled as instrumental (Geeraerts et al., 2016; Novotný & Brücknerová, 2014). Moolenaar (2010) found only partial overlap between these different networks, which highlights the semi-unique character of these networks as a source for exchange of knowledge, expertise, teaching materials, and other resources valuable to teacher learning and school performance. This study focuses on instrumental relationships and labels them as professional relationships due to its professional nature and closer link to organisational benefits.

Taken together, professional relationships among school team members are essential since they provide access to social resources such as knowledge, information, and expertise. School team members can only benefit from these resources when they have access to them through social interactions, and these interactions are facilitated by social relationships. A research method that allows us to investigate the formation of school team members' relationships is social network analysis. In the following, we discuss degree centrality and network homophily as two important network concepts.

2.4 Social network concepts and dynamics

2.4.1 *Degree centrality*

Social network research has the potential to reveal the underlying network structure in an organization so that more insight in the exchange of resources within an organization can be established (Cross, Parker, & Borgatti, 2002). In this study, networks are represented by school teams in which school team members

are the actors or nodes. Centrality is a commonly used concept within social network research that focuses on the position of a node or actor within a network (Borgatti et al., 2013). The concept of centrality identifies the structural importance of a node, by looking at how many connections or relations one node has to other nodes. Within social network research, these relationships are often referred to as ties. Since our study aims to investigate relationships, we do not approach our data from the perspective of centrality as such, but rather from the perspective of interactions, measured by degree centrality.

Degree centrality is a frequently used measure for relationships within networks, and it refers to the number of ties a node has to other nodes. In a directed graph or network, degree centrality has two types: indegree and outdegree (Borgatti et al., 2013). Indegree centrality involves the number of incoming ties of an actor within a network. It can be seen as a measure of individual popularity (in the case of a positive tie network), since this measure is the number of colleagues by whom the respondent, or school team member, was nominated. Outdegree centrality counts the number of outgoing ties of an actor within a network. It involves the number of colleagues nominated by the respondent, or school team member, which suggests a measure of individual activity (Borgatti et al., 2013). Consequently, degree centrality refers to the individual node level. A normalized in- and outdegree score can be interpreted as the percentage of relationships that school team members maintain within the whole network.

We focus on the calculation of degree centrality within the networks of discussing work, asking and providing advice, and collaboration, since these networks can be seen as a potential indicator of learning within school teams. Moreover, we assume that there might be differences in degree centrality between different generational cohorts. For instance, Kelchtermans (2006) mentioned that asking for advice from a colleague might be seen as a request for help, which is accepted for young or beginning teachers but not for experienced ones. This might imply that teachers of the youngest cohort are more likely to form more ties to ask advice than teachers of the older generational cohorts. Spillane et al. (2012) see advice and information relationships as critical for teachers' professional development and for knowledge development. In their study, more experienced teachers were less likely to receive advice and information from other colleagues, as compared to early career teachers (Spillane et al., 2012). In terms of teacher collaboration, previous research of Richter et al. (2011) showed that young teachers tend to collaborate more frequently than older colleagues. Teacher collaboration seems to decrease with age (Richter et al., 2011). Regarding work-related conversations, beginning teachers are more likely to interact with colleagues in order to overcome professional challenges and to exchange teaching ideas, as compared to experienced colleagues (Grangeat & Gray, 2007).

2.4.2 *Network homophily*

The concept of network homophily, often referred to by the proverbial expression ‘birds of a feather flock together’, captures the idea that individuals are more likely to have ties with others who are similar to themselves on attributes such as age, race, gender, education, and values, than with individuals that are dissimilar to them (Feld, 1982; McPherson et al., 2001). A study of Marsden (1988) revealed that the greater the age difference between individuals, the less likely they were to discuss important matters with each other. In particular, the youngest age cohorts tend to have confiding relationships with individuals of their own cohort.

Whereas degree centrality focused on the individual level, network homophily refers to similarities between individuals and therefore focuses on the dyad level within networks. These dyads can be mutual, asymmetric or null dyads (Wasserman & Faust, 1994). In mutual dyads, actors within the network choose each other; ties are reciprocated. An asymmetric dyad refers to a one-directional tie in which one actor chooses the other actor, without being reciprocal. A null dyad indicates the absence of a tie between two actors. When dyads occur between actors with similar attributes, in our case being part of the same generational cohort, this can be labelled as homophily.

Individuals with similar background characteristics are more likely to have mutual experiences which in turn results in shared knowledge (Reagans & McEvily, 2003). According to Reagans and McEvily (2003) this common knowledge has a positive effect on knowledge transfer. Therefore, we expect that teachers of the same generational cohort are more likely to engage in work related or so-called instrumental interactions. This concept of network homophily is also supported by the ideas of social identity theory (Tajfel & Turner, 1986). This theory follows a similar reasoning, suggesting that individuals have more positive perceptions towards people who are similar to them, compared to people who are dissimilar. This results in categorizations of in (“us”) and out (“them”) groups. Within work-group diversity research, Williams and O’reilly (1998) referred to this way of categorizing as a social categorization perspective. Similarity of age characteristics can be seen as a trigger for these in- and out-group categorizations (Dencker et al., 2007).

Consequently, teachers might be more likely to form ties with colleagues of the same generational cohort. This implies that resources such as information and knowledge tend to flow within the particular generational cohort. Following this reasoning, both outgoing and incoming relationships, also referred to as ties of sender and receiver, occur within a generational cohort rather than between different generational cohorts.

3. Research questions

We investigate whether belonging to a certain generation affects individual school team members' likelihood of having relationships in networks through which resources can flow. More specifically, we focus on four instrumental networks, referring to professional relationships in which school team members discuss their work, receive or provide advice, and collaborate, since these relationships can be relevant for learning in school teams (Geeraerts et al., 2016; Novotný & Brücknerová, 2014). Therefore, the following research questions are set forward:

RQ1: To what extent do school team members of different generational cohorts differ in the number of professional relationships (indegree and outdegree; sending and receiving relationships)?

RQ2: To what extent does being part of the same generational cohort affect the likelihood of engaging in professional relationships within school teams (network homophily)?

4. Methodology

4.1 Sample

The data from this study was collected at 15 elementary schools in The Netherlands. The data collection was part of a larger project on school improvement in The Netherlands in which 53 schools participated. All schools were organised as a cluster of Catholic schools, supported by a single Catholic school board. We selected the subsample of schools based on the following criteria: school team size was 10 or more teachers, and in each school, each generational cohort was represented by at least 20% of the respondents. This resulted in a final selection of 15 schools, which enabled us to investigate intergenerational relationships in schools where all generational cohorts were sufficiently represented. The sample consisted of all principals and teachers, including instructional coaches (teachers with specialised instructional tasks, such as emotional/behavioral support), since we wanted this selection to be as close as possible to the core teaching team. The sample did not include temporary and replacement teachers. The overall sample contained 284 teachers and 15 school principals (n=299).

Generational cohorts are based on chronological age. Within this sample, three generational cohorts can be distinguished. The 'young' cohort contained 94 educators aged 35 years old or younger. The 'middle'

cohort contained 87 educators from 36 to 50 years old. The 'old' cohort consists of 118 teachers older than 50 years. Most school members (75%) were female. The sample demographics are summarized in Table 1.

Table 1 Sample demographics (n schools= 15, n respondents=299)

	<i>Categories</i>	<i>Number of teachers</i>	<i>Number of principals</i>	<i>Total number of school team members</i>	<i>Percentage</i>
<i>Generational cohort</i>	Young cohort (<36 yrs)	93	1	94	31%
	Middle cohort (36 – 50 yrs)	84	3	87	30%
	Old cohort (50+ yrs)	107	11	118	39%
<i>Gender</i>	Male	63	11	74	25%
	Female	221	4	225	75%
<i>Total number</i>		284	15	299	100%

4.2 Data collection

The survey included questions on job satisfaction, leadership, school team, strategy and policy, processes, citizenship in the classroom and general questions. The section on 'school team' contained socio-metric questions that questioned the social networks within the school team. Network questions used in this study were:

- Discussing work: Whom do you turn to in order to discuss your work?
- Asking advice: Whom do you prefer to go to for work related advice?
- Providing advice: To whom do you give work related advice?
- Collaboration: With whom do you like to collaborate the most?

To answer these socio-metric questions, respondents were provided with a list of their school team members. According to Marsden (2011), this list helps respondents to remind the alters in their network and so it also minimizes measurement error. In order to contribute to the premise of anonymous analysis of the data, the alter list contained a letter code for each alter (e.g. Jessica Thompson = AB). Respondents were asked to indicate this letter code by completing the survey instead of mentioning the name and surname of the alter. There was no limitation to the number of colleagues a respondent could indicate as part of his/her network. An example of the visualization of a school team network is displayed in Figure 1.

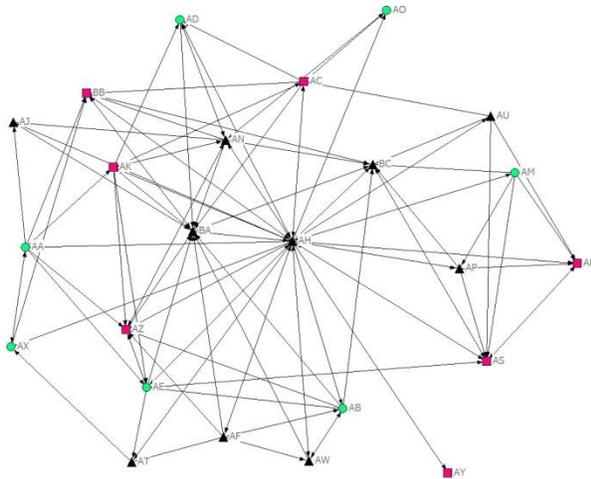


Figure 1. Example of ‘asking advice’ network.¹

4.3 Measures

Our dependent variable is the existence or the absence of a professional relationship between two school team members (a dyad). Concretely, for every pair of school team members i and j , a value of 1 represents a relationship between i and j . For instance, i provides advice to j . A value of 0 indicates the absence of a tie between i and j . The mathematical representation of these relationship is an adjacency matrix composed by 0s and 1s (Van Duijn & Vermunt, 2006).

4.3.1 Individual level measures involve characteristics of the individual school team members.

4.3.1.1 Generational cohort

In line with the findings of a study by Richter et al.(2011), based on Spearman’s correlation we found a high correlation between age and the number of years of teacher experience within education or within the school, $r=0.84$ and $r=0.52$ respectively. This implies that these measures are nearly interchangeable and suggests that the number of teachers who enter the teaching profession at later stages in their life is limited. Consequently, we only take into account the variable of generational cohort based on chronological age.

This measure refers to three age related categories: young, middle and old cohort. In the survey, teachers were asked to indicate their age (1 = 20-25 years, 2 = 26-30 years, 3 = 31-35 years, 4 = 36-40 years, 5 = 41-

¹ the youngest cohort is represented by circles, the middle cohort by squares, and oldest cohort by triangles

45 years, 6 = 46-50 years, 7 = 51-55 years, 8 = older than 55). These age categories were first recoded into three categories that are in line with generational cohorts that can be found in the literature under the labels of Generation Y, Generation X, and the Baby Boomers generation (young = 20-35 years, middle = 36-50 years, old = 51 and older) (Edge, 2014; Geeraerts et al., 2016; Glass, 2007; Novotný & Brücknerová, 2014). Consequently, this categorical variable contains three categories that each cover approximately 15 years. Finally, two dummy variables were generated, in which 'middle' and 'old' were contrasted with the 'young' cohort.

4.3.1.2 *Gender*

This individual feature is coded in the following way: a value of 0 refers to male school team members, and a value of 1 refers to female school team members.

4.3.1.3 *Function*

This measure takes a value of 0 for a teacher position, and a value of 1 for a principal position.

4.3.2 *Dyadic level measures, also named relationship covariates.*

4.3.2.2 *Generational cohort similarity*

Three dummy variables of a generational cohort are used: youngest cohort, middle cohort, oldest cohort. The 'absolute difference' function in the p2 module is used to investigate the likelihood of a relationship when actors are part of a different generational cohort, in other words, not being part of the same generational cohort.

4.4 Data analysis

In order to respond to RQ1, social network properties at the individual level were calculated by using software package UCINET 6.0 (Borgatti et al., 2013). Normalized degree centrality, both indegree and outdegree, was calculated. These measures can be interpreted as percentages. Consequently, these normalized in- and outdegree scores have a value from 0 to 100, in which 0 indicates the absence of relationships, and 100 refers to being tied to the entire school team. The variations in the percentages of incoming and outgoing relationships are provided by the standard deviations of the normalized in- and out degree measures. In addition, the statistical software program IBM SPSS 24 was used to measure the effects of individual node characteristics on the network properties as a dependent variable. A one-way

Analysis of Variance (ANOVA) was conducted on each network question. For comparisons of the mean scores among the different generational cohorts, the post hoc test Tukey with its significant difference procedure ($\alpha=0.05$) was used.

Regarding RQ2, we used the p2 package within the social network software Stocnet (Boer et al., 2006). By using p2 modelling, we investigated dyadic ties as the dependent variable. Dyadic level factors focus on similarities and differences.

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 & van Duijn, 2003). As such, a p2 model is designed to predict the likelihood of the formation of social relationships (e.g. work discussions) between pairs of actors (e.g. teachers and principals) based on individual and dyadic variables (e.g. belonging to a generational cohort (Boer et al., 2006; Zijlstra & van Duijn, 2003). P2 models can be seen as a type of logistic regression model that takes the dependency between relationships from one to another actor into account (Lazega & van Duijn, 1997). Ordinary logistic regression models cannot be used here since the assumption of data independence is violated. P2 modelling specifically focusses on complete, directed networks, which implies that every actor within the network can have ties with all other actors. However, the model can handle (some) missing data (Van Duijn & Vermunt, 2006). The multilevel variant of the p2 model is an extension of the p2 model which can be used for the analysis of multiple networks. Parameter estimates of the p2 model and the multilevel p2 model derive from the Markov Chain Monte Carlo (MCMC) procedures which are integrated in the p2 module of the social network analysis software StOCNET (Boer et al., 2006; Zijlstra et al., 2006).

The p2 model is designed to compute the likelihood of sending a relationship (cf. out-degree; called sender effect), receiving a relationship (cf. in-degree; called a receiver effect), and the likelihood of engaging in a relationship based on dyadic similarity (cf. homophily; called a reciprocity effect). A positive significant parameter estimate indicates a positive effect of the variable on the likelihood to form a relationship. For example, a positive significant sender effect of gender (male/female) indicates that female teachers have a higher likelihood to send relationships within the network than male teachers. 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 school team member of the youngest generational cohort and a school team member of the middle generational cohort represents a relationship between school team members 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 would suggest that a difference in generational cohort is related to a lower likelihood of having relationships. Consequently, a negative parameter suggests that relationships between members of the same generational cohort are more likely to occur. As such, a negative reciprocity effect signals the existence of a homophily effect.

Regarding the significance level of the parameter estimates, the p2 output in Stocnet does not directly provide this information. An additional Wald test needs to be calculated by dividing the parameter estimate by the standard error of the estimator. When the ratio is smaller than -2 or larger than 2, a significant effect occurs at 0.05 level.

5. Findings

5.1 To what extent do generational cohorts differ in the number of professional relationships?

The first part of the study investigated if teachers of different generational cohorts show differences in degree centrality measures of the network questions. A one-way Analysis of Variance (ANOVA) was conducted on each network question. The independent variable contained the generational cohorts and the dependent variable contained indegree centrality and outdegree centrality.

5.1.1 *The number of outgoing professional relationships*

No significant generational cohort differences were found with regard to normalized outdegree centrality measures of the networks, as displayed in Table 2. This implies that school team members of different generational cohorts do not significantly differ statistically, with regard to the average number of sending ties within the networks of discussing work, asking advice, providing advice, and collaboration.

Table 2 Anova of normalized outdegree (N=15, n=299)

	Young (1)		Middle (2)		Old (3)		ANOVA main effect	
	M	SD	M	SD	M	SD	F	p
Discussing work	0.32	0.19	0.33	0.22	0.27	0.19	2.448	0.088
Asking advice	0.20	0.15	0.17	0.14	0.16	0.13	2.304	0.102
Providing advice	0.20	0.19	0.22	0.23	0.19	0.19	0.460	0.632
Collaboration	0.27	0.20	0.27	0.24	0.25	0.22	0.362	0.697

5.1.2 *The number of incoming professional relationships*

Regarding normalized indegree centrality, the main effect analysis found a statistically significant generational cohort difference in the network question ‘providing advice’ [F(2, 297)=9.003, p=0.000] and the network question ‘collaboration’ [F(2, 297)=9.367, p=0.000]. No significant differences were found for the networks of ‘discussing work’ and ‘asking advice’. Descriptives of the mean values for the normalized indegree of the generational cohorts are displayed in Table 3.

Table 3 Anova of normalized indegree (N=15, n=299)

	Young (1)		Middle (2)		Old (3)		ANOVA main effect		Post hoc Tukey
	M	SD	M	SD	M	SD	F	p	
Discussing work <i>“being chosen to discuss work with”</i>	0.32	0.21	0.29	0.17	0.30	0.19	0.530	0.589	
Asking advice <i>“being asked for advice”</i>	0.16	0.18	0.18	0.16	0.18	0.16	0.633	0.532	
Providing advice <i>“being provided with advice”</i>	0.24	0.14	0.21	0.12	0.17	0.12	9.003**	0.000	1 > 3 **
Collaboration <i>“being chosen to collaborate with”</i>	0.32	0.18	0.25	0.12	0.23	0.14	9.367**	0.000	1 > 3 * 1 > 2 **

* significant at 0.05 level

** significant at 0.01 level

The post hoc test Tukey with its significant difference procedure ($\alpha=0.05$) was used for comparisons of the mean scores among the different generational cohorts. Regarding the indegree of ‘providing advice’, members of the youngest cohort (M=0.24, SD=0.14) were found to have significantly higher ratings than members of the oldest cohort (M=0.17, SD=0.12). This implies that the youngest school team members receive advice from more colleagues than the members of the oldest generational cohort do. Whereas young school team members are tied to on average 24% of the network, the oldest cohort is tied to on average 17% of the school team. There were no statistically significant differences found between the other generational cohorts in terms of indegree on giving advice.

Regarding the indegree of 'collaboration', the youngest group of team members ($M=0.32$, $SD=0.18$) was found to have significantly higher scores than members of the middle and oldest cohorts ($M=0.25$, $SD=0.12$; and $M=0.23$, $SD=0.14$, respectively). This implies that the youngest team members are chosen by more colleagues to collaborate with, as compared to the two older generational cohorts. Young school team members form ties with on average 32% of their network, in contrast to 25% for the middle cohort and 23% for the oldest cohort.

The above described ANOVA analysis and findings provide insight in the average number of outgoing and incoming ties, however, insight in which generational cohort sends ties to and receives ties from which cohort is missing. In addition, the ANOVA did not control for gender and function, which might give a different picture of sending and receiving ties. Also, the occurrence of a homophily effect could not be tested by the previous analysis. Therefore, we ran the p2 analysis to further our understanding in these dynamics. Parameter estimates of the multilevel p2 models for investigating the effect of individual and dyadic level demographics on the likelihood of having relationships within the networks of discussing work, asking advice, providing advice, and collaboration, are presented in Table 4.

Table 4 The effect of sender and receiver demographic variables on the likelihood of having relationships within the networks of discussing work, asking advice, providing advice, and collaboration. Parameter estimates of the multilevel p2 models. (n=299)

Network	Discussing work	Asking advice	Providing advice	Collaboration
	PE (SE)	PE (SE)	PE (SE)	PE (SE)
Overall effects				
<i>Density</i>	-1.98 (0.22)	-2.12 (0.15)	-2.51 (0.22)	-2.17 (0.25)
<i>Reciprocity</i>	2.63 (0.18)	2.21 (0.17)	2.11 (0.18)	2.21 (0.21)
Sender covariates				
<i>Middle cohort</i>	0.10 (0.21)	-0.36 (0.22)	0.40 (0.23)	0.29 (0.27)
<i>Old cohort</i>	-0.28 (0.18)	-0.39 (0.13)	0.47 (0.19)	0.15 (0.21)
<i>Gender</i>	0.20 (0.15)	0.00 (0.00)	0.25 (0.18)	0.25 (0.21)
<i>Function</i>	-0.09 (0.31)	0.62 (0.33)	-0.06 (0.30)	0.86 (0.36)
Receiver covariates				
<i>Middle cohort</i>	-0.16 (0.19)	0.28 (0.12)	-0.37 (0.14)	-0.44 (0.17)
<i>Oldest cohort</i>	-0.08 (0.16)	0.07 (0.15)	-0.60 (0.13)	-0.55 (0.14)
<i>Gender</i>	0.15 (0.17)	0.00 (0.00)	0.24 (0.13)	0.21 (0.14)
<i>Function</i>	1.35 (0.29)	0.97 (0.21)	-0.38 (0.25)	-0.17 (0.28)
Relationship covariates				
<i>Youngest cohort</i>	-0.21 (0.06)	-0.18 (0.08)	-0.15 (0.08)	-0.15 (0.07)
<i>Middle cohort</i>	0.01 (0.07)	0.08 (0.08)	0.03 (0.09)	0.10 (0.08)
<i>Oldest cohort</i>	-0.10 (0.06)	-0.08 (0.07)	-0.04 (0.08)	-0.09 (0.07)
Random effects				
<i>Sender variance</i>	1.19 (0.15)	0.72 (0.11)	0.54 (0.18)	1.78 (0.22)
<i>Receiver variance</i>	1.06 (0.13)	1.18 (0.16)	0.36 (0.08)	0.68 (0.11)
<i>Covariance</i>	-0.78 (0.12)	-0.62 (0.11)	-0.58 (0.11)	-0.71 (0.13)

note: PE= parameter estimate; SE= standard error; bold typeface refers to a significant PE; N=9309 dyadic relations from 299 school team members in 15 elementary schools

First of all, overall effects show negative density effects and positive reciprocity effects within the four networks. These findings suggest that the networks are overall rather sparse, meaning that the likelihood of having a tie is lower than 50% for the reference group, which are dyads of young male teachers. The positive parameter estimates of reciprocity indicate a tendency of reciprocated ties instead of unidirectional ties throughout the different networks. With regard to the random effects, the positive and significant effects of sender and receiver variance indicate that there is considerable variation among school team members in the amount of ties they send and receive within the four networks. The negative sender-receiver covariance suggests that school team members who report to send more ties have a lower likelihood of receiving ties within their network, when allowing for differences between schools.

5.1.3 *The likelihood to send professional relationships*

Looking at the sender covariates, we found no significant effects for the network discussing work. In other words, none of the individual characteristics affected the likelihood of sending ties in a positive or negative way. More specifically, school team members of the middle or oldest cohort did not send more ties than young school team members, female not more than male, and school principals not more than teachers. Within the other three networks, results indicated that some of the individual characteristics affected the likelihood of sending relationships. Within the network of asking advice, being part of the oldest cohort decreases the likelihood of asking advice. In addition, the oldest cohort tends to send significantly more relationships of providing advice. Within the network of collaboration, results reveal that being a school principal increases the likelihood of sending collaboration ties.

5.1.4 *The likelihood to receive professional relationships*

Regarding the receiver covariates, significant effects were found in all the four networks. Being a school principal increases the likelihood of receiving relationships in discussing work and asking advice networks. Also, being part of the middle cohort increases the likelihood of receiving relationships in the network of asking advice. This implies that principals and teachers of the middle cohort are more likely to be sought out for advice. In addition, the network of 'providing advice' shows that teachers of the middle and oldest cohort have a lower likelihood to receive advice relationships. The same trend can be found within the network of collaboration. Both individual characteristics, being part of the middle and being part of the oldest cohort, decreases the likelihood of receiving collaboration ties. For both networks, providing advice

and collaboration, the effect of being part of the oldest cohort is stronger than the middle cohort. This suggests that being part of the oldest cohort decreases the likelihood of the formation of a tie to a greater extent than their colleagues of the middle cohort.

Gender did not affect any of the sender and receiver relationships in the four instrumental networks.

5.2 To what extent does being part of the same generational cohort affect the likelihood of engaging in professional relationships?

Regarding the effects of the relationship covariates, homophily effects can be found for the youngest cohort within all the networks. This finding suggests that school team members of the youngest cohort are more likely to form ties with colleagues of the same generational cohort than with colleagues of the middle or the oldest generational cohort. This tendency of homophily occurs at the level of significance for the youngest generational cohort in the networks of discussing work, asking advice, and collaboration. The other generational cohorts, middle cohort and oldest cohort, do not show a significant homophily effect in all the networks. Relationships in these cohorts can therefore be described as heterogeneous. We conclude that, in particular, school team members of the youngest cohort tend to form intra-generational ties, whereas older generational cohort members form inter-generational ties.

6. Conclusion and discussion

In the present study we have focused on the role of being part of a generational cohort in the formation of professional relationships within elementary school teams in the Netherlands. Our first research question focused on differences between generational cohorts in terms of professional relationships being sent or received. To answer this question, we included both findings from descriptive ANOVA analysis of degree centrality measures, and from a p2 model based on probability distributions. The latter analysis gave a slightly different picture which we explain by the fact that our p2 model provides a more sophisticated investigation of sender and receiver tendencies within the networks. Therefore, we elaborate our conclusions primarily on the basis of this p2 model and indicate how they are in line with the ANOVA analyses.

When looking for differences in sending and receiving relationships, we noticed a significant role of generational cohort within the networks of asking advice, providing advice, and collaboration. Within the

network of discussing work we did not find any significant impact of belonging to a certain generation, neither in the ANOVA and the p2 findings. Next, we discuss the findings for each of the respective networks studied.

Regarding asking and providing advice, our results reveal that the middle cohort can be seen as an important source of advice within the school team. This is the cohort who is asked by most colleagues for advice. On the other hand, we noticed that the oldest cohort sees themselves as an important provider of advice, since this cohort provides more colleagues with advice. It must be noticed that members of the oldest cohort provide advice to colleagues who did not necessarily ask for it. The middle cohort does not certainly provide more advice, but they are asked for it by more colleagues. This finding underlines the importance of the middle cohort as a source of knowledge within the school team. In addition, we found that the youngest cohort is provided with advice by more colleagues, as compared to their older counterparts.

Relationships within the networks asking advice and providing advice can be interpreted as complementary. When looking at these networks asking and providing advice, it can be questioned to what extent providing advice is the result of asking advice. Further research might pay attention to what degree providing advice is a voluntary action or the result of being asked for advice. When looking to the effects of generational cohort within these two advice networks, we also recognize the complementary tendencies. Being part of the oldest cohort did decrease the likelihood of sending relationships for asking advice, and did increase the likelihood of sending relationships for providing advice. A second complementary tendency for asking and providing advice was found for the middle cohort. While being part of the middle cohort increased the likelihood of receiving relationships within the network asking advice, it decreased the likelihood of receiving relationships within the network of providing advice. Being part of the oldest cohort decreased the likelihood of being provided with advice even more than the middle cohort. The ANOVA results were supporting these findings, revealing that young school team members were more provided with advice than their oldest counterparts. A similar tendency has been observed by Spillane et al. (2012), where more experienced colleagues were less likely to receive advice. Our findings of both asking and providing advice relationships do relate to the traditional mentor models in which older or experienced teachers serve as knowledge providers to younger ones. Within recent developments and ideas on intergenerational learning, knowledge supplies and demands are seen as important for all generational cohorts. Consequently, our findings bring the importance of stimulating intergenerational relationships under attention.

Within the last network, collaboration, we found that being part of the oldest cohort did decrease the likelihood of receiving collaboration ties. A decrease of receiving collaboration relationships was also found for the middle cohort. These findings were also supported by the ANOVA results. The youngest cohort is the most preferred cohort to collaborate with. Previous research revealed that older teachers have positive perceptions towards their youngest counterparts in terms of enthusiasm and creativity (Geeraerts et al., 2016). These positive perceptions about young teachers might contribute to preference to collaborate with them. We found similarities within the tendencies of sending and receiving relationships between the providing advice network and collaboration network. This raises questions on the existence of overlap between both networks. Further research might investigate the extent to which instrumental relationships show overlap.

Whereas gender did not affect the likelihood to send or receive professional relationships, the other control variable function did. Principals tend to mention more different colleagues they prefer to collaborate with. In addition, principals were also chosen by more colleagues to discuss work with and to ask advice to. Further research might foreground the role of the school principal and investigate, for instance, the network position of the principal within professional school team networks, and, the role of the principal's age.

Regarding our first research question we conclude that, for some networks, generational cohorts based on chronological age do matter in the formation of professional relationships. These findings also underline the importance of focussing on different instrumental networks since different age dynamics can be at play, and therefore give support to the findings of Moolenaar (2010) to approach different professional networks as unique networks. Future research might include expressive relationships in addition to instrumental relationships, for instance, by including friendship relationships. By doing this, the extent to which instrumental relationships are explained by expressive relationships can be investigated.

Our second research question captured the mechanisms of homophily within elementary school teams. Teachers of the youngest cohort in particular seem to form relationships within their own generation for discussing work, asking advice, and collaboration, which is in line with the homophily effects for the young individuals in other contexts found by Marsden (1988). From the viewpoint of intergenerational learning and intergenerational knowledge sharing, this is a worrying finding. This suggests that facilitating bidirectional intergenerational relationships is important for practice. Further research, for instance by using qualitative methods, may dive deeper into the reasons why young teachers have this tendency.

Factors such as the level of trust, a safe and respectful climate, as perceptions of being evaluated or hierarchical perceptions of seniority are worth taking into account. In addition, it is worth to investigate how this tendency of homophily relates to early career teacher dropout and challenges such as practice shock or feelings of uncertainty (Pillen, Beijaard, & den Brok, 2013; Stokking, Leenders, De Jong, & Van Tartwijk, 2003). Also, literature on intergenerational relationships often focusses on age bias and generational stereotyping within organizations (e.g. King & Bryant, 2017; Rupp, Vodanovich, & Credé, 2006). The effects of age stereotyping in school teams on the formation of professional relationships and intergenerational knowledge exchange might offer interesting starting points for further research.

This study has limitations that suggest additional paths for future research. First of all, sending and receiving advice ties are only general indicators of knowledge flows. The content of the advice ties has not been included in this study. Given the idea that teachers of different generations are able to provide different kinds of information and knowledge, it might be interesting to investigate content related advice relationships, for instance, whom do you go to for advice on classroom management? This will provide information on which knowledge can be seen as a demand or supply for a certain generational cohort. A second limitation is related to the fact that we did not have information about the amount of advice shared and the frequencies of interactions within the networks. An actor can receive more advice from one colleague than from a number of different colleagues. Further research can more explicitly map the strength of teacher relationships across generational cohorts by looking at the frequency, length, and duration of contact (e.g. Van Waes et al., 2015). Also, the relevance of the received advice has not been discussed yet; to what extent is provided advice valuable advice to a teacher? Exchange of information or advice is no guarantee for learning to occur. For instance, Kyndt, Vermeire, and Cabus (2016) did not find a significant relationship of knowledge acquisition and access to information with informal workplace learning outcomes. This finding underlines the importance of further evaluating the relevance of the advice that is being shared (e.g. van der Rijt et al., 2013; van der Rijt, Van den Bossche, van de Wiel, Segers, & Gijsselaers, 2012). Similarly, information on the quality of relationships between generational cohorts would be a valuable contribution for further research. This also opens up the discussion on the 'unknown side of intergenerational learning' which refers to the idea that intergenerational learning does not necessarily lead to positive learning outcomes. This is also connected to newly emerging social network research on 'negative ties'. An interesting perspective on knowledge sharing within school teams might be to investigate the opposite, for instance, knowledge hiding. Further research might focus on reasons why school team members would be shielding knowledge from their school team.

Previous research suggested not to use a too narrow approach on 'generation', but also to take into account factors such as work tenure and years of job experience (Geeraerts et al., 2016; Kooij et al., 2008). We did not include years of experience since this variable was too highly correlated with our age variable, which might cause problems of multicollinearity. We would argue that the conceptualisation of generations and operationalization of generations of teachers needs further elaboration. For instance, future research might focus on the relevance of age boundaries of generational cohorts or reveal whether there exists a linear effect of age? The division of generational cohort in this study was based on previous studies within the context of school teams (Edge, 2014; Geeraerts et al., 2016). In this study, our generational cohorts are diverse. For instance, the youngest cohort includes both inexperienced teachers in their induction phase and teachers with 10 years of experience. This division has not been included in this study, but potentially offers an important perspective to further unravel the complexity of teacher generations.

Due to the selection of our sample in which we targeted balance in terms of the presence of three generational cohorts within school teams, the generalizability of our study is limited to schools that are characterized by equal distribution of generational cohorts. An interesting path for further studies is to look at schools with different constellations of generational cohorts and examine whether these different constellations paint a similar picture regarding the formation of intergenerational relationships within school teams. Would our results remain if a certain generational cohort is absent within a school team? Differences in age demographic profiles of school teams might raise interesting questions for further research.

Also, our analysis technique (multilevel p2 modelling) has certain limitations since this model is restricted to dyadic relationships (Spillane et al., 2012). The extent to which relationships between pairs of teachers are influenced by their relationships within the larger structure of the network (e.g. triads) are not taken into account. Based on our findings, future studies might hypothesize more complex social network models and for instance use Exponential Random Graph Models (ERGM) to explore triadic structures in intergenerational relationships.

To conclude, we state that being part of a generational cohort based on chronological age does matter within these elementary school teams and that it plays a role in the formation of teachers' professional relationships. Both researchers and practitioners may regard social networks as a valuable concept to contextualise and investigate teacher interactions in order to further understand and support teacher intergenerational learning and teachers' professional development in general.

Study 4. Teachers' intergenerational advice and information seeking: content matters!



This chapter is based on:

Geraerts, K., Van den Bossche, P., Vanhoof, J. (accepted with minor revisions). Teachers' intergenerational advice and information seeking: content matters! *Journal of Professional Capital and Community*

Abstract

This paper investigates 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. Data were collected from 660 teachers in 10 secondary education schools in Flanders (Belgium) by using an online socio-metric survey. Social network analysis was conducted, more specifically Quadratic Assignment Procedure (QAP) and multilevel P2 modelling. Our findings underline the importance of investigating content-related advice networks. Generation affects the formation of interactions. First, our results revealed that older teachers are less likely to ask advice on subject-matter knowledge, classroom management, and innovative teaching methods. Second, our 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. 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.

1. Introduction

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 towards the development of a strong and sustainable professional teacher community (e.g. Stone-Johnson, 2011; Stone-Johnson, 2017).

Generational diversity among teachers relates 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 firstly 'who' is interacting with whom, and secondly '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, Borgatti, and Parker (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. Secondly, 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 QAP correlations and multilevel p2 modelling, 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 & Novotný, 2016). A traditional conceptualisation 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) recognizes three approaches to define generations: a chronological approach, based on chronological age; a social approach, based on shared social experiences; or 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 to 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, labelled as 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., 2017; Geeraerts et al., 2016).

Generational diversity in school teams has been related to diversity in knowledge in school teams. Previous research by Geeraerts et al. (2016) 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 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 behavioural approach to knowledge management emphasizes the relational character of knowledge sharing and focusses on the importance of interactions (Argote et al., 2003; Thambi & 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, professional development and knowledge development (Baker-Doyle, 2015; Frank, Zhao, & Borman, 2004; Kwakman, 2003; Lohman, 2006; Parise & Spillane, 2010). Research often distinguishes an explicit and implicit mode of knowledge (Billet, 2001; Eraut, 2000). Both sharing of explicit and implicit knowledge are seen as relevant for workplace learning and expertise development (Tynjälä, 2008). Interactions such as asking advice can initiate a process of externalisation and, therefore, contribute to the conversion of implicit knowledge into an explicit mode (Geeraerts et al., 2016; Nonaka & Takeuchi, 1995). In addition, these interactions among teachers provide access to social resources such as information, knowledge, and expertise (Choo, 1998; Penuel, Riel, Krause, & Frank, 2009). 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 & Forsé, 1999; Wasserman & Faust, 1994). Firstly, individuals within a social network are viewed as interdependent rather than independent as in conventional statistical modelling approaches. Secondly, relationships between individuals are seen as opportunities for the exchange of resources, for instance, advice and information. Thirdly, the patterns of relationships, in other words, the 'social structure' can both inhibit or 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 & 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 focussed 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). Accordingly, we adopt a thematic conceptualisation 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 & Brücknerová, 2014). We distinguish between roles of sender and receiver of advice and information, in other words, 'asking advice and information' (sender effect) versus 'being asked for advice and information' (receiver effect).

Scholars already focussed 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:

H2 a. 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 earlier described, 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, Wagner, Klusmann, Trautwein, & Kunter, 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. Valuing someone's knowledge as relevant for your own work seems to increase the probability of seeking that person out for information (Borgatti & 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, Soderstrom, and Uzzi (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 & Turner, 1986). This theory suggests that individuals have more positive perceptions towards 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 labelled as a social categorization perspective (Williams & 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.

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 & Yoon, 2011; Daly, 2010; de Lima, 2007; Moolenaar, 2010; Penuel et al., 2009).

3.1 Participants

The sample contained 660 classroom teachers, from 10 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 1.

Table 1 Sample demographics and measures (n schools= 10, n respondents=660)

		Description of the measures	Valid %
Generational cohort	Young	<36 yrs	34
	Middle	36-50 yrs	43
	Old	>50 yrs	23
Working full time	No (0)	< 90% of a full time vacancy	37
	Yes (1)	> 90% of a full time 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 counsellor, 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:			
- <i>subject-matter knowledge</i>	No (0)		31
	Yes (1)		69
- <i>classroom management</i>	No (0)		65
	Yes (1)		35
- <i>innovative teaching methods</i>	No (0)		76
	Yes (1)		24
- <i>ICT</i>	No (0)		78
	Yes (1)		22

Data were collected in 10 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%, ranging from 78 to 98%. 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.

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 6 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 digitalisation 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 & 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 & 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 & 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 1.

3.4 Data analysis

Regarding H1, we conducted a series of quadratic assignment procedure (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 modelling, 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 & van Duijn, 2003). This model focusses 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 & 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 & van Duijn, 2003). The p2 model takes into account the dependency between relationships from one to another actor within the network (Lazega & 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 focusses on the uniqueness of content-related advice and information networks within school teams. Table 2 summarizes the average QAP correlations between the four advice networks. In general, results indicate that all the networks are correlated to 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 and teaching methods show 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.

Table 2 Average QAP correlations (N=10)

	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

4.2 Sending and receiving interactions in content-related advice networks (H2a,b,c , 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 3.

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 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.

Table 3 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. Parameter estimates of the multilevel p2 models.

Asking advice Networks:	Subject-matter knowledge	Classroom management	Innovative teaching methods	ICT
	P.E. (S.E.)	P.E. (S.E.)	P.E. (S.E.)	P.E. (S.E.)
Overall effects				
<i>Density</i>	-3,81 (0,26)	-4,41 (0,43)	-3,98 (0,51)	-6,06 (0,74)
<i>Reciprocity</i>	4,04 (0,18)	2,34 (0,30)	3,36 (0,43)	-0,12 (0,65)
Sender covariates (asking advice)				
<i>Age</i>	-0,0255 (0,0062)	-0,030 (0,010)	-0,0331 (0,0102)	-0,0199 (0,0104)
<i>Working Fulltime</i>	-0,02 (0,12)	-0,13 (0,20)	-0,23 (0,23)	-0,05 (0,19)
<i>Participating in learning activities</i>	0,14 (0,12)	0,33 (0,18)	-0,07 (0,20)	0,08 (0,22)
Receiver covariates (being asked for advice)				
<i>Age</i>	0,0127 (0,0044)	0,0025 (0,0054)	-0,0152 (0,0075)	-0,036 (0,0138)
<i>Working fulltime</i>	0,17 (0,09)	-0,02 (0,12)	-0,05 (0,15)	0,85 (0,22)
<i>Mentor role</i>	-0,03 (0,25)	0,92 (0,29)	0,51 (0,43)	0,55 (0,61)
<i>Head of subject team</i>	0,14 (0,11)	0,39 (0,14)	0,51 (0,20)	1,14 (0,30)
<i>Additional formal role</i>	0,26 (0,13)	0,81 (0,18)	0,73 (0,26)	1,95 (0,34)
<i>Participating in learning activities</i>	-0,18 (0,11)	-0,03 (0,13)	0,15 (0,18)	-0,25 (0,27)
<i>Expertise in subject-matter knowledge¹/classroom management²/innovative teaching methods³/ ICT⁴</i>	-0,05 ¹ (0,09)	0,54² (0,13)	0,16 ³ (0,16)	1,80⁴ (0,24)
Relationship covariates				
<i>Youngest cohort</i>	-0,17 (0,06)	-0,14 (0,09)	-0,10 (0,11)	-0,31 (0,16)
<i>Middle cohort</i>	-0,05 (0,06)	0,07 (0,09)	-0,11 (0,12)	0,13 (0,17)
<i>Oldest cohort</i>	-0,01 (0,07)	-0,21 (0,10)	-0,22 (0,16)	0,17 (0,20)
Random effects				
<i>Sender variance</i>	0,69 (0,09)	2,41 (0,30)	1,96 (0,33)	1,41 (0,29)
<i>Receiver variance</i>	0,31 (0,06)	0,56 (0,09)	0,74 (0,16)	2,20 (0,34)
<i>Covariance</i>	-0,30 (0,06)	-0,19 (0,12)	-0,27 (0,18)	0,12 (0,33)

Note: P.E.= parameter estimate; S.E.= standard error; bold typeface refers to a significant P.E.

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 full time position did not affect the likelihood to ask advice within the four networks.

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. Firstly, 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. Secondly, 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. Also, the facilitating role of other networks, for instance, physical proximity or friendship raises interesting questions for further studies (e.g. Spillane, Shirrell, & Sweet, 2017).

The interactions within the networks of this study deliberately focussed 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 behaviour when it comes to ICT. 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). 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). This also implies 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 & Ampiah, 2017). 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 versus 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. Within different national contexts research showed that teachers' chronological age correlated 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). Due to problems of multicollinearity, age and experience could not be included simultaneously in our p2 model.

Based on this study, suggestions for practice can be formulated. The low density's 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 & 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 & Yoon, 2010). It is a challenge for schools to create awareness on the 'silent experts' within the school team (Baker-Doyle & 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 & 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.

General conclusion and discussion



This dissertation aims to contribute to our understanding of teacher generations and the occurrence of teachers' intergenerational knowledge flows. More precisely, three main questions shape this dissertation: (1) How do teachers perceive their colleagues of different generations in terms of knowledge, skills, and attitudes? (2) How do teachers' intergenerational knowledge flows occur? And (3) what is the role of generation in the formation of teacher interactions? In this chapter, we first resume the discussion of the current need for teachers' intergenerational knowledge flows. Then, we summarise the main outcomes and discuss these findings. Meanwhile, we also come back to the question in our title, namely older teachers. Can they be considered as *dead wood or untapped expertise*? Moreover, we elaborate on the limitations of this dissertation and formulate suggestions for further research by going more deeply into the unknown side of intergenerational knowledge flows. At the end of this chapter, we conclude with the implications of our findings and suggestions for practice.

Due to current demographic changes such as the aging workforce, school teams are characterized by generational diversity in terms of chronological age (Edge, 2014). Recently, there is increasing interest in understanding generational differences in order to develop a strong and sustainable teacher community (Stone-Johnson, 2011, 2017). In order to benefit from generational diversity in school teams, intergenerational learning is relevant, and can be obtained by knowledge-sharing between different generations of teachers. Since not all kinds of knowledge can easily be captured or shared, for instance in the case of tacit knowledge, interactions are found to be beneficial. Teacher interactions such as collaborating, discussing work, asking for and providing advice, have been shown to offer a way to share knowledge and contribute to teacher learning (Baker-Doyle, 2012, 2015; Kwakman, 2003; Lohman, 2006). Knowledge flows occur when information is exchanged through interactions (Borgatti et al., 2013). Looking at age-components in previous studies on teacher knowledge and teacher learning, the majority of research focusses on differences between novices and expert teachers (e.g. Grosemans et al., 2015; Kyndt, Gijbels, et al., 2016; Richter et al., 2011; Sternberg & Horvath, 1995). Studies dealing with teachers and teacher learning from the perspective of generations have only recently been developed (e.g. Brücknerová & Novotný, 2016; Edge, 2014; Novotný & Brücknerová, 2014). This dissertation aims to contribute to this field by examining teachers' knowledge flows from an intergenerational perspective.

MAIN OUTCOMES AND DISCUSSION

The main outcomes and take-aways from this dissertation are structured around the three main questions posed in this dissertation.

INTERGENERATIONAL (PERCEPTIONS OF) DIFFERENCES IN KNOWLEDGE, SKILLS, AND ATTITUDES

GENERATIONS OF TEACHERS HAVE SPECIFIC KNOWLEDGE DEMANDS AND SUPPLIES OF KNOWLEDGE

In studies 1 and 2 we explored how teachers perceive their youngest and oldest colleagues within the teacher team in terms of knowledge, skills, and attitudes. In the first study, teachers of the youngest and oldest cohort were interviewed. The second study included also teachers of the middle cohort, which means that teachers of all three generational cohorts filled in an online survey. Consequently, Studies 1 and 2 were complementary, both from a content point of view, and from a methodological point of view, since both qualitative and quantitative methods were used.

Study 1 in particular focussed on how teachers perceive colleagues from other generations in terms of knowledge demands and knowledge supplies. In this study, interview data were analysed thematically. The results revealed that the knowledge supplies of young teachers, perceived by the oldest participants in this study, are related to their creative and innovative teaching methods, and to their well-developed ICT skills. According to young participants in this study, the knowledge supplies of older teachers are mainly related to their high level of subject-matter knowledge and their well-developed classroom management skills.

The quantitative findings of study 2 confirmed the findings of study 1 as described above, indicating that teachers of all generational cohorts attributed smooth classroom management skills and having extensive knowledge of the subject matter to a larger extent to older teachers. Moreover, making use of ICT, and having creative and innovative ideas were more likely to be attributed to young teachers.

The formulated knowledge supplies of older teachers identified in this dissertation were in previous studies described as examples of the challenges facing early career teachers. Previous research revealed that novice teachers experience difficulties in terms of classroom management, adequate knowledge of the subject matter, and self-confidence (e.g. Shoval, Erlich, & Fejgin, 2010; Veenman, 1984; Wolff et al., 2015). Our findings contribute to these findings by approaching these challenges from a knowledge demand and knowledge supply perspective, and from the perspective of different generations of teachers.

PERCEPTIONS OF THE ATTITUDES OF DIFFERENT GENERATIONS OF TEACHERS ARE NOT VERY STEREOTYPICAL

Perceptions about the characteristics of colleagues of certain generations might be generalized and can therefore be labelled as stereotypes (Hilton & von Hippel, 1996). In addition to knowledge as an important component of teacher generations, our results from studies 1 and 2 also included perceptions about the attitudes of different generations of teachers. Our qualitative data of study 1 revealed rather stereotypical perceptions on the attitudes of older teachers as they were perceived by young ones as taking things easy, complaining, being conservative and self-confident. The attitudes of young teachers were perceived by old participants in the study as dropping out easily, being enthusiastic, and being in close interaction with students. In addition, perceived attitudes affect flows of knowledge demands and knowledge supplies (study 1). Individuals might base their behaviour on these stereotypes (Hedge et al., 2006), and therefore, teachers' age-related stereotypical beliefs might affect intergenerational knowledge flows. Study 2 mainly focussed on the investigation of the age-related stereotypical beliefs of teachers, and revealed that being interested in technological change, and considering another profession was by teachers of all generational cohorts attributed to young teachers. Furthermore, taking a leadership role, being loyal, being confident, and being conservative was perceived by teachers of all generational cohorts as being a characteristic of older teachers. However, most of the characteristics in terms of attitudes were not clearly attributed to a certain age group of teachers and therefore considered to be age-neutral. These age-neutral characteristics included: being flexible, being motivated, being enthusiastic, exchanging course materials, being interested in professional development programmes, being collegiate, being socially skilled, and being absent/on sick leave. These findings were in contrast with the findings of previous research in non-educational workplaces suggesting that older workers are, for instance, less flexible, less motivated, and less interested in professional development (e.g. Ng & Feldman, 2012; Posthuma & Campion, 2009; Taylor & Walker, 1994). Study 2 also aimed to examine whether or not there were differences between generational cohorts in terms of attributing characteristics to young or old colleagues. In almost all cases, significant differences were found between the youngest and oldest cohort, in a way that teachers attributed positive characteristics to a larger extent to their own cohort members than to colleagues of other age groups. To give some examples: 'being interested in technological change' was attributed to young teachers by teachers of all cohorts. However, young teachers did attribute this feature to a larger extent to young teachers than did their older colleagues. In addition, 'being enthusiastic' was not clearly attributed to a certain age group of teachers since this item approached the neutral point. However, statistically different perceptions on this were present between different generations. Both young and old teachers attributed this item slightly to their own age-group. What do these differences between

generational cohorts tell us about the social identity theory of Tajfel and Turner (1986)? First of all, no extreme values were found, meaning that no clear indication of in- and out-groups was found. However, some indication of social identity theory might be at play given that social identity theory is understood in terms of having more positive beliefs about in-group members as compared to out-group members in order to achieve a positive self-image. Both with regard to items in which the three generational cohorts somehow agreed on which characteristics were more attributed to younger and older teachers, and with regard to items that were perceived to be more neutral, significant differences in perceptions between different generational cohorts were found. These differences were related to the extent to which they attributed characteristics to younger or older colleagues. As our items were mainly positively formulated, teachers attributed these characteristics to a larger extent to their own age group. Therefore, our findings only provide slight support for social identity theory in terms of having more positive beliefs about colleagues of one's own generation.

The above described findings allow us to discuss the first part of the question in our title. Can we consider older teachers as '*dead wood*'?

The label *dead wood* has been used in the workplace literature to refer to stereotypes of older workers in terms of their low energy level, limited potential and low performance within the organization (e.g. Costanza & Finkelstein, 2015; Pitt-Catsouphes & Matz-Costa, 2008). The findings of our first study based on interview data indicated that older teachers were perceived by younger teachers as taking things easy, slowing down a bit in the period towards retirement, and being unmotivated. When looking at the quantitative findings of study 2 based on a bigger sample that also included respondents of the middle cohort, these findings can be nuanced. A less stereotypical image of older teachers has been created by respondents in study 2 as compared to those of study 1. Perceptions of teachers' attitudes regarding, for instance, being flexible, being motivated, being enthusiastic, being interested in professional development programmes, being absent/on sick leave, were not particularly attributed to a certain age group of teachers. Accordingly, these characteristics can be considered as age-neutral within the context of teachers. Therefore, this dissertation does not support the description of older teachers as *dead wood*. While our dissertation has focussed on how teachers' stereotypical beliefs exist among teachers, further research might focus on the age-related stereotypical beliefs of school principals. In other words, how do school principals perceive teachers of different generations, and to what extent are these perceptions stereotypes?

We want to emphasize that the label of stereotype should be used with caution. According to our definition of teachers' age-related stereotypes, it refers to major the generalizations teachers that make about the characteristics of the knowledge, skills, and attitudes of young or old colleagues. In study 2, we made statements with regard to the extent to which stereotypical beliefs exist. Judd and Park (1993a) highlighted the difficulties in assessing the accuracy of social stereotypes. The majority of studies on stereotypes investigate stereotypical beliefs by formulating items in a stereotypical way, and by mainly focussing on older workers (e.g. Cadiz et al., 2017; Henkens, 2005; Posthuma & Campion, 2009). To give an example item: 'older workers are not as creative as younger workers'. This might support the idea that the stereotypical ideas of respondents are reinforced. The fact that the findings of study 2 contrasted the findings of studies in other workplace settings might be related to the workplace context, or it might be explained by the way in which they are measured. In our opinion, our reframing of the items into age-neutral items has contributed to a more accurate way of measuring stereotypical beliefs. The question remains whether or not stereotypes are just inaccurate perceptions of teacher characteristics, or whether they are reality, and therefore facts. Future research might delve more deeply into the accuracy of teachers' age-related stereotypes to unravel to what extent stereotypical beliefs touch upon reality. One way to minimise stereotype inaccuracy is to triangulate data, and to compare outcomes of rather stereotypical formulated items with outcomes of age-neutral items or with interview data. In this way, discrepancies can be identified.

In the previous section, we elaborated on the first main question of this dissertation related to intergenerational perceptions of differences in the knowledge, skills, and attitudes of teachers. Additionally, we also aimed to contribute to the conceptualisation of teacher generations. We state that generations of teachers contain both an age and a knowledge component. In the following section, we elaborate on this conclusion.

GENERATIONS OF TEACHERS CONTAIN BOTH AN AGE AND A KNOWLEDGE COMPONENT

The concept of generations was first used within a sociological context, and was later used in organisational contexts too. The definition as provided by (Mannheim, 1952) described generations as groups of individuals who experienced shared social and historical events during their lives. This definition highlighted the presence of a chronological age component within the concept of generations. Within the context of teachers, we expect that generations of teachers have attended similar teacher education

institutions and have experienced similar waves of educational reform. This also accentuates the age component involved within generations, and more specifically, generations of teachers.

A recent study on intergenerational learning in organizations revealed that workers of different generations possess different types of knowledge (Gerpott et al., 2016). The findings of studies 1 and 2 in this dissertation support this idea, and show that teachers of the youngest generation possess knowledge on innovative teaching methods and ICT, while the oldest generation of teachers possess knowledge related to the subject matter and classroom management skills. Throughout all the studies described in this dissertation, generational cohorts of teachers were distinguished by taking the chronological age of teachers into account. Given the fact that teachers seem to associate certain knowledge domains with certain age groups of teachers, we state that the generational cohorts of teachers contain an age component based on chronological age and a specific knowledge component. This finding extends current conceptualizations of generations in both sociological and organizational perspectives.

This dissertation has contributed to the conceptualization of teacher generations. However, suggestions for further elaboration can be formulated. Taking into account the age component within generations, a first idea relates to the multidimensionality of age (Sterns & Doverspike, 1989). As suggested by Kooij et al. (2008), chronological age is often related to organizational age. Organizational age refers to the aging of individuals in professions and organizations, and can be found in the literature under labels such as seniority, tenure, career stage (Kooij et al., 2008). Within the context of teacher learning, scholars have looked into differences between novice and expert teachers (e.g. Grosemans et al., 2015; Richter et al., 2011). This dissertation did initially look into the variable years of experience that teachers within the school had and, years of experience that teachers had within education. However, both variables could not be included in our type of statistical analysis due to high correlations with our generation/age variables (studies 3 and 4). Problems of multicollinearity occur when taking years of experience into account. This is a consequence of the Flemish and Dutch context where the number of individuals who enter the teaching profession at later stages of their career is still limited. Therefore, teachers' chronological age is in line with their years of experience (Deneire, Vanhoof, Faddar, & Van Petegem, 2014). This might be different in other national contexts, and might be an interesting question for further research on teacher generations. In addition to the multidimensionality of age, the age-related boundaries of generational cohorts provide input for discussion. The literature provides a lot of inconsistencies in terms of the labels and boundaries associated with generational cohorts, which implies that the span of years that indicates

a generational cohort varies from source to source (Gerpott et al., 2016; Joshi, Dencker, & Franz, 2011). The generational cohorts of teachers in this dissertation included a young (20-35 years old), a middle (36-50 years old), and an old cohort (older than 50). This distinction is in line with previous research on teacher generations conducted by Edge (2014). Each cohort has a range of 15 years which might raise questions on the diversity of expertise within each cohort. Studies on teacher learning focussing on differences between novices and experienced teachers have labelled teachers with more than 3 years of experience as experienced (e.g. Grosemans et al., 2015; Kyndt, Gijbels, et al., 2016; Richter et al., 2011). Due to the connection between generational cohorts and years of experience, this puts a question mark on the boundaries of generational cohorts. For instance, the youngest cohort contains novice teachers and teachers with more than 10 years of experience. This suggests paying attention to differences within generational cohorts in addition to differences between generational cohorts. A consideration of this division was not included in this dissertation, but potentially offers an important perspective when it comes to further disentangling the complexity with regard to teacher generations. Accordingly, this would generate new questions on the extent to which we are still talking about generations, or rather about the matter of age-diversity.

INTERGENERATIONAL KNOWLEDGE FLOWS

A VARIETY OF ACTIVITIES PROVIDE OPPORTUNITIES FOR TEACHERS' KNOWLEDGE DEMANDS TO MEET KNOWLEDGE SUPPLIES

Another focus of study 1 was to explore how intergenerational knowledge-sharing processes take place within school teams. The results indicate a large variety of activities in which knowledge demands meet knowledge supplies between teachers of different generations: subject team meetings, informal moments, collegial visitations, mentoring sessions, digital learning environments, training sessions, pedagogical seminars, and collaboration with colleagues. These results are in line with previous research on intergenerational knowledge transfer (DeLong, 2004; Liebowitz, 2009; Nonaka et al., 2006; Wamundila, 2008).

In addition to providing examples of opportunities for the occurrence of intergenerational knowledge flows, we also investigated the occurrence of knowledge creation by investigating the four main processes that contribute to knowledge creation as described by Nonaka and Takeuchi (1995): socialization, externalization, combination, and internalization (Study 1). We found evidence for the occurrence of these four main processes within the school teams investigated. Whereas the first three processes were

prominently featured in the data, the last process, internalization, was the most absent. This finding might suggest that teachers share their knowledge but do not always reach the level of implementation of their newly-created knowledge in their teaching practices. However, further research is needed to elicit this issue and could particularly focus on the internalization phase. The aforementioned activities contain usually more than one of these processes, which indicates the occurrence of overlap. The conversion of implicit knowledge into explicit knowledge and vice versa is key in these processes (Nonaka & Takeuchi, 1995). Interaction and integration between explicit and implicit knowledge is important when it comes to improving workplace learning (Tynjälä, 2008). By adding an intergenerational component to these interactions, knowledge loss within organizations can be avoided, and intergenerational learning can take place (Gerpott et al., 2016; Ropes, 2013; Starks, 2013).

Building on earlier work of, for instance, Argote et al. (2003) which suggested that social relationships offer opportunities for knowledge retention, knowledge transfer, and knowledge creation, we paid considerable attention to intergenerational relationships and interactions in this dissertation. Knowledge flows are assumed to be outcomes of interactions between individuals (Borgatti et al., 2013). We aimed to capture these knowledge flows by adopting social network research methods in studies 3 and 4. By doing this, we were able to delve more deeply into the processes of socialization and externalization. In the following, we elaborate on the role of generations in the formation of teachers' professional relationships and interactions. After discussing our findings, we come back to our question as to whether intergenerational knowledge flows occur, by taking into account our findings of the network studies.

BOTH 'GENERATION' AND 'CONTENT' MATTER IN THE FORMATION OF TEACHERS' PROFESSIONAL RELATIONSHIPS AND INTERACTIONS

Studies 3 and 4 built further on the idea that knowledge sharing between teachers of different generations occurs through their social relationships with their colleagues. In order to investigate the formation of intergenerational teacher relationships, a social network approach was used. Whole network data were analysed by performing multilevel p2 modeling (Zijlstra et al., 2006). This particular method enabled us to investigate the effect of age, and/or belonging to a certain generational cohort on the likelihood of forming a relationship within the school team. In addition to sender and receiver effects, generational homophily effects could be revealed, in other words, the extent to which intragenerational relationships are formed instead of intergenerational relationships. Study 3 contained network data from 15 elementary schools in

the Netherlands. The participants in this study were school team members, including school principals, teachers, and instructional coaches. The relationships studied in study 3 are labelled as professional relationships and included discussing work, asking and providing advice, and collaborating. Our findings revealed that being part of a generational cohort based on chronological age affects the formation of relationships within the networks in terms of asking and providing advice, and collaboration. Furthermore, different generation dynamics were at play in different networks. More concretely, being part of the oldest cohort did decrease the likelihood of sending relationships for asking advice, and did increase the likelihood of sending relationships for providing advice. Being part of the middle cohort increased the likelihood of sending asking advice relationships and decreased the likelihood of receiving relationships within the network of providing advice, which refers to 'being provided with advice'. Being part of the oldest cohort did decrease the likelihood of being provided with advice, even more than was the case with their colleagues in the middle cohort. This finding supports earlier findings observed by Spillane et al. (2012), indicating that more experienced colleagues were less likely to receive advice. A reason for this tendency can be found in a recent study of Burmeister, Fasbender, and Deller (2018) on the significance of age in terms of expectations concerning the roles that workers occupy in knowledge transfer processes. The findings revealed that age plays a role in being perceived as a knowledge sender or a knowledge receiver within knowledge transfer processes. More concretely, older workers were expected to contribute their knowledge and were therefore perceived as knowledge senders, whereas younger workers were expected to receive knowledge (Burmeister et al., 2018). These expectations relate to a rather traditional and unidirectional interpretation of intergenerational knowledge flows, whereas the findings of our studies 1 and 2 and other studies highlight the value of bidirectional knowledge flows in terms of teachers' intergenerational learning due to the level of knowledge diversity (Brücknerová & Novotný, 2016; Novotný & Brücknerová, 2014).

In terms of teacher collaboration, previous research by Richter et al. (2011) showed that young teachers tend to collaborate with one another more frequently than did older colleagues. In other words, teacher collaboration seems to decrease with age. In our study, we focussed on collaboration in terms of being perceived as a preferred partner to collaborate with, which offers an additional view on the findings of Richter et al. (2011). Within the network of collaboration, we found that being part of the middle or oldest cohort did decrease the likelihood of receiving collaboration ties. This implies that young teachers are more likely to be mentioned as a preferred partner to collaborate with (study 3).

In addition to investigating sender and receiver effects within the networks, study 3 also aimed to capture the mechanisms of homophily within elementary school teams. Homophily refers to the idea that individuals are more likely to form relationships with people who are similar to themselves in terms of attributes such as age, race, gender, education, and values, than with individuals that are dissimilar (Feld, 1982; McPherson et al., 2001). In terms of generational homophily, our findings revealed that teachers in the youngest cohort tend to form relationships within their own generational cohort when it comes to discussing work, asking advice, and collaborating (study 3). This finding is in line with research in other work contexts, revealing that the youngest age cohorts tend particularly to have confiding relationships within their own cohort (Marsden, 1988). We suggest further research is needed to investigate the reasons why young teachers have this tendency. Factors such as trustworthiness, perceptions of being evaluated, and psychological safety are worth consideration (e.g. Burmeister et al., 2018; Kelchtermans & Ballet, 2002; Van den Bossche, Gijssels, Segers, & et al., 2006). Qualitative data can be helpful in order to gain insight with regard to this issue.

The design of study 4 was based on insights gained from the three previous studies described in this dissertation with the aim of going deeper into teachers' intergenerational advice and information seeking interactions. From studies 1 and 2 we learned that the various generations of teachers contain specific knowledge domains. More concretely, older teachers were seen as potential knowledge suppliers when it comes to subject-matter knowledge and classroom management. Young teachers were seen as knowledge suppliers with regard to innovative teaching methods and ICT. In study 3, we learned that 'asking advice' was one of the networks in which generation played a role, both in terms of sender/receiver effects as well in terms of the homophily effect. The outcomes of study 3 triggered the important question 'what was the advice about?', since asking advice relationships were formulated in a general way. Therefore, study 4 deliberately focussed on asking content-related advice and on information interactions. The network 'asking advice and information' refers to an interaction in which we expect knowledge demands (asking for advice and information) to meet knowledge supplies (being asked for advice and information). The following content-related advice and information seeking networks were investigated in 10 secondary education schools in Flanders (Belgium): asking advice and information on subject-matter knowledge, classroom management, innovative teaching methods, and ICT. Our findings indicated that both 'generation' and 'content' matter within the formation of these content-related advice and information interactions. The significance of 'content' was underlined by the finding that our four content-related advice and information networks appeared to give a different picture of interactions. In other words, teachers tend to approach different colleagues for advice and information depending on the kind of advice

they require (study 4). 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). In addition, Cross et al. (2001) underlined the importance of going beyond general advice networks in order to reveal different dimensions of advice. Therefore, the relevance of the addition of content to our advice and information seeking interactions is one of the main contributions of this study.

Our findings also indicated that generations matter within the formation of these content-related advice and information interactions. Regarding asking advice (knowledge demand), our results showed that older teachers are less likely to ask advice and information of their colleagues when it comes to subject-matter knowledge, classroom management, and innovative teaching methods. In terms of being asked for advice (knowledge supply), 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. Consequently, the label of older teachers as an untapped source of expertise seems to be untrue when it comes to subject-matter knowledge. The significant effect of older teachers being more likely to be asked for advice and information in this knowledge domain indicates that older teachers' subject-matter knowledge is 'tapped' rather than 'untapped'.

Although the indications that subject-matter knowledge serves as a knowledge supply on the part of older teachers (Studies 1, 2 & 4), there was a clear tendency of homophily for the youngest cohort in terms of asking advice and information on subject matter knowledge (study 4). In other words, teachers of the youngest cohort tend to ask for advice and information on subject-matter knowledge from their colleagues in the same generational cohort. Consequently, for the youngest group of teachers, intragenerational interactions are more likely to occur than intergenerational interactions in terms of asking advice and information on subject-matter knowledge. Also, a tendency towards homophily was found for the oldest cohort in terms of classroom management (study 4). From the viewpoint of intergenerational knowledge flows, this is a worrying finding. We expect that these tendencies can be explained by the 'sensitivity' with regard to lacking knowledge and skills as a teacher. For instance, Boakye and Ampiah (2017) acknowledged that young teachers face feelings of deficiency in terms of subject-matter knowledge. Feelings of uncertainty and challenges in terms of classroom management have been known to occur for early career teachers for many years (e.g. Kelchtermans & Ballet, 2002; Pillen et al., 2013; Stokking et al., 2003; Veenman, 1984; Voss et al., 2017). Recent societal changes that have resulted in more diverse student backgrounds and increasing demands for inclusive education put pressure on teaching practices.

Accordingly, older teachers might also face difficulties when it comes to classroom management nowadays. Consequently, the need for advice on classroom management has become an urgent matter for teachers of all generations. The fact that older teachers tend to ask advice on classroom management within their own generational cohort might be explained by feelings of being evaluated. For instance, Kelchtermans and Ballet (2002) described that young teachers fear being perceived as incompetent or vulnerable by their more experienced colleagues. The study 1 findings reported in this dissertation provide a good example of these feelings, and broadens them to young and old teachers. Teachers of all age groups agreed that collegial classroom visitations would be a beneficial way to improve their own teaching practices. However, many thresholds were verbalized by young and older teachers in terms of their fear of being evaluated, feelings of discomfort when it comes to being observed, and being afraid of failure (Study 1). It might be that young teachers perceive questions in terms of classroom management as being more 'normal' or 'accepted' at the beginning of their career as compared to questions related to subject matter knowledge. Consequently, young teachers interact with older teachers when it comes to seeking advice on classroom management and not with regard to subject matter knowledge. Older teachers might perceive the opposite, that asking advice on classroom management might be perceived as being problematic or less acceptable due to their level of experience. Additionally, older teachers might assume that their youngest colleagues are not the right source of knowledge for this topic, since novices are known to have difficulties in this respect. Research efforts to further investigate and optimise intergenerational knowledge flows are still crucial in order to minimise untapped expertise in teacher teams. Further research is needed to capture the reasons why some homophily effects occur by focussing on the assumptions described above. For instance, to what extent do feelings of being evaluated affect advice-seeking behaviour among the teachers of different generations? What are the reasons for teachers seeking advice within their own generational cohort? Does it feel more socially accepted for young teachers to ask advice on classroom management as compared to subject-matter knowledge? And how does this feeling of being evaluated play for older teachers? Qualitative research methods can go more deeply into the question of whether and why some knowledge domains are perceived as being easier or more permissible to ask advice about than other knowledge domains. Moreover, generational differences can be investigated in this regard.

AGE EFFECTS EXIST IN TEACHER INTERACTIONS

Within this dissertation, more specifically in studies 3 and 4, a variety of significant effects on the formation of teachers' professional relationships and interactions was found in terms of generation and age. We make this distinction between generation and age since study 3 measured generations by means of generational cohorts, whereas study 4 measured generations as both a numeric age variable for the individual level covariates and the generational cohort as a relationship covariate. It can be questioned to what extent these effects were real generation or age effects, and not effects that were influenced by other teacher characteristics such as formal roles or expertise. Previous social network studies on the formation of teachers' professional relationships found significant effects in terms of physical proximity (e.g. Spillane et al., 2017), formal subunits such as subject departments (e.g. Meredith et al., 2017), or formal roles (e.g. Parise & Spillane, 2010; Spillane et al., 2012). In study 4, formal roles such as being a mentor, being the head of a subject team, fulfilling an additional formal role, were included as control variables. Also, expertise in terms of specific knowledge domains was taken into account. Given the fact that many of our age effects remained statistically significant after controlling for variables related to formal roles and expertise, we conclude that age plays a substantial role in teachers' advice and information seeking interactions.

Even though our studies revealed that teachers are asked for advice on certain knowledge domains, critical comments are needed with regard to the low density in our school networks (study 4). These densities were in line with other network studies in Flanders (Meredith et al., 2017). Concretely, this means that each school had relatively few interactions compared with the overall number of possible interactions. Consequently, school teams seem to have missed opportunities for knowledge-sharing and for tapping expertise. A cultural aspect might be involved. A first cultural aspect refers to differences in school culture, while the second aspect refers to the broader national context. Schools with different values with regard to network density might offer interesting opportunities for case studies in order to reveal antecedents for intergenerational knowledge-sharing. Also, different generational constellations across schools could be taken into account. For instance, what is the effect of a certain generational cohort being absent or being well-represented in a school team? A second cultural aspect refers to our national context. The TALIS 2013 results revealed that Flemish teachers tend to be individual rather than team workers. There tend to be little peer collaboration and feedback among Flemish teachers as compared to teachers in other

educational systems (Deneire et al., 2014). Comparative studies could focus on differences in national cultures in terms of intergenerational advice-seeking behaviour.

THE (UN)KNOWN SIDE OF TEACHERS' INTERGENERATIONAL KNOWLEDGE FLOWS

While the previous parts of this conclusion chapter mainly focussed on what we have learned throughout this dissertation, this part will highlight what we do not know (yet). The limitations of this dissertation also provide opportunities to formulate suggestions for further studies on the topic of teachers' intergenerational knowledge flows.

Our first point relates to the diversity in *teacher knowledge* connected to different generations. Studies 1 and 2 provide insight into the specific knowledge supplies of young and old teachers. However, insight into the knowledge supplies of the middle cohort received relatively little attention throughout this dissertation. The findings of our social network analysis in study 3 suggested that this middle cohort of elementary school teachers serves as an important knowledge source for their colleagues since teachers of the middle cohort were found to be more likely to be asked for advice by their colleagues. Further research might investigate knowledge supplies and demands of the middle cohort of teachers on different educational levels.

Secondly, limitations regarding the contribution of the investigated intergenerational teacher relationships and interactions in terms of intergenerational knowledge flows, and with regard to intergenerational learning can be identified. To put these into question form: *to what extent have we measured intergenerational knowledge flows* and *to what extent do intergenerational teacher interactions identified in this dissertation lead to intergenerational learning?* Our first question relates to the content of interactions. The importance of interactions has been emphasized as a facilitating factor for information and knowledge-sharing among teachers (e.g. Baker-Doyle, 2015; Grangeat & Gray, 2007; Kwakman, 2003; Lohman, 2006). As stated by Borgatti et al. (2013), interactions between individuals are facilitated by relationships, and knowledge flows occur when information is exchanged through interactions. The professional relationships and interactions investigated in this dissertation relate to discussing work, asking for (content-related) advice and information, and providing advice, and collaborating (Studies 3 and 4). Our content-related information and advice-seeking interactions focussed on 'asking advice' and referred to knowledge demands. Adding specific knowledge content to the advice and information interaction has provided us with more information on the exchanged type of knowledge. In study 4 we investigated one direction of advice interactions, namely the aspect of 'asking advice'. The question

remains as to whether or not this interaction evoked that the asked for advice was answered by the advice provided, and that this interaction led to flows of knowledge between teachers. Based on Borgatti and Cross (2003), we assume that the go-to people possess valuable knowledge that can be shared, since information-seeking interactions are found to be a function of both knowing what that person knows, and valuing that knowledge. This provides arguments to assume that interactions involved in asking for information and advice result in knowledge flows. In order to increase our understanding of the appearance of knowledge flows, we suggest future network studies to include a simultaneous consideration of the interactions involving content-related asking for and provision of advice.

Our second question relates to the assumed learning process as an outcome of intergenerational interactions. Previous research has already acknowledged the importance of teacher interactions for teachers' professional development, and therefore the social side of learning had been emphasized in recent work on teacher learning (e.g. Kwakman, 2003; Lohman, 2006; Meredith et al., 2017; Van Waes et al., 2015). Kyndt, Vermeire, et al. (2016) stated that the exchange of information and knowledge acquisition do not necessarily result in informal workplace learning outcomes. This finding underlines the importance of evaluating the relevance and quality of the advice and information that is shared (e.g. van der Rijt et al., 2013; van der Rijt et al., 2012) and the importance of investigating the extent to which teachers make use of the advice and information that they receive through professional interactions. The latter also relates to the process combinations and to internalisation, in which explicit knowledge will be combined with other explicit knowledge, and such explicit knowledge then becomes implicit and therefore becomes a part of teachers' practices (Nonaka & Takeuchi, 1995). In order to capture this unknown side of intergenerational knowledge flows, future research might more explicitly seek to link intergenerational teacher interactions with teacher learning outcomes by investigating how knowledge that has been shared through intergenerational interactions is internalised and leads to teacher learning.

So far, we have focussed on a rather positive interpretation of our relationships and interactions, for instance by implicitly assuming that valuable information and knowledge flows through interactions (Borgatti & Cross, 2003). However, asking and providing advice can also contain information that is different from one's own teacher beliefs. Also, these interactions can lead to learning. For instance, Engeström (2001) focusses on learning from contradictions and reflection. As different generations of teachers might have different viewpoints, this can lead to disagreement between different generations, which might contribute to learning. This brings questions to the fore that have not been particularly

focussed on within this dissertation. Some examples are: to what extent does intergenerational conflict exist among teachers? and, to what extent does intergenerational conflict contribute to teacher learning?

Thirdly, the measured relationships and interactions were framed within the network boundaries of school teams (studies 3 and 4). Nowadays, the use of the internet has led to an increased availability of external (online) sources for the acquisition of knowledge and knowledge sharing. De Lima (2010) discusses the boundary specification problem, and highlights that individuals might also interact with people outside the boundaries of the network they operate in. These external ties can be relevant since these can affect interactions within the internal network. Some examples are found in interactions in online teacher communities (e.g. Klascement), YouTube channels, e-learning channels or interactions with teachers from other school teams. This implies that also outside the school organization, the possibilities for intergenerational learning are present. Based on our findings that particularly young teachers are positively oriented towards ICT (studies 1 & 2), we assume that these external interactions might be present in their networks. Given the anonymity found in online teacher communities, teachers might interact in an open way and might have less feelings of uncertainty and being evaluated (study 1). This suggests the need for further research involving a broadening of network boundaries when investigating teachers' intergenerational learning. Other interesting questions can be related to the impact of the availability of sources of knowledge outside schools and their impact on intergenerational knowledge flows within the school.

Fourthly, this dissertation is based on cross-sectional data. Given the time-dimension involved in the generational approach, it would be interesting to see how teachers of different generations evolve over time, and also how their networks change over time. For instance, to what extent do teachers of the youngest cohort continue acting like 'young ones' or do they start behaving like 'old ones'? Which features are responsible for changes in knowledge, skills, and attitudes when teachers move through different generational stages? Finally, how do teachers' advice and information seeking interactions change during their career, influenced by their experience and expertise? Longitudinal data could provide insight with regard to these processes.

IMPLICATIONS AND SUGGESTIONS FOR PRACTICE

The findings of the different studies identified in this dissertation enable us to formulate implications in terms of what there is to learn for practice. In this section our ideas concerning implications and suggestions for practice are summarized. These ideas are primarily aimed at optimizing knowledge flows between different generations of teachers, but can also be relevant for knowledge-sharing among teachers in general. Furthermore, we believe that other work contexts can also be inspired by these suggestions in order to develop intergenerational learning communities within such organizations.

First, we suggest that school principals and policy makers consider intergenerational learning initiatives as a substantial part of their general school policy, or as a part of their more specifically-formulated personnel or human resources policy. In this dissertation, intergenerational learning is a story of generational and knowledge diversity. This underlines the value of paying special attention to intergenerational learning with regard to professional development policies. For instance, the bidirectional character of intergenerational learning initiatives within schools should be emphasized in order to optimally capitalise on the available variety of knowledge (Brücknerová & Novotný, 2016; Novotný & Brücknerová, 2014). Whereas traditional initiatives for teachers' professional development focus mainly on the learning processes of young and novice teachers, professional development needs to focus on all generations of teachers. Recently, reverse mentoring initiatives in which older colleagues learn from their younger colleagues have been emphasized (Baily, 2009). In addition, initiatives such as co-teaching can offer possibilities for intergenerational learning when younger and older teachers are combined.

Second, efforts are needed to stimulate teachers' reflections on their own knowledge demands and knowledge supplies. This can be done at the individual teacher level, but also within the entire school team where reflection on the knowledge demands and knowledge supplies of a team as a whole can be valuable. In addition to reflection on *what* type of knowledge is needed, it is also important to focus on *where* the needed knowledge is available or, in other words, which person within the school team can supply this knowledge. By doing this, network awareness and network literacy can be created or enhanced. Consequently, school principals and teachers can gain insight into the available teacher knowledge and the current (un)tapped knowledge sources within the school team. The application of social network analysis methods can be helpful to achieve this goal. Examples of creating network awareness and network interventions to stimulate teachers' professional development in higher education can be found in Van Waes (2017). Schools should also take on the challenge to create awareness of the 'silent experts' within the school team (Baker-Doyle & Yoon, 2010). From a knowledge management perspective, gaining insight

into 'isolates' within the school team is beneficial, since their knowledge tends to be isolated which, implies that such knowledge cannot be shared or leveraged (Cross & Borgatti, 2004). Creating expertise transparency is a way to strengthen teachers' professional development (Baker-Doyle & Yoon, 2010).

Third, our call to stimulate reflection on teachers' knowledge demands and knowledge supplies can be extended with reflection with regard to *what* teachers learn from younger and older colleagues, and on *how* they learn from their colleagues of different generations. These questions can serve as a basis for sharing good practices among teachers, or these questions can be used by school principals as a starting point for discussion during feedback sessions or performance appraisals.

Fourth, efforts to decrease negative stereotyping or to maintain positive stereotyping are needed. This can be achieved by focussing on the strengths of teachers of all the generational cohorts. A school climate in which the positive characteristics of all generational cohorts are emphasized, contributes to the creation of a strong professional teacher community (e.g. Stone-Johnson, 2017). It might also decrease negative thinking in terms of 'them' and 'us' when it comes to 'young' and 'old' within the school team. Focussing on positive stereotypes rather than negative ones positively affects intergenerational interactions (Fowler & Gasiorek, 2018). To give an example, the idea that young teachers do not always perceive their teaching job as a lifetime career might hinder knowledge-sharing processes with this age group. Shedding light on the positive characteristics of young teachers within school teams could moderate these negative effects.

Fifth, efforts are needed to increase the low density levels with regard to school networks. School principals and policy makers should pay attention to cultivating a formal structure as a fruitful context for both formal and informal intergenerational teacher interactions. One way to do this is by stimulating face-to-face interactions in organised teacher meetings such as subject team meetings or formal subgroups within the school (Meredith et al., 2017). These formal subunits have been found to facilitate information-seeking among teachers to some extent (Meredith et al., 2017). In addition, the role of physical proximity should not be underestimated. Consciously dealing with questions such as which teacher is located in which classroom, what is the position of this classroom within the school building, and where the common rooms (e.g. teacher staff room or lunch room) are located, are important in order to provide opportunities for teacher interaction and therefore teacher learning (Kyndt, Gijbels, et al., 2016; Lohman & Woolf, 2001). Teachers who are located in classrooms closer to one another might cross paths more frequently during their work days, which in turn leads to more chances to talk to each other about their teaching practices (Spillane et al., 2017). Consequently, we want to accentuate the benefits of paying attention to physical proximity within the school building as a way to foster intergenerational teacher interactions.

Besides considering physical proximity to stimulate face-to-face interactions among different generations of teachers, the digital learning environment could be deployed as a facilitator for intergenerational interactions and knowledge-sharing. Although the digital learning environment tends to be mainly seen as a learning tool for students, it also has the potential to be used as a learning tool for teachers. School principals should take the challenge to further develop the digital learning environment in a way that captures externalised teacher knowledge, and which facilitates knowledge-sharing for the entire school team. This implies that special attention should be paid with regard to older teachers, since this group was found to be less skilled in terms of ICT according to studies 1 and 2. Efforts to activate older teachers in their use of digital learning environments are needed.

Some actions can be undertaken prior to entering the teaching profession, and can start with initial teacher education. Teacher education programmes can aim at developing a knowledge-sharing attitude as a generic skill that teachers need to acquire. In this sense, it is important to reduce possible barriers to advice-seeking behaviour. For instance, attention should be paid to the perception that asking advice of a colleague is not necessarily about 'having a problem', but rather a way to learn and to develop oneself as a teacher. Also, the importance of facilitating interactions between student teachers and mentor teachers of different generations can be highlighted. Teacher educators who acknowledge that mentor teachers of different ages have access to different types of knowledge and skills, can use the potential of age-diversity among mentor teachers as a strength within teacher training programmes. Therefore, student teachers might be combined during their internship with a mentor teacher who is somehow complementary in terms of knowledge and skills, so that knowledge sharing and learning can be optimized.

While the development of a knowledge-sharing attitude can be initiated in initial teacher education, it is important to maintain it as an objective during one's entire teaching career, meaning from initial teacher education to retirement. Considering the development of a knowledge-sharing attitude as a part of teachers' continuous professional development is therefore essential.

We hope that the findings detailed in this dissertation will encourage practitioners to embrace intergenerational learning as an opportunity to build a strong and sustainable teacher community. Additionally, we hope to have convinced both researchers and practitioners of the value of a social network approach to capturing intergenerational teacher interactions. Furthermore, we hope that the limitations and suggestions for further research that are mentioned in this dissertation will inspire researchers to continue their efforts to understanding and fostering teachers' intergenerational knowledge flows and intergenerational learning.

KEY FINDINGS:***INTERGENERATIONAL (PERCEPTIONS OF) DIFFERENCES IN KNOWLEDGE, SKILLS, AND ATTITUDES***

- Subject-matter knowledge and classroom management skills are seen as supplies of older teachers (*Studies 1 & 2*)
- Creative and innovative teaching methods and ICT skills are seen as supplies of young teachers (*Studies 1 & 2*)
- Perceived characteristics of older teachers: taking a leadership role, being loyal, being confident, being conservative (*Study 1*)
- Perceived characteristics of young teachers: being interested in technological change, making use of ICT, having creative and innovative ideas, and considering another profession (*Study 2*)
- Many characteristics in terms of attitudes are not clearly attributed to a certain age group of teachers (*Study 2*)
- Perceptions on teachers' attitudes affect flows of knowledge demands and supplies (*Study 1*)

INTERGENERATIONAL KNOWLEDGE FLOWS

- A large variety of intergenerational knowledge brokerage activities is found (*Study 1*)
- Processes of socialization, externalization, combination, and internalization occur between teachers of different generations; however, the internalization process was most absent (*Study 1*)

THE ROLE OF GENERATION IN THE FORMATION OF TEACHER RELATIONSHIPS AND INTERACTIONS

- Different generation dynamics are at play within different networks: asking and providing advice, and collaboration (*Study 3*)
- Generation affects the formation of content-related advice and information seeking interactions (*Study 4*)
- Young teachers are more likely to be mentioned as a preferred partner to collaborate with (*Study 3*)
- Young teachers in particular tend to form relationships within their own cohort //(homophily effect) (*Study 3*)
- Young teachers are more likely to be asked for advice and information on innovative teaching methods and ICT (*Study 4*)
- Homophily effects occurred for the youngest teachers when advice is about subject-matter knowledge (*Study 4*)
- Old teachers are less likely to ask advice, while teachers of the middle generation are more being asked for advice (*Study 3*)
- Older teachers are less likely to ask advice on subject matter knowledge, classroom management, and innovative teaching methods (*Study 4*)
- Older teachers are more likely to be asked for advice and information on subject matter knowledge (*Study 4*)
- Homophily effects occurred for the oldest teachers for advice seeking about classroom management (*Study 4*)

“Anyone who stops learning is old, whether at twenty or eighty. Anyone who keeps learning stays young. The greatest thing in life is to keep your mind young.”

(Henry Ford)

Nederlandstalige samenvatting



Dit proefschrift levert inzichten op over intergenerationele kennisstromen bij leerkrachten. Het proefschrift is opgebouwd rond drie hoofdvragen: (1) Hoe ervaren leerkrachten hun collega's van andere generaties op vlak van kennis, vaardigheden en attitudes? (2) Op welke manieren vinden intergenerationele kennisstromen plaats? (3) Wat is de rol van generaties in het vormen van interacties tussen leerkrachten?

De huidige demografische veranderingen, zoals bijvoorbeeld de vergrijzing van de bevolking, hebben impact op de leeftijdsverdeling binnen schoolteams. Debatten rond de verhoging van de pensioensleeftijd van leerkrachten zijn brandend actueel. Terwijl oudere leerkrachten verwacht worden om langer in een lerarenteam te functioneren, verlaten velen onder hen het schoolteam in de nabije toekomst. Ook bij jonge leerkrachten stellen we een sterke uitstroom vast in de eerste jaren van hun loopbaan omwille van de zogenoemde 'praktijkschok'.

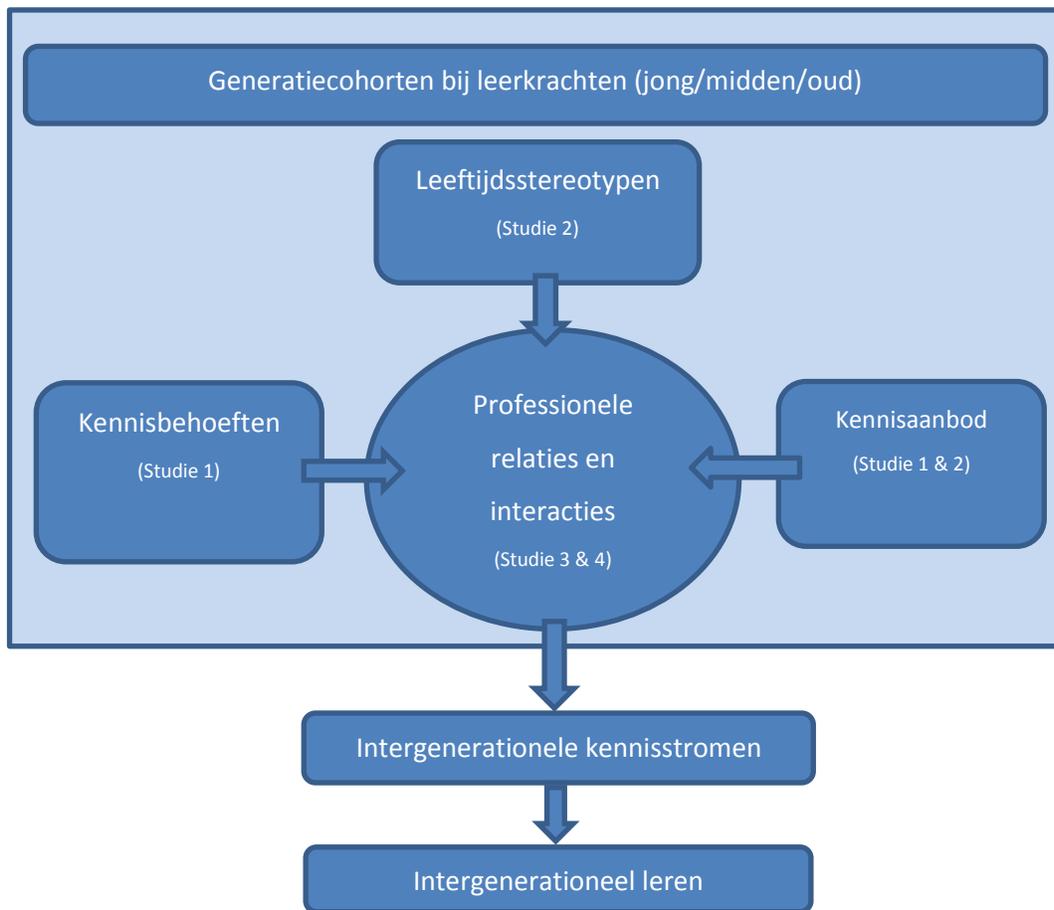
Kennisbehoeften van leerkrachten worden mede gestuurd door maatschappelijke tendensen zoals de toenemende multiculturele samenleving en de duidelijke vraag naar meer inclusief onderwijs (bv. 'M-decreet' in België, 'Passend Onderwijs' in Nederland). Daarnaast zorgen de snelle innovaties op vlak van informatie- en communicatietechnologie er ook voor dat leerkrachten zichzelf voortdurend moeten bijscholen en op zoek moeten gaan naar kennis. Terwijl oudere leerkrachten door sommigen worden omschreven als 'dood hout', m.a.w. als medewerkers met weinig potentieel, argumenteren anderen dat hun impliciete en expliciete kennis onderschat wordt en te weinig wordt aangeboord. De rol van kennismanagement in scholen krijgt meer aandacht omwille van het potentieel om innovaties te ondersteunen en kennisverlies binnen scholen te vermijden (Thambi & O'Toole, 2012). Hierbij zijn strategieën noodzakelijk om impliciete kennis te expliciteren. Het expliciet maken van kennis is een belangrijke voorwaarde om tot kennisstromen te komen. Intergenerationele kennisstromen worden omschreven als het resultaat van een interactief proces tussen kennisbehoeften en kennisaanbod van verschillende generaties leerkrachten.

CONCEPTUEEL KADER EN HOOFDBEVINDINGEN VAN 4 STUDIES

Intergenerationeel leren bij leerkrachten wordt beschreven als een interactief proces tussen leerkrachten van verschillende generaties waarbij ten minste één van beide partijen leert (Novotný & Brücknerová, 2014; Ropes, 2011). Dit soort leren kadert hoofdzakelijk binnen een sociale benadering van werkplekleren omwille van de focus op relaties en interacties (Lee et al., 2004). Voorgaand onderzoek benadert het leren van leerkrachten hoofdzakelijk vanuit verschillen tussen beginnende en ervaren leerkrachten (bv.

Grosemans et al., 2015; Kyndt, Gijbels, et al., 2016; Richter et al., 2011). Studies die de invalshoek van generaties leerkrachten nemen zijn schaars en werden pas recentelijk gepubliceerd (e.g. Brücknerová & Novotný, 2016; Edge, 2014; Novotný & Brücknerová, 2014).

Figuur 1 geeft het conceptueel model weer dat in dit proefschrift gebruikt werd om het intergenerationeel leren van leerkrachten te benaderen.



Figuur 1. Conceptueel model

De literatuur over generaties mist een duidelijke definitie van wat generaties leerkrachten precies zijn. De meest gebruikte conceptualisering van generaties is terug te vinden in de sociologie en verwijst naar generaties als groepen van individuen die dezelfde maatschappelijke en historische gebeurtenissen delen doorheen hun leven (Mannheim, 1952). Volgens Edge (2014) zijn er drie hoofdgeneraties te vinden in schoolteams: Generatie Y (geboren tussen 1981 en 2003), Generatie X (geboren tussen 1966 en 1980) en Babyboomers (geboren tussen 1946 en 1965). Dit proefschrift bouwt verder op deze indeling van

generaties leerkrachten gebaseerd op chronologische leeftijd en labelt deze als: jonge cohort, middencohort en oude cohort.

De eerste hoofdvraag in dit proefschrift tracht inzicht te bieden in hoe leerkrachten van verschillende generaties hun collega's van andere generaties ervaren op vlak van kennis, vaardigheden en attitudes. Enerzijds wordt hier verwezen naar percepties over kennisbehoeften en kennisaanbod. Anderzijds wordt deze vraag beantwoord vanuit leeftijdsstereotypen bij leerkrachten.

Binnen het conceptueel kader werden kennisbehoeften en kennisaanbod opgenomen. (Figuur 1) Kennisbehoeften verwijzen naar de noden die leerkrachten hebben om hun professionele doelen te bereiken. Kennisaanbod duidt op de kennis die leerkrachten beschikbaar kunnen stellen omwille van hun expertise. Deze kennisbehoeften en kennisaanbod vinden elkaar door professionele relaties en interacties tussen leerkrachten.

We vertrokken vanuit een kwalitatieve benadering om percepties van leerkrachten te onderzoeken.

Studie 1. Percepties van leerkrachten m.b.t. intergenerationale kennisstromen. Deze studie beschrijft enerzijds hoe leerkrachten elkaar ervaren m.b.t. kennisbehoeften en kennisaanbod. Anderzijds verkent deze studie hoe kennisdelingsprocessen tussen verschillende generaties leerkrachten plaatsvinden.

Gegevens werden verzameld aan de hand van interviews met acht jonge leerkrachten en acht oudere leerkrachten uit vier Vlaamse secundaire scholen. Gegevensanalyse gebeurde d.m.v. thematische analyse.

De resultaten tonen aan dat percepties van leerkrachten of collega's van andere generaties kunnen ingedeeld worden in percepties rond kennis, vaardigheden en attitudes. De jonge generatie leerkrachten percipiëren oudere leerkrachten voornamelijk als kennisbron voor vakinhoud en klasmanagement. Oudere leerkrachten zien hun jongste collega's daarentegen voornamelijk als kennisbron voor creatieve en innovatieve werkvormen, en ICT. Deze kennisbronnen worden beschouwd als kennisaanbod van de ene generatie en tegelijkertijd als kennisbehoefte van de andere generatie. Betreffende percepties rond attitudes worden oudere leerkrachten geassocieerd met kenmerken zoals onder andere behoudsgezind en zelfverzekerd zijn. Jongere leerkrachten worden o.a. omschreven als enthousiast en snel uitvallend in de zin van een andere school of job overwegen. De resultaten tonen ook aan dat percepties m.b.t. attitudes

een impact kunnen hebben op intergenerationele kennisstromen. Bijvoorbeeld, wanneer het idee leeft bij oudere leerkrachten dat jonge leerkrachten na een schooljaar van job of school zullen veranderen, kan dit kennisdelingsprocessen belemmeren. Activiteiten waarin intergenerationele kennisstromen kunnen plaatsvinden zijn: vakgroepwerking, collegiale visitaties, aanvangsbegeleiding, interacties via de digitale leeromgeving, bijscholingen, pedagogische studiedagen, samenwerking met collega's en tijdens informele momenten. Kenniscreatieprocessen zoals socialiseren, externaliseren, combineren en internaliseren komen aan bod, maar voorbeelden van internalisering zijn het minst sterk aanwezig in de data.

De kwalitatieve bevindingen van studie 1 werden verder uitgediept door de kwantitatieve benadering in studie 2. Percepties m.b.t. kennisbehoeften en kennisaanbod werden uitgebreid met percepties m.b.t. attitudes waarbij we geïnspireerd werden door literatuur over leeftijdsstereotypen. Leeftijdsstereotypen worden gedefinieerd als veralgemeningen over de kennis, vaardigheden en attitudes van een bepaalde leeftijdsgroep. Inzicht in het stereotiep denken van leerkrachten is van belang aangezien deze manier van denken interacties op de werkplek kan beïnvloeden (Fowler & Gasior, 2018; Urick, Hollensbe, Masterson, & Lyons, 2017).

Studie 2. Leeftijdsstereotypen bij leerkrachten. Deze studie focust op de mate waarin leerkrachten kenmerken van hun collega's op vlak van kennis, vaardigheden en attitudes toeschrijven aan een bepaalde leeftijdsgroep, m.a.w. in welke mate denken leerkrachten leeftijdsstereotiep? Bovendien werden verschillen tussen generatiecohorten onderzocht.

Gegevens werden verzameld door het invullen van een online vragenlijst. Deze werd door 558 Vlaamse leerkrachten secundair onderwijs ingevuld. Gegevensanalyse gebeurde d.m.v. beschrijvende analyses en ANOVA's.

De resultaten tonen aan dat interesse hebben in technologische ontwikkelingen, het gebruik maken van ICT, het hebben van creatieve en innovatieve ideeën, en het overwegen van een andere job, in grotere mate worden toegeschreven aan jonge leerkrachten. Oudere leerkrachten worden in grotere mate geassocieerd met volgende kenmerken: de leiding nemen in activiteiten, loyaliteit, zelfverzekerdheid, behoudsgezindheid, respect kunnen afdwingen en autoriteit uitstralen, en een uitgebreide vakinhoudelijke kennis bezitten. Vele kenmerken die betrekking hadden op attitudes werden niet duidelijk toegeschreven aan een bepaalde leeftijdsgroep en kunnen dus niet beschouwd worden als stereotiep. Betreffende de verschillen tussen

generatiecohorten stellen we vast dat voor de meerderheid van de kenmerken verschillen tussen de jongste en oudste groep leerkrachten bestaan. Positieve kenmerken werden in grotere mate toegeschreven aan de eigen leeftijdsgroep.

Het centrale deel van het conceptueel kader (figuur 1) bevat professionele relaties en interacties. Borgatti et al. (2013) onderscheiden twee types relaties: relationele statussen en relationele gebeurtenissen. Relationele statussen verwijzen naar continu aanwezige relaties tussen individuen (bv. een collega of vriend zijn van iemand). Relationele gebeurtenissen verwijzen naar interacties, m.a.w. gebeurtenissen die niet continu aanwezig zijn (bv. advies vragen aan iemand). Voorgaand onderzoek over het leren van leerkrachten op de werkplek beklemtoonde de relevantie van interacties voor het faciliteren van informatie- en kennisuitwisseling tussen leerkrachten (e.g. Baker-Doyle & Yoon, 2011; Grangeat & Gray, 2007; Kwakman, 2003; Lohman, 2006). Voorbeelden van deze interacties zijn werkgerelateerde gesprekken, samenwerking, advies vragen en advies geven.

Volgens Borgatti et al. (2013) kunnen kennisstromen ontstaan wanneer informatie wordt uitgewisseld door interacties. Binnen dezelfde redenering omschrijven we intergenerationele kennisstromen als potentiële uitkomst van interacties tussen verschillende generaties leerkrachten. Deze kennisstromen vormen een eerste stap richting intergenerationeel leren bij leerkrachten. De concepten intergenerationele kennisstromen en intergenerationeel leren worden buiten het kader in figuur 1 afgebeeld omwille van het feit dat deze niet rechtstreeks gemeten werden. Intergenerationele kennisstromen en intergenerationeel leren worden dus verondersteld als uitkomst, maar deze uitkomst is niet gegarandeerd.

Studie 3 en studie 4 gaan dieper in op intergenerationele relaties en interacties bij leerkrachten. Om deze relaties en interacties te meten wordt gebruik gemaakt van een sociale netwerkbenadering.

Studie 3. Intergenerationele professionele relaties in basisscholen: een sociale netwerkbenadering. Deze studie focust op de mate waarin professionele relaties van leerkrachten beïnvloed worden door het al dan niet behoren tot een bepaalde generatiecohort. Professionele relaties in deze studie omvatten werkgerelateerde gesprekken, advies geven/vragen en samenwerken.

Gegevens van 299 schoolteamleden uit 15 Nederlandse basisscholen werden gebruikt voor deze studie. Gegevens werden verzameld aan de hand van een sociometrische vragenlijst en geanalyseerd d.m.v. multilevel p2 modellen.

Resultaten geven aan dat generatiecohorten een rol spelen in het aangaan van professionele relaties. We stellen vast dat de oudste cohort minder relaties aangaat op vlak van advies vragen, in vergelijking met de jongste cohort. Anderzijds geven ze aan meerdere collega's advies, in vergelijking met de jongste groep. Leerkrachten van de jongste groep ontvangen van meer collega's advies dan twee andere cohorten. Leerkrachten van de middengroep worden het vaakst gevraagd voor advies. Wat ook opvalt is het feit dat de jongste cohort werkgerelateerde gesprekken en advies vragen binnen de eigen leeftijdsgroep houdt.

De laatste studie in dit proefschrift maakt gebruik van de verworven inzichten in de vorige drie studies. Waar studie 3 advieszoekend gedrag benadert vanuit de algemene adviesvraag, koppelt studie 4 advies- en informatievragen aan kennisaanbod.

Studie 4. Intergenerationeel advies- en informatiezoekend gedrag van leerkrachten: inhoud doet ertoe! Deze studie geeft inzicht in de rol van generaties in het vormen van inhoudsgebonden advies- en informatiezoekend gedrag tussen leerkrachten. De inhoud van de interacties verwijzen specifiek naar kennis over de vakinhoud, het klasmanagement, innovatieve werkvormen en ICT. Bovendien werd de mate waarin inhoud een rol speelt onderzocht.

Gegevens werden verzameld bij 660 leerkrachten van 10 Vlaamse secundaire scholen aan de hand van een sociometrische vragenlijst. De gegevens werden aan de hand van multilevel p2 modellen geanalyseerd.

Onze bevindingen onderstrepen het belang om advies- en informatienetwerken te specificeren naar inhoud. De verschillende inhoudsgebonden advies- en informatienetwerken geven een andere samenstelling van interacties. Dit wijst erop dat leerkrachten voor de verschillende soorten kennis te rade gaan bij andere collega's. Verder stellen we vast dat oudere leerkrachten minder geneigd zijn om advies te vragen over vakinhoudelijke kennis, klasmanagement en innovatieve werkvormen. Oudere leerkrachten worden wel vaker gevraagd om advies en informatie over vakinhoudelijke kennis. Jongere leerkrachten worden dan weer vaker gecontacteerd als adviesbron voor innovatieve werkvormen. Wat klasmanagement betreft, hebben leerkrachten van de oudste cohort de neiging om advies en informatie te vragen binnen hun eigen generatiecohort. Binnen de jongste groep leerkrachten stellen we hetzelfde vast wanneer het gaat over vakinhoudelijke kennis.

CONCLUSIE

Samengevat kunnen we stellen dat generatiecohorten van leerkrachten hun specifieke kennisbehoeften en kennisaanbod hebben. Verder merkten we op dat percepties m.b.t. attitudes van leerkrachten minder stereotiep zijn dan hoe deze vaak aan bod komen in populaire literatuur rond generaties op de werkplek. Dit wil ook zeggen dat de vergelijking en veralgemening van oudere leerkrachten als *'dood hout'* niet opgaat. Verder beoogden we ook een bijdrage te leveren aan het concept van generaties leerkrachten. Naast een leeftijdscomponent stelden we vast dat ook een kenniscomponent aanwezig is. Op verschillende manieren kunnen kennisbehoeften en kennisaanbod van verschillende leerkrachten elkaar vinden, informele interacties zijn hierbij van belang. Betreffende het vormen van professionele interacties tussen leerkrachten doen zowel generatie als inhoud ertoe. We stelden vast dat oudere leerkrachten als kennisbron gezien worden voor vakinhoudelijke kennis en dat oudere leerkrachten ook meer adviesvragen ontvangen voor dit kennisdomein. Deze laatste bevinding suggereert dat de vakinhoudelijke kennis van oudere leerkrachten wordt *'aangeboord'*. Anderzijds stellen we vast dat de jongste groep leerkrachten adviesvragen rond vakinhoud eerder binnen de eigen cohort houdt. Scholen doen er goed aan om kwaliteitsvolle interacties tussen leerkrachten van verschillende generaties te ondersteunen en te stimuleren zodat kennis binnen schoolteams optimaal benut kan worden.

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