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EDITORIAL

The world-famous quote by John Donne, "No man is an Island, entire of itself; every man is a piece of the continent, a part of the main," is almost four hundred years old. Nevertheless very accurately captures the central idea of this special issue of *Studia paedagogica*. The key aim of the issue you are now reading is to abandon the perspective in which an individual actor is perceived as an "island, entire of itself" and which studies actors' independent actions related to learning and teaching processes. In this issue, we see individuals as structures of interrelated ties and as "part of the main" – as part of a social network that we understand in the light of the relational sociology of Harrison White as configurations of social relationships between individual or corporate actors (White, 2008). This led us to create this monothematic issue, entitled *Social Networks in Educational Processes*, with the aim of opening a space in which researchers of social networks could present this research direction that has been gaining in importance and in which they can, through their research, show how social networks can be used in educational contexts.

Social networks have been mainly used in two directions in educational research. First, they have been used as a methodological approach whose proponents frequently rely, to give just one example, on "social network analysis" (Wasserman & Faust, 2019). Within this approach, social networks are understood as analytical structures that comprise individual actors and institutions, both of which are called *nodes*, and the interactions that exist between them. This enables the researchers to study the positions of individual actors within the social networks and quantify the nature of unidirectional and mutual relationships that interconnect the actors. In educational research, social networks have been employed on numerous levels ranging from small social structures (such as classrooms, see for example Kindermann, 2007) to specific macro-structures such as institutions that connect authors publishing in educational sciences (see for example Juhaňák, 2017).

Second, social networks have been used by authors as the theoretical background for their research. In this area, social networks are understood as "an analytical construct" with "observed and nonobserved dyadic relationships between actors" (Fuhse, 2009, p. 52). Within this second approach, social networks are discovered by authors through research of interactions represented by communicative processes and mediate what is happening

between individual or corporate actors in social networks, and through meanings emerging from the interactions (Fuhse, 2009; see for example Engle et al., 2014; Karam et al., 2019). By observing interactions and studying meanings that lie at the background of these interactions, researchers can create estimates about the nature of social networks and describe in detail the processes ongoing within them.

Studies printed in this issue approach social networks from both of these directions. The first four studies employ social networks as a methodological framework; the last three studies use them as a theoretical framework.

The first study, titled *The Role of Language Competence in Building Peer Relationships in Early Childhood: A Social Network Perspective*, by Femke van der Wilt, Dominik Froehlich, and Chiel van der Veen, examines how children's language competence affects their peer relationships in the context of early childhood classrooms. The authors use the social exchange theory and the theory on homophily to investigate the role of language competence in the early peer relationships of 334 children from 18 early childhood classrooms in the Netherlands. The findings of the study show that children are more likely to form relationships with children with high levels of receptive vocabulary knowledge and similar levels of receptive vocabulary knowledge. On the other hand, the authors report that levels of oral communicative competence do not play a role in young children's network formation. The authors interpret their findings through the lens of the social exchange theory in which actors tend to build relationships with others who can provide something valuable. The authors claim that the possibility of understanding within interactions is a valuable thing worthy of exchange that is also associated with decreased chances of peer conflicts.

The study concludes with a list of practical implications for strategic thinking about the creation of peer groups in which pupils are not excluded from certain learning opportunities and peer interactions.

The second study, *Exploring the Role of Positive Leadership for Mobilizing Innovative Practices: A Social Network Approach*, was authored by Stephen MacGregor, Chris Brown, and Jane Flood. The study explores how school staffs' perceptions of positive leadership influence the potential for mobilizing innovative teaching and learning practices, especially practices that advance well-being and positive mental health for students and teachers. The authors arrive at one of the many interesting findings presented in the study by comparing instrumental and expressive networks in selected schools. Based on this comparison, they show that some school staff are not strongly influenced or easily reached by these leaders. Consequently, such members of staff can question a leader-centric perspective. The study concludes by pointing out that its findings show that innovative practices are mobilized throughout school networks and can facilitate implementation of innovative practices.

The title of the third study, *Classroom Space and Student Positions in Peer Social Networks: An Exploratory Study*, signals that its authors, Tomáš Lintner and Zuzana Šalamounová, explore social networks through their spatial organization. Based on an analysis of social networks from 17 classrooms comprising 363 students attending lower secondary schools (ISCED 2A) and the students' seating arrangements, the authors identify the relationship between the student's seating position and their position within their respective peer social networks. The study shows that using social networks in this way enables the identification of spaces in the classroom that are advantageous both from the perspective of peer relationships and in terms of academic achievement.

The fourth study, titled *Similarity-Attraction Theory and Feedback-Seeking Behavior at Work: How Do They Impact Employability?*, is the last one to use social networks as a methodological framework. Authored by Dominik E. Froehlich, Simon Beausaert and Mien Segers, the study investigates how similarity attraction relates to feedback seeking in the workplace and to employees' employability. The study thus leaves the environment of the school class-rooms and moves our exploration of social networks into the workplace. The study uses data gathered from 2,058 feedback-seeking relationships of 118 employees in seven complete organizational networks from three European countries. The study then inquires as to how often feedback-seeking behavior is used as an opportunity for informal learning and who is approached to provide the feedback.

The findings of the study show that employees are more likely to ask colleagues and supervisors similar to themselves for feedback, which might be caused by the so-called network ties that are very much structured by intra organizational boundaries such as functional organizational structures. Nonetheless, the study's conclusion points out that having a highly homogeneous feedback-seeking network is not always beneficial for one's employability, since feedback from colleagues with different backgrounds or a general awareness could be heterogeneous and enriching.

The following three studies move away from using social networks as a methodological framework, instead employing them as a theoretical framework that guides their own thinking about the educational reality. The first of these studies, titled *"I'm Telling!": Exploring Sources of Peer Authority During a K-2 Collaborative Mathematics Activity*, is authored by Jennifer Langer-Osuna, Rosa Chavez, Faith Kwon, Jim Malamut, Emma Gargroetzi, Kimiko Lange, and Jesse Ramirez. The study explores peer interaction during collaborative mathematics activities and identifies which sources of authority are called on by children to affect the behavior of their peers and how each source of authority used influences the collaborative dynamics of the groups.

The study shows that the direct threat of adult authority overwhelms resistance to directives and shuts down opportunities for shared work. It also documents that peer resistance is sustained and all children can remain engaged in the collaboration if students position themselves and one another within intellectual authority.

The studies section is closed by a text by Kateřina Lojdová, Kateřina Vlčková, and Jan Nehyba titled *Stories of Teachers' Identity: Between Personal and Professional Experience*. The authors use a corpus of 262 research studies published in English between 2010 and 2020 selected from the Web of Science database that examine teacher identity and narrative research. The authors approach the concept of teacher identity as a dynamic, multifaceted, negotiated, and co-constructed phenomenon and their study identifies which factors affect the definition of teacher identity and in what ways. They divide the identified factors into professional factors, which are exclusive for the teaching profession and influence the formation of the so-called professional identity, and personal factors, such as gender, ethnicity, and parenting experience, which are not directly linked to the teaching profession and help to shape the so-called personal identity, which interacts with the professional identity. The text concludes by claiming that identity is a "crucial tool" of teachers that needs to be understood if classroom practices are to be improved.

A qualitative research study written by María Angélica Mejía-Cáceres and Laísa Maria Freire, *Influences of Educational Policy on the Pre-Service Education of Teachers in Science and Environmental Education: A Latin American Context*, is published in the Emerging Researchers section. Its authors rely on a critical discourse analysis of laws, decrees, and resolutions about pre-service teacher education in Colombia to point out the similarity of interactions between educational policies and curriculum. The study illustrates how policies are based on ideological productions that can influence and condition certain social relationships and interactions. In their findings, the authors highlight the existence of a dialectical interaction between global and local policies and on how the educational system can sacrifice educational quality for economic market-driven demands.

We would be delighted if the studies included in this issue of *Studia paedagogica* motivated you to consider how social networks and their uses can enrich the current understanding of educational reality. We would be even more delighted if you then discussed your perspective within your own social network.

Zuzana Šalamounová and Jennifer M. Langer-Osuna
editors of the special issue

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THE ROLE OF LANGUAGE COMPETENCE IN BUILDING PEER RELATIONSHIPS IN EARLY CHILDHOOD: A SOCIAL NETWORK PERSPECTIVE

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Abstract

Engaging in positive relationships with peers is highly important for children's learning and development. In the present study, social network analyses were used to investigate how children's language competence affects their peer relationships in the context of early childhood classrooms. A total of 13 classrooms (N = 248 children) participated. Children's language competence was measured using tests for oral communicative competence and receptive vocabulary knowledge. Furthermore, a sociometric method was used to obtain network data. Outcomes of social network analyses showed that children are more likely to form relationships with children with high and similar levels of receptive vocabulary knowledge. In addition, weak support was found for the hypothesis that children form relationships with children with high levels of oral communicative competence.

Keywords

peer relationships, social network analysis, oral communicative competence, receptive vocabulary knowledge, early childhood education

The moment children enter early childhood classrooms, they become part of a larger social network and are faced with the challenge of building relationships with peers (Rubin et al., 2015). These first peer relationships are highly important for children's learning and development. Previous research has shown that children who are not able to build positive relationships with peers are shut out from interactions in which children can practice communicating, giving and receiving feedback, and resolving conflicts. Being rejected and shut out from interaction can ultimately lead to low(er) academic performance (Furrer et al., 2014; Rubin et al. 2018; Wentzel, 2017). In addition, it has been found that satisfying peer relationships have a positive effect on children's wellbeing, academic functioning, and future romantic relationships (Holder & Coleman, 2015; Kiuru et al., 2015). Because of the significance of children's early relationships with peers, it is important to examine possible predictors in order to promote opportunities for children to build positive relationships with peers. Previous studies have indicated that children's levels of language competence are related to their relationships with peers (Van der Wilt et al., 2018a, 2018b). Although a connection between language competence and peer relationships has been established (see Troesch et al., 2016; Van der Wilt et al., 2019), not much is known about the role of language competence in building social networks. Therefore, in the present study social network analyses were used to investigate how children's language competence affects their peer relationships.

Language competence is a broad concept that consists of multiple aspects (Conti-Ramsden & Durkin, 2012). The present study specifically focused on oral communicative competence and receptive vocabulary knowledge. Oral communicative competence entails a combination of knowledge, skills, and attitudes that enables children to use language in an appropriate and effective manner in different social contexts (Hymes, 1972; also see Savignon, 2017). Receptive vocabulary knowledge refers to the understanding of the meaning of words that are heard or read (Vatalaro et al., 2018). Previous research has shown that both oral communicative competence and receptive vocabulary knowledge play a role in building and maintaining peer relationships. That is, children with high levels of oral communicative competence and receptive vocabulary knowledge have been found to be more liked by their peers than children with low levels (Cheung & Elliot, 2017; Van der Wilt et al., 2018a, 2018b).

Previous findings regarding the link between children's language competence and their relationships with peers can be explained by the social exchange theory. According to the social exchange theory, social relationships are built on a consideration of costs and benefits (Cook & Rice, 2003; Cropanzano & Mitchell, 2005; also see Homans, 1961). An important assumption is that one seeks relationships with people who are able to provide something

valuable (Cropanzano & Mitchell, 2005). Regarding the role of language competence in peer relationships, the social exchange theory indicates that children tend to prefer peers with high levels of language competence, since the interactions with such peers are expected to be more rewarding, stimulating, and satisfying (Menting et al., 2011). This could explain why children with high levels of language competence have been found to be more liked by their peers than children with low levels.

Both the social exchange theory and findings of previous research suggest that children have a tendency to build relationships with peers who have well-developed language skills. However, previous studies into the role of language competence in peer relationships primarily used linear regression analyses (Cheung & Elliot, 2017; Van der Wilt et al., 2018a, 2018b). In social network analysis, we adopt a relational/structural perspective; we do not investigate the (linear) relation between individuals' language competence and their relationships with peers, but we explore the role of language competence in network development in early childhood classrooms. This is important, as social structures enhance or limit the opportunities (e.g., for further development of language competence) an individual has (Froehlich et al., 2020). Besides, the social exchange theory is merely one of the theories on the formation of social relationships that is frequently used in the context of social network analysis. Investigating other theories and principles deriving from it could provide new insights regarding the role of language competence in peer relationships. One principle that is known to highly influence social relationships is the principle of homophily (McPherson et al., 2001).

Homophily indicates that friends are likely to be similar with regard to sociodemographic, behavioral, and interpersonal characteristics (McPherson et al., 2001). It has been demonstrated, for example, that play groups during free play time (i.e., play situations that are not configured or managed by teachers) in early childhood classrooms are highly gender segregated: Boys prefer to play with boys and girls prefer to play with girls (Martin et al., 2014). In addition, research has indicated that children tend to connect to peers who are similar in age (Shutts et al., 2010). Homophily, however, has been shown to be also applicable to individuals' knowledge, skills, and abilities. Research in high schools has demonstrated, for instance, that friends are likely to be similar in social skills and academic achievement (Flashman, 2012; Pijl et al., 2011). With regard to the role of language competence in early peer relationships, the homophily theory would indicate that children with similar levels of language competence tend to connect to each other. However, whether the principle of homophily also holds for children's early language competence is unknown. Therefore, besides (re-)investigating hypotheses based on the social exchange theory, the present study also tested hypotheses derived from the theory of homophily.

To summarize, two different theoretical frameworks (i.e., the social exchange theory and the homophily theory) were used to investigate the role of language competence in children's early peer relationships. Based on the social exchange theory, the expectation is that children build relationships with peers who might provide something valuable. Hence, in the present study, the following hypotheses were tested: Children are more likely to form relationships with children with high levels of oral communicative competence (Hypothesis 1a); Children are more likely to form relationships with children with high levels of receptive vocabulary knowledge (Hypothesis 1b). In addition, based on the homophily theory, the expectation is that children who are similar connect to each other. In this study, we examined the following hypotheses: Children with similar levels of oral communicative competence are more likely to form relationships with one another (Hypothesis 2a); Children with similar levels of receptive vocabulary knowledge are more likely to form relationships with one another (Hypothesis 2b). The hypotheses were tested using social network analyses.

Methods

Ethical Considerations

For the present study, ethical approval was obtained from the Scientific and Ethical Review Board of the Faculty of Behavioural and Movement Sciences of the Vrije Universiteit Amsterdam. Teachers who wanted to participate in the study were asked to hand out the information letters and permission forms to their pupils' parents. In the parents' information letter, the purpose and procedure of the study was explained, and it was clearly stated that participation of the child was completely voluntary. Parents were asked to sign the permission form and to indicate (yes or no) whether they permitted their child to participate in the test administrations. Children who did not receive permission were excluded from the study. All data were anonymized as soon as possible and were saved on a secured drive of the university.

Sample

In total, $N = 334$ children from 18 early childhood classrooms participated in the study. The children's ages ranged from 3.1 to 7.0 years ($M = 5.05$, $SD = 0.66$) and there were somewhat more girls ($n = 183$) than boys ($n = 150$). Most of the children were born in the Netherlands (91.6%). Other countries of birth were in Europe (1.5%), Asia (0.9%), Africa (0.6%), South America (0.6%), and North America (0.3%). In the Netherlands, Dutch is the main language that is spoken in early childhood classrooms. For 87.1 percent of the children, Dutch was the main language spoken at home. Other home

languages were English (1.2%), Arabic (1.2%), Aramaic (0.9%), Kurdish (0.6%), and other non-Western (3.3%) and Western (1.5%) languages. Parents' educational levels were low (7.2%), average (48.5%), or high (38.0%).

Instruments

Children's language competence was measured using two instruments: the Nijmegen Test for Pragmatics to measure children's oral communicative competence and the Peabody Picture Vocabulary Test to measure children's receptive vocabulary knowledge.

Oral communicative competence. Children's level of oral communicative competence was measured with the Dutch Nijmegen Test for Pragmatics (Embrechts et al., 2005). This test consists of three subscales; in the present study, only the communicative functions subscale was administered as this scale is most relevant for measuring oral communicative competence. Besides, it takes quite long to administer the total test (i.e., 30–45 minutes; Embrechts et al., 2005). The communicative functions subscale consists of 22 items and is designed to measure whether children are able to use language for different functions, such as providing instruction (see Appendix for an overview of the items of this test). During the individual test administration, the test assistant tells the child a story by referring to large color pictures. The story is about two children, Peter and Lotje, who live in a house with their parents and find themselves in different social situations. One item goes as follows: "Dad and Peter are playing a game. Peter does not yet know how it works. Dad does. Peter wants Dad to explain the game to him. What does Peter ask?" As this example illustrates, the items are aimed to elicit a verbal response from the child.

Total test administration took approximately ten minutes and was audiorecorded so the responses of the children could be scored afterwards. Children's responses were dichotomously scored. One point was ascribed to a correct response (e.g., for the previous example: "Could you explain it to me?") and zero points were ascribed to an incorrect response (e.g., "He does not get it"). In order to assess children's level of oral communicative competence, a total score was calculated by summing the number of correct responses. The reliability of the communicative functions subscale has been found to be satisfactory (Cronbach's alpha coefficient of 0.82; Embrechts et al., 2005), and this was also the case in the present study (Cronbach's alpha coefficient of 0.85).

Receptive vocabulary knowledge. Children's receptive vocabulary knowledge was assessed using the Dutch version of the Peabody Picture Vocabulary Test, third edition (Schlichting, 2005). This is a standardized test

that is frequently used to measure receptive vocabulary (Dunn & Dunn, 1997). In the present study, we followed the approach of Mulder et al. (2014) and, based on children's age, selected three sets of items (i.e., set 5, 6, and 7). Together, these sets consist of 36 items (item 49 to 84) which increase in difficulty. During the individual test administration, the participant is shown four black-and-white line drawings. With each item, the test assistant reads a word aloud and asks the participant to point to the picture that represents the word in question best. For example, one item goes as follows: "Could you point to the picture of a person who is laughing?" In this case, one can choose between pictures of a person who is crying, who is drinking tea, who is looking shocked, and who is laughing.

In the present study, test administrations took approximately five minutes. A total score was computed by subtracting the number of errors from the total number of items. Previous research into the reliability of the Peabody Picture Vocabulary Test has indicated that its internal consistency is good (average Guttman's lambda-2 coefficient of 0.93 for children aged four to seven years; Schlichting, 2005). The reliability of the three sets was also high in the present study (Cronbach's alpha of 0.80).

Network data. Peer nominations were used to obtain the network data. During the nomination procedure, participants are typically asked to nominate others to indicate who their friends are, with whom they like to work, et cetera. In the present study, children were asked to nominate classmates they liked to play with (positive nomination) and classmates they did not like to play with (negative nomination), but we only focused on the positive nominations in the analyses. To support children in nominating their peers, they were first shown a picture of their classmates and were asked to name each child in the picture. Next, children were asked: "With whom do you (not) like to play?" ("Is there someone else you (do not) like to play with?"). Children were asked to nominate at least one peer. In the analyses, we included a maximum of four nominations per child. The total procedure took approximately five minutes per child. The reliability of the peer nomination procedure was examined by Wu et al. (2001) by calculating test-retest correlations over an eight-week period in a sample of four- to five-year-old children. With a reliability coefficient of 0.79, the peer nomination procedure proved to be a reliable method for obtaining network data in early childhood.

Analyses

Missing data. There were multiple missing values on the measurements of both oral communicative competence (8.7%) and receptive vocabulary knowledge (5.1%). Missing values were imputed using the commonly used Expectation-Maximization (EM) method after finding no statistically reliable

deviation from randomness (Little's MCAR test $X^2(282) = 301.40, p = 0.204$). Classrooms in which less than 80% responded in the network data were excluded from the analyses, given the sensitivity of sociometric network analysis concerning missing data (Froehlich & Brouwer, 2021; Wasserman & Faust, 1994). This was the case for four classrooms. Moreover, one class was excluded from the analysis because the nomination data was captured in a different format. Hence, a total of 13 early childhood classrooms (N = 248 children) were included in the final sample used in our analyses.

Data-analysis plan. Hypotheses were tested using exponential-family random graph modeling (ERGM; Lusher et al., 2013)such as reciprocated ties and triangles. A social network can be thought of as being built up of these local patterns of ties, called network configurations xe \"network configurations\", which correspond to the parameters in the model. Moreover, these configurations can be considered to arise from local social processes, whereby actors in the network form connections in response to other ties in their social environment. ERGMs are a principled statistical approach to modeling social networks. They are theory-driven in that their use requires the researcher to consider the complex, intersecting and indeed potentially competing theoretical reasons why the social ties in the observed network have arisen. For instance, does a given network structure occur due to processes of homophily xe \"actor-relation effects:homophily\", xe \"homophily\" \\t \"see actor-relation effects\" reciprocity xe \"reciprocity\", transitivity xe \"transitivity\", or indeed a combination of these? By including such parameters together in the one model, a researcher can test these effects one against the other, and so infer the social processes that have built the network. Being a statistical model, an ERGM permits inferences about whether, in our network of interest, there are significantly more (or fewer) using the statnet package for R (R Development Core Team, 2007; Statnet Development Team; see also Handcock et al., 2008). ERGMs enable the statistical analysis of social networks by treating the observed network (in our case, the data recorded in multiple early childhood classrooms) as one realization of possible networks with similar underlying characteristics (Robins et al., 2007). Put differently, we sought to understand the extent to which our proposed model could explain the networks observed in the early childhood classrooms. The model was tested using Markov Chain Monte Carlo Maximum Likelihood Estimation (MCMCMLE) for each class. For every estimation, goodness-of-fit plots and MCMC statistics were evaluated for model fit and convergence. The results were then pooled through meta-analysis using restricted maximum likelihood estimation to give estimates of the overall effects.

To test the hypotheses derived from the social exchange theory (Hypothesis 1a and Hypothesis 1b), we introduced multiple main effects of covariates for in-edges (ERGM term "nodeicov") in our analyses. Specifically, network

statistics based on oral communicative competence (Hypothesis 1a) and receptive vocabulary knowledge (Hypothesis 1b) were used. The question was whether children who scored higher on these variables received more positive nominations from their peers. Next, in order to test the hypotheses based on the homophily theory (Hypothesis 2a and Hypothesis 2b), absolute differences of nodal attribute levels (ERGM term "absdiff") was used to investigate homophilic effects based on oral communicative competence (Hypothesis 2a) and receptive vocabulary knowledge (Hypothesis 2b). This model term can indicate whether ties are created between children with similar levels of oral communicative competence and receptive vocabulary knowledge disproportionally more (or less) often than in a random graph. A negative estimate indicates homophily (i.e., the larger the differences are, the less likely tie formation becomes). As covariates in terms of homophilous behavior, we included the terms based on gender and age.

As a final step, we included endogenous network terms to control for the possible effects on tie-generation. In particular, we focused on three types of endogenous network effects: The edges terms stand for the general propensity of the existence of ties (i.e., the density of a network). The terms gwideg and gwodeg, the geometrically weighted in-and out-degree distributions, were also controlled for in order to account for transitivity. We also controlled for reciprocity (mutual term) and the geometrically weighted dyadic shared partners term (gwdsp), which accounts for shared actors between dyads of actors. The term gwdsp takes into account that pairs of individuals may be not only connected directly, but connected through (multiple) indirect links they have with shared partners. Note that the more common term for geometrically weighted edge-wise shared partners (gwesp, which assumes a direct connection among the two individuals in focus) was not included. This is because the model then would not converge for a few classrooms. However, for the other classrooms, the data show a statistically insignificant effect of gwesp and no differences in the patterns of findings in the rest of the model, which gives confidence in this procedure. The model was constrained by the maximum number of outdegrees, which was set to four (the maximum number of nominations that were included from the survey data).

Results

Descriptive Statistics

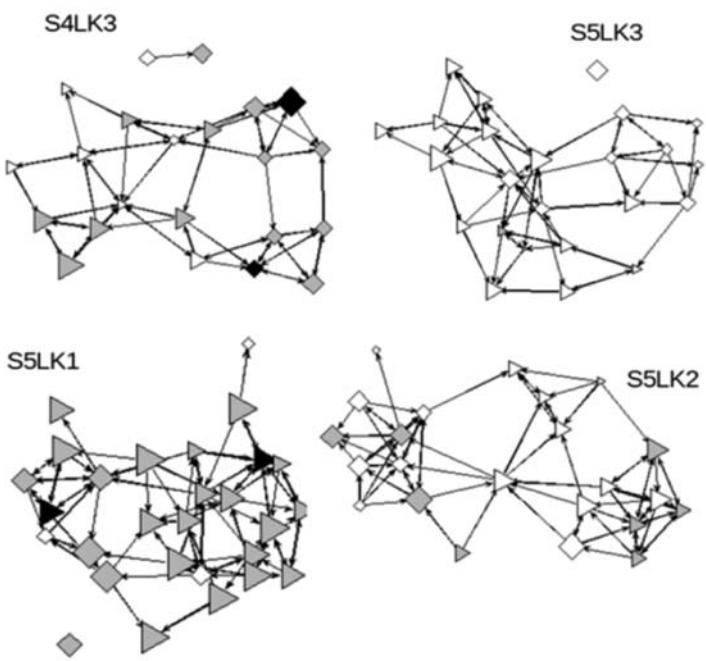
The descriptive statistics of the main variables are provided in Table 1. In addition, Figure 1 shows four exemplary networks of four early childhood classrooms to illustrate the data of the current study. While the general context is the same across classrooms, the figures show different structures (e.g., note

the two visible sub-groups in class S5LK2 or the less centralized network of class S5LK3) and composition (e.g., children in class S5LK3 seem to be relatively young and homogeneous in terms of age).

Table 1
Descriptive Statistic of the Main Variables

	Minimum	Maximum	Mean	Standard deviation
Oral communicative competence	0	22	13.44	4.83
Receptive vocabulary knowledge	6	35	21.66	6.08
Network data				
Nominations provided	0	8	2.02	1.66
Nominations received	0	10	5.06	2.61

Figure 1
Visualization of the networks of four classrooms from the sample (randomly selected) for the purpose of illustration



Note: node size signifies receptive vocabulary knowledge (the bigger the node, the higher the level of receptive vocabulary knowledge); node shape signifies gender (triangle = girl, square = boy), node color signifies age group (white = young, gray = middle, black = old); edges represent directed friendship nominations.

Hypotheses Testing

Hypothesis 1a and Hypothesis 1b were both based on the social exchange theory. Hypothesis 1a assumed that children are more likely to form relationships with peers with high levels of oral communicative competence. Hypotheses 1b assumed that children are more likely to form relationships with peers with high levels of receptive vocabulary knowledge. The outcomes of our analyses provided support for Hypothesis 1b and weak support for Hypothesis 1a. Specifically, whereas the observed nodeicov term based on oral communicative competence was slightly above the alpha-level of 0.050 in the meta-analysis (0.014, $p = 0.054$), the nodeicov term based on receptive vocabulary knowledge was statistically significant (0.01, $p = 0.035$).

Hypothesis 2a and Hypothesis 2b were derived from the homophily theory and assumed that children with similar levels of oral communicative competence are more likely to form relationships with one another (Hypothesis 2a) and children with similar levels of receptive vocabulary knowledge are more likely to form relationships with one another (Hypothesis 2b). The hypothesis regarding homophily in oral communicative competence, as represented by the absdiff term, was not supported by the studied data (−0.009, $p > 0.10$). In contrast, the hypothesis regarding homophily in receptive vocabulary knowledge showed a significant effect of −0.01 ($p = 0.020$) across the sampled classrooms.

Besides the previously described effects, endogenous network effects, which are based on our general understanding of how social networks are formed (unrelated to the domain of this article), played a large role in explaining the nomination data. Specifically, we included five such terms (edges, gwideg, gwodeg, mutual, and gwdsp) in our model, all of which showed statistically significant effects (see Table 2). This suggests that the general density, reciprocity, transitivity, and distributions of in- and outdegrees help to explain the networks' structures. In terms of probabilities, these endogenous network terms suggest that the general propensity to nominate someone is 16% (EXP(−1.645)/(1+ EXP(−1.645)) or that the propensity to reciprocate a friendship nomination is 86%. Note that the meta-analysis indicated heterogeneity across the classrooms for the matching genders and the edges term when we take a conservative alpha level of 10%. The former means that while we note a general tendency for ties to exist among pairs of pupils of the same gender, the strength of this effect varies across classrooms. This may be attributed to, for instance, the specific classrooms' cultures or the general mix of genders present in the classroom. Heterogeneity indicated for the edges term means that the observed density of connections varied between classrooms. This may be due to attributes of the classrooms not taken into consideration for the analyses, such as a classrooms' social climate or even cultural factors beyond the classroom, number of children in the classroom, interpersonal teacher behavior, and the length of time that the pupils in the classroom have known each other.

Table 2
Outcomes of ERGM analyses

	Estimate	p	Qp
Social exchange theory			
Oral communicative competence (nodeicov)	0.014	0.054†	0.407
Receptive vocabulary knowledge (nodeicov)	0.013	0.035*	0.472
Homophily theory			
Oral communicative competence (absdiff)	−0.009	0.287	0.232
Receptive vocabulary knowledge (absdiff)	−0.014	0.020*	0.622
Age (absdiff)	−0.318	0.000**	0.326
Gender (nodematch)	0.935	0.000**	0.052
Endogenous terms			
Edges (edges)	−1.645	0.000**	0.076
Distributions indegree (gwideg)	−0.844	0.000**	0.985
Distributions outdegree (gwodeg)	−0.972	0.000**	0.901
Reciprocity (mutual)	1.779	0.000**	0.287
Geometrically weighted dyadwise shared partner distribution (gwdsp)	−0.147	0.000**	0.478

Note. **$p < 0.01$; * $p < 0.05$, †$p < 0.10$

Discussion

The aim of the present study was to investigate how language competence affects peer relationships in early childhood classrooms. Outcomes confirmed that children are more likely to form relationships with children with high levels of receptive vocabulary knowledge (Hypothesis 1b) and similar levels of receptive vocabulary knowledge (Hypothesis 2b). Weak support was found for the hypothesis that children are more likely to form relationships with children with high levels of oral communicative competence (Hypothesis 1a); the data did not support the hypothesis that similar levels of oral communicative competence play a role in young children's network formation (Hypothesis 2a).

The finding that children are more likely to form relationships with children with high levels of receptive vocabulary knowledge coincides with outcomes of previous studies showing that children with high levels of receptive vocabulary knowledge are more liked by peers (Cheung & Elliot, 2017). This finding can be explained by the social exchange theory in which it is argued that one tends to build relationships with people who can provide something valuable (Cook & Rice, 2010). That is, children with high levels of receptive vocabulary knowledge might be able to provide something valuable, because their language competence (i.e., vocabulary knowledge) helps them to understand others' verbal messages which, in turn, facilitates

verbal communication with others and diminishes the chance of peer conflicts (Menting et al., 2011). In contrast, children with poor receptive vocabulary knowledge have been shown to experience problems in interpreting and understanding verbal expressions, which is likely to result in problematic peer relationships (Menting et al., 2011). The present study provides further support for the beneficial role of children's language competence, and specifically their receptive vocabulary knowledge, in building peer relationships.

Besides the finding that children are more likely to form relationships with children with high levels of receptive vocabulary knowledge, outcomes also indicated that children are more likely to form relationships with children with similar levels of receptive vocabulary knowledge. This indicates that children tend to connect with peers who are not only similar in gender (Martin et al., 2014) and age (Shutts et al., 2010), but also in receptive vocabulary knowledge. This finding is in line with the homophily theory: People tend to connect to others who are similar to themselves (McPherson et al., 2001). The present study adds to previous studies by showing that, besides the social exchange theory, the homophily theory is also applicable to the role of receptive vocabulary knowledge in peer relationships.

In contrast to the outcomes with regard to the hypotheses on receptive vocabulary knowledge, weaker support was found for the hypotheses on oral communicative competence. The finding that children were more likely to form relationships with children with high levels of oral communicative competence was less pronounced than in previous studies in which it was shown that children with high levels of oral communicative competence received significantly more positive nominations from their peers (i.e., were more liked) than children with low levels (Van der Wilt et al., 2018a, 2018b). This could be explained by methodological differences between the studies. That is, in previous studies children were allowed to nominate up to three peers whereas the current study included a maximum number of four nominations per child. Moreover, there were differences in the data-analysis approach: Previous research used linear regression analyses, whereas the present study used social network analyses. Future research is required in order to investigate exactly how these methodological differences explain differences in outcomes.

In addition, the outcomes of our analyses did not support the hypothesis that children are more likely to form relationships with children with similar levels of oral communicative competence. This outcome contradicts findings of previous research in which friends were likely to be similar in abilities such as social skills (Pijl et al., 2011). It is important to note however, that these studies were conducted within the context of high schools. This could indicate that similarities that are not directly observable (e.g., certain skills such as language skills) only start to play a role in peer relationships when children

are older. An important question then, however, is why children in the present study were more likely to build relationships with children with higher and similar levels of receptive vocabulary knowledge, but not with higher and similar levels of oral communicative competence. The answer to this question might be found in differences between these two aspects of children's language competence. Specifically, research has shown that the development of receptive vocabulary knowledge is relatively stable and predictable (Bornstein et al., 2004). During early childhood, children rapidly learn new words and steadily build their vocabulary. In contrast, children's oral communicative competence is highly dependent on the (affordances of the) pragmatic context: In one context (e.g., in a dyadic play activity with a friend) children can show advanced levels of oral communicative competence, whereas in another context (e.g., in a conversation with an unknown peer) children might show relatively low levels of oral communicative competence (cf. Hodges, 2009). This could indicate that young children only use relatively stable and predictable similarities such as gender, age, and – as the present study shows – receptive vocabulary knowledge to select their friends.

In interpreting the present study's findings, it is important to note that language competence might partially reflect an underlying construct, such as socioeconomic status (SES). It has been demonstrated that children from low SES and language minority homes demonstrate lower levels of the language skills that are required, valued, and tested in school (e.g., Betancourt et al., 2015; Fernald et al., 2013; Hoff, 2013; Huttenlocher et al., 2010; Luo et al., 2021; Pungello et al., 2009). In other words, both family SES and the language that is spoken at home predict children's scores on mainstream and monolingual language tests. The question is whether the present study only measured children's language competence or also measured, for example, SES. If language competence is partially a reflection of SES, the present study's findings indicating that children prefer peers with similar or higher levels of vocabulary could also indicate that children prefer peers with a similar or higher SES. Further research (e.g., qualitative research into children's own perspective regarding reasons for selecting friends) is needed to clarify this matter.

Although the current study provided interesting outcomes, there were also several limitations. One limitation is that the hypotheses were based on two theoretical frameworks (i.e., the social exchange theory and the homophily theory) that are commonly used in research on social networks. Other theories, such as theories on altruism, are not frequently used in this area of research, but might advance our understanding of the complexity of building social relationships in (early childhood) education. As the present study did not take such theories into account, it is unknown whether these theories and principles derived from them might also or even better explain the role of language

competence in peer relationships. Therefore, future research into the role of language competence in peer relationships should also take other theories than the social exchange theory and the homophily theory into account.

A second limitation concerns the language tests that were used in the present study. Specifically, language tests are generally based on the assumption that language is a fixed (or innate) ability that is reflected in the test performance (McNamara, 2001). Several researchers, however, have critiqued this fixed ability thinking (Bradbury, 2019; Hoff, 2013; Marks, 2013; McNamara, 2001; Messick, 1989; Wolbring, 2014). For example, considering language as a fixed ability ignores the fact that children's language acquisition is highly influenced by their language experiences, which are shaped by the cultural and social contexts in which the children live (Hardin et al., 2010; Hoff, 2013; Hoff & Tian, 2005; Marks, 2013; Ryan & Mercer, 2012). Future research should adopt a more socially oriented conception of language and combine standardized tests with observations of children's language learning experiences (Hoff & Tian, 2005; McNamara, 2001). In addition, the use of monolingual language tests (as were used in the present study) has been challenged, because they might be biased toward certain populations (Hoff, 2013). It has been argued that the unique linguistic strengths of low SES children and bilingual children are not captured by standard language tests, which are based on mainstream expectations (Hoff, 2013). As a result, the language competence of children from nonmainstream backgrounds might be considered deficient (instead of different), whereas their competency would not at all be deficient according to the norms of their own group (Hoff, 2013). We argue that more research is needed on how to value children's prior language experiences when assessing their language competence.

A final limitation is that this study specifically focused on the role of language competence, whereas it has been shown that variables such as social competence are also involved in children's peer relationships (Bierman & Powers, 2009). In addition, as previously discussed, language competence might be a reflection of some underlying construct, such as socioeconomic status. Hence, future studies should include additional factors that might be related both to language competence and children's relationships with peers.

The findings of the present study have several practical implications. The finding that children tend to seek out peers with high levels of receptive vocabulary knowledge as well as peers with similar levels of receptive vocabulary knowledge seems to indicate that children with high levels do not tend to connect to children with lower levels. However, previous research has indicated that it is important for children with advanced abilities to connect to children with low abilities, as the latter group can benefit from the first group (Justice et al., 2011). The tendency of children to connect to peers with similar or higher levels of receptive vocabulary knowledge might

indicate that children with low levels of receptive vocabulary knowledge are excluded from certain learning opportunities and peer interactions. Teachers should therefore carefully think about how they can compose play groups in early childhood classrooms in such a way that children can learn from each other and that all children have the possibility to engage in meaningful social relations that promote their language development.

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Appendix

List of the sub-skills assessed by the communicative function subscale of the Nijmegen Test for Pragmatics (Embrechts et al., 2005).

Sub-skill	**Description**
Requesting explanation	Asking for an explanation in order to clarify something
Requesting clarification	Asking for a further explanation
Describing feelings	Expressing emotions and feelings
Providing a suggestion	Providing ideas in order to solve a problem
Providing information	Providing new information in order to provide a clear picture
Providing instruction	Providing assignments that need to be followed
Asking for information	Asking for information in order to get a clear picture
Asking for action	Request for performing an action
Talking about what others are doing	Talking about the activities of others
Asking about a wish	Asking about the needs or wishes of someone else
Providing an explanation	Clarifying the consequences of something
Negotiating	Trying to reach agreement

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EXPLORING THE ROLE OF POSITIVE LEADERSHIP FOR MOBILIZING INNOVATIVE PRACTICES: A SOCIAL NETWORK APPROACH

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CHRIS BROWN, JANE FLOOD

Abstract

An emerging body of literature suggests the importance of positive leadership for school and district improvement (e.g., Cherkowski, 2018; Louis & Murphy, 2018). A number of lines of evidence have converged upon how positive leadership principles can influence behavioral outcomes (e.g., collaboration among school staff), attitudinal outcomes (e.g., job satisfaction), leader-related outcomes (e.g., trust for leadership), and performance outcomes (e.g., collective efficacy), as well as a wide variety of moderating and mediating variables for these outcomes (Murphy & Louis, 2018). At present, there is little evidence about the role of positive leadership in relation to the mobilization of innovative teaching and learning practices, particularly practices that advance well-being and positive mental health for students and teachers. This article reports on a study that examined the associations between school staff perceptions of positive school leadership, their behaviors related to innovative practices, and their connections to other staff within a multi-school network. The question guiding our work was, "How do school staff perceptions of positive leadership alongside information about their school roles and social connections influence the potential for mobilizing innovative practices?" A cross-sectional survey methodology combining traditional and social network data collection methods (Carolan, 2014; Groves et al., 2009) was employed to generate an understanding of the interconnectedness of relational patterns within schools, perceptions of positive leadership, and individual efforts toward innovation. The case for this study was a federation comprising three infant schools in Hampshire, England. In total, 31 teaching staff completed the survey: a response rate of 84%. Our analysis suggests that well-being and positive mental health leadership roles are important not only for mobilizing advice about teaching practices and classroom management, but also in galvanizing the expressive social networks that promote self-governance in school staff. Furthermore, expert uses of innovative practices related to well-being appear to be concentrated on the staff holding well-being leadership positions. Although it is intuitively beneficial to have this concentration of expertise in individuals explicitly charged to promote and support well-being, comparisons between the instrumental and expressive networks suggest that some school staff were not strongly influenced by these leaders. We view this finding as reflecting the importance of paying attention to how practices are mobilized throughout school networks. Against the backdrop of positive leadership, mobilizing practices requires that leaders have an authentic understanding of their staff, an attentiveness to their needs, and an ability to attune their behaviors to those needs.

Keywords

positive leadership, innovative practices, social network approach

Introduction

The importance of positive leadership for school and district improvement is receiving increased attention (e.g., Cherkowski, 2018; Louis & Murphy, 2018). In particular, it is suggested that positive leadership, when implemented effectively, can influence behavioral outcomes (e.g., collaboration among school staff), attitudinal outcomes (e.g., job satisfaction), leader-related outcomes (e.g., trust for leadership), and performance outcomes (e.g., collective efficacy), as well as a wide variety of moderating and mediating variables for these outcomes (Eva et al., 2019; Murphy & Louis, 2018). At the same time, there is limited evidence about the role of positive leadership in relation to the mobilization of innovative teaching and learning practices, particularly practices that advance well-being and positive mental health for students and teachers. The mobilization of such practices is of increasing importance in education systems that are "self-improving": i.e., which rely on teachers and schools to understand what effective practice comprises and then sharing it widely (Brown, 2020).This article reports on a study that examined the associations between staff members' perceptions of positive school leadership, their behaviors regarding innovative practices, and their connections to others within a multi-school network. The overarching research question guiding our work is, "How are perceptions of positive leadership together with information about school roles and social connections associated with the potential for mobilizing innovative practices?"

We begin by outlining several principles of positive leadership that are important for understanding the development of social capital in support of well-being and positive mental health. We next introduce the notion of networks in education and how networks represent opportunities for channeling embedded social capital toward achieving school improvement targets, particularly in relation to mobilizing effective practices. We then posit several hypotheses about the mobilization of innovative teaching and learning practices related to well-being within the framework of positive leadership and education networks.

The Service-Grounded and Empathetic Principles of Positive Leadership

Positive leadership is a multi-dimensional concept that brings together aspects of transformational, distributed, authentic, servant, and ethical leadership models (see Hoch et al., 2018; Murphy & Louis, 2018). The complex nature of positive leadership is evident in Murphy and Louis's (2018) recursive model, where positive leadership is shown to have antecedents in notions of leader

traits and moral characteristics, in leader behavior, approaches to social exchange, and also to psychological empowerment. These elements are activated, aligned, and integrated by two factors that pervade all aspects of school leadership: *context* and *trust*. With this complexity in mind, we concentrate on the service-grounded and empathetic principles that inform positive leadership behavior.

Servant leadership, or leadership that adheres to service-grounded principles (Murphy & Louis, 2018), describes a humanistic approach to leadership that begins from an orientation to serve rather than to lead. Despite some negative connotations arising from the term *servant* (see Van Dierendonck, 2011), what such leadership signifies "is an (1) other-oriented approach to leadership (2) manifested through one-on-one prioritizing of follower individual needs and interests, (3) and outward reorienting of their concern for self towards concern for others within the organization and the larger community" (Eva et al., 2019, p. 114). Since its emergence, some forty plus years ago in the works of Greenleaf (1970, 1977), research exploring the theory and measurement of servant leadership has burgeoned (Eva et al., 2019; Van Dierendonck et al., 2009; Van Dierendonck, 2011). As a result, there has been repeated demonstration of servant leadership's predictive validity over other leadership models on a variety of outcomes (including trust, affective commitment, individual-level task performance, and team-level performance) (Hoch et al., 2018; Lee et al., 2019).

To date, most quantitative measures of servant leadership employ a combination of items for examining personal traits and behavioral characteristics (Zhu et al., 2015). One measure that has consistently demonstrated strong psychometric properties is a 28-item multidimensional scale, the SL-28, developed by Liden et al. (2008). This aggregate measure examines servant leadership across seven dimensions: emotional healing, creating value for the community, conceptual skills, empowering, helping subordinates grow and succeed, putting subordinates first, and behaving ethically. For studies that do not aim to investigate these individual dimensions of servant leadership behavior and instead target the global nature of servant leadership, Liden et al. (2015) developed a short-form version entitled the SL-7. This more concise measure borrows the item with the highest factor loading from each of the seven dimensions of the SL-28. The SL-7 has since garnered attention for its ability to capture the essence of the full scale while respecting the ethical concerns and notions of respondent fatigue associated with asking teachers to complete lengthy questionnaires (Eva et al., 2019). Moreover, after implementing the short-form scale in three independent studies with six samples, Liden et al. (2015) concluded there exists "strong support for the use of the SL-7 scale as an alternative to the SL-28 scale when researchers are interested in investigating servant leadership as a composite

or global variable" (p. 265). This conclusion is salient for our purposes, as we aim to investigate servant leadership behavior alongside a number of other individual and social variables.

A complementary leadership model is that of empathetic leadership, which to date has received comparatively less attention. Empathetic leadership represents an approach to leadership that recognizes leaders' roles in providing emotional support to followers. At the core of the empathetic leadership approach is the notion of empathy: a prerequisite for building strong, reciprocal relationships by necessitating "an ability to suspend judgement and bias to walk in another's shoes" (Greason & Cashwell, 2009, p. 4). Empathetic leadership complements servant leadership by providing an awareness that recognizing, utilizing, and developing others' capacities requires leaders to (a) develop an understanding of followers' perspectives, (b) communicate that understanding to ensure its accuracy, and (c) act on that understanding in a helpful way (Harris & Lusk, 2010). An empathetic leadership measure with promising psychometric properties is the 5-item scale developed by Kock et al. (2019), adapted from earlier research into motivating language theory. The value of this scale in combination with the global servant leadership scale is that it balances service-grounded principles with the possibilities of a more collaborative, distributed approach to leadership.

Networks in Education

A network in education is generally considered to represent a " group or system of interconnected people and organizations whose aims and purposes include the improvement of learning and aspects of well-being known to affect learning" (Hadfield et al., 2006, p. 5). The emergence of networks within education has, on one hand, been driven by the interconnected and pervasive nature of issues facing education (Díaz-Gibson et al., 2017). On the other hand, the value of networks has emerged through the ability of networked actors to engage with "the resources embedded in social relations and social structure which can be mobilized when an actor wishes to increase the likelihood of success in purposive action" (Lin, 2001, p. 24). In more concrete terms:

> Recent research suggests that relationships and collegial support are central for the retention, increased professionalism, and depth of engagement of educators. The stronger the professional network, the more likely educators—at all levels—are to stay in the profession, feel a greater sense of efficacy, and engage in deeper levels of conversation around teaching and learning. Thus the building and supporting professional [and affective] relationships and networks is a critical way to sustain the work of teaching and learning and ultimately of change (Daly, 2010, p. 1).

A focus on networks and social capital in education systems leads to two general propositions (Borgatti et al., 2018): first, the position of school staff within their school and district social networks has bearing on the opportunities and constraints they will encounter, and second, school and district outcomes are a function of the social networks connecting school staff. Mapping education networks can therefore enable an understanding of the potential for mobilizing information, resources, and support for effective teaching practices (Daly, 2012). This point is especially salient against the backdrop of the aforementioned "self-improving school," which is now prevalent in high autonomy and high accountability education systems, such as England (Brown, 2020; Dowling, 2016). Achieving teacher and school improvement in these systems requires cultures of enquiry and learning to be established, both within and across schools.

The fundamental units of any education network are the edges or ties (relations) that connect school staff (nodes). *Instrumental* ties give rise to social networks grounded in a professional context (e.g., work-related advice, co-teaching), whereas *expressive* ties give rise to social networks grounded in affect and for which the professional context is secondary (e.g., friendship, venting, energy exchange, and so on). The collection of ties defined on a group of nodes gives rise to relational patterns that, when combined with node attributes (e.g., perceptions, demographics), can be used to describe school networks and predict individual or group behavior and attitudes (Carolan, 2014). The body of empirical research into advice-seeking relations is one of the richest in the education networks literature (e.g., Coburn et al., 2013; Farley-Ripple & Buttram, 2013, 2015; Moolenaar et al., 2012a) and tends to describe how professional exchanges contribute to improved curriculum and instruction. Expressive relations have received comparatively modest attention, especially in the context of education leaders (Daly et al., 2016). The expressive relations of energy-exchange and venting contain valuable structural information about networks in terms of trust, engagement, and the perceived quality of ties among school staff (e.g., Daly et al., 2016; Finnigan & Daly, 2012). Much extant literature suggests attending to both instrumental and expressive ties, as it is through their combined influence that "the speed and ease with which information is conveyed through its different channels" (Moolenaar et al., 2012b, p. 367) is best understood.

Innovation Within the Framework of Positive Leadership and Networks

We draw together the literature on positive leadership and networks in recognition that teachers' and school leaders' behaviors and social exchanges "help to determine not only the individual's productivity but also the overall work climate of the school" (Louis & Murphy, 2018, p. 172). Yet, at present, there is little empirical evidence about the extent to which positive leadership

behaviors can create the conditions necessary for school staff to engage in innovative teaching and learning practices.

Of the growing number of instruments that seek to measure how educators are engaging with innovative teaching and learning practices in K-12 settings (see Lawlor et al., 2019), many fail to capture "whether practitioners were being guided slavishly by the evidence or had combined it in a more intuitive, holistic way with their wider practical experience so that their overall ability to understand or tackle particular situations had been enhanced" (Brown & Rogers, 2014, p. 253). Conducting more adequate and appropriate measurements of the use of innovative practices requires an instrument to capture the extent to which people feel involved with any new approach; the extent to which they employ the new approach; and, as a result, the likelihood that the new approach will impact practice and student learning. An instrument that meets these requirements is the 8-item scale from Brown and Rogers (2014) that combines Flyvbjerg's (2003) *Levels of Expertise* with Hall and Hord's (2020) *Levels of Use* instruments to measure possible changes in behavior resulting from school staff engaging with innovative practices. Developed as a general scale for eliciting notions of expertise, the scale ranges from the educator not engaging with innovative practices, to them behaving as a novice, to them behaving as an expert user and making major modifications to the innovation to improve its efficacy.

Against the background of the service-grounded and empathetic principles of positive leadership along with the literature concerning networks in education and innovative practices, we present a study that explored the following hypotheses for a small three-school system in England:

> *H1.* Instrumental and expressive social ties are structured by both formal leadership and well-being leadership roles.
> *H2.* Instrumental and expressive social ties are structured by the extent to which they are engaging in innovative teaching and learning practices related to well-being.
> *H3.* Perceptions of the extent to which federation leaders enact service-grounded and empathetic leadership principles are positively associated with the quantity and structure of instrumental and expressive social ties.

Collectively, these hypotheses were developed based on theory and our knowledge of prior research in this area. Furthermore, these three independent hypotheses are informed by our abovementioned research question.

Methods

Research Design and Sample

A cross-sectional[1] survey methodology combining traditional and social network data collection methods (Carolan, 2014; Groves et al., 2009) was employed to generate an understanding of the interconnectedness of relational patterns within schools, perceptions of positive leadership, and individual efforts toward innovation. The case for this study was a federation comprising three infant schools in Hampshire, England (henceforth, the Federation). In response to a green paper jointly forwarded by the Department of Health and the Department of Education in England[2], well-being is presently a major focus for the Federation. As a professional learning network of three schools, the Federation is actively building capacity to support and promote students' and teachers' well-being and positive mental health. Collaboration among school staff has received particular emphasis as a mechanism for raising awareness and diffusing effective practices related to well-being. For example, leadership directives have included training with a local mental health team, encouragement to explore cross-sector partnerships (e.g., with universities) around the well-being role of schools, and heightened expectations for collaboration across schools to reduce teacher workload and improve work-life balance by sharing practices and building and harnessing social capital.

Initial online distribution of the survey paired with targeted reminders led to 31 teaching staff completing the survey—a response rate of 84%. Demographic information was collected about teachers including sex, years of experience in current role, years of experience in current school, and the presence of formal leadership and well-being leadership roles. This is presented in Table 1.

Table 1
Sample Demographics (N = 31)

	Number	**Standard Deviation**
Sex (female)	27	–
Formal well-being leadership responsibilities (yes)	10	–
Hold a formal leadership or support role	3	–
	Mean	
Years in current role	10.26	9.10
Years in current school	7.62	7.24

[1] A limitation of this design is an inability to determine the direction of causation between attribute and network data.

[2] Transforming Children and Young People's Mental Health Provision: A Green Paper.

Data Collection

Our survey instrument used traditional Likert-type scales as well as several network questions. Combined, these two forms of question enabled representation of how school staff attributes gave rise to the observed patterns in several instrumental and expressive social networks. The Likert-type scales were as follows:

- Two 6-item scales for measuring participant perceptions of the Federation's organizational climate for innovation (e.g., "The Federation experiments with new ways of working") and climate of trust (e.g., "Staff in the Federation trust each other")—see Brown et al. (2016) for the complete scales;
- The 7-item global servant leadership scale from Liden et al. (2015) to measure perceptions of how Federation leaders prioritize others' needs (e.g., "Leaders in the Federation make my career development a priority");
- The 5-item empathetic leadership scale from Kock et al. (2019) to measure perceptions of how Federation leaders express emotional support and understanding (e.g., "Federation leaders show concern about my job satisfaction"); and
- The 8-item scale from Brown and Rogers (2014) to measure possible changes in behavior resulting from school staff engaging with innovative practices.

Each scale was selected on the basis of having accrued substantial validity evidence in prior research. All individual scale items possessed response options ranging from 1 (strongly disagree) to 5 (strongly agree).

The network questions asked participants to report on several kinds of ties in order to describe their position in the Federation's social networks. Since September 2019, after many years of stability, the Federation has experienced a large turnover in staff, with corresponding changes to pedagogical approaches and collaborative working patterns. Mental health and well-being are a focus of the Federation's improvement plan, and correspondingly, these questions were designed to explore staff's responses to these changes in terms of their instrumental and expressive ties in the network. Instrumental, or work-related, network questions investigated whom participants sought for advice with respect to (a) pedagogical content and (b) classroom management, both couched within the Federation's focus on well-being. Several follow-up questions further characterized the instrumental social networks according to the frequency of interaction (daily weekly, monthly, or less than once a month), the mode of interaction (i.e., face-to-face, telephone, or online), and how interactions tended to occur (i.e., free choice, leadership directive, or both). Expressive, or affective, network questions investigated with whom participants experienced an increase in energy following exchanges as well as to whom participants turned when

they needed to vent (i.e., relieve emotional pressure through shared expression). For each question, participants were provided with a complete roster listing all teaching staff in the Federation in order to guard against recall error (Borgatti et al., 2018).

Data Analysis

Our analysis proceeded in two steps. In the first, we began by inspecting participant demographics and the responses to each question in order to generate initial impressions of survey data quality. We then examined the internal consistency of each Likert-type scale as measured with Cronbach's alpha. All scales showed acceptable values in the range of 0.70 to 0.95 (Bland & Altman, 1997). However, due to our small sample size, it was not possible to examine the factor structure of the different scales; even forgiving guidelines on best practices for exploratory and confirmatory models maintain that factor analysis is a "'large-sample' procedure" (Costello & Osbourne, 2005, p. 5). Hence, while we can say the items of each scale did produce similar scores (i.e., scales were internally consistent), and that there is face validity given items appear representative of the domains they seek to cover, we cannot make claims about scale dimensionality. Finally, we used standard descriptive statistics, correlational analysis, and descriptive network analysis to develop an understanding of node attributes and the relational patterns explored in this study. This descriptive overview provided a sense of overall network structures and the degree to which network structure appeared to follow social symmetries (e.g., homophily).

In the second step, we examined the associations between node attributes and social relations using both categorical and continuous methods in order to test the hypotheses posed in this study. For categorical attributes, ANOVA models were run. For continuous attributes, or those approximating a continuous distribution, the spatial autocorrelation measures of Moran's *I* and Geary's *C* were calculated. Essentially, these measures provide a sense of how the proximity of two nodes in a social network is related to the attributes of those nodes (Borgatti et al., 2018). Roughly defined, these measures can be thought of as comparable to correlation coefficients, with Moran's *I* more attuned to global network structure and Geary's *C* more attuned to local network structure. The advantage of calculating both measures is that we are able to gain insight into the relational patterns of a network as a function of global as well as local node characteristics. Finally, given that network data is inherently dependent, all inferential statistics were calculated using permutation-based versions of standard tests[3].

[3] We used 20,000 permutations for each test.

Findings

Descriptives and Correlations

We begin by presenting findings that describe the instrumental and expressive social networks existing within the Federation in relation to the formal leadership roles and innovative practices that support well-being, as well as school staff perceptions of servant and empathetic leadership behaviors. Descriptive statistics are summarized in Table 2, and relational patterns are summarized in the sociograms[4] set out in Figures 1 and 2. Inspection of the scale responses revealed that school staff on average believed their Federation possessed a strong climate of trust (M = 3.82, SD = 0.44), an effective organizational climate for innovation (M = 3.63, SD = 0.57), and positive perceptions about leaders' enactments of servant-based (M = 3.66, SD = 0.56) and empathetic (M = 3.96, SD = 0.31) leadership principles. Statistically significant, strong positive correlations existed between all pairs of these variables ($p < 0.001$). This finding suggests that teachers who perceived school leaders as enacting the principles of servant and empathetic leadership were also more likely to perceive their schools as possessing a strong climate of trust and an organizational climate for innovation. Additionally, the strong correlation between servant and empathetic leadership (r = 0.868) suggests there is likely considerable overlap in how teachers are perceiving these principles of positive leadership, at least for the instruments employed by this study. The innovative practices of individual staff, on the other hand, displayed no statistically significant correlation with either the trust and context variables or the positive leadership variables. As a result, it seems that these aspects of the school environment alone are insufficient for explaining how staff are engaging with new practices around well-being.

Turning to the Federation's social networks, whole network measures revealed the greatest density[5] to exist for the energy network (D = 0.13), followed by pedagogical advice (D = 0.11), venting (D = 0.08), and classroom management advice (D = 0.05). Since we took the direction of ties into account, these densities, despite appearing low, do sit within commonly observed ranges (e.g., Brown et al., 2016; Daly et al., 2016; Farley-Ripple & Buttram, 2015). Examining tie direction specifically, the expressive networks

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[4] Given the strong positive correlation between servant and empathetic leadership found in this study (0.868, $p < 0.001$), we chose to represent only servant leadership in the sociograms in order to avoid redundancy. Close visual inspection confirmed minimal differences between diagrams where nodes were sized by perceptions of servant leadership versus empathetic leadership.

[5] Density is the number of ties in a network as a proportion of the number possible. For example, a density of 0.10 means 10% of all possible ties are observed.

possessed greater levels of reciprocity (venting 32%, energy 29%) than the instrumental networks (22% for both). That is, ties founded on affect were more likely to be reciprocated than those founded on professional context. Isolating the ties received by individual staff (known as in-degree centrality), statistically significant, strong positive correlations were found between all networks. This finding means that school staff who were frequently sought out in one social network (e.g., energy) were also frequently sought out in the other social networks. Moreover, the innovative practices of individual staff were moderately to strongly positively correlated with all but venting network nominations. In other words, for the case of the Federation, staff sought out for advice about pedagogy and classroom management as well as for energy were more likely to be engaging in more expert uses of innovative practices.

Table 2
Descriptive Statistics and Correlation Matrix

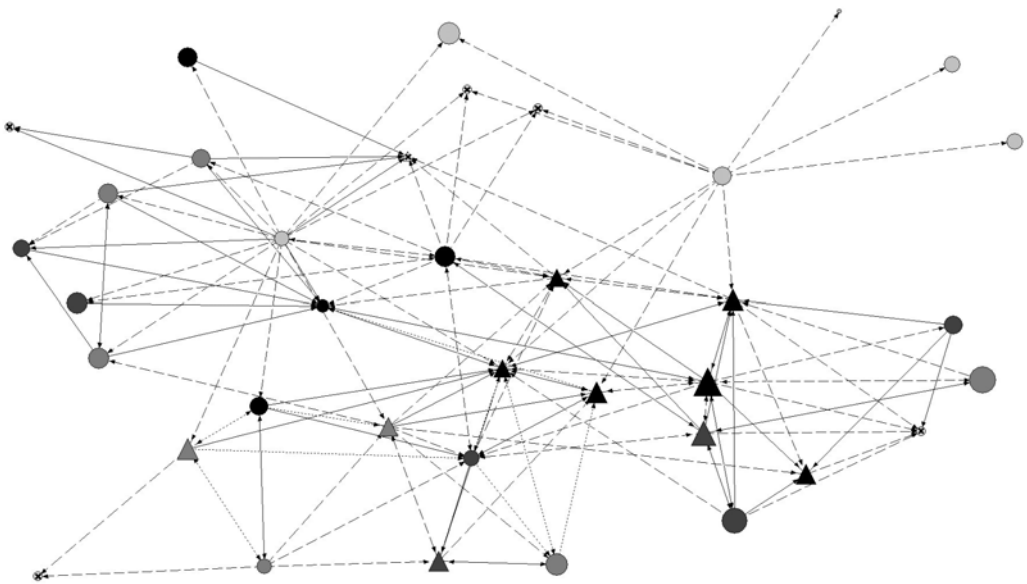
		Correlation Matrix							
Node Attribute	Mean (SD)	1	2	3	4	5	6	7	8
1. Trust (max = 30)	22.94 (3.71)								
2. Context (max = 30)	21.77 (3.74)	0.790**							
3. Servant Leadership (max = 35)	25.61 (4.68)	0.637**	0.574**						
4. Empathetic Leadership (max = 25)	19.81 (3.24)	0.654**	0.624**	0.868**					
5. Innovative Practice	3.06 (2.13)	−0.037	−0.044	0.324	0.026				
6. Pedagogy	3.84 (3.12)	−0.196	−0.343	0.032	−0.184	0.659**			
7. Classroom Management	1.81 (2.10)	−0.264	−0.415*	−0.002	−0.215	0.594**	0.888**		
8. Energy	4.57 (2.71)	−0.401*	−0.454*	−0.085	−0.254	0.446*	0.823**	0.807**	
9. Venting	2.92 (2.08)	−0.401*	−0.424*	−0.135	−0.267	0.302	0.712**	0.675**	0.904**

Note. The values reported for the relational dimensions correspond to in-degree centrality, which is the number of nominations a node receives from other nodes (e.g., if nodes A, B, and C report going to node X for energy, node X's in-degree centrality is 3 for energy).
*$p < 0.05$, **$p < 0.01$.

The sociograms of Figures 1 and 2 are revealing in several ways not easily captured by the descriptives and correlations reported above. Specifically:

- For ties constituting the instrumental networks, 56% involved only pedagogical advice, 6% involved only classroom management advice, and 38% involved both. Conversely, for ties constituting the expressive networks, 42% involved only energy, 8% involved only venting, and 50% involved both. Hence, while the difference is slight, the expressive networks showed greater overlap or multiplexity.
- More expert uses of innovative practices related to well-being appear concentrated, though not exclusively, on staff holding formal well-being

Figure 1
Instrumental relational patterns for the Federation

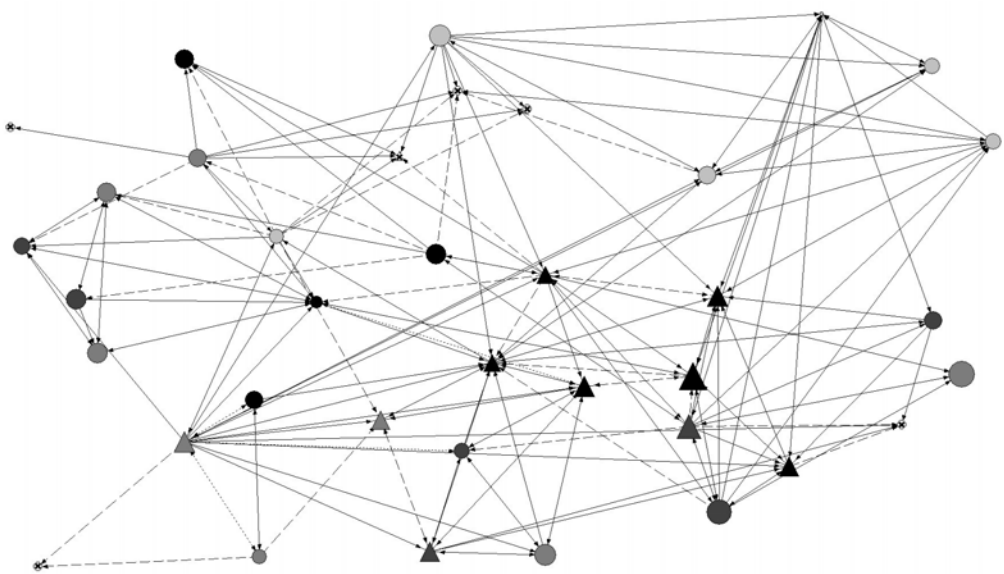


Dashed lines indicate advice-seeking for pedagogical content, dotted lines indicate advice-seeking for classroom management, and solid lines indicate both relations. Node size correlates positively with perceptions of servant leadership, node shape corresponds to well-being leadership roles (triangle = yes, circle = no), and node shade corresponds to innovative practices (darker shades = more expert use, "x" = unknown).

leadership roles. Moreover, staff engaging in similar levels of use of innovative practices appear to cluster together (e.g., the orange nodes clustering in the upper right all reported "no use").

- Some school staff who are on the periphery of the Federation's instrumental networks (e.g., the small orange node in the upper right) appear to hold important positions in the Federation's expressive networks. In combination with the finding that innovative practices correlate with both instrumental and expressive ties, it appears that failing to account for both kinds of ties would lead to a distorted perception of how innovation is mobilized within and across schools.

Figure 2
Expressive relational patterns for the Federation



Dashed lines indicate energy seeking, dotted lines indicate venting, and solid lines indicate both relations. Node size correlates positively with perceptions of servant leadership, node shape corresponds to well-being leadership roles (triangle = yes, circle = no), and node shade corresponds to innovative practices (darker shades = more expert use, "x" = unknown).

Inferential Statistics

The second set of analyses aimed to test the hypotheses posed in this study by examining how the Federation's instrumental and expressive networks were patterned by school staff's attributes, including their leadership roles, perceptions (e.g., servant leadership), and reported behaviors (innovative practices). Beginning with formal organizational leadership roles (i.e., subject leads, middle leaders, senior leaders), leader–leader ties were on average 14% more likely in the instrumental network and 16% more likely in the expressive network than teacher–teacher (p <0.01) or teacher–leader ties (p <0.05). Looking at well-being leadership roles, leader–leader ties were 15% more likely in the instrumental network and 20% more likely in the expressive network than teacher–teacher ties (p <0.01) or teacher–leader ties (p <0.05). Together, these findings indicate that ties between school leaders were marginally more likely than ties between two staff chosen at random for all social networks. Table 3 extends these findings by examining whether the school staff connected in each social network (columns) are more or less likely to be similar on each continuous attribute (rows) than two staff chosen at random.

Table 3
Spatial Similarity Tests Using Moran's I and Geary's C

	Relational Dimension							
Attribute	Advice: Pedagogy		Advice: Classroom Management		Energy		Venting	
	I	C	I	C	I	C	I	C
Trust	0.03	0.71	0.06	0.67	−0.04	1.09	0.10	0.98
Context	0.01	1.10	0.24*	1.02	−0.04	1.10	0.08	0.97
Servant Leadership	0.16**	0.71	0.15	0.66	0.04	1.03	0.06	1.16
Empathetic Leadership	0.14*	0.82	0.05	0.90	−0.08	1.19*	−0.04	1.15
Innovative Practice	0.31**	0.75	0.33**	0.52	0.36***	0.73	0.33**	0.75

*p < 0.05, **p < 0.01, ***p < 0.001

The significant findings noted in Table 3 indicate three general associations. First, staff who similarly perceive an orientation to innovation within the Federation were more likely to have a tie relating to classroom management advice. Second, staff with similar perceptions about Federation leaders' enactment of servant and empathetic leadership behaviors were more likely

to have a pedagogical advice tie, and for perceptions of empathetic leadership this extends to energy ties. Third, staff engaging in similar levels of use of innovative practices around well-being were more likely to have a tie in all social networks.

Conclusions

The aim of this article was to present a case examining the potential for mobilizing innovative practices related to well-being within a framework of positive leadership and school social networks. Regarding formal leadership and mental-health leadership roles (Hypothesis 1), we can infer the latter was important not only in mobilizing advice about teaching practices and classroom management, but also in the expressive social networks that promote self-governance in school staff. Indeed, this is precisely the idea underlying servant leadership, wherein "leaders focus on providing for followers so that they reach their full potential, become empowered to handle tasks and decisions on their own, and adapt to communal sharing and a culture of serving others" (Eva et al., 2019, p. 128). A related and important finding concerned the extent to which staff were engaging in innovative practices in terms of their position in the Federation's social networks (Hypothesis 2). Predictably, more expert uses of innovative practices related to well-being appeared concentrated on the staff holding well-being leadership positions. Although it is intuitively beneficial to have this concentration of expertise in individuals explicitly charged to promote and support well-being, comparisons between the instrumental and expressive networks suggest that some school staff were not easily reached by these leaders. We view this finding as reflecting the importance of paying attention to how practices are mobilized throughout school networks. Against the backdrop of positive leadership, mobilizing practices requires that leaders have an authentic understanding of their staff, an attentiveness to their needs, and an ability to attune their behaviors to those needs (Louis & Murphy, 2018).

Finally, regarding the association with school staff perceptions of servant and empathetic leadership behaviors (Hypothesis 3), while we did not observe a strong association with individual teachers engaging in more expert uses of innovative practices, it appeared that relationship may be moderated through school social networks. As phrased by Murphy and Louis (2018), "in contrast to a simple leader-centric perspective, the culmination of dyadic relationships helps to shape the way in which all members work with one another to carry out a jointly agreed upon task" (p. 47). In sum, then, mobilizing overall school well-being requires attention not only to leaders' enactment of positive leadership principles, but also to the ways in which leaders are positioned to facilitate social exchanges to that end.

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CLASSROOM SPACE AND STUDENT POSITIONS IN PEER SOCIAL NETWORKS: AN EXPLORATORY STUDY

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Abstract

The aim of this explorative research study was to identify the relationship between the positions of individual students in their peer social networks and their classroom seating arrangement through sociometry and social network analysis. We examined the social networks of 17 classrooms comprising 363 students (183 boys, 180 girls) attending lower secondary schools (ISCED 2A). We found that positions in social networks could not be connected with single specific seating positions. Nonetheless, certain tendencies can be observed. Students who are perceived as more likeable sit in the middle column of the classroom and are seated close to each other. Locations inhabited by dominant students are positioned further from teachers and further apart from each other. The increase of the values of degree centrality, closeness centrality, and eigenvector centrality is noticeable in desks positioned further away from the teacher. By comparing these results with studies examining seating arrangements as a means of distributing learning opportunities through student participation, specific zones can be observed in the classroom that could benefit the children seated there in their roles as students and at the same time in their roles as classmates.

Keywords

likeability, dominance, centralities, classroom seating arrangement, social network analysis, sociometry

Introduction and theoretical background

Observations that the space in which education takes place influences the educational processes within it are nothing new. Kohl pointed out in 1971 that such space represents specific values and sends specific messages to all those it encompasses. For example, the notion that there is a "front of the class" or that the teacher's desk is typically taller than those of students (and has a drawer, which the desks of students do not have, etc.), indicates the existence of "the authoritarian mode of delivering knowledge received from above to students who (…) are below" (p. 107). Meighan (1981) called this ability of space to influence a "hidden curriculum of educational buildings" that is learned by students in addition to the official curriculum. Therefore, the problematic relationships between spaces for education and the processes taking place in such spaces have deservedly become the focus of several empirical studies.

Among such studies, those which narrow their focus onto classrooms are the most dominant ones.[1] In these studies, seating arrangement has been recognized as a significant attribute of the classroom space.[2] The term "seating arrangement" refers to specific maps of classrooms that depict the organization of the physical space of a classroom through the positioning of the school desks of students and teacher(s) during education. Numerous studies have examined the relationship between particular seating locations and various factors associated with educational processes in the classroom. There is empirical evidence that students seated in specific seating locations daydream less during classes (Breed & Colaiuta, 1974; Lindquist & McLean, 2011), attain higher academic achievement (Benedict & Hoag, 2004; Perkins & Wieman, 2005; etc.), have different attitudes to education (Getie, 2020), or are absent less often (Burda & Brooks, 1996; Stires, 1980; Zomorodian et al., 2012). Furthermore, studies have indicated that seating location is related to student participation in classroom discourse. It has been established that classrooms contain a so-called "T-zone" or zone of dominant activity. This zone covers the seats at the front of the classroom, in the first desks of all three columns, and the remaining desks of the middle column. According to Bradová (2011,

1 There are interesting studies focused on the environment of educational buildings; see, for example, López-Chao et al. (2020). Such studies are thematically beyond the scope of this article.

2 Classroom seating arrangement is synonymous with classroom seating order. In this study, we systematically use the first term.

2020), the participation of students is weaker in the last desk of the middle column, so the last desk is not considered a part of the T-zone. Increased communicative activity associated with T-zones has been confirmed by a number of studies (Bradová, 2020; Jones, 1990, Marx et al.,1999), and is closely associated with the distribution of opportunities that students have to learn (Resnick et al., 2017; Sedova et al., 2019).[3] Hence, current research supports the existence of a zone in every classroom in which students participate and pay attention more, daydream and are absent less, and have higher academic achievement, and that this zone is located in the center and front of the classroom.

All these studies raise the question of whether their findings are truly caused by the physical space (a position known as the environmental hypothesis) or whether students themselves choose certain seats in the arrangement that are aligned with their personal characteristics and preferences, a position known as the self-selection hypothesis (see, for example, the experimental study by Stire, 1980). The question has not yet been conclusively answered. Should the environmental theory hold, it would mean that teachers could use seating arrangement as a tool to adjust the learning conditions of individual students. Startling consequences were presented in a study of a secondary school in China by Zhang (2019), who demonstrated how teachers can transform seating arrangements into a symbolic hierarchy and use it as a tool for student stratification, as more successful students are located in more prestigious positions in the classroom.

All these studies perceive the classroom as a space designated for education. Nevertheless, the children and youth who are the focus of these studies perceive the classroom primarily as a social space. Since they spend several hours a day in the classroom with their classmates, a key concern for them—which can be superior to concerns that they associate with education—is having good relationships with others (Adler & Adler, 2003; Cothran & Ennis, 1997; Moscovici, 2002; Šalamounová & Navrátilová, 2021). Far less is known about the way in which seating arrangements may be associated with the positions of individual students in their peer social networks.

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[3] Given that the most prevalent seating arrangement in classrooms is that of students seated in rows and facing the teacher, most studies examining the relationship between communication and the location in the classroom focus on the participation of students in these conventionally organized classrooms. Nevertheless, various types of classroom organization are used in practice, such as groups or modules, circle or half-circle arrangements, U shaped seating, and the "open-plan" classroom (Gremmen et al., 2018; Wannarka & Ruhl, 2008).

The relationship between students' seating locations and their positions among their peers was examined by Babad and Ezer (1993) in a study based on a sample of 2,039 fifth graders from 39 Israeli schools and using the sociometric nomination method. The authors postulated that leaders (students who were identified as leaders of boys or girls by their classmates) were more likely to be seated in the back of the classroom. Granström (1996) found that students seated in the back of the classroom tended to interact more frequently with their classmates seated in the back as well. Van den Berg and Cillessen (2015) chose a different approach by focusing on the interpersonal distance between students and their sociometric popularity and likeability. Using data gathered from 336 children distributed through 14 fifth-grade and sixth-grade classrooms from 11 different elementary schools, the authors found that children who were less liked by others sat towards the edges of the classroom at the beginning of the year; children who sat closer to the center were more liked. On the dyadic level, seating arrangement was associated with likeability as well as with popularity, since children who sat closer to each other liked each other more and perceived each other as more likeable, in accordance with the theory of mere exposure. In their second study, van den Berg and Cillessen (2015) asked 158 fifth graders and sixth graders from 6 classrooms in 4 elementary schools in the Netherlands to create their own seating arrangement together. Having analyzed these student-made arrangements, the authors found that if children liked a specific classmate or perceived the classmate as popular, they placed that classmate closer to themselves in their own preferred seating arrangements.

The present study

In this study, we perceive classrooms as firmly organized social spaces and examine the relationship between classroom seating arrangement and the position of individual students in their peer social networks. Studies examining the relationship between the spatial positioning of students and the position of individuals among their classmates in the classroom have been rare (e.g., Babad & Ezer, 1993, who focused on student leadership; van den Berg & Cillessen, 2015, who studied peer status of individuals represented by popularity and likeability). These two studies applied different research designs. The Babad and Ezer study (1993) was based on the sociometric nomination of highly likeable students; the van den Berg & Cillessen (2015) study focused on interpersonal distance between students instead of on their seating location. To our knowledge, no study has yet examined the association between classroom seating arrangement and the position of individuals in the whole peer social network of classmates.

For this study, we measured the position of individual students within their peer social networks through the common sociometric measures of likeability and dominance; we also included the four most commonly used centrality measures based on social network analysis: degree, betweenness, closeness, and eigenvector. Centrality measures are algorithms that assign scores to individual students based on their prominence within the network structure composed of all their peers and their relationships in the classroom (Wasserman & Faust, 2019). Compared to purely sociometric measures, which assign students scores based on aggregate ratings from their peers, centrality measures account for the relational nature of social positions and assess each student's importance based on their relative position in the whole ecosystem of relations in classroom.

Therefore, the overall aim of this study is to investigate the relationship between student seating position and the student's position within the peer social network by asking the following research questions:

- *What is the relationship between a student's seating position and their likeability?*
- *What is the relationship between a student's seating position and their dominance?*
- *What is the relationship between a student's seating position and their degree centrality?*
- *What is the relationship between a student's seating position and their betweenness centrality?*
- *What is the relationship between a student's seating position and their closeness centrality?*
- *What is the relationship between a student's seating position and their eigenvector centrality?*

We believe that answering our research questions will contribute to the current understanding of the relationship between the space in a classroom and the social processes within the classroom. As Stires (1980) mentioned in his experimental study, classrooms offer only a limited number of seating spaces (and hence a limited number of seating choices) which is why certain students are given specific seating locations that they have not chosen and that are disadvantageous for them. Hence, knowing whether there are positions or zones within classrooms that are associated with certain positions of students within their social networks enables us to work with the educational space.

This direction of research is also aligned with the research inquiry of this special issue, since we do not focus on individual actors and their independent actions related to learning and teaching processes. Instead, our aim is to examine educational actors in their social networks (White, 1992).

Methods

Sample

This study is part of a larger project on educational communication and student academic achievement. The participants of the whole research project were ninth-grade students (aged between 14 and 15 years) from 21 schools located in three different regions of the Czech Republic randomly selected from a representative sample of 163 schools involved in a national survey organized by the Czech School Inspectorate[4] to monitor student reading literacy.

For the current study, some classes were also excluded since education took place in specialized classrooms with unique seating arrangements. Four classes were excluded since students in the classes could change their seating position during their lessons, which they did, and thus their seating arrangement was not stable. In total, we observed 17 classrooms comprising 363 students (183 boys, 180 girls). The mean number of students in one classroom was 20.2 (the smallest classes comprised 15 and the largest 26 students, median = 20.5).

Procedure

Data collection for this study took place in December 2017. Students were given standardized sociometric questionnaires. Instructions were relayed aloud in the classroom and team members demonstrated to the students how to answer questions (using the example of fictional students; no real student names were used). No time limit was given; therefore, students were able to use all the time they needed to complete the questionnaires. They rarely needed more than 20 minutes.

The seating plans of the students in the observed classes were provided by their teachers or were accessible in the classrooms where members of the research team could make copies of them. For this study, we worked with the values provided for each student by their peers in a sociometric rating questionnaire and with that particular student's seating position in the classroom.

In all the researched classrooms, the school leaders and the teachers involved actively consented to participation. The parents or guardians of the children received a letter explaining the research and its aims. They could tell the researchers that they did not agree with their child's participation in the research. Participants were assured of confidentiality and of the ability to withdraw at any time. No one withdrew during the study. This research

[4] The CSI is a key central institution in the evaluation of the education system in the Czech Republic that distributes and evaluates standardized tests focused on different areas of student learning to measure student achievement in Czech schools.

study followed the ethical guidelines outlined by CERA. All participants were assigned numbers and all personally identifying information was removed from the dataset prior to processing.

Measures

Peer ratings. Data on the position of individual students in their peer social networks are particularly important for this research study. The social networks in individual classrooms were created based on data gathered through standardized sociometric questionnaires designed for small social groups, especially for classes (fifth grade and older) (Hrabal, 2002). Data gathered through sociometric rating questionnaires identify the sociometric positions of students through two dimensions: the dimension of likeability and the dimension of dominance. Likeability was explained orally and in writing with the following formulation: "If we like a person, then we think they are nice and we want to spend time with them. Each one of us can like different people." Dominance was explained orally and in writing with the following words: "If a person is dominant then other people behave as they say and adopt their opinions. Their dominance can be good or bad." The instructions asked the students to identify the dominance of each student. Students were asked to evaluate the degree of likeability and dominance of all their classroom peers, except for themselves. A scale from 1 to 5 was used, where a value of 1 means being the most liked/the most dominant and a value of 5 means being the least liked/not dominant at all. Part of the questionnaire can be seen in Table 1.

Table 1
Sample excerpt of sociometric questionnaire

Name	**Likeability**					**Dominance**				
Anna Berková	1	2	3	4	5	1	2	3	4	5
David Cvrček	1	2	3	4	5	1	2	3	4	5

We normalized likeability into a value of −1 to 1 since values 4 and 5 in the questionnaire represented a negative relationship. A value of 1 represents a score for a student who is perceived by the whole classroom as likeable. The dominance was normalized into a value of 0 to 1, with a value of 1 representing the highest dominance and 0 none, since the values 4 and 5 in the questionnaire represented a low extent of dominance, but nothing with a meaning such as negative dominance.

Centralities. To explore the social prominence of individual students beyond basic sociometric measures, we constructed peer social networks based on likeability ratings between the students (see Figure 1). The sociometric

questionnaires allowed us to identify the existence of mutual likeability ties between the individual students within classrooms. A mutual likeability tie was operationalized as a tie between two students who both rated each other as likeable (values 1 and 2 in the original sociometric questionnaires). We assume that, compared to unreciprocated and negative likeability ties, the existence of a mutual likeability tie suggests a mutually acknowledged relationship that facilitates further interaction and social exchange. Four different centrality measures then aim to assess each student's prominence in the classroom based on their relative position within the whole social network of these mutual relationships. While there is a substantial conceptual overlap between the four centrality measures and significant correlations between the centrality measures are present in virtually all networks (Valente et al., 2008), each centrality measure derives prominence of actors based on a distinct criterion.

Degree centrality measures an actor's prominence based on the number of direct links they have with others. In our networks, it is calculated as the number of mutual ties an actor has, and it is normalized into a value of 0 to 1 by dividing the number of the ties by the number of maximum possible ties the actor can have (the number of all students in the classroom minus one). Degree centrality is based on the assumption that direct links lead to greater ability to exercise influence over others.

Betweenness centrality (Freeman, 1977) measures an actor's prominence based on the number of times an actor lies on the shortest path between all other actors. We normalized betweenness centrality into a value of 0 to 1 by dividing the number of shortest paths running through an actor by the maximum possible betweenness centrality value. Betweenness centrality shows the potential of individuals to act as bridges between others. Actors with high betweenness centrality do not necessarily have a high number of direct links but are usually positioned between clusters of actors and/or serve as sole links between otherwise unconnected actors and the rest of the network.

Closeness centrality (Sabidussi, 1966) measures an actor's prominence based on the number of shortest paths originating from an actor to all other actors. In other words, it measures how close any given actor is to all other actors. We normalized closeness centrality into a value of 0 to 1 by dividing the number of the lowest possible number of shortest paths originating from an actor (the number of all students in the classroom minus one) by the actual shortest paths leading from the actor.

Eigenvector centrality (Bonacich, 1987) is an extended–recursive version of degree centrality. It measures an actor's prominence based on how well connected they are to other well-connected actors. In other words, it places importance on both direct and indirect connections. Eigenvector centrality is normalized into a value of 0 to 1 with an actor with the highest eigenvector centrality in network always having a value of 1.

As illustrated by Figure 1, the four centrality measures in our networks do not overlap entirely. On the contrary, even the students with the highest value of one centrality do not necessarily have the highest values of other centralities. In an example below, students with high betweenness centrality scores are not those who have the most direct connections. What they have in common, though, is that they serve as bridging points between otherwise sparsely connected groups. On the other hand, students with high closeness centrality score are located in the core of the network; the more peripheral students are, the lower their centrality scores. Students with high degrees of centrality will almost certainly have high eigenvector centrality as well; however, in some cases, it is possible to have a high eigenvector score with only a few connections, if the immediate connections have many other connections.

Figure 1

Four visualizations of the same exemplary network of mutual likeability ties from our study. Students are colored by values of the respective centrality measure: the darker the color, the higher the value of the centrality measure. Circled students have the highest centrality values in the classroom.

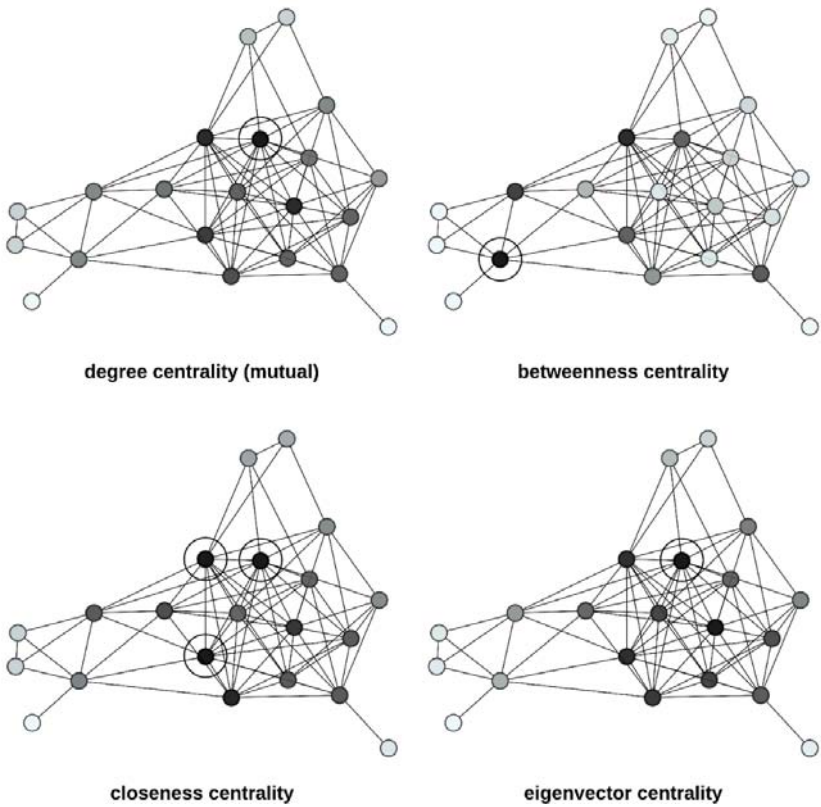


Table 2 shows the sample's descriptive statistics of the studied variables. With the exemption of the betweenness and closeness centrality measures, the data distribution resembles standard distribution. Both betweenness and closeness centrality measures have heavy-tailed distributions, and they are positively and negatively skewed, respectively.

Table 2
Descriptive statistics of the studied variables

	Range	**Mean**	**SD**	**Skewness**	**Kurtosis**
Likeability	−0.79–0.79	0.21	0.29	−0.93	0.85
Dominance	0.01–0.94	0.49	0.20	−0.12	−0.38
Degree centrality	0.00–0.90	0.36	0.18	0.24	−0.38
Betweenness centrality	0.00–0.32	0.04	0.05	2.43	7.16
Closeness centrality	0.00–0.91	0.57	0.14	−1.65	6.19
Eigenvector centrality	0.00–1.00	0.55	0.27	−0.17	−0.95

Seating location. Data on seating arrangements in the classrooms and the location of individual students in their respective seating arrangements are significant for the purposes of this study. Czech school classrooms are typically set up in a traditional way with pairs of students sitting in three distinctive columns comprised of student desks (these columns are known as the window column, the middle column, and the door column). Typically, each column consists of five or six desks. All the desks are oriented towards the blackboard or whiteboard located at the front of the classroom (in the middle) and the teacher's desk (which is placed in the window column of desks). We take the term seating arrangement to visually describe the spatial arrangement of the classroom (and the individual desks present within it), which also includes the names of all the students within that particular classroom.

It is essential to think about how a seating arrangement comes into existence. A limitation of our study was that while we have the seating arrangements of individual classrooms, we did not have access to the information on which of the students chose their seating positions and which of them were assigned one by their teacher. Our study nonetheless stems from the research of Bradová (2012) who described in detail the emergence of a seating arrangement into existence in lower-secondary education. Students can typically choose a location in the classroom during the first day of their lower-secondary education. Teachers tend to adopt a supportive stance in this matter and respect students' choices influenced by their friendship preferences. Teachers thus give students a chance to manifest that they are

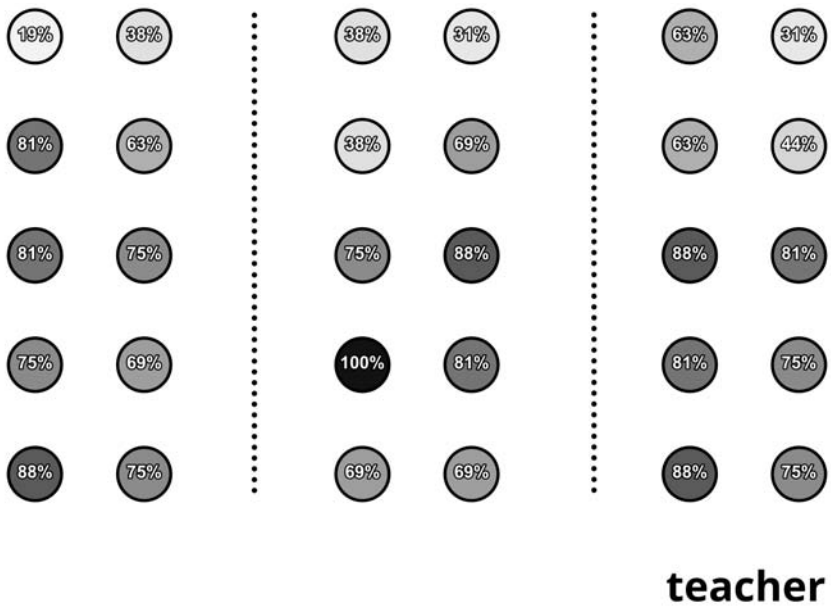
able to work from their selected location within the classroom. It is this ability that will decide whether they will be allowed by their teacher to keep their seating space. As Bradová shows (2012), if students can work, they can retain their location. However, should that not be the case, and the seating arrangement should be less than optimal from the point of creating possibilities for education, the teacher will introduce changes to the seating arrangement and will start moving individual students to different seating locations. Bradová (2012) notes that teachers are highly aware of the state of the seating arrangements and change the location of individual students to prevent conflicts among them. Once teachers perceive a seating arrangement as optimal, it can stay unchanged for the whole duration of the students lower-secondary education (that is, from sixth to ninth grade). This was also the case in the classes that were observed for this study.

Creation of seating heat maps

Once each student's likeability, dominance, and centrality scores were computed, we projected students onto standardized seating maps representing their seating position within the classroom and colored the students according to their scores of the observed variables, with darker colors representing higher values of the respective variable. This resulted in seating heat maps visually denoting student positions within peer social networks projected into space. The seating heat maps have three double columns (representing shared desks) with two aisles between them, with the number of rows ranging from three to six, and the teacher's desk in the bottom right corner. For each classroom, we created six different heat maps representing students' values of the six observed variables (likeability, dominance, and the four centrality measures) allowing us to explore unique configurations within the individual classrooms.

Afterwards, we created six aggregate seating heat maps for each variable representing the mean value and standard deviation of the respective variable attributed with the individual seating positions, with the individual rows, and with the individual columns. Compared to the seating heat maps of the individual classrooms, the aggregate seating maps aim to provide an overall picture of the relationship between seating positions and positions in peer social networks across the classrooms. Figure 2 shows the percentage of occupied seats across the classrooms. Unfortunately, compared to the rest of the seats, back seats were more often unoccupied. We chose to compute the means (and the standard deviations) in the aggregate heat maps dividing the sum of the values by the number of students occupying a given seat, not by the total number of classrooms, as all seats would be occupied only if all classrooms comprised exactly 30 students.

Figure 2
Percentage of occupied seats



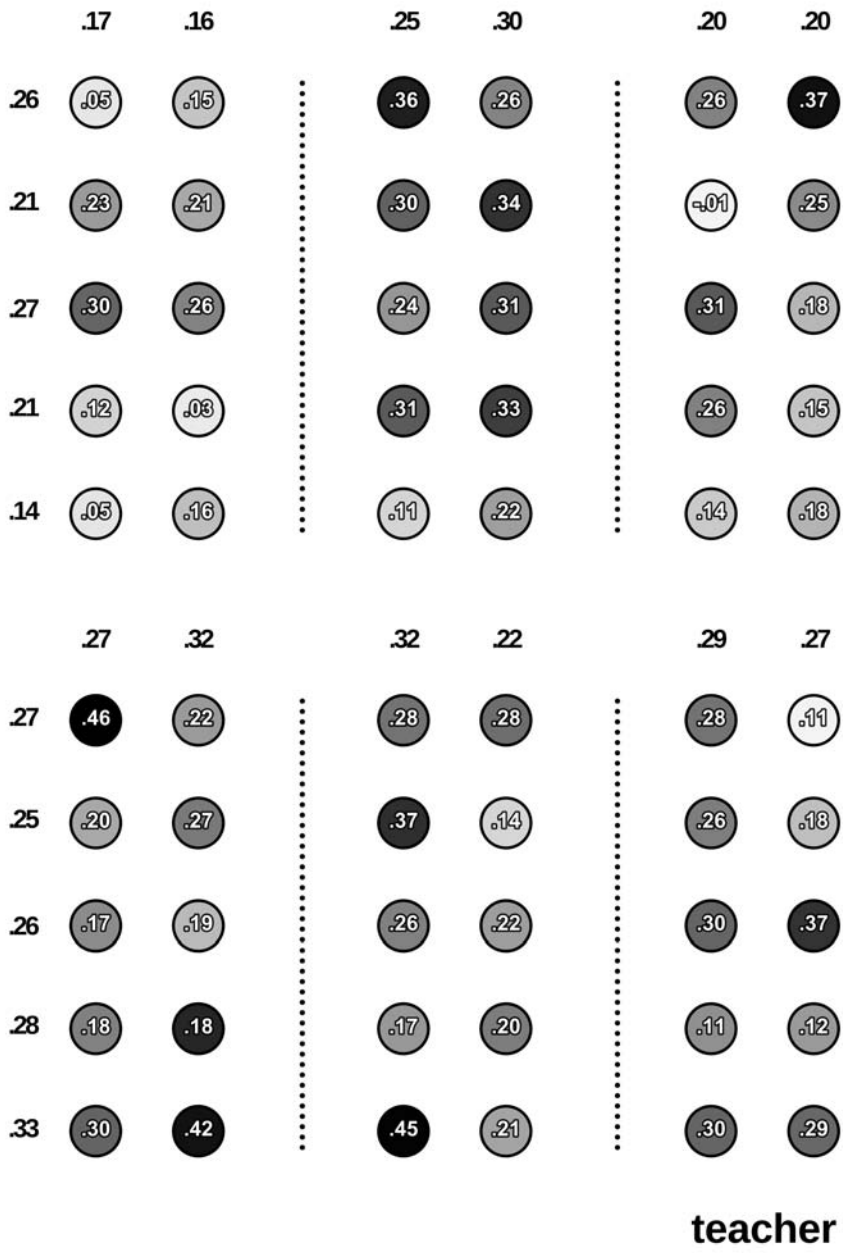
Computing and visualizations were both performed in Gephi software (Bastian et al., 2009).

Selected results

Seating location of likeable students

In order to identify the location of likeable students in seating arrangements, we provide the aggregate likeability score for each student in the individual seating arrangements. The aggregate values can be found in Figure 3.

Figure 3
Aggregate seating heat maps of likeability (top = mean, bottom = SD)



The figure clearly shows that students perceived as likeable sit mostly in the middle column, which has higher aggregate values. An exception to this is present in the first desk of middle column as it is the desk closest to the teacher's desk. There are, however, two exceptions to this finding: the very last desk in the door column and the third desk in the window column. Both represent seating positions on the margins of the classroom and yet students who inhibit these spaces have high likeability scores. This is not a random deviation, and the high likeability of the students is linked to the centrality measures that we also examine in our research and that pertain to the seating arrangement of dominant students.

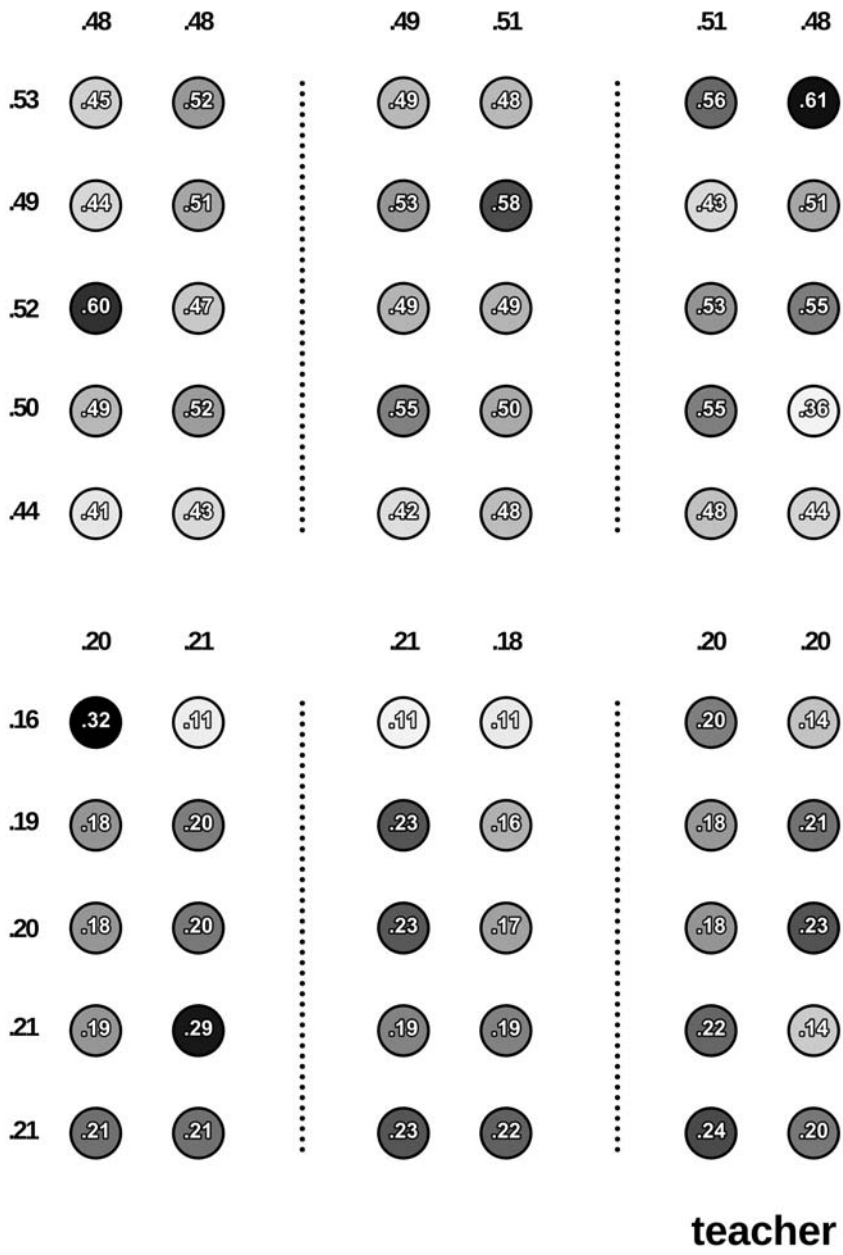
Locations taken by students whom their peers ascribe lower likeability scores can be found in the first desks of all three columns. These low likeability scores also apply to the students sitting in the second rows of both the window and door columns. We explain this drop in likeability by the proximity of these desks to that of the teacher, a position that does not enable the students to interact with their peers during teaching. Such students would have to turn their backs or sides to the teacher to communicate with their peers, which would likely be noticed by the teacher and would be accompanied by at least some reaction from the teacher. These students might find it difficult to communicate even with the other students sharing their desk, assuch communication can be easily detected by the teacher. At the same time, students sitting in the first desks find themselves in the so-called T-zone which means that teachers tend to call on such students more often than on others (Bradová, 2020), which, at their age, can also have a lowering effect on their likeability scores. In sum, both provided explanations can influence the likeability scores of these students.

From looking at the heat maps from the individual classrooms, it is also clear that likeable students are seated close to each other – they inhibit spaces within easy reach of other likeable students. Students with the highest likeability scores vary in their position in the middle column; they typically shared a desk with a student whose likeability score was also high.

Seating location of dominant students

Using the aggregate values, we can also identify the seating locations inhabited by students who are perceived as dominant by their peers. Such seating locations can be found in all the three columns (and by looking at the individual classrooms, we can note that the tendency of likeable students to sit close to each other is not replicated with dominant students). We can also note that locations taken by the dominant students are further away from the teacher, with students seated in the first row on average having the lowest and students seated in the back the highest values of dominance, respectively. On the other hand, locations with low values of dominance can again be found in the first desks in all three columns, as is apparent from Figure 4.

Figure 4
Aggregate seating map of dominance (top = mean, bottom = SD)



If we compare Figure 3 with Figure 4, we can observe that locations with the highest values of dominance in fact overlap with locations with the highest values of likeability. These locations are not represented in all three columns (as opposed to being solely placed in the middle column as is the case with likeable students). This means that they can also be found on the margins of the classroom space. These locations can be seen as an exception to the previous part of this study, which focused on space connected with high values of likeability. Our finding confirms that students to whom their peers ascribe high degrees of dominance are at the same time ascribed high values of likeability (cf. Šalamounová & Fučík, 2019). Nonetheless, these (dominant and liked) students sit in different locations than, for example, students who are perceived "only" as likeable.

Spaces inhabited by likeable students are in close proximity to one another. In contrast, when we look at the individual classrooms, the locations inhabited by dominant students are positioned further apart. This means that isolated dominions can be seen dispersed throughout the classroom.

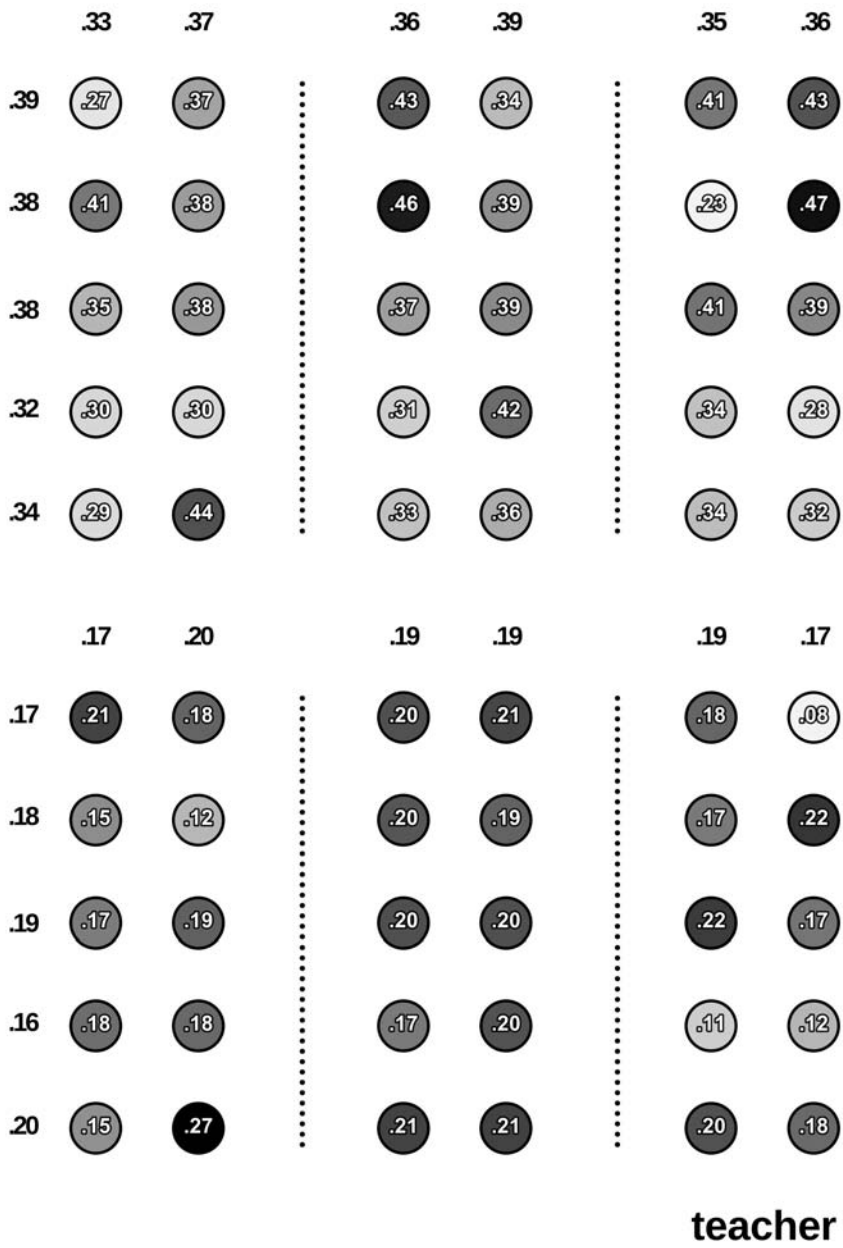
The three locations with high occurrence of dominant students are equally far from the teacher's location in the classroom (which can typically be found in front of the first row of desks and in front of the aisle between the middle and the door column). We explain this occurrence by pointing out that students with high dominance index communicate more frequently with their teacher (Šalamounová & Navrátilová, 2021). Even though there is a certain distance between them and the teacher, they are not located very far away from the teacher, as that would prevent their mutual communication.

Seating location of students with degree centrality

If we turn our attention to the connection between individual classroom space and the number of direct links expressed through the degree centrality, we can notice an increase in values in spaces located further from the teacher; a decrease in values can be observed in the first and seconds desks of all the columns. Nonetheless, increased values can be found in all three columns and are again not solely positioned within the middle column, as is the case with likeability. The distribution of spaces and their connection to the degree of centrality is shown in Figure 5.

We can thus state that is not only the likeable students seated in the middle column who have positive mutual relationships with their peers, who show their peers sympathy and receive it in return; even other students not seated in the middle column have such relationships with their peers. This is also the reason that the degree of centrality is distributed more evenly through the seating arrangement and is not represented exclusively by the students seated in the middle column.

Figure 5
Aggregate seating map of degree centrality (top = mean, bottom = SD)

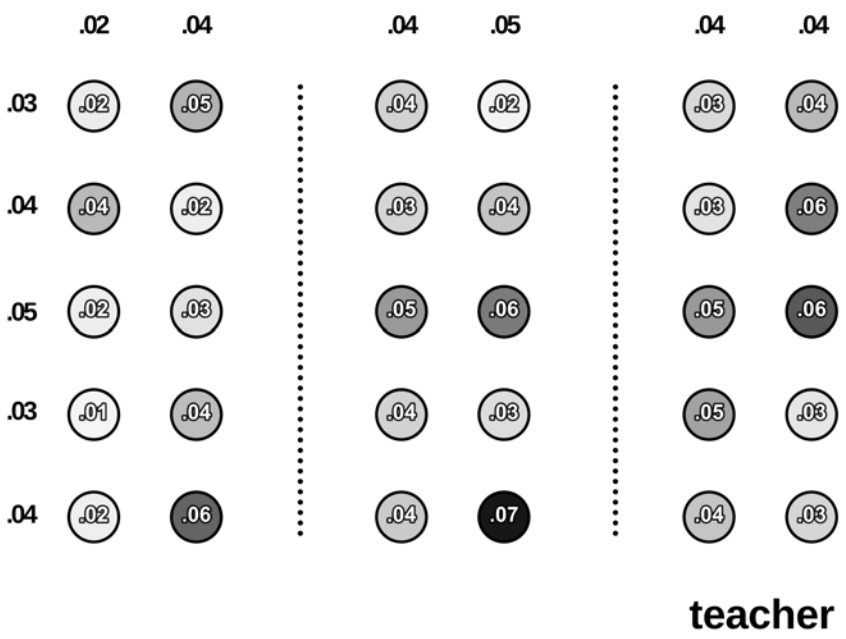


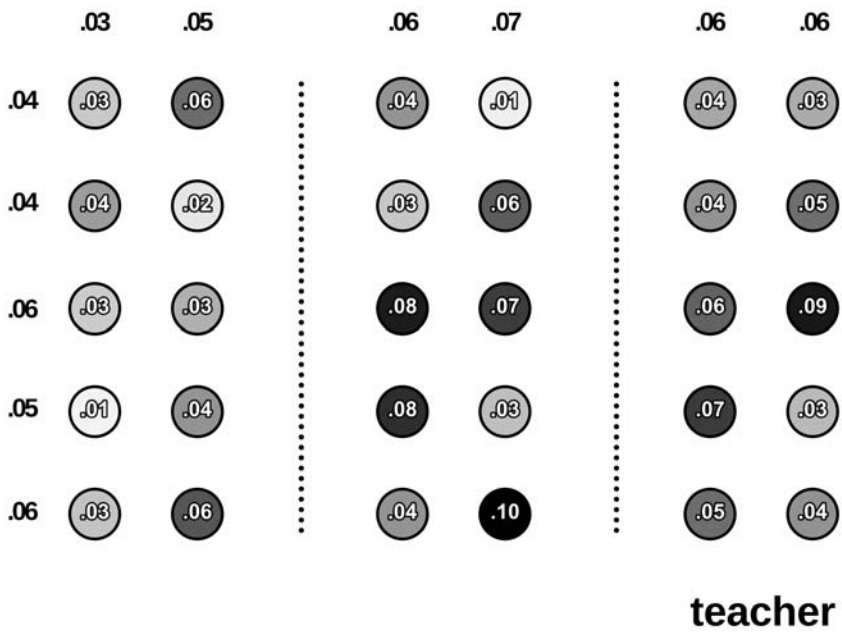
Students seated in the first two desks in each column can have fewer relationships with their classroom peers. However, the figure also shows that this trend might not be valid at all times. We explain the higher degree of centrality in locations positioned further away from the teacher by the fact that these spaces enable the students to have easier communication with their peers, even when those peers are not seated in the same desks. Spaces in front of the teacher do not come with conditions that enable non-educational communication during teaching.

Seating location of students with betweenness centrality

When it comes to betweenness centrality, locations positioned further away from the teacher are not associated with higher values, as we have seen previously. On the contrary, high values are associated with spaces in the front desks and in the middle row, as both the aggregate and the individual classrooms heat maps attest. Further, spaces with high values for betweenness centrality are found in the middle desks of the middle and door column. The respective values are shown in Figure 6.

Figure 6
Aggregate seating map of betweenness centrality (top = mean, bottom = SD)



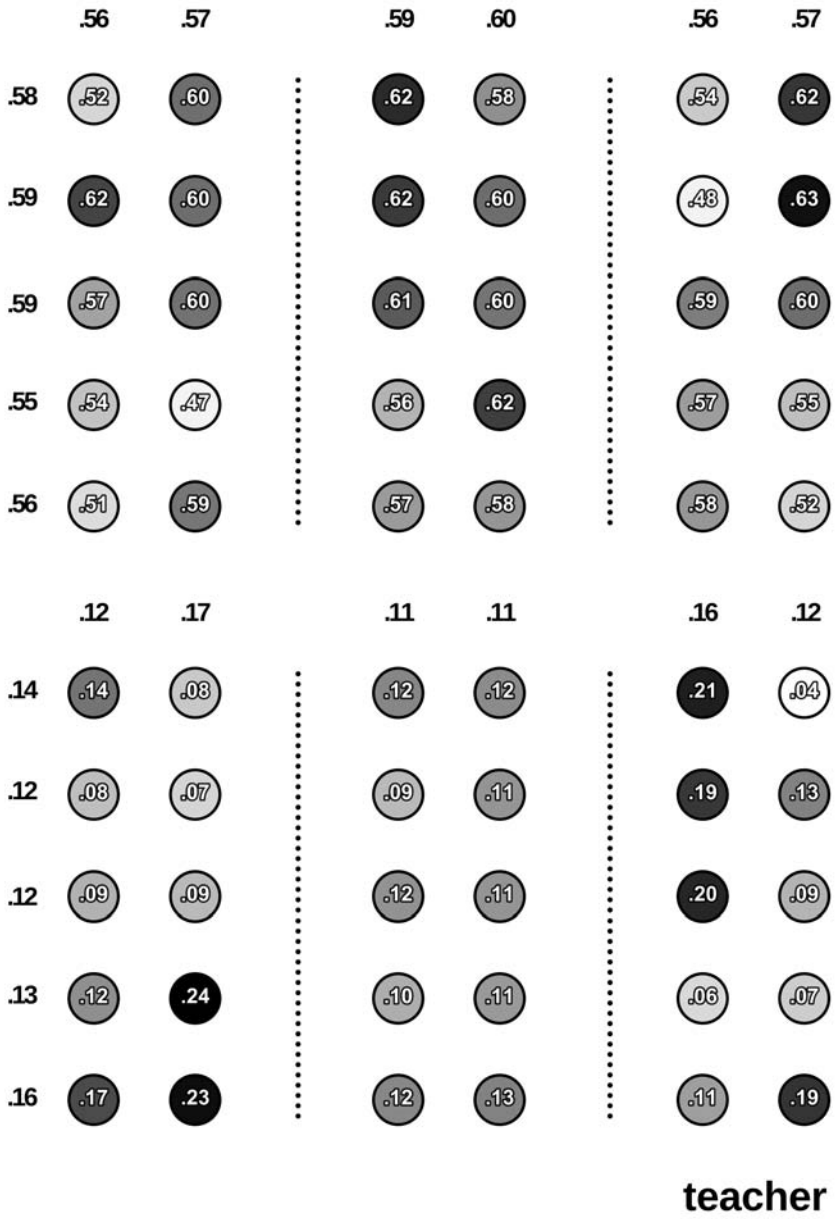


This can indicate that students who interconnect various groups in their classrooms might have fewer direct relationships (which is clearly the case of the spaces with the highest values in the middle desks of the middle column). This shows that students who interconnect various student groups can be seated in spaces linked with fewer direct relationships. Nonetheless, even when such students do not occupy the very centers of various student groups, they can interconnect different groups well thanks to their non-central positions.

Seating locations of students with closeness centrality

The aggregate data on closeness centrality clearly show the highest values located in the middle column, which does not include a single space with low values. The differences between the front and back desks are minor. Spaces with lower values can be found in front spaces on the margins of the classrooms. Yet the results are still rather homogenous.

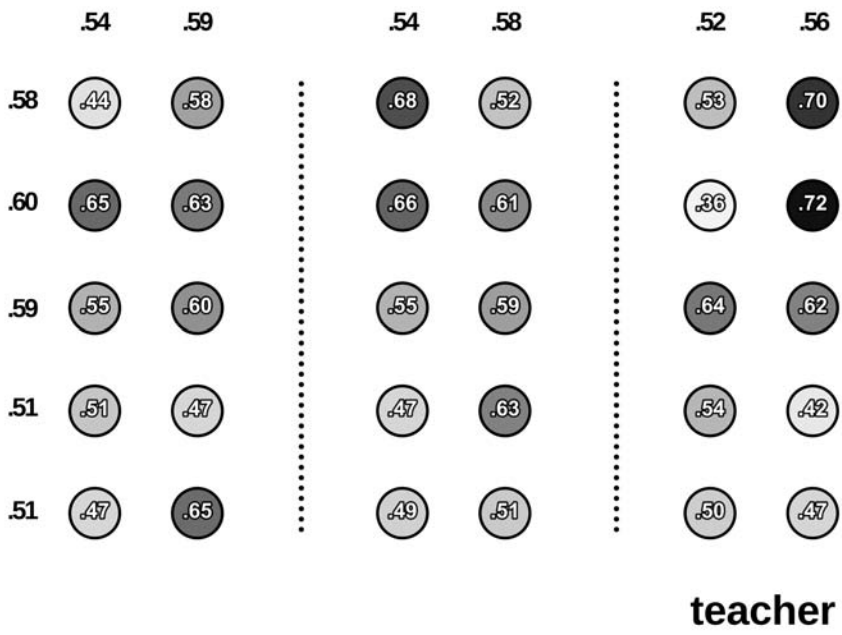
Figure 7
Aggregate seating map of closeness centrality (top = mean, bottom = SD)

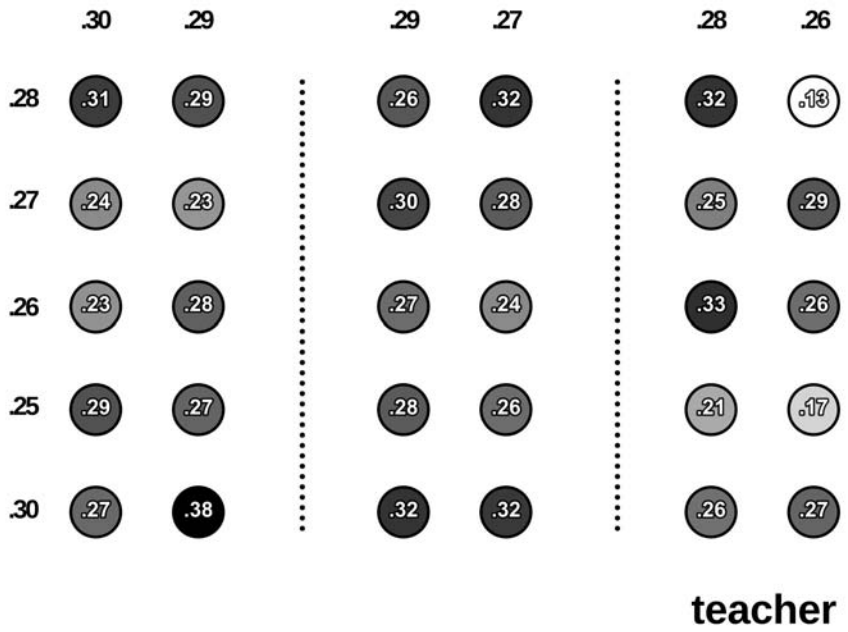


Seating location of students with eigenvector centrality

The last observed value relates to the eigenvector centrality, which specifies whether individual nodes in a network have relationships to others through the closest node to which they have direct links. It is therefore possible that even a node without many direct links can have a high value of eigenvector centrality. Our data show that the dispersal of values in the classroom seating arrangements points to a similar dispersal as we saw with the degree centrality. We again see an increase in desks positioned further away from the teacher while spaces associated with higher values can be found in all three columns, as Figure 8 shows.

Figure 8
Aggregate seating map of eigenvector centrality (top = mean, bottom = SD)





If we interpret both the values for degree and eigenvector centrality, it becomes clear that spaces in the front desks are associated with a lower number of direct positive links among students. It also becomes clear that these links lead to other students who also have fewer direct positive links to their peers. It therefore follows that students in the front desks have primarily relationships with other students from the front desks who surround them as they also have lower values of eigenvector centrality. This finding thus corresponds with the findings of van den Berg and Cillessen (2015), according to which relationships occur among students who are seated closer to each other.

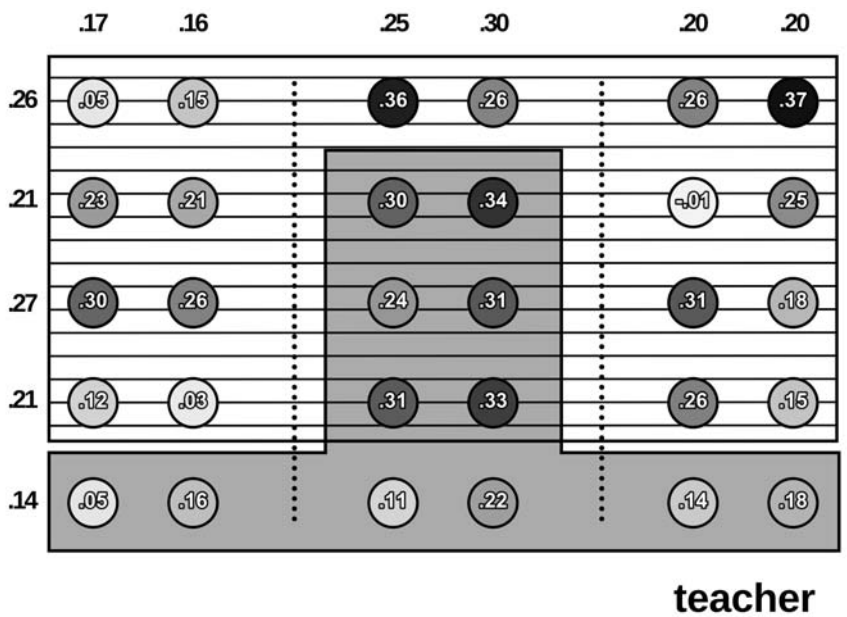
Seating locations for learning and mutual relationships

Empirical evidence indicates that variables related to seating arrangement or seating position can impact educational interactions (Bradová, 2011, 2020; Jones, 1990; Marx et al., 1999). If we interconnect the studies that examine seating arrangement from the perspective of student participation in classroom discourse with the results of our study—which explores how seating arrangements may be associated with social relationships among classmates—we can summarize that there are several specific zones in which students can be seated. There is a zone that provides students with more opportunities for learning (the so-called T-zone, rendered in gray in Figure 9). Also, there is a zone in which students have more positive mutual relationships than students seated in the first desks of all three columns (rendered with

horizontal lines in Figure 9). The middle column (without its first and last desk) is the overlap between these two zones (rendered in gray and horizontal lines in Figure 9).

This location can be understood as the most advantageous position in the seating arrangement, since students seated in these desks are given more opportunities to participate in educational communication. They also have, at the same time, more positive mutual relationships and they are ascribed the highest values of likeability out of all the students. This space is therefore advantageous both from the perspective of peer relationships and academic achievement.

Figure 9
Different zones laid over aggregate seating map of likeability



Summary and discussion

The aim of this explorative research study was to identify the relationship between the positions of individual students in their peer social networks and their classroom seating arrangement through sociometry and social network analysis. Clearly, positions in peer social networks cannot be automatically connected with specific seating positions. Nonetheless, certain tendencies can be observed.

Ascribed likeability is represented the most in the middle column (with the exception of its first desk). We consider this finding to be interesting especially in the context of data on students' location and their degree centrality. From analyzing the individual classrooms, it follows that students who are perceived by their peers as likeable do not have more positive mutual relationships with others. In other words, ascribed sociometric likeability does not show that these students automatically have more relationships since higher values for positive mutual relationships are dispersed through all the three columns (with the exception of the first and second rows). Apparently, students have positive relationships with other students no matter whether their peers sit in the window, middle, or door column. Yet, if asked to identify the likeability of their peers, they ascribe higher values to students sitting in the middle column (with the exception of its first and last desk). It is possible to deduce that students inhabiting these central desks are situated close to other students who surround them on both sides. As such, these students can be more easily seen and heard by their peers. Locations with positive mutual relationships among peers are distributed throughout all three columns with the weakest values detected in the first rows (and partly also in the second rows). Bradová (2012) points out that the first and second rows are indeed unpopular among students. The surveyed students explained this with a lack of privacy; students in the window column felt that their actions were easily scrutinized by the teacher, and students in the door column seated next to the washbasin complained about higher levels of noise. The lower centrality values associated with these spaces then present another reason why these spaces are disliked. As Bradová (2012) points out, students inhabit these spaces simply because they have to (for example, they would not see the writing on the board were they seated elsewhere) and not because they want to.

The lowest values measured in the first and second desks can also be explained taking the eigenvector centrality into account. Students seated in these desks have relationships with the peers who surround them and also inhabit the first and second desks. Such students also have low levels of eigenvector centrality. This finding is affirmed by the findings of van den Berg and Cillessen (2015), which show that students have mutual relationships with other students who are seated close to them. The authors of the study claim that people who interact with each other think more positively of one another. They also ascribe each other higher values of likeability, which is a finding that is applicable to classroom students as well.

If we examine the seating arrangement through the perspective of dominance, we can state in accordance with Babad and Ezer (1993) that high values are associated with spaces situated at the back of the classroom. From analyzing the individual classrooms, we can state that such spaces are

distributed throughout the classroom, which means that students with high values of dominance are not seated close to other students with similarly high values, as is the case with likeability. Instead, dominant students are located in some kind of dominions that spread around them and do not include similarly dominant students. Our study was limited by the fact that we did not have access to data on how the seating arrangements came into existence. There are two possible explanations. First, the distance between individual dominant students can be motivated by their own choice since they prefer not to be close to other dominant students. However, their position can also be explained as the decision of the teachers who distribute dominant students throughout the classroom to prevent either friction or accumulation of their dominance.

It is interesting to realize that dominant students are not necessarily located in the places furthest from the teacher. Two possible explanations are available. Or previous study (Šalamounová & Navrátilová, 2021) shows that dominant students tend to be very communicative and engage with the teacher even without an invitation to do so. At the same time, they also prefer to communicate with their peers. This could explain the dominant students' avoidance of desks at the back of the classroom, provided they have chosen their seating position themselves. If they find themselves seated in these spaces because of the teacher, this can be motivated by the teacher's wish to more easily monitor their actions and interact with them if necessary.

A question arises as to how these findings can be implemented into teaching practice. Since teachers are in control of seating arrangement in their classrooms, they are in control not only of the learning opportunities given to their students but also of their relationships with their peers, and of their position in the social network of their classroom. They could consider the option of systematically changed seating arrangements in which students would not inhabit one particular space. The findings of Bradová (2020) speak against such a possibility, since her study shows that students do not wish to change the seating position that they themselves chose at the beginning of the school year. We therefore believe that particular procedures should be devised for particular classes of students. We believe that the awareness of how seating arrangement can influence student relationships can enable teachers to reduce "cliques and cleavages" and to improve the social integration of isolated and rejected children (Gest & Rodkin, 2011) so that students have good opportunities not only to learn but also to create relationships with their peers.

Our study has limitations. The first limitation is presented by the asymmetric unoccupied seats across the rows, with back rows having a disproportionately higher percentage of unoccupied seats. This study does not consider a possibility that (un)occupancy of seating places also relates to the resulting

variable values. In other words, we see (un)occupancy as a nuisance resulting from uneven numbers of students, rather than a state related to social processes among the students. The second limitation lies in its temporary access to seating arrangements of students during the data collection phase of the study. As Bradová (2012) shows, seating arrangement can undergo changes and fluctuations during the school year at the behest of the teacher who can change the arrangement to create better conditions for learning in the classroom. Our study worked with the end result of this process: with the stabilized seating arrangement in the final grade of lower secondary schooling. We did not have access to data on the creation, its gradual changes, and its causes, which are all important factors that could be explored in future research on the classroom.

Acknowledgements

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SIMILARITY-ATTRACTION THEORY AND FEEDBACK-SEEKING BEHAVIOR AT WORK: HOW DO THEY IMPACT EMPLOYABILITY?

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MIEN SEGERS

Abstract

Employees' feedback-seeking networks at work are important for employees' learning and employability. Earlier studies often neglected the specific characteristics of the different relationships an individual employee has at work. We conduct social network analyses in seven samples to study inter-individual differences in feedback-seeking relationships in detail. We investigate 2,058 feedback-seeking relationships of 118 employees to study how similarity-attraction affects the composition of feedback-seeking networks at work and how the composition of these feedback-seeking networks influences employees' employability. This research study aims to contribute by taking into account both the mechanisms that shape feedback-seeking networks and the effects of this on employability. The results show that similarity-attraction affects feedback-seeking in the workplace and that having a largely homogeneous feedback-seeking network has detrimental effects on employability.

Keywords

employability, feedback-seeking, similarity-attraction, social networks

Similarity-attraction and feedback-seeking at work: How do they impact employability?

Employability has recently received a lot of political and academic attention (Lu et al., 2015; Peeters et al., 2017). How can the competences that empower individuals to maintain, create, or obtain adequate jobs be developed (Van der Heijden et al., 2018)? Previous research studied various forms of learning activities and how they impact employability (e.g., Froehlich et al., 2015; Van der Heijden et al., 2009; Van der Heijden & Bakker, 2011). In this literature, feedback-seeking stands out as a major contributor (Anseel et al., 2013).

To derive meaningful interventions for practice, we need to comprehend the specific feedback-seeking relationships individuals engage in (cf. Wu et al., 2013) and how these feedback-seeking networks impact individuals' employability. So far, research has focused on the broad relationship between engagement in (social) learning activities and employability (Froehlich et al., 2019; Froehlich & Beausaert, 2014; Gerken et al., 2016; Lecat et al., 2018; Van der Heijden & Bakker, 2011) or, for instance, job (in)security (Van Hootegem & De Witte, 2019). An investigation of the specific network ties is often more useful than studying relationships at only a very general level (Reagans et al., 2004). This is especially true for social settings marked by heterogeneity, where individual differences in terms of pluralistic backgrounds, competences, or perspectives are potential catalysts for reflection and growth. Therefore, we pose the following research question: *How does the composition and usage of individuals' feedback-seeking networks affect the feedback-seekers' employability?*

The text makes two major contributions. First, by building on similarity-attraction theory (Byrne, 1971), we take into account both the mechanisms that shape feedback-seeking networks at work and the effects of these on employability. This information complements previous research findings on how social informal learning translates into employability (Froehlich et al., 2017) and how interactions may help to get a job after higher education (Batistic & Tymon, 2017; Chen, 2017). Second, we argue that previous research's focus on the quantity of feedback-seeking is limiting, as other strands of research suggest that the quality of the feedback received and the attributes of the source of feedback also matter (e.g., London, 1995). The data gathered for this study, which includes 2,058 feedback-seeking relationships of 118 employees in seven complete organizational networks from three countries, make it possible to study the contributions of specific configurations of feedback-seeking networks in an international context.

Theoretical background

Competence-based employability

In this study, we view employability as an individual's ability to continuously fulfill, acquire, or create work through the optimal use of competences (Van der Heijden et al., 2018). How can competences be used to fulfill, acquire, or create work? At least two theoretical lenses offer an explanation. First, human capital theory (Becker, 1993) looks at an individual's competences as malleable resources that determine the individual's capacity and quality of work and hence also as important resources to offer on the labor market. Therefore, time spent learning and in education are useful investments. The strong relationship between human capital and (perceived) employability also received empirical support (Berntson et al., 2006). The resource-based view of a firm (Barney, 1991) emphasizes an employer's view on the same matter: individuals who possess important competences are regarded as valuable resources for the company (Van der Heijde & Van der Heijden, 2006). Thus, they should be invested in. Both perspectives indicate that individuals competent in areas that are in demand are very attractive to the labor market. This emphasizes the role of competences in individual employability.

What are these in-demand competences? In line with other research (De Vos et al., 2011; Froehlich et al., 2018), we see employees as employable if they not only have relevant technical knowledge, but also are attentive to changes in the work context and adequately adapt to changes imposed on them. This means we focus on (Van der Heijden et al., 2018): *occupational expertise* (technical domain knowledge); *anticipation and optimization* (proactive, self-initiated screening and preparation for potential changes in job and career requirements and conditions); and *personal flexibility* (reactive adaptation to change).

Developing competence-based employability via seeking feedback

Knowing about these competences is one thing. But how are they to be developed and maintained? Previous research on workplace learning suggests that seeking feedback from others—the inquiry for information targeted at evaluating and reflecting upon work processes and the self (Anseel et al., 2007)—is especially important for this. Indeed, feedback-seeking has been related to many positive outcomes, such as goal attainment (Ammons, 1956), managerial effectiveness (Ashford & Tsui, 1991), performance (Kluger & DeNisi, 1996), a more accurate self-view (Ashford et al., 2003), career success (Cheramie, 2013; Van der Rijt et al., 2012a), and employability (Froehlich et al., 2014).

A useful lens to understanding learning from others is offered by social capital theory (Burt, 2005). Connecting to other people gives access to their human capital and other resources, such as their personal networks, which

can be used to develop one's own competences. Put differently, through seeking feedback individuals may acquire developmental resources to enhance their own human capital and, hence, their employability.

However, Ilgen et al. (1979) and Vancouver and Morrison (1995) note that it is difficult to separate the effects of feedback-seeking from the source of feedback-seeking. A network of contacts represents potential resources—an individual needs to become active and ask for feedback to actually access these resources (Ashford & Cummings, 1985; Frieling & Froehlich, 2017; Harwood & Froehlich, 2017). One important mechanism here is homophily—the tendency to build relationships with similar others (McPherson et al., 2001; Mello & Delise, 2015). Previous research offers two theoretical explanations for this tendency. Social categorization theory posits that employees categorize their colleagues and themselves based on observable characteristics such as gender (Ibarra, 1992; Louch, 2000) or age (Tsui & O'Reilly, 1989; Zenger & Lawrence, 1989). Similarity-attraction theory adds that people tend to interact with similar others in an attempt to reduce the potential for discomfort (Byrne, 1971; Standifer et al., 2013). Consequently, personal networks are often rather homogeneous in terms of these demographic characteristics. Empirical evidence for such effects has been found, for instance, in performance evaluation situations (Ferris et al., 1991) or when reporting job satisfaction (Peccei & Lee, 2005). Given homophily's evident influence on the development of interpersonal networks in the workplace (Carpenter et al., 2012), we hypothesize that homophily also affects feedback-seeking. Aligned with the previous studies on homophily and feedback-seeking mentioned above, the focal attributes of this study are age, tenure, function, and gender.

Hypothesis 1a: Employees seek more feedback from others who are similar to themselves in terms of age, tenure, function, and gender.

While many studies have found positive outcomes of feedback-seeking, Mulder and Ellinger (2013) have observed conflicting findings. They attribute this to varying conceptualizations of what constitutes good quality feedback. This statement is in line with the findings of Van der Rijt et al. (2012b), which show that the usefulness of the feedback received had a much greater impact than the quantity of feedback on perceived career development in their sample of financial experts. This evidence suggests that the usefulness of the feedback received needs to be considered in addition to the frequency of feedback-seeking. This is especially true given that feedback can have devastatingly negative effects if not delivered in constructive ways (Wang et al., 2015).

As mentioned before, similarity-attraction theory explains homophily via the reduced potential to experience discomfort or conflict in an interaction between similar individuals (Byrne, 1971). Relatedly, empirical research linked homophily to increased credibility (Wright, 2000), trust (Winter & Mitesh,

2013), and ease of communication (Zenger & Lawrence, 1989). More generally, this suggests that the potential for common understanding between two similar individuals is greater. This, in turn, makes the feedback received more likely to be perceived as more useful.

Hypothesis 1b: Employees rate feedback received from others who are similar to themselves in terms of age, tenure, function, and gender as more useful.

While the positive effects of seeking useful feedback are prevalent in the literature, much less focus has been put on the role of similarity-attraction. We posit, however, that similarity-attraction is an important constraint when considering feedback-seeking and its outcomes. This is because the process of feedback-seeking can be modeled as a process of experiencing uncertainty (e.g., a gap in one's knowledge), gathering additional information, and processing this information to reduce uncertainty and reach the respective goals (cf. Ashford et al., 2003). This raises the question about the nature of information that can be accessed in one's feedback-seeking network. We assume that the knowledge in one rather homogeneous group based on age, tenure, function, and gender is potentially more similar than in heterogeneous groups. Similar arguments have been brought forward elsewhere (e.g., Froehlich & Messmann, 2017; Granovetter, 1973; Phillips et al., 2006). From this perspective, individuals who are heavily influenced by similarity-attraction constrain themselves to only a limited pool of resources. In other words, what differentiates employees with heterogeneous feedback-seeking networks from employees with homogeneous feedback-seeking networks is that the former have greater potential to access information that is instrumental in reducing uncertainty and contributing to reaching a set goal. Hence, we hypothesize that individuals learn less for their own employability if their feedback-seeking network is characterized by similarity-attraction. Similar arguments have been advanced in other fields, such as in the context of top management teams' advice-seeking to make strategic decisions (Alexiev et al., 2010).

Hypothesis 2: Homophilous feedback-seeking networks relate negatively to employability in terms of occupational expertise, anticipation and optimization, and personal flexibility.

Method

Sample

We test the model in a population of knowledge-intensive workers. The major reason for the choice of this population is that the dynamic nature of knowledge-intensive work (Froehlich, 2017) may make the need to update competences even more pronounced. Given the sensitivity of social network

Table 1
Characteristics of the groups under research

	Sample						
	aca.at	**aca.nl**	**con.in**	**con.at**	**con.nl**	**ban.at**	**soc.at**
Country	Austria	Netherlands	India	Austria	Netherlands	Austria	Austria
Industry/Sector	Research	Research	Consulting	Consulting	Consulting	Banking	Social Startup
Employees	12	19	14	27	11	20	15
Potential ties	132	342	182	702	110	380	210
% Female	83%	63%	36%	15%	27%	55%	53%
Age (Mean + SD)	41 (10)	40 (12)	34 (4)	34 (8)	33 (10)	43 (10)	37 (12)
Experience on job in months (Mean + SD)	127 (115)	106 (99)	11 (15)	30 (27)	37 (24)	127 (111)	21 (10)

analysis to missing data (Froehlich & Brouwer, 2021), we sent out questionnaires to a convenience sample of seven complete organizational entities (see Table 1). To keep the findings generalizable across sectors and countries, the sample includes research units (*aca.at*, *aca.nl*), consulting firms (*con.in*, *con.at*), a team on an innovative project at a bank (*ban.at*), and a startup (*soc.at*) in Austria, the Netherlands, and India (Note: The consulting teams are project teams of a large IT implementation program that work on-site in Austria—*con.at*—and off-site in India—*con.in*—for the same client.). After sending two reminders to the potential participants, we achieved a sufficient response rate of 92%. In total, the data of 2,058 feedback-seeking relationships, or ties, and 118 employees were available for analysis.

Instruments

We collected both psychometric and sociometric data via the survey. For the sociometric data, we presented each respondent with a roster of all employees (including supervisors) in the respective workgroup or project team.

We focus on feedback-seeking via inquiry, as it is "a more explicit behavioral choice" (Ashford et al., 2003, p. 788), and asked for the *frequency of feedback-seeking* (1 = *(almost) never,* 7 = *several times a day*). Each person also estimated how often they were approached by another person for feedback. We used the mean of these two values as a more reliable estimate of the frequency of feedback-seeking for all relationships and in both directions (raters diverged only 0.5 points on average). Furthermore,

we asked for the *usefulness of the feedback* received from every other person in the network (1 = *(almost) not useful*, 5 = *very useful*).

We assessed the similarity of each pair of employees based on the demographic and work-related characteristics of the respondents: age, tenure, function, and gender. For each tie, we evaluated whether the employees are of similar age (+/- one SD of the group), have a similar tenure (+/- one SD of the group), work in similar functions (based on their self-reported role description, which is not linked to their departmental affiliation), or identify as the same gender. The SD was chosen to capture the differences in terms of group composition across samples. This information (0 = *dissimilar*, 1 = *similar*) was used to create networks based on similarity for each attribute under study. We then extracted two feedback-seeking networks: one that includes the frequencies of feedback-seeking only between similar employees for each respective characteristic and one that includes all frequencies of feedback-seeking. We calculated the weighted out-degree centrality for all nodes in both networks. Weighted out-degree centrality denotes the number of outgoing ties each node has, multiplied by the respective frequency of interaction. We then set the weighted out-degree centrality based on similar persons in relation to the total weighted out-degree centrality of the individual in terms of feedback-seeking frequency for each characteristic. The result is the ratio of sources of feedback that are similar to the employee weighted by the frequency of feedback-seeking. This figure ranges from zero (all sources of feedback are different) to one (all sources of feedback are similar).

We gauged *employability* using three validated subscales by Van der Heijde and Van der Heijden (2006): occupational expertise (Sample item: "I consider myself competent to engage in in-depth, specialist discussions in my job domain."), anticipation and optimization (Sample item: "I take responsibility for maintaining my labor market value."), and personal flexibility (Sample item: "I adapt to developments within my organization."). Respondents answered on a 5-point Likert-scale (1 = *almost never*, 5 = *very often*). The scales achieved satisfactory Cronbach's alphas ($\alpha = 0.92$, 0.79, and 0.71, respectively).

Analyses

To test Hypothesis 1, we used the Multicollinearity Robust Quadratic Assignment Procedure (MRQAP) to estimate regression coefficients. MRQAP is a standard procedure to analyze autocorrelated structures, such as social network data (Dekker et al., 2003). After calculating the standardized regression coefficients (β), standard errors, and p-values for each sample, we performed a meta-analysis to estimate the effects shown in the MRQAP-analyses across all samples. For this purpose, we calculated three statistics: the Q-statistic (which assesses heterogeneity across the samples; Krackhardt & Kilduff, 1999), the summary effect (β_+), and the overall level of significance.

We performed multiple regression analyses to test Hypothesis 2, using chronological age, tenure, gender, and sectoral background (dummy coded) as control variables. To aid the presentation of the results, we also highlight the relationships significant at an *a*-level of 0.10. This, however, will not change the interpretation of the general pattern of effects found.

Results

In this section, we present the analyses that answer our research question in three steps. First, we provide summary statistics across all samples that relate feedback-seeking to demographic characteristics. Second, we explore these relationships more deeply by also considering the results of individual samples. Last, we investigate the relationship between individuals' feedback-seeking networks and their competence-based employability.

We hypothesized that employees seek more feedback from colleagues and supervisors who are similar to themselves in terms of age, tenure, function, and gender. Table 2 shows the results of the meta-analysis. The Q-statistics, which indicate heterogeneity across samples, show that heterogeneity was found only for the relationship between same function and feedback-seeking frequency ($Q = 21.54$, $p < 0.01$). Put differently, for this relationship, the results vary across the samples. Additionally, we found a strong summary effect on feedback-seeking frequency of same function ($\beta_+ = 0.30$, $p < 0.01$). This means that employees in all samples were more likely to seek feedback from colleagues and supervisors who work in a similar function. This supports Hypothesis 1a only partially. Concerning the perceived usefulness of the feedback received, the effect sizes were homogeneous across all independent variables. We found a strong summary effect of same function ($\beta_+ = 0.19$, $p < 0.01$). This supports Hypothesis 1b for function.

Table 2
Combined results of the Matrix Multiple Regression via Double Dekker Semi-Partialing Multiple Regression Quadratic Assignment analyses (df =6)

	Frequency				Usefulness			
	Q	**β_+**	**LL**	**UL**	**Q**	**β_+**	**LL**	**UL**
Similar age	0.515	0.004	−0.095	0.103	0.812	−0.033	−0.262	0.197
Similar tenure	1.682	0.046	−0.046	0.138	0.476	0.036	−0.177	0.250
Similar function	21.535**	0.297**	0.187	0.408	4.191	0.194**	0.018	0.370
Same gender	3.050	0.001	−0.102	0.105	1.102	−0.018	−0.165	0.128

** $p < 0.01$; * $p < 0.05$; † $p < 0.10$.Note: LL and UL show the lower and upper level of the 90% confidence interval of the summary effect size.

Table 3 shows the results of the individual samples. It shows that employees seek feedback more often from colleagues and supervisors who work in the same function (five samples; from $\beta = 0.23$, $p < 0.05$ to $\beta = 0.39$, $p < 0.01$) and are of the same gender (two samples, from $\beta = 0.17$, $p < 0.05$ to $\beta = 0.29$, $p < 0.01$). Conversely, employees addressed colleagues and supervisors of a different age more readily in the startup ($\beta = 0.14$, $p < 0.10$). For colleagues and supervisors with a similar tenure, we found both positive (*con.at*: $\beta = 0.08$, $p < 0.05$) and negative (*con.in*: $\beta = -0.15$, $p < 0.10$) relationships with feedback-seeking frequency. The independent variables explained up to 20% of the variance in feedback-seeking frequency.

Table 3
Standardized results of the Matrix Multiple Regression via Dekker Double Semi-Partialing Multiple Regression Quadratic Assignment analyses on feedback-seeking frequency and perceived usefulness of feedback

		Sample					
	aca.at	**aca.nl**	**con.in**	**con.at**	**con.nl**	**ban.at**	**soc.at**
Feedback-seeking frequency							
R^2	0.196**	0.164**	0.065**	0.128**	0.116**	0.006	0.171**
Similar age	−0.067	0.042	−0.012	−0.011	0.028	−0.022	0.143†
Similar tenure	−0.023	0.031	−0.148†	0.079*	0.116	0.010	0.018
Similar function	0.392**	0.373**	0.228*	0.351**	0.134	0.056	0.374**
Same gender	−0.258	0.168*	−0.048	−0.082	0.292*	−0.051	−0.013
Perceived usefulness of feedback							
R^2	0.230**	0.104**	0.048*	0.090**	0.125***	0.033†	0.142**
Similar age	−0.139	0.060	−0.021	−0.130†	−0.159	−0.102	0.172*
Similar tenure	−0.034	0.106	−0.153	0.185*	−0.004	0.184†	0.020
Similar function	0.451**	0.249**	0.167*	0.185**	0.224**	−0.009	0.320**
Same gender	−0.222	0.158**	−0.086	−0.162†	0.199**	−0.050	0.011

** $p < 0.01$; * $p < 0.05$; † $p < 0.10$.

The patterns of effects on the perceived usefulness of feedback are similar. Employees perceive feedback as more useful from colleagues and supervisors who work in the same function (six samples; from $\beta = 0.17$, $p < 0.05$ to $\beta = 0.45$, $p < 0.01$) and who have a similar tenure (two samples; from $\beta = 0.18$, $p < 0.10$ to $\beta = 0.19$, $p < 0.05$). We found mixed results for colleagues and supervisors of a similar age (*soc.at*: $\beta = 0.17$, $p < 0.05$; *con.at*: $\beta = -0.13$, $p < 0.10$) and the same gender (*aca.nl*: $\beta = 0.16$, $p < 0.01$; *con.nl*: $\beta = 0.20$, $p < 0.01$; *con.at*: $\beta = -0.16$, $p < 0.10$). The independent variables explained up to 23% of the variance in perceived usefulness of feedback (in *aca.at*).

We were also interested in the relationships between feedback-seeking and employability. In the regression analyses (Table 4), we found that similarity-attraction in terms of function relates negatively to occupational expertise ($\beta = -0.18$, $p < 0.10$), anticipation and optimization ($\beta = -0.23$, $p < 0.05$), and personal flexibility ($\beta = -0.27$, $p < 0.05$). For the composite measure of employability, a similar effect-size was noted ($\beta = -0.27$, $p < 0.05$). Similarity-attraction in terms of age relates negatively to occupational expertise ($\beta = -0.29$, $p < 0.10$). These findings suggest that feedback-seeking networks largely composed of people of similar ages and who work in similar functions relative to the feedback-seeker may be less helpful for improving their employability. Therefore, Hypothesis 2 is partially confirmed. Conversely, similarity-attraction in terms of gender relates positively to occupational expertise ($\beta = 0.24$, $p < 0.05$). As concerns the control variables, we note negative effects of chronological age on occupational expertise ($\beta = -0.45$, $p < 0.05$) and differences between the participating organizations. In total, the model explains 20% of the variance in the employability scales ($R^2 = 0.15$ to 0.21).

Table 4
Standardized results of the linear multiple regression analyses

	Occupational expertise	Anticipation and optimization	Personal flexibility	Employability (composite)
R^2	0.211**	0.152†	0.214**	0.174*
Age	–0.445*	−0.323†	−0.078	−0.347†
Tenure	0.088	−0.040	0.099	0.048
Gender	0.063	−0.066	−0.032	−0.022
Sector 2	0.085	0.233	0.335*	0.269†
Sector 3	0.382**	0.096	0.243*	0.274*
Sector 4	0.213	0.196	0.493**	0.352*
Similar age	−0.293†	−0.224	−0.091	−0.252
Similar tenure	−0.206	0.092	0.201	0.042
Similar function	−0.177†	−0.233*	−0.273*	−0.274*
Same gender	0.239*	0.067	−0.056	0.092

** $p < 0.01$; * $p < 0.05$; † $p < 0.10$.

Discussion

We set out to investigate how similarity-attraction relates to feedback-seeking in the workplace and employees' employability. We hypothesized that employees seek feedback from colleagues and supervisors like themselves. We proposed that the feedback received from similar sources is perceived to be more useful. In this section, we discuss the findings in light of their contributions to (a) similarity-attraction and feedback-seeking research and (b) employability and competence development research.

Contributions to similarity-attraction and feedback-seeking research

Our meta-analysis across seven organizations shows that employees seek more feedback from colleagues and supervisors who work in a similar function and that the feedback received from these sources is perceived as more useful. This is in line with previous theorizing about similarity-attraction (Byrne, 1971; Lazarsfeld & Merton, 1954; McPherson et al., 2001) and empirical research about homophily (Tsui & O'Reilly, 1989; Wexley et al., 1980). Our data agrees with earlier findings that network ties are very much structured by intra-organizational boundaries such as functional organizational structures (Feld, 1981; Kleinbaum et al., 2013). Like earlier studies, the results show different effects for the different variables used to test similarity (Goldberg et al., 2010).

This part of the study also revealed an interesting secondary finding about the relationship between feedback quantity and feedback quality. Unlike previous research (e.g., Van der Rijt et al., 2012b), the patterns of findings for feedback-seeking frequency and perceived usefulness of feedback received were remarkably similar. This suggests the (very rational) behavior that employees seek feedback more often from colleagues and supervisors from whom they have received useful feedback in the past. This leads to a convergence of the two concepts.

Contributions to employability and competence development research

The data also shows that having a homogeneous feedback-seeking network has detrimental effects on employees' employability and the competences it contains. We find a negative relationship between homogeneous networks in terms of function and all three dimensions of employability tested. This suggests that if employees constrain themselves to similar colleagues and supervisors, they do not make use of the full potential of the existing inter-individual differences. Colleagues or supervisors different in terms of their demographic or functional background may be precious sources of feedback as well—people with different backgrounds have rather different ways of thinking (Chua, 2018). Here, we contribute to the literature of developmental networks. For example, Higgins and Thomas (2001) called for further examination of diversity within developmental relationships such as feedback-seeking relationships.

The relationship between feedback-seeking network composition and employability is less pronounced for occupational expertise. One reason for this might be that colleagues outside the same function have access to different information. Therefore, a feedback-seeking network that consists mainly of colleagues in the same function has limited potential to access information outside the main domain of work (e.g., upcoming trends). When it comes to the technical expertise needed for the tasks at hand, this information is less relevant. The sociometric data reveal that the employees themselves judge

the feedback received from their colleagues in the same function as more useful. This contradiction may result from the different motives for seeking feedback. Ashford et al. (2003) distinguish instrumental, ego-based, and image-base motives, of which instrumental feedback-seeking is most conducive to developing competences. However, employees may seek feedback from similar sources for other motives, which may explain the diverging results.

We found a negative relationship between homogeneous feedback-seeking networks in terms of age and occupational expertise. One possible reason for this is that knowledge and skills are different but compatible across age groups. For instance, younger employees may contribute important knowledge of how to use IT more efficiently, while older employees may give helpful advice for social relationships and general work conduct. Eventually, all these competences are needed to remain employable. Therefore, seeking feedback from colleagues and supervisors of other age groups can be beneficial (Mannix & Neale, 2005). In any case, the findings need to be cautiously interpreted, as age has been found to moderate the relationship between learning and employability (Van der Heijden et al., 2016).

As concerns homogeneous networks in terms of gender, we found a positive effect on occupational expertise. This finding is not in line with our hypothesis and stands in contrast with the other empirical evidence we have generated. But it still can be explained, given that homogeneous relationships also have advantages. For example, interaction with similar partners is associated with lower transaction and communication costs, as both parties may share similar experiences and have more common ground. This may explain the positive effect between homogeneous networks in terms of gender and occupational expertise. Future research may investigate these competing mechanisms (similarity lowers communication costs but also potential value, as outlined above).

The results complement the findings about the antecedents and consequences of advice-seeking relationships prevalent in social network research (Borgatti & Cross, 2003). This is interesting, as seeking feedback is conceptually very different from seeking advice and we cannot just assume similar antecedents and outcomes of different types of networks. For instance, feedback-seeking focuses on the past, while advice-seeking centers on upcoming challenges. The irreversible nature of past actions, however, may leave the feedback-seeker even more vulnerable to others' judgments and might lead to a more intimate, more closed-off network.

Limitations and directions for future research

The meta-analytic strategy applied in this research made it possible to find effects across the samples. The MRQAP analyses of individual samples, however, show varying patterns of effects in the samples. This exploratory

research cannot fully explain why these differences exist. Specifically, while there are many potential differences between the groups—for instance, in terms of climate concerning diversity (Chrobot-Mason & Aramovich, 2013) or learning (Froehlich et al., 2014)—our research does not capture all of these variables. Interestingly, while our model explained a significant part of the variance in the MRQAP analyses in six samples, the effects were less pronounced for the banking sample. One apparent difference between this particular sample and the other samples is the content of work: *ban.at* is a steering committee with its members spread across organizational units. Consequently, their work is less focused on technical details, but more on coordinating and managing. Also, banks operate in a highly regulated environment and may face less uncertainty than the more entrepreneurial organizations taking part in this study. This warrants other sets of competences, ways of collaborating, and making decisions. Future research may consider different sectors, types of tasks, and ways of working.

Also, we cannot assess the role of feedback-seeking relationships that employees may have outside their organizational entity. This may represent a problem given our conceptualization of employability, which also includes the more generic competences of personal flexibility and anticipation and optimization. However, social network analysis demands that boundaries are set that define who is in the network and who is not, and focusing on workgroups is a common approach to that (Cummings & Cross, 2003). According to focus theory (Feld, 1981), individuals who share the same focus (in this case, the same organizational entity) are more likely to interact with each other. This is even more true given the constraining nature of this particular focus (i.e., individuals mostly have no choice who else is part of their respective organizational entity). Therefore, we decided to focus on the feedback-seeking relationships within organizational entities—capturing all relevant interactions is impossible, but we at least collect information about the relationships that are most likely to be of major influence. The strong effects of homogeneity in terms of function on the frequency and perceived usefulness of feedback-seeking empirically support this assumption. Nevertheless, future research may also study feedback-seeking across organizational boundaries. For example, acquaintances who work at different departments or organizations, members of the same sports club, and family members may also be good sources for feedback. In our case, confining data collection to the respective organizational units was also important in terms of limiting confounding effects of proximity. Proximity has received some attention in previous research (e.g., Ibarra & Andrews, 1993; Rice & Aydin, 1991), especially when linked to homophily (Monge & Contractor, 2003; Skerlavaj et al., 2010). However, in this study, the participating organizational entities are small and all employees are relatively close to each other. Also, for

two (additional) Belgian samples that were used for pilot testing, we studied the office plans to see whether proximity should be taken into account—with negative results. In sum, this gives us confidence in stating that proximity does not confound the results pervasively. However, future research may also make use of approaches that are more liberal with respect to network boundaries—for instance, ego-social network analyses or qualitative (Hollstein & Straus, 2006) and mixed methods approaches to social network analysis (Froehlich et al., 2020; Froehlich & Van Waes et al., 2020).

The measurement of constructs used presents another challenge. The self-reported scores of feedback-seeking and employability may raise concerns about common method variance (Podsakoff & Organ, 1986). However, self-appraised employability scores are well supported by theory and empirical evidence (Dries et al., 2014). Also, both the source and the target were asked about the frequency of the feedback-seeking relationship. Nevertheless, future research may use different methods and different sources, such as observations or tracking devices. After all, previous research found employees to rate themselves higher than their employers did (Van der Heijde & Van der Heijden, 2006) and higher than their labor market success would suggest (Patrickson & Ranzijn, 2003).

Practical implications

The results indicate that similarity affects employees' feedback-seeking networks and, subsequently, their employability. This is important to consider, especially because managers often attempt to assemble heterogeneous teams in the hopes of increasing the group's potential to innovate (Miura, 2004). To accompany such measures, this research suggests that it may be advisable to educate the employees about the potential pitfalls of homophily by offering training and sessions for reflection. The aim here could be to encourage employees to use the full potential of their network and reduce the insecurities of contacting "other" people. For instance, this may include assigning tasks to pairs of previously unrelated colleagues with different backgrounds or a general awareness training about one's social network in the workplace. Mentoring or job shadowing programs are also useful interventions. In that respect, the use of social network analysis may be considered as an apt managerial tool to diagnose existing social networks in the workplace and to design specific interventions (Palonen & Froehlich, 2020).

Conclusion

While earlier research has investigated the effects of feedback-seeking on employability, we extend the body of literature by considering both the sources of feedback-seeking and the composition of employees' feedback-seeking networks. The findings suggest that employees are more likely to ask

colleagues and supervisors similar to themselves for feedback. However, having a highly homogeneous feedback-seeking network is not always beneficial for one's employability.

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"I'M TELLING!": EXPLORING SOURCES OF PEER AUTHORITY DURING A K-2 COLLABORATIVE MATHEMATICS ACTIVITY

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Abstract

This article draws from a study on the construction of authority relations among K-2 students across 20 videos of collaborative mathematics partnerships, from three classrooms in one elementary school. Drawing on positioning theory, we explore how authority relations between children affected collaborative dynamics. In particular, we trace how children drew on both adult and peer sources of authority and the effects on peer interactions during collaboration. Through three vignettes, we show how students' deployment of adult authority through the perceived threat of getting in trouble can overpower peer resistance and shut down possibilities for shared work. We also show how peer resistance was productively sustained when the threat of getting in trouble was less directly connected to the teacher, and instead students positioned themselves and one another with intellectual authority.

Keywords

authority relations, collaborative mathematics partnerships, positioning theory

Introduction

Student-led collaborative learning, like all social activity, involves relationships of power among members of the classroom community. Social and relational processes, such as turn-taking, shared attention, the establishment of intersubjectivity, and the uptake of ideas, are affected by forms of power such as status (Cohen & Lotan, 1997) and authority (Langer-Osuna, 2011, 2016). These relationships can shape not only who participates and in what ways (Wood, 2013), but also the nature of the mathematical discussions (Esmonde & Langer-Osuna, 2013), the construction of a mathematical solution (Kotsopoulos, 2014; Langer-Osuna, 2016), and the development of identities as learners (Anderson, 2009; Bishop, 2012). Yet, the study of power in peer-led collaborative learning has been relatively small in comparison to other social, relational, and cognitive processes.

The early elementary years are a time of both introduction to schooling and significant changes in children's socio-emotional development. Studies of how young children come to dominate social situations reveal both prosocial and coercive ways they garner influence with peers (Bohart & Stipek, 2001; Hawley, 2002; Lease et al., 2002; Ostrov & Guzzo, 2015; Pellegrini et al., 2007). Ostrov and Guzzo (2015) found that the most influential children were the ones who readily shared with others and did so in the absence of a teacher directing them to do so. These findings suggest that the construction of influence among peers can promote or disrupt possibilities for productive and equitable collaborative learning, depending on the strategies deployed. Positioning theory shifts the analytic focus from the particular strategies deployed to, instead, a focus on how discursive moves position students in relation to particular rights and obligations, including the right to manage others or the obligation to obey (cf., Langer-Osuna, 2011).

This chapter examines relational power from the perspective of positioning theory (Davies & Harré, 1990), which frames social discourse as not simply communication, but also as an interpretive lens for making sense of activity and locating individuals as kinds of people in relation to socially constructed storylines. For example, in classrooms, the teacher is positioned as a knowledgeable expert and manager of children's behavior. Children are positioned as learners, with a duty to obey the teacher. These positions are both constructed and revealed through interaction, creating relationships of power that shape the possibilities for activity. As such, positioning theory frames the interactional nature of activity as enabled and constrained by the normative possibilities of the authority, duties, and obligations associated with the different characters within the storylines at play (Davies & Harré, 1990). Children navigate lived worlds organized by storylines that afford particular relations of power. Within these storylines, particular roles or

characters take on more or less authority. For example, a child who threatens to "tell the teacher" about the perceived misdeeds of their peer in an effort to influence the peer's behavior is drawing on the authority of the teacher to punish, whereas a child who tries to influence their peer's behavior by insisting that they have greater knowledge or skills is drawing on their own authority in the form of competence. The deployment of different forms of authority shape possibilities for engagement, which we explore here.

In particular, this study explores the sources of authority children draw on in times of struggle during collaborative activity, and their implications for peer collaborative dynamics. Further, we explore whether there are grade-level differences in children's deployment of authority during collaborative activity.

Methods

Study context and data sources

This study is situated within a broader Research-Practice Partnership between a university research team and an instructional team of five teachers at an elementary school in Northern California that served predominantly bilingual Latinx and Pacific Islander communities. The goal of the broader teacher-initiated partnership was to support teachers in implementing student-led collaborative mathematical activity, using the Contexts for Learning Mathematics (CFL) instructional units (Fosnot, 2007) as a curricular resource (see Table 1). The teachers involved in the study worked to create classroom contexts in which children were expected to author and evaluate mathematical ideas and to share this authority with one another productively and inclusively.

Table 1
Data sources and classroom context by grade level

Teacher	Grade	Unit	Number of Videos
Ms. Bene	Kindergarten	Bunk Beds and Apple Boxes	7
Ms. Kim	1st	Bunk Beds and Apple Boxes	7
Mrs. De Waal	2nd	Double Decker Bus	6

Data sources and analysis

Here, we report preliminary findings from an ongoing study focused on 20 total videos of student-led table work across three K-2 classrooms (see Table 1). The classrooms were selected in order to represent the early elementary grades, as the focus of this study. The research team (authors) created analytic content logs of each video at the 5-minute level, focused

in particular on describing children's talk, bodily orientation and gaze, and distribution of resources. Each video was content logged by two researchers and reviewed by the entire research team in iterative rounds of discussion and in the development of the content logs. We then selected moments of peer resistance, in which "multiple [interactional] bids to manage participation, author ideas, offer help, or lead the work are rejected by peers such that there is no settled authority" (Langer-Osuna et al., 2020, p. 338). We found 167 instances (K = 83; 1 = 33; 2 = 51), which we coded for both the type of struggle – e.g. for resources, attention, or a turn – as well as the sources of authority drawn upon. For example, an instance where a child threatened to tell the teacher or other adult on a student was coded as "drawing on adult authority." Codes were developed through iterative rounds of open coding until data saturation was reached. A finalized codebook comprehensively described the sources of authority used, including adult authority, children drawing on their own and one another's competence, the norms and expectations of the classroom, the norms or expectations of society, such as "girls won't like you if you do that," and more. We identified and examined patterns across the K-2 classrooms based on the three most common sources of authority, which we report below. Finally, we chose three instances to explore qualitatively in greater depth through interaction analysis representing each grade and each of the three most common sources of authority. Vignette analysis illuminated how the deployment of different sources of authority shaped peer collaborative dynamics.

Findings

The most frequent sources of authority deployed by children per classroom are indicated in Table 2. For the kindergarten and second-grade classrooms, adult sources of authority, such as the threat of "telling," was most frequently deployed during instances of struggle. In first grade, child/peer sources of authority, such as self-competence, were most frequently deployed. For all three classrooms, classroom norms and expectations was the second most frequent source of authority deployed. While there were differences across classrooms, they did not correspond to grade levels in a way that indicated developmental differences, but rather, differences in classroom cultures for interaction. We define these codes in Table 3.

Table 2
Top two most frequently deployed sources of authority per classroom

K	1	2
Adult Authority	Student Authority	Adult Authority
59%	47%	54%
Classroom Norms and Expectations	Classroom Norms and Expectations	Classroom Norms and Expectations
38%	47%	38%

Table 3
Definitions

Sources of Authority	Definition	Example
Adult Authority	Students explicitly invoke the **teacher's or other adult's power** (as embodied in the teacher person) in an effort to change peer behaviors	[raises hand] to get teacher's attention "I'm going to tell the teacher" "She can see you" "Teacher's coming to check you out"
Student Authority	Students invoke assumed strengths, knowledge, skills, or **competence in themselves or in their peers** in order to change behaviors or resolve struggles	Copy her "Let her do it, she knows how to write" I know how to do this, guys
Classrooms Norms and Expectations	Students invoke the mathematical, socio-mathematical, and social **rules or expectations of the classroom/activity** in an effort to change peer behaviors	We're supposed to do this together You're not supposed to touch that Don't count by ones

We then explored three instances wherein these sources of authority were deployed, and traced their consequences on the collaborative dynamics through vignette analysis. The kindergarten vignette highlights how children drew on adult authority (the classroom teacher, for example) in response to peer resistance in ways that ended the collaboration. The first-grade vignette shows how children at first drew on classroom norms and expectations to influence peers, then shifted into drawing on adult authority in ways that dissolved the collaboration. The second-grade vignette shows how children drew on classroom norms and expectations and peer competence in ways that maintained the collaboration.

Kindergarten: "I'm telling!" "You are telling on me?"

Table 4 offers a vignette of two children, Nicolas and Ashley, working together to represent combinations of the number eight, using a worksheet and a rekenrek (a kind of abacus). In the vignette, Ashley drew on the threat of teacher authority to position Nicolas as behaving inappropriately, while Nicolas protested that he had done nothing wrong. However, despite his protests, Nicolas relinquished task materials in response to Ashley's wielding of teacher authority, folding his body increasingly into himself, spatially and verbally disconnecting from the collaboration entirely.

Table 4
Kindergarten Vignette Transcript: "I'm telling!" "You are telling on me?"

Line	Time	Talk	Action	Figure
1	34:40	N: Ok. One (..)	Nicolas is facing forward and has the rekenrek in front of him. He is counting beads. Ashley is sitting next to Nicolas and is facing forward drawing lines on the paper.	
2		N: There's one on the top and,	Ashley is having a conversation with students sitting across from her about moving the microphone.	
3		N: Two, three, four, five, six, seven, eight.		
4		N: There are eight. A: There's four.	Nicolas shifts his body towards Ashley. Ashley looks over the rekenrek.	
5		N: One, two, three, four. Ok.	Nicolas recounts the beads and Ashley begins to draw circles on the worksheet. Nicolas shifts the rekenrek towards the middle of the table.	
6		A: NICOLAS YOU'RE SUPPOSED TO DO IT!	Ashley turns to Nicolas. Nicolas turns to look at Ashley and taps the rekenrek on the table.	
7		A: I'm telling.	Ashley continues to draw circles on the worksheet.	

8		N: Wha:::t, what I'm doing to you, I'm not doing nothing.	Nicolas continues to move the beads on the rekenrek.	
9		N: Ms. Bene.	Nicolas looks up at the teacher and continues to move the beads on the rekenrek.	
10		A: Ms. Bene.	Nicolas turns to look at Ashley.	
11		A: Ms. Bene.	Ashley raises her hand towards the teacher who is working with a student across from her.	
12		Ms. Bene: Hold on a second.		
13		N: What?	Nicolas places both hands on the table and interlocks his hands and turns towards Ashley.	
14		A: You touched this (.) XXX.	Ashley points at the microphone in the middle of the table.	
15	36:09	N: You're gonna tell on me? Why?	Nicolas puts his head on his hands and looks down, away from Ashley.	

Nicolas represented a number on the rekenrek, which he slid over towards his partner Ashley as he counted the beads aloud (lines 1–5). Ashley responded in protest, asserting that Nicolas was supposed to be doing something else (line 6). Nicolas gestured surprise to Ashley's utterance and tapped his rekenrek on the table (line 6), signaling that he was contributing appropriately (having represented a number on the rekenrek) and thereby resisting Ashley's notion. Ashley then threatened to "tell" (line 7), a move that positioned Nicolas as having done something wrong and facing consequences if his wrongdoing was communicated to the teacher. In doing so, Ashley took on the power of teacher authority by proxy. Nicolas protested that he had done nothing wrong. Ashley then called on the teacher (lines 10–11), who acknowledged Ashley (line 12). Nicolas let go of the rekenrek completely, increasingly folded his arms and then his body into himself (see screenshot, line 15), and ceased his activity as he pleaded with Ashley (line 15).

First Grade: "Gonna find out who's naughty and nice."

Table 5 offers a vignette of two children, Erick and Angela, tasked with making "easy" representations (those anchored in 10) or "hard" representations of the same number on a rekenrek. Angela had been directing her partner Erick, unchallenged, from the start of the collaborative activity. Erick eventually began to challenge Angela's authority after a series of slights: she took his turn recording the bead combination on the worksheet, took the rekenrek from his hands to recount the beads on her own, and then critiqued his work. They engaged in a struggle at first in ways that drew on the task norms and expectations, in particular expectations around turn-taking; while they continued to be in some amount of conflict, they nevertheless sustained engagement. This changed when one of the partners, Angela, began to draw on adult sources of authority, and the interaction was dismantled.

Table 5
First-Grade Vignette Transcript: "Gonna Find Out Who's Naughty or Nice"

Line	Time	Talk	Action	Snapshots
1	27:02	A: Wait I'm supposed to write this one.	Angela makes 13 on the rekenrek, 10 on the top and 3 on the bottom.	
2		E: Okay.		
3		A: Okay we have to do this one and then I think then this one, remember?	Angela is drawing on the paper, Erick turns towards her watching.	
4		E: Nuh uh.		
5		A: Uh huh.		
6		E: I do the hard way.		
7		A: Yeah this is the easy way. Ten...okay now my hard way.		
8		E: My hard way.		
9		A: You do the hard way.		
10		A: What's this?	Erick is making 13 with 5 on top and 8 on the bottom. Angela touches the microphone on the table.	

11		O: That's to record your voice.		
12		A: Is it?		
13		E: Hellooo.	Erick leans in to the microphone.	
14		A: Ask her.		
15		E: It's the camera.		
16		A: What's this?		
17		E: I'll show you it's the camera.	Erick drops out of his seat, crawling on the ground to show how the microphone wire connects to the camera, Angela continues talking to Olivia at the table.	
18		A: She says it's to record your voice.		
19		O: No that's the camera.	Olivia points to the camera.	
20		A: Oh. Maybe you could ask her, what is this?		
21		E: Counting now, counting! The bus is moving!	Erick comes back, and starts moving the rekenrek on the table like a bus.	
22		A: 5, 10, 11, 12, 13!		
23		A: 5 on the top and how many on the bottom?	Angela starts drawing on the paper.	
24		E: You wrote yours so I write mine. I didn't get to write mines!	Angela keeps drawing.	
25		A: You're doing this one, then I do this one.	A is pointing to the paper.	
26		A: Wait, how many?		
27		E: 8!		
28		A: 1, 2, 3, 4, 5, 6, 7, 8	Angela counts the 8 bottom beads on the rekenrek while Erick has it clasped in both hands.	
29		A: You did the opposite of me!	Angela keeps drawing.	
30		A: Never mind!		

31		E: No I didn't!		
32		A: Wait. Wait, wait, wait. Let me see.	Angela takes the rekenrek from Erick.	
33		E: look! 1 and 8.	Erick points to the paper.	
34		A: Wait. 1, 2, 3, 4, 5. 1, 2, 3, 4, 5, 6, 7, 8.	Angela counts beads on the rekenrek. Erick puts his head down on the table as Angela counts. Across the table, Olivia says to her partner, "now it's your turn" and she and her partner switch materials.	
35		E: You see Olivia's not doing it the same way you do it.	Erick pops back up, looking at the partnership across the table, using his pen to manipulate the microphone wire, which is taped to the table. Angela does not respond.	
36		A: Stop doing that, Erick!	Erick starts nudging his pen under the microphone wire.	
37		E: I was just like this.	Erick shows how he is sliding the pen under the wire without moving the microphone.	
38		A: Or else Imma tell. You can't do that. You're ripping off the tape.	Erick picks up his pen, closes the cap, then rests his head in his hands.	
39	29:49	A: (singing) "Gonna find out who's naughty or nice, Santa Claus is coming…"	Angela rests her head in her hand, looking at the paper in front of her.	

Erick's first challenge to Angela's directives (lines 4–9) involved a series of turns where Erick held his ground (lines 4, 6, 8). Angela then turned attention to the microphone, engaging Erick in conversation about it (lines 10–12). Angela tried to reclaim authority by issuing directives about the microphone (lines 14, 20), which were again unsuccessful. Erick re-engaged Angela with the task and asserted his right to contribute (line 24). Angela continued to issue unsuccessful directives or complaints (lines 25, 29, 36), then invoked the authority of the teacher, threatening to tell on Erick (line 38). She then further invoked the authority of Santa Claus, whose Christmas Eve visit was

only weeks away, by singing the lines, "Gonna find out who's naughty and nice" (line 39). Erick acquiesced; he stopped his actions entirely, and lowered and shifted his body away from the partnership.

Second Grade: "We are never going to finish!" "Copy us, please!"

Table 6 offers a vignette of two partnerships working at the same table: Fale and Aaron, and Valeria and Gabriel. Each partnership was working to determine how many empty seats were on the top of a double decker bus using a worksheet and a rekenrek. The children were explicitly instructed to first write their name, their partner's name, and the date on their worksheet. While Aaron quickly completed the instructions and began working on the problems with Fale, Gabriel sat staring at the worksheet until the teacher approached him and reminded him that there were three things that needed to be written at the top of the worksheet.

Table 6
Second-Grade Vignette Transcript: "Are You Kidding Me?!"

1	33:30	V: We're never gonna finish it. He doesn't even know what to do with (XXX)		
2		F: Copy us, copy us, please, I just, I don't kno::w I just feel bad for them.	Fale turns paper to face Valeria.	
3		F: So put two on there...	Fale points to a spot on the paper he is holding and Gabriel starts erasing something on his own paper.	
4		F: Wait, copy the date.	Fale puts his hand on Gabriel's paper. Gabriel pulls it away and continues erasing. Fale points to a spot on his paper.	
5		F: Let Valeria write, she knows how to write.	Fale reaches to touch Gabriel's paper and Gabriel pulls it from Fale and towards himself.	
6		G: I know how to write.	Gabriel looks at the board and continues to write on his paper.	

7		V: Don't write that (XXX) the date.		
8		F: Is is this right?	Fale points to something on his paper.	
9		A: ten slash twenty six		
10		V: You don't know how to do it?!	Gabriel holds the paper and turns towards Valeria.	
11		A: Look, it's ten(..)		
12		[overlap] V: Are you kidding me?!		
13		[overlap] A: slash(...) two thousand		
14		F: The da:::te! The::: date.	Fale turns the paper he is holding towards Valeria and Gabriel and points repeatedly to it.	
15		F: One:: zero, put one(..)one(..)put a one!	Gabriel continues to write on his paper.	
16		V: Can I do it right now yet?		
17		F: Could you just do it?	Fale puts his hand on Gabriel's paper.	
18		F: one, zero		
19		[overlap] A: one, zero		
20		[overlap] F: one		
21		[overlap] A: zero		
22		[overlap] F: zero!		
23		A: slash		
24		[overlap] F: slash		
25		A and F: slash!		
26		(XXX): goodness		
27		A: twenty-six		
28		[overlap] V: twenty-six		
29		A: two six		
30		[overlap] V: two six		
31		G: two(...)six	Gabriel continues to write.	
32		V: six!		
33			Gabriel starts erasing.	
34		G: I don't get this, you guys are(..)		

35		F: Just write your answer, put two and six right here, goodness.	Fale points to Gabriel's paper. Gabriel pulls it away and continues to write.	
36		G: I know		
37		(XXX): Go::sh, twenty six		
38		F: one, two(...)one, two(...)two!	Fale turns his paper towards Gabriel.	
39		V: two		
40		V: goodness:::		
41		A: zero		
42		F: one five		
43		[overlap] A: one five		
44		F: Go:::sh you got to understand this, Gabriel!		
45		G: I just don't(..)		
46		V: Ok, now two and six		
47	35:20	G: Look, I can copy it right there, I was copying it right there, remembering, but she said 'no:: no::'		

Fale, Aaron, and Valeria interacted with Gabriel in ways that created a sense of urgency to direct him towards quickly completing the opening instructions. While the teacher's authority was not directly referenced, utterances by Gabriel's peers (lines 1, 2, 10, 12, 14–32, 35, 44) such as, "We are never going to finish it" (line 1), "Copy us, copy us, please!" (line 2), "Are you kidding me?!" (line 12) marked a perceived need to rush and implied consequences to running out of time. Gabriel's peers also positioned him as lacking competence that they themselves had. For example, Fale directed Gabriel to "copy us" (line 2) and to let Valeria write the date (line 5). Gabriel resisted both the group's directives and their positioning, stating that he knew how to write (lines 6, 36, 47) and pulling the worksheet closer towards himself (lines 5, 35). Unlike in Vignettes 1 and 2, where the direct threat of adult authority overwhelmed resistance against directives, here, Gabriel was able to resist his peers' directives and remained engaged in the task.

Discussion

The sources of authority that children draw on–that is, the stories about authority they use to influence one another or resist influence–can have implications for the ways in which they learn and work together. Drawing on the power of adult authority through the perceived threat of getting in trouble can overpower student resistance to a peer's commands and shut down possibilities for shared work. When the threat of getting in trouble was less directly connected to the teacher, and the children positioned themselves and one another with intellectual authority, peer resistance was sustained and all the children remained engaged in the collaboration.

Classroom-level differences suggest that dynamics around authority are tied to instruction and are not necessarily developmental. In new analyses, we are examining the case of the first-grade classroom, in particular, in which the students most frequently drew on student authority and classroom norms and expectations. Bringing these preliminary results together with other studies from this broader project, we are finding that even young learners can learn to take on and share intellectual and social authority in productive and inclusive ways and that particular kinds of classrooms support these aims.

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STORIES OF TEACHERS' IDENTITY: BETWEEN PERSONAL AND PROFESSIONAL EXPERIENCE

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Abstract

Teacher identity is one of the key factors influencing the form and quality of educational processes. The aim of our literature review is an analysis of research on teachers' narrative identity in primary and secondary education. We used the Web of Science database and selected studies from 2010–2020 in English. The analysis shows that the area of teacher identity can be viewed from the points of personal and professional identity and their interplay. The data about teacher identity were collected mostly as narratives showing teachers' experience of their profession and their selves. Professional identity is investigated in terms of diversity in classroom discourse, curriculum, and professional development. Research on a teachers' personal identity focuses primarily on gender, parenting, sexual orientation, ethnicity, culture, political orientation, and national identity. The study illustrates an interplay of professional and personal identity.

Keywords

teacher identity, professional identity, personal identity, narratives

Teacher identity is formed and reformed by the stories teachers tell and that they draw upon in their communications with others (Beijaard et al., 2004). Connelly and Clandinin (1999) developed the narrative term "stories to live by," referring to "a narrative way of thinking about teacher identity [that] speaks to the nexus of teachers' personal practical knowledge and the landscapes, past and present, on which teachers live and work." The temporality of individuals' experiences combined with the social networks in which they have worked and lived shape who they are and who they are becoming (Schaefer & Clandinin, 2019).

Based on these premises, we decided to analyze the personal and professional landscapes of teachers' identities as portrayed in their narratives. The goal of this study is to review current research on narratively constructed identity by teachers. This study reveals "stories to live by which denote teacher identity" (Li et al., 2019, p. 293) and thus contributes to the special issue answering the question of how identities of teachers are constructed, specifically in personal interactions and professional interactions, including staffroom interactions.

Teacher identity in narrative construction

With respect to narrative studies, we focus on identity as a social construct; however, this approach has taken a number of different routes (cf. de Finna, 2003). We chose to examine narrative identity based on a research project focused on narrative identities in alternative education (footnote 1). Ricoeur's (1991) use of the adjective "narrative" enriched the analytical approach to identity. In our research project, we rely on the concept of narrative identities as more situational or "episodic" (Holler & Klepper, 2013), and we examine them in relation to teachers. Identity is not a single stabilized entity that teachers acquire at some point in life; instead, one might enact distinct identities throughout various stages of life and through the disparate contexts one traverses (Park & Schallert, 2018) or even through dialogues during different situations within a day (Akkerman & Meijer, 2011). Identity is an ongoing process, and it changes its form (Alsup, 2006; Beijaard et al., 2004). Thus, teacher identity is dynamic, multifaceted, negotiated, and co-constructed (Edwards & Burns, 2016), as are the identities of other participants in education. While identity has been conceptualized differently, "what these various meanings have in common is the idea that identity is not a fixed attribute of a person, but a relational phenomenon" (Beijaard et al., 2004, p. 108). "Narrative approach to identity shows that teacher identity derives from the sociocultural orientation, emphasizing the multiplicity, discontinuity and social nature of identity" (Schutz et al., 2018, p. 186). When focusing on life in schools, the situational aspect of teacher identity plays a role.

If researchers take into account the situational aspect of identities, they usually assume that the main focus should be to observe how the participants in interaction are oriented toward one another and one another's categories "here and now" (Törrönen, 2014). A lifelong series of these "here and now" moments construct a teacher's lived experience and could be investigated narratively.

Identity is constructed in interactions; it is also constructed narratively in teacher speech referring to these interactions. Narrative identity might be conceptualized as a co-construction of reality (cf. Riessman, 1993). Emerging research on teacher identity in the last two decades is shifting from the traditional notion of teachers as professionals who acquire predefined professional standards to teachers as whole persons and agents who make sense of themselves and their teaching practices (Korthagen, 2001). Current research focuses on aspects of teacher identity constructed in their narratives such as gender or subject matter. There is a lack of synthesizing research. Therefore, our analysis leads to an overview on professional and personal teacher identities constructed in teacher narratives as these identities impact student learning (Schutz et al., 2018).

Methods[1]

The research question for the literature review was: What factors influence the identity of teachers in published narrative research from 2010 to 2020?

For the literature review, the Web of Science (WoS) database was used, and research studies in English from 2010 to 2020 were collected. The keywords *narrative research* AND *identity* were entered in combination with AND *education* (area 1), AND *teachers* (area 1), AND *directors/principals* (area 2), AND *pupils/students/learners* (area 3), AND *parents* (area 4). Due to the large number of resources, we subsequently focused only on narrative research of teachers in primary and secondary education. The teachers' identities were not specified as only for private schools or for the Czech Republic, but for education in general.

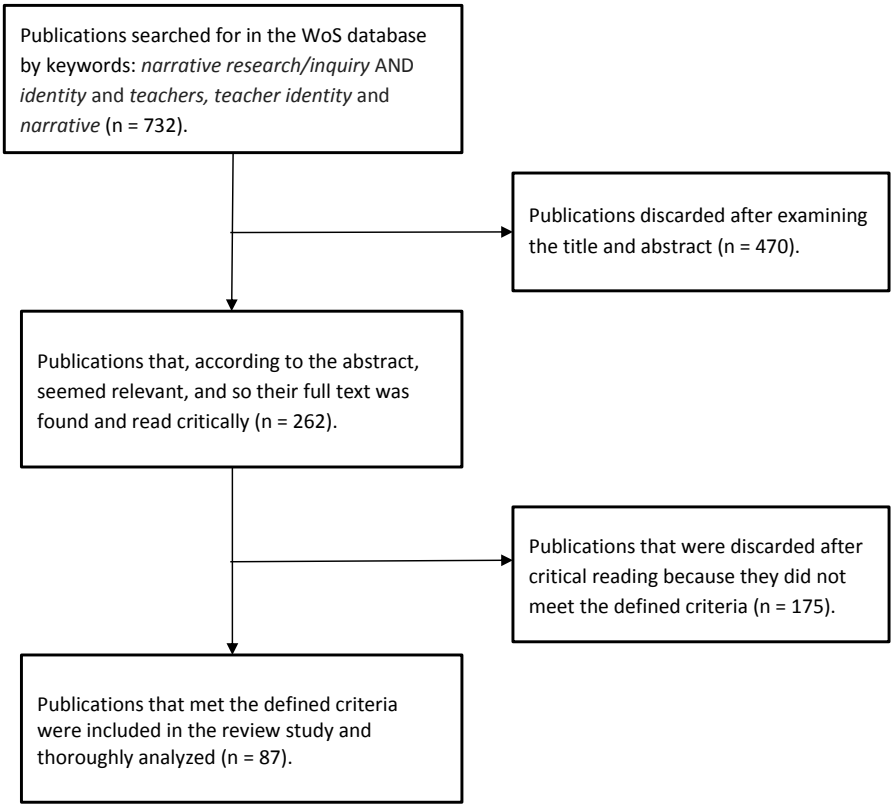
[1] This review study of teachers' identities is a part of our research on Narrative identities of participants in education at private alternative schools (project No. GA20-12828S) funded by the Czech Science Foundation, in which we map the identities of participants in Czech alternative education within the area of narrative research. In that project, we focus on the narrative research of teachers, student teachers, school principals, pupils, and parents.

A total of 558 studies from a direct search on the given keywords *narrative research* AND *identity* AND *teachers* were found, and another 174 studies were found with the keywords *teacher identity* AND *narrative*. From these studies, 470 studies were excluded after the title and abstract were examined. Studies were included that reported on teachers focused on primary and secondary education. Studies focusing on teachers in pre-primary and tertiary education, on teachers in their pre-service phase, and on educators outside of the context of formal education were excluded (see Figure 1). In terms of the pre-service phase, studies about in-service teachers referring to their pre-service phase were included. Studies that did not discuss the identity of the teachers were excluded. Some, for example, discussed the identity of other actors in education, such as students. In total, 262 full texts of studies were read, and 87 studies were analyzed in detail.

The research studies were qualitative; the keyword *qualitative* was found in 28 abstracts. In terms of research methods, the keyword "interview" was found in 62 abstracts. The aims of these studies were mostly to explore how teachers negotiate their identity: explore professional identity development"; "negotiate identity"; "examine lived experiences", "provide insights into teachers journeys"; "investigate second/foreign language teachers' translingual identity development"; "explore cultural knowledge and lived experience in pedagogical practice"; "describe memory and life story process engaged in by teachers". The studies also investigated the effects of phenomena on teacher identity and teachers: "investigate the effects that a changing world and precarious job conditions can have on newly qualified teachers' sense of engagement"; "analyze training implications"; and "investigate emotional demands on teachers."

Factors forming the identity of teachers were extracted from the analyzed studies. These factors were then divided into two categories: professional and personal. "Professional" refers to the professional career of teachers. These factors are exclusive for the teaching profession, e.g., classroom discourse or professional development of teachers. "Personal" factors are factors not directly linked to the teaching profession, such as gender, ethnicity, or parenting experience.

Figure 1
Sample for the literature review



Stories of professional identity

Stories of professional identity consist of teachers' narratives focused on their professional lives. Teacher identity is formed through integrating a number of sub-identities flowing from different working contexts and professional relationships. Teachers tell stories about their professional life and themselves within this context. In this chapter, classroom discourse appears to be an important source of teachers' narrative identity, followed by curriculum matters; finally, the phase of professional development is mirrored in teachers' narratives.

Diversity in classroom discourse portrayed in teachers' stories

The call for papers of this monothematic issue of *Studia paedagogica* cites Foucault's assumption that social phenomena are constructed from within discourses. We would like to start with classroom discourse as an area in which teachers construct their identity in their narratives. Teacher identities are multiple, fluid, and dynamic, emerging in interactions in one important discursive space of their lives: the classrooms where they converse with students (Juzwik & Ives, 2010). In the critical education perspective, classroom discourse includes issues related to social justice such as the ideas of equitable redistribution and knowledge (Salvador & Kelly-McHale, 2017).

Classroom diversity is an important issue within the classroom discourse, as our review revealed. In their narratives, teachers may express problematic issues of student diversity in relationship to their own professional identity. Wagner and Hu (2020) showed that teachers found that the diversification of Luxembourg society led to diverse classrooms. This classroom diversification was linked to a fear of marginalization—that by giving other cultures and languages too much importance and space, it was possible to lose one's own cultural traditions and thus identity. Thus, these teachers' identity was connected with their own cultural traditions. In fact, classroom diversity might be a transformative power for teacher identity. In their narratives, teachers refer to their students' otherness (racial, socioeconomic, sexual orientation), which leads to a naming Self-Other relationship. Thus, through the diversity of their students, teachers think about themselves. Diversity requires Self–Other transformation, especially in the field of emotions. In order to teach, teachers need to understand the emotions that support their identity and the identity of their students. Keith (2010) explained that black and white racial identity in schools revealed different emotional paths that must be taken before people can understand themselves and one another. Another category that the teachers in the research by Wagner and Hu (2020) used to differentiate among themselves and their students was their sociocultural background. They referred to the social environments of their students to explain their behavior and their performance at school. The investigated teachers relied on concepts of identity and culture. They established a specific connection between the development of identity and the fact of being rooted in a cultural and linguistic tradition (Wagner & Hu, 2020).

In the reviewed studies, we can identify the interplay between racial identity and teachers' commitments to social justice. Racial identity is defined as the significance and qualitative meaning that individuals attribute to their membership within a racial group (Livingston et al., 2020). Regarding teachers' black identity, in the narrative of a black teacher in a southwestern U.S. urban middle school by Zhu (2020), the teacher improved her students' academic performance by confirming the funds of their identities – she brought her

students' community cultural wealth, such as rap, police brutality, immigration, and legal issues, into her classroom. In examining the relationship between racial identity and classroom discourse, Zhu (2020) suggested that this black teacher's story could inspire more urban teachers to reflect on their professional identities and repertoires of instruction; for instance, this teacher's culturally responsive pedagogy might act as a powerful lens through which urban teachers could examine sociopolitical discourses contributing to the "achievement debt."

Classroom diversity may be a challenge for the construction of teacher identity where the racial and sociocultural contexts of teachers and students differ; on the other hand it may be a source of justice-oriented pedagogy, by drawing on students' community cultural wealth, funds of knowledge, and funds of identity in teaching where the racial and sociocultural identity of teachers and students is close.

Student disabilities represent other fields of classroom diversity. Franklin (2017) focused on a disability-as-deficit model that labels those students who receive special education services as somehow less, as outside the norm, as others. In his autoethnographic exploration, he explores the intersection of sibling (a brother he has with Down syndrome) and special educator knowledge. He explains how his teacher knowledge creates his identity differently than the identity of his colleagues. Inclusive education is brought into practice through teacher identity. Naraian (2016) discovered a dilemma in interviews with teacher educators in the U.S. working towards inclusion: should they consider themselves special educators, inclusive educators, or general educators – or all three? This study disclosed that learning needs formed the pivot around which educators established their sense of competence and professional self-worth, thereby reinforcing the boundaries for different kinds of learning spaces.

Classroom diversity in terms of LGBTQ students was researched by Smith (2018). Teachers used the phrase "all students" as a mechanism to include LGBTQ students in their professional narratives without naming them and their particular needs.

The classroom diversity issues discussed are manifested within classroom discourse and seem to be a vital force for teacher identity construction.

Subject-matter portrayed in teachers' stories

In terms of curriculum and subject matter, teachers of science (Lutovac & Kaasila, 2019; Murphy et al., 2017; Novelli & Ross, 2017), physical education (Fadale & Powell, 2017; Landi, 2018), arts (Kraehe, 2015) and most of all second languages (EFL) have been researched (Ahn, 2019; Aneja, 2016; Avalos-Rivera, 2019; Lieva, 2010; Liu & Xu, 2013; Loo, 2018; Pennington, 2016; Raman & Yiğitoğlu, 2018; Torres-Rocha, 2017; Trent, 2017; Wolf & de Costa, 2017). Although we studied many papers in this category, in terms of our

research project based on the field of humanities and an extensive body of literature in this field, we illustrate only the example of languages in this article. It is not a coincidence that language teachers have been researched in terms of their identity, partly because research into teacher identity has found that identities are performed through a combination of language features (Poole, 2020). According to Pennington and Richards (2016), a person's identity as a language teacher relates to the person's language background and language proficiency. For EFL teachers, transnationalism seems to have been paramount to enacting identities. For example, in the life stories of teachers who have experienced migration moves between Mexico and the U.S., while living in the U.S., a teacher seemed to be well aware that it was important to preserve his Spanish language; when he decided to leave the U.S., he made an effort to maintain social, cultural, and linguistic connections with the U.S. to preserve the transnational identity he had constructed as a result of his passages in both contexts (Mora Vázquez et al., 2018). Also, the subject and content of instruction, the methods and approaches to teaching, and the students and specific context in which one teaches are important factors influencing teacher identity (Pennington & Richards, 2016). As for students, the narrative analysis of an English teacher by Avalos-Rivera (2019) revealed that students played an important role in his professional identity negotiations. He presented his ability to construct a friendly relationship with his students as essential in legitimizing his position as a teacher. Construction of teacher identity in curricular conversations with students in the classroom is vital, but identity is also constructed in other social spaces (e.g., teachers' staffroom, lunchroom conversations with colleagues, research interviews) where curriculum might be a topic (Juzwik & Ives, 2010).

Identity also depends on whether the teacher is a native speaker or a nonnative speaker. For native speakers, accent matters. In the research by Aneja (2016), one of the teachers mentioned that "British accents were fashionable in China decades ago and American accents are becoming increasingly common and Australian is definitely no good." Identity is co–constructed with other sub-identities, such as race, socioeconomic class, and country of origin. This complicates the native–nonnative dichotomy (Aneja, 2016). A teacher's identity as a nonnative English speaker in a study by Avalos-Rivera (2019) clashed with some of his students who, thanks to their privileged access to cultural capital, had experienced English in ways that the teacher perceived as superior to his own. To compensate for this power differential, the teacher attributed his success in neutralizing student hostility to his participation in a competition in which he positioned himself as a leader. Therefore, in this teacher's story, his professional identity was successfully negotiated as he engaged in relevant social practices with his students. These practices, although not connected to English teaching, allowed the teacher to gain his students' respect.

In the narrative research of EFL teachers in China by Poole (2020), there was tension between Chinese and English professional identity, conveyed in the frequent use of the conjunction 'but' in the researched teacher's narratives. In this case, the teacher' s decision to enter the teaching profession was based on strong personal reasons rather than a more pragmatic decision to teach English for its perceived symbolic capital. Reasons for entering the profession may play a role in teacher identity construction, not only in second language teachers.

Rahimi and Bigdeli (2014) interviewed EFL teachers in Iran. The results revealed nine role identities: teacher as vendor, teacher as entertainer, teacher as motivator, teacher as expert, teacher as learner, teacher as socializer, teacher as reflective practitioner, and teacher as collaborator. It was also revealed that participants invested in the role identities that were supported by positive feedback from others. The role of others is crucial for teacher identity; positive feedback for teacher identity construction was also found by Trent (2017).

Teacher identity interplays with teaching practice. For foreign language teachers, code switching might be an example. Raman and Yiğitoğlu (2018) found that teachers were taking multiple identity positions when justifying their code-switching practices, i.e. their personal identities, non-native English teacher identities, language learner identities, and linguistic identities. Qin (2019) examined how curriculum became a resource for identity in one ESL classroom. The ESL teacher narrated her journey into teaching as an instructional example and performed a dominating teacher identity rhetorically portrayed in a morally positive light.

In spite of the fact that classroom context is more important than school context for a teacher's identity construction (Juzwik & Ives, 2010), the broader educational context also matters. Educational reform seems an influencing factor for teacher identity. Turvey et al. (2012) described a standards-based reform experienced by teachers and their students in connection to the identity of both. As for teachers, Wee Teo (201) captured a schoolteacher who described the curriculum reform as "walking a tight rope." De Villiers (2016) introduced educational reform and the way that the new school curriculum served as an impetus for professional development for teachers.

Identity construction within a Catholic school in Australia shows how school context matters (Sultmann & Brown, 2019). However more focused on curriculum reform itself, Liu and Xu (2011) examined the complexity of teacher identity in the broader context of a reform in which teachers had to reconcile conflicting selves. Bechard (2017) captured the autobiographical narrative of identity shift caused by transformative moments in international teacher travel experiences in sociopolitical changes in context, especially demographic shifts, with increasingly diverse learners, curricular mandates, high-stakes accountability, technological advancements, and globalization. As the educational environment evolves, so must teacher identities.

Although focused only on EFL teachers, several areas of identity construction in teachers emerged that could also be found in other subject matters. Avraamidou (2014) synthesized the findings of 29 empirical studies on teacher identity within the field of science education. Studying teacher identity within reform recommendations, conducting life-history studies, and examining teacher identity enactment in school classrooms happened in science classrooms as well as in language classrooms. With respect to curriculum differences, teacher identity is co-constructed with different actors from the micro-social level of the classroom to the macro-social level of educational policy (e.g., educational reform).

Professional development of teachers portrayed in teachers' stories

Teaching practice periods and in-service experiences appear to be highly influential for identity development (Anspal et al., 2012; Dreon & McDonald, 2012). Trent (2017) offered an in-depth analysis of the experiences of two teachers during their initial year of full-time teaching in Hong Kong schools. Teacher identity construction was captured in two very different experiences, as one teacher justified and reaffirmed her determination to pursue a career within English language teaching and the other made the decision to leave the teaching profession. The reflected positive experiences of lesson observation by the principal of the teacher who remained in the profession stand in contrast to that of the teacher who left the profession. The teacher who left rejected the principal's preferred mode of teaching as "too boring" in contrast to his own preferred "interactive approach" to teaching. Schaefer (2013), in a study based on autobiographical narrative inquiry, showed how important the lived experiences of each individual are and how important the stories are that bring beginning teachers to the profession or lead them out of the profession. Teachers have two important stories: "stories to live by" and "stories to leave by," which are associated with leaving or staying at the school (Schaefer, 2013). If the teacher stays at the school, narratives as experienced teachers or even veteran teachers develop.

One important topic in the phases of teacher development is the stage of novice or beginner teacher identity (Craig, 2014). Novice teachers often undergo an identity shift from learner to teacher. Novice teachers in the study by Huang et al. (2019) experienced four processes related to their beliefs in their teaching work: 1) confirmation, during which the novice teachers strengthened their prior beliefs, 2) realization, which refers to the process during which the novice teachers became more fully aware of or developed a new belief in teaching, 3) disagreement, which took place when the novice teachers rejected their previously held beliefs; and 4) elaboration, during which

the novice teachers deepened and expanded their existing beliefs by adding in new dimensions. For novice teachers, the gap between theory/beliefs and practice is often discussed. Schatz-Oppenheimer & Dvir (2014) showed how to help resolve the gap between fantasy and the professional reality of novice teachers, which is how "stories to live by" are supported. Golombek and Klager (2015) showed how imagining different perspectives in teaching is a way to support the creation of a new identity for a novice teacher. Another important way to support "stories to live by" is to support a beginning teacher's identity through diverse emotionally significant relationships in the micropolitical context of the school (Uitto et al., 2015b) or institutional support in providing opportunities (Huang et al., 2019). Former teachers or mentors seems to be crucial for novice teachers' construction of identity. In their written narratives, almost all 342 teachers in one study (Cardelle-Elawar & de Acedo Lizarraga, 2010) mentioned former teachers as a source of inspiration and role models to imitate in their current classroom practices.

In a longitudinal study, Barkhuizen (2016) investigated the imagined identities of an English teacher in New Zealand in the pre-service phase and compared these with the identities she had negotiated in her teaching practice nearly nine years later. During her teaching practicum, she was mistaken for a cleaner in the kitchen because of her Pacific Island (Tongan) appearance. This incident is what she remembers most about her practicum experience. The change of identity in this case is shifted from a desire to teach immigrants to teaching mainly white and international students in a privileged school in a high socioeconomic suburb of Auckland.

Another challenge for novice teachers might be educational reform, as the story of a young teacher by Liu and Xu (2011) revealed. The teacher felt "included in" and "excluded from" the community; the authors showed how this teacher coped with an identity crisis in the midst of educational reform. This research created a portrait of a teacher's identity experience in, through, and beyond the community. The story recounted a critical incident that led to the teacher leaving the community.

As for practicing teachers, Kauppinen et al. (2020) found in their narrative research that in-service training plays a role in the construction of professional identity. The education program for in-service teachers affected the pedagogical thinking and professional orientation of all participating teachers in some way. In the narratives, the teachers' identities were transformed or strengthened mainly by the adoption of new or cultivated ways of planning, implementing, and evaluating innovations in instruction. In contrast, only small changes emerged in the teachers' pedagogical mindset and professional orientation. These teachers could not rid themselves of the various defenses that regulated their actions both in the education program and in the classroom (Kauppinen et al., 2020).

In-service training may have different landscapes, such as the teacher-scientist partnership in the western U.S. (Giamellaro et al., 2020). The teachers were at first the learners and then became the teachers/narrators. Even though the teachers highly valued their experiences with the scientists, they generally did not bring them back to the classroom as independent stories. In this case, the teachers' narratives were based heavily on the scientists' narratives. Thus, teacher identity and teaching practices are interconnected. Another example of an in-service training landscape is that teachers who held a positive attitude toward their professional identity are more autonomous in their teaching practices than those with a negative attitude (Qian & Huang, 2019).

Educational experience is not the only significant factor for identity construction of in-service teachers. Besides learning in training courses, teachers learn through their life experiences within the schools. Public school teachers share narratives in the workplace to understand their identities in the changing educational system (Gilmore & Kramer, 2019). Conway and Hibbard (2018) focused on the micropolitical landscape of the school in teachers' narratives. Metaphoric models were used to describe participants' salient roles in the micropolitical landscape, sometimes defined by relationships with administrators, teachers, parents, or students.

Besides learning in the workplace, leaving the workplace for a while, especially in terms of an international experience, is also vital for a teacher's identity and professional development. Ospina and Medina (2020) researched a group of visiting teachers in the United States in terms of the benefits from their intercultural experiences and the challenges they faced. For benefits, teachers mentioned that the visit helped them build a good rapport with students, which affects the teachers' self-esteem. However, culturally different educational contexts also bring challenges. It appears that some school districts made efforts to support international educators by assigning a mentor, although those efforts were not structured enough to provide sufficient support and guidance to the mentees (Ospina & Medina, 2020). How the cross-cultural teaching experience of a Chinese beginning teacher in Singapore influenced the development of his professional teacher identity was captured in the narrative study by Yip et al. (2019). The main challenges to the teacher's identity in cross-cultural teaching according to this study are: identity confusion; adjusting to the local environment, standards, and pedagogy; stress and fear.

Prout et al. (2020) explored the unique nature of narrative research in fostering intra-personal transformation of veteran teachers in Australia. The author, as an experienced teacher and teacher educator himself, revealed transformative moments for participants and for the researcher himself within narrative research, especially during moments of nonverbal communication. Narrative research seems to be a strong tool for capturing participants' identities during their professional lives as well as the identities of the researchers.

Stories of personal teacher identity

Teacher identity, as shown in the analyzed studies, is influenced by many personal and cultural factors like gender, age, sexual orientation, parenting, ethnicity, culture and language, national identity, political orientation, religion, and emotions.

Gender portrayed in teachers' stories

The main topic in the area of teachers' gender identity is that women are often under-represented in secondary school headships. For example, Smith (2012) reported that a third of secondary headships were held by women in England and Wales. Based on questionnaires and interviews, she described the differences of female and male student teachers' professional aspirations at a UK university (Smith, 2014). Whilst there was commonality in interest in subject leadership and teaching- and learning-oriented roles such as Advanced Skills Teacher, women were more likely than men to aspire to the post of Special Educational Needs Coordinator, and men were more likely to aspire to the most senior posts, especially headship. Whilst both showed awareness of the challenging aspects of management, men were more likely to perceive the advantages and to envisage themselves as headteachers. There was also a difference in the ways in which men and women constructed teaching and leadership (Smith, 2014).

Smith (2012), using life history interviews with 40 secondary school female teachers in all stages of their professional careers in the UK, looked at the main factors affecting their career decisions and drew up a typology of female teachers' approaches to career, identifying two types: those who defined their teaching career as self-defined and planned, and those who saw their career paths as defined by external factors, where the circumstances of their lives and jobs (available opportunities, limitations, level of support from others, fate, chance events, family responsibilities, partner's attitude, and so on) framed their decisions, and in some cases, stymied their potential progress (Smith, 2012). The external factor type of woman used passive language, compared to the self-defined type. Smith (2012) reported women's lives as characterized by conflict and contradiction. Women negotiated life and career decisions within the limitations of their lives, both conforming to and opposing the constraints on their freedom. The ways in which they conformed or resisted varied according to the particular context of their lives. In Smith's (2011) research, 10 head teachers spoke very positively about their roles, while the other 30 women teachers interviewed were adamant that they would not consider headship as a career option.

Smith (2012) found that the women's rejection of headship was based for the most part on a set of perceptions of headship that discouraged them from aspiring: "It was seen as inevitable that the headship role would take teachers out of the classroom, away from children, so compromising their pupil-centered values. It was seen to require an ability to be tough, which entailed isolation and loss of popularity, and it was seen to involve dull, uninspiring work, dealing with bureaucracy and finance. Finally, it was seen to impact negatively on one's home and family life." Many of the women who were adamant that they would not consider headship said they would consider it if the school leadership culture were more in harmony with their values and preferred ways of working. These results show that female headship rejection is not a simple matter of lack of ambition or self-belief, as some previous studies had suggested.

Sexual orientation portrayed in teachers' stories

Some of the most significant research about LGBTQ teachers emerged in the 1990s (e.g., Griffin, 1992; Jennings, 1994), providing nascent understandings of the conflicts that LGBTQ teachers negotiated between their personal and professional identities. The personal identity of teachers is connected to their sexual orientation, which can cause tensions, as teachers often invest much of themselves in their work, blurring boundaries between the public and private (Llewellyn & Reynolds, 2021). Many teachers share details of their lives as a way to build LGBTQ rapport with students, but this is often denied LGBTQ teachers as a "heterosexual privilege." Many LGBTQ teachers experience pressure to be role models for young people (Neary, 2013), despite the fact that young people do not commonly look to teachers to be role models. LGBTQ teachers are particularly aware that their silence adds to the underlying heteronormativity in society (Endo et al., 2010).

Queer teachers' identity is a substantive topic of teacher identity; we can find many articles about this topic. Endo et al. (2010) pointed out that very often queer sexual identity is separate from the teacher identity. Landi (2018) formulated some recommendations for queer physical education. Lander (2018) reported on queer English language teachers in Columbia and their image in society. Bracho and Hayes (2020) studied literature on gay teachers of color and reported that rectifying their image requires queer colored educators to examine their experiences within the intersections of race, gender, class, and other dimensions of identity.

To sum up, LGBTQ teachers often report developing strategies that protect their professional identity, one of which is building a super-teacher identity as a means of deflecting attention from their sexuality (Endo et al., 2010).

Because they are good teachers, they have not experienced any discrimination, but they fear discrimination because of potentially systemic, rather than overt, homophobia (Msibi, 2019). In their own view, they have to work harder to prove their worth and build an identity that would be difficult to criticize (Msibi, 2019). Therefore, these teachers construct the identity of a hard-working teacher to compensate for a perceived deficit in mainstream sexual orientation and a sense of difference that could lead to a devaluation of their value in the eyes of others. The super-teacher identity displays a hyper-professionalism (Llewellyn & Reynolds, 2020). As well as adopting a "super-teacher" position, further strategies include adjusting the personal information they share and the language they use (Llewellyn & Reynolds, 2021). LGBTQ teachers demonstrate agency and resistance and to some extent it is positive; however, its status primarily serves as protection against being viewed as an outsider or against expected failure.

Parenting experience portrayed in teachers' stories

Using the example of a teacher and head teacher, Li et al. (2019) showed how his relationship to his son is mirrored in his teaching concepts. The research teacher reported that he failed to communicate with his son when he spoke with him as a parental authority and told him why he should do something. When he started treating his son as an equal being, his son shouldered his own responsibility. At that moment, the teacher felt deeply that the true meaning of education is to guide, not to control.

Importance of the culture that teachers live in portrayed in teachers' stories Teachers also might report the importance of the culture that they live in, including their mother tongue. Wagner and Hu (2020) interviewed one teacher in Luxemburg who elaborated the metaphor of being "rooted in a tradition" when she spoke about her own experience, highlighting that her socialization was based on strong "roots" that are fixed in a stable tradition. The repetitive use of several strong metaphors, such as "roots", "rooted", and "not anchored in any culture" was obvious and seemed to reflect a strong emotional involvement and a tendency to essentialize identity, language, and culture.

Ethnicity portrayed in teachers' stories

Zhu (2020) showed how teachers build identity in minorities and a (multi) cultural context. If students have the same ethnicity as the teacher, teachers might try to emancipate students in the sense that if they managed, the students will manage as well (upwards social mobility); they focus on a caring

relationship and support minority topics in the lessons (e.g., social justice) and delimit themselves against neoliberal educational politics (Zhu, 2020).

National identity portrayed in teachers' stories

Similarly, the importance of national identity was reported by teachers in different countries: American identity (Generett & Olson, 2020), Luxemburg identity (Wagner & Hu, 2020), and Mexican identity (Johnson, 2020).

Political orientation portrayed in teachers' stories

Teachers' protest became a symbol of identity along the lines of a public leftist discourse (Johnson, 2020). The politicization of teacher identity was obvious in Norway, where public narratives about teacher identity gave education policy a rather strong governing function, which Søreide (2007) called narrative control.

Role of emotions portrayed in teachers' stories

The perception of obstacles is connected the role of emotions in teacher identity. Emotions play an important role in shaping the working lives and identity of teachers (Keith, 2010; Kirk & Wall, 2010). The emotional dimension helps create the identity of novice teachers (Uitto, 2015a); or the identity of English teachers were created through emotional challenges (Wolff & de Costa, 2017). Giovanelli (2015) reported that despite feelings of anxiety and low self-confidence, teachers felt that their teaching experience had been a positive one.

This chapter showed several personal factors influencing teacher sub-identities in their narratives. Clearly, who teachers feel themselves to be outside of their professional life is also crucial to their professional identity: gender and sexual orientation are linked to the value teachers perceive in themselves and how they position themselves in the profession; parental experience can be linked to the overall image of the teacher they want to be; and culture, ethnicity, national identity, and political orientation show how teachers define their identity to larger units.

In terms of social networks, these factors can be found in a microsocial environment such as the family of the teacher and a macrosocial environment such as a national state or political party. Negotiation and reconstruction of teacher identity in these non-professional environments might not be as visible as in the classroom, but it might bring deeper understanding of who teachers are.

Discussion: The interplay of personal and professional teachers' narrative identity

This issue of *Studia Paedagogica* covers the question of the identity construction of teachers. Our research question was: Which factors influence the identity of teachers in published narrative research from 2010 to 2020? What do stories of teachers tell us about their identity construction?

First, we would like to emphasize that our analysis focused only on narrative research in teacher identity; a whole body of research on teacher identity was not within our scope (cf. Alsup, 2019; Schutz et al., 2018). Narrative research on teacher identity does not represent a coherent methodological approach; rather, it is a very diverse methodological practice. Research methods in this field consist of written and spoken narratives represented mainly by in-depth interviews (e.g., Cardelle-Elawar & de Acedo Lizarraga, 2010; Trent, 2017), but these methods are also combined with other methods, such as with participant observation of interviewed teachers (e.g., Prabjandee, 2019). These multi-method approaches might connect teacher identity with teaching practices and demonstrate the importance of teacher identity for classroom discourse and vice versa. Research in this qualitative field of study has in common small samples, even case studies or autobiographical studies (e.g., Schaefer, 2013). To compensate for small samples, in-depth data and longitudinal perspectives are present. To choose a case for a case study, specific criteria are used, e.g. teachers from minorities (ethnicity, race, LGBTQ community) or teachers within a certain phase of professional development or participating within a unique educational program. As a result, teachers from minorities and specific topics regarding teacher identity might be represented while the identity of mainstream teachers with mainstream teaching careers might be underrepresented in this research field. It is complicated to generalize research outcomes, as narrative research presents mainly unique biographies of teachers, but interpretation of the research could be broader. For example, in terms of social networks, the specific story of a Tonga immigrant in New Zealand being mistaken for a cleaner instead of the teacher (Barkhuizen, 2016) might represent the experience of being labeled as different by colleagues and what it means for teacher identity if the teacher "does not fit" into the collectively shared perception of a teacher.

To analyze an extensive body of narrative research on teacher identity, we established two main categories of teacher identity: professional and personal. The title of the text speaks of identity between professional and personal. In the text, both spheres of identity are described separately, because this is the way that research is most often focused on them. In reality, however, these identities interact, as we will suggest at the end of the article.

Within these two categories of identity, several sub-identities emerged. In terms of professional identity, these sub-identities were connected with diversity in classroom discourse, professional development, and curriculum. For personal identities, they were gender, age, sexual orientation, parenting, ethnicity, culture, etc. Although described separately, it is obvious that these two categories of teacher identity interact. Construction of teacher identity might be viewed as a continuous interplay of these identities and sub-identities. As Wagner and Hu (2020) argued, both autobiographical resources (personal identity in our research) and professional identity, including teachers' specialist knowledge, contribute to their self-positioning. Professional and personal identity can support each other or can be in conflict. An example of synergy between professional and personal identities was in the research by Li et al. (2019), in which the parenting experience of a teacher was mirrored in his teaching practice and deepened his professional reflection. By contrast, conflicts between personal and professional identities might appear in LGBTQ teacher identity (Bracho & Hayes, 2020). For other teachers, the synergy or conflict of sub-identities might work differently. For our theoretical framework, it is important to perceive teacher identity as a result of the interaction of different professional and personal identities. This construction of identity is not finished; rather, it is permanently co-constructed in professional and personal biographies. Regarding the title of this article, teacher identity seems to be a unique quality that lies between personal and professional identity and is also an outcome of their potential synergy or conflict. As we define identity as a relational phenomenon, social networks in personal and professional life represent a field of teachers' identity construction. One of the key social networks for construction of teachers' identity seems to be the classroom and particularly classroom discourse.

Several researchers have argued for the importance of a consideration of discourse as critical to a person's identity (Baxter, 2004; Clarke, 2009; Gee & Gee, 2007). The relationship of identity and classroom discourse is seen as dialectical. This view of identity has implications for pedagogy and classroom discourse and vice versa. Moje and Luke (2009) posited that one way to portray identity is as social practices in which individuals construct their identity through the discourses in which they are engaged. Therefore understanding the construction of identity within an educational context also requires an understanding of the practices (interactional approach to discourse) and beliefs, knowledge, and ideas (critical educational approach to discourse) that people make use of in classroom discourse (cf. Esteban-Guitart & Moll, 2014). On the other hand, classroom discourse is constantly re-shaped by the identities of its participants. For example, code switching within classroom discourse was legitimized by EFL teachers' non-native speaker identity (Raman & Yiğitoğlu, 2018). Forming teacher identity within

a classroom discourse seems to be a crucial social arena where professional and personal identity interplay.

Besides the classroom discourse and students within, staffroom interactions seem to be important for teacher identity construction. We demonstrated the importance of colleagues and even experts (scientists), partly in an international context. Connelly and Clandinin (1999) stated that who teachers are originates with a knowledge of the narrative history of school stories and of the central "stories to live by" for teachers and others in the school. We add that personal stories of teachers are as important as professional stories, and that narrative research seems to be an option for understanding their connection (cf. Schaefer & Clandinin, 2019).

Sometimes some identities are foregrounded while others are backgrounded, and this foregrounding and backgrounding can be complex. Teacher identities are both personal and professional and are shaped by the contexts in which teachers live and work (Schaefer & Clandinin, 2019). For example, at a social gathering outside work, a teacher might identify more with personal identity (e.g., gender); at an education conference, a teacher might identify more with professional development identity (novice teacher). But this foregrounding and backgrounding of identities is also influenced by how much the various identities interrelate. These different interrelations can be adopted at different times or with different emotional states and can have very different consequences for social interaction (Roccas & Brewer, 2002).

As teacher identity is a crucial tool for teachers and thus a key to understanding and improving classroom practices, our literature review indicates an urgent need for understanding the construction of teacher identity within the broad context of their professional as well as personal lives and their mutual ongoing interaction.

To understand teacher identity, interactions and meanings in social networks in work and life need to be captured in a scope beyond the narrative research of teachers. Identities of principals, parents, and students contribute to a holistic understanding of identity within a school community.

The findings of this literature review were crucial for our research project in the development of research methods (semi-structured interviews captured professional and personal identities) and in the data analysis, where the findings contributed toward the theoretical sensitivity of researchers.

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INFLUENCES OF EDUCATIONAL POLICY ON THE PRE-SERVICE EDUCATION OF TEACHERS IN SCIENCE AND ENVIRONMENTAL EDUCATION: A LATIN AMERICAN CONTEXT

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Abstract

This study aims to recognize which political guidelines operate at the educational level and influence the pre-service education of teachers in science and environmental education. The research question concerns which political discourses influence the curriculum of the pre-service education of teachers in science and environmental education in Colombia. To address this question, we conducted exploratory research regarding educational policies from 1886 to 2017; these consisted of eight laws, nineteen decrees, and eight resolutions. Additionally, we made use of the document of the Colombian System of Educator Education and Policy Guidelines. Finally, in the Universidad del Valle, we studied five resolutions that guided the pre-service education of teachers in science education from 2002 to 2017. In our introduction, we discuss a range of theoretical influences, such as of the World Bank and Western European thought, in education policy discourses that are subsequently supported by the results of our research. Our findings help to understand how scientific and environmental education knowledge could, in response to the educational policy, co-exist or compete with each other for placement.

Keywords

policy discourses, power relationships, environmental education, science education, pre-service teacher education

Introduction

We begin by identifying the role and the level of recognition that scientific knowledge has compared with other domains of study and knowledge, such as pedagogy, that influence the processes of the pre-service education of teachers. This identification starts with the division of responsibilities between the education and science faculties, moves on to the relationship between the state and science (Feyerabend, 1970), as in the financing of research projects, and further progresses to the creation and publication of public policies that guide educational processes. Policies can generate social and cultural coercion that lead education to be a part of and a response to "public sector discourses of excellence, effectiveness and quality and the logic of the culture of new managerialism" (Ball, 2006, p.12) where education is favored and is motivated to be better and produce quality and to generate efficiency and effectiveness, ultimately generating a competitive profession and not collective work (Ball, 2006; Höfling de Mattos, 2001). However, despite the fact that the guidelines established by public policy on education have an impact on daily practice, we note that the actual execution of these practices depends on the questioning and critical thinking of individual teachers as well as universities in such a way that education can influence social transformation.

In certain cases, we found similarities between European and Latin American research regarding how the scientific component is granted a higher status in undergraduate careers, and given greater power over the pedagogical, didactic, and environmental education (EE) components, thus generating, in some cases, a subordination that is unconscious and uncritical of hegemonic positions and that would directly influence the processes of the pre-service education of teachers. This could result in the generation of a worldview characterized by the instrumentalization, verification, and devaluation of knowledge other than scientific knowledge. It is, in fact, a consequence of the globalization of ideologies; according to Jicking and Wals (2008) "the powerful wave of neo-liberalism rolling over the planet, with pleas for 'market solutions' to educational problems and universal quality-assurance schemes, are homogenizing the educational landscape" (p. 2).

In addition, the European perspective recognizes how the World Bank is influencing international research agendas and educational policies. The curricula of many educational programs are being changed in response to demands to better prepare individuals to join local labor markets, such as in Europe, where they have implemented higher education reforms in

accordance with the Bologna Process.[1] Part of the decision-making regarding the development of new study programs and reforms is made by the internal academic structures of higher education institutions; however, governments are also involved in decision-making (Eurydice, 2018).

It is not surprising that this kind of reform finds its way to Latin America. Countries such as Colombia create and implement educational policies inspired by European, North American, and global initiatives. Programs in science education (SE) and EE can hardly escape this reality. Taking this into consideration, we focused on the "Bachelor in Basic Education with an Emphasis in Natural Sciences and Environmental Education" (BBEENSEE) program offered by the Universidad del Valle. The program's curriculum was reformed in such a way that the EE component was reduced in order to accommodate other components of the course; this was despite its being a program that is supposed to have an emphasis in EE, thus reinforcing the necessity of educational policy in Colombia. According to Ball (2015), political discourses can be constructed, reordered, displaced, reconstructed, fulfilled, and standardized. Hence it can be analyzed in terms of its cycle. The policy cycle is made up of three interrelated contexts. The first is the context of influence, in which policies and discourses are initiated and constructed; the second is the context of text production, expressed in the language of public interest and materialized in legal political texts; the third is the context of practice, a scenario in which politics are subject to interpretation and re-creation, producing effects and consequences, changes and transformations (Ball & Bowe, 1992).

As part of this special issue on "Interactions and Meanings in Social Networks," our intention is to contribute to research and policy through our analysis and to provide the opportunity to understand which political guidelines operate at the educational level and influence the pre-service education of teachers in science and EE. This will subsequently allow the recognition of how discursive practices of political and institutional subjects influence the construction of discourses during pre-service education. However, in this article, we will not be developing this last objective. This article discusses and includes part of a previous study made by Mejía-Cáceres (2019) and Mejía-Cáceres et al., (2021).

In addition, we rely on the understanding of discourse (spoken or written) advanced by Fairclough (2008) as a moment of social practice; meaning that it is a mode of action, located historically and socially as well as socially constituted and socially constitutive of social identities, social relations, and

[1] According to Kushnir (2016, p. 665), "the Bologna Process has had an impact on higher education systems in other parts of the world."

knowledge and belief systems, so that it is also a practice of the significance of the world. Therefore, in critical discourse analysis, this understanding proposes the explanatory criticism of societies and institutions and their discursive practices that coexist, contrast, and compete with each other (Fairclough, 2008).

Taking into account these concepts, to identify the political orientations, discourses, and hegemonic scenarios[2] that influence the process of the pre-service education of teachers, one question leads us through this article: Which political discourses influence the curriculum of pre-service teacher education in science and EE in Colombia?

Pre-service education of teachers in Colombia: understanding the context

Education in Colombia is guided by the general education Law 115 of 1994 (República de Colombia, 1994), which establishes educational purposes as well as structures the educational system, including formal education such as that provided by approved educational establishments.

This same law establishes that the pre-service education of teachers will be exercised by universities, other institutions of higher education that have a faculty of education or another unit dedicated to education, and normal schools for the pre-service education of teachers. The pre-service education of teachers in the field of SE in Colombia, which falls under the responsibility of the universities, occurs through degrees considered professional by the Ministry of National Education of Colombia. In 2015, according to the National Information System for Higher Education (SNIES), there were five types of bachelor's degrees; however, during the development of this research, the new Resolution 02041 of 2016 arose in which the only degree that has EE in its name is the Degree in Natural Sciences and Environmental Education, which generated a whole curricular restructuring (addressed in our analysis), although degrees in natural sciences, physics, chemistry, and biology are also among the compulsory and fundamental area of natural sciences and EE.

[2] Meaning scenarios such as the conception of knowledge, science status, pedagogic and didactic strategies, and other scenarios that can be more powerful and that can control other sciences, conceptions, and educative strategies.

An academic debate on the implementation of public policies in curricula has been motivated by curricular reforms and changes (Bordin, 2015; Lopes, 2004). Vilanova (2015) confirmed that the typical communication strategy of reforms is one of rupture. However, many investigations are carried out in order to understand the relevance (Lähdemäki, 2019; Wales et al., 2016) and the application (Berdugo & Montaño, 2017; Serbănescu, 2013; Symeonidis, 2017) of these policies, disregarding the discursive aspects that guide the policies themselves (Mejía-Cáceres et al., 2021), linking them to certain societal interests and projects. Perry et al. (2010) explained that

> In some areas, policy has been soundly based on evidence of success, and confirmed by later evaluation. In a number of other areas, however, we have been shown examples of policies that are either flimsily evidenced, or actually counter-indicated. Worse, serious studies that cast doubt on the effectiveness of an aspect of policy are swiftly dismissed or attacked (p. 7).

In this research, we work with the guidelines that influence the BBEENSEE from the Universidad del Valle. It is important to clarify that although the different bachelor's programs have the same name in various universities, each degree has its own curriculum.

The BBEENSEE was organized by five elements: the basic subjects, professional subjects, complementary electives, professional electives, and compulsory law subjects. The basic and professional subjects are grouped into four components: socio-environmental knowledge, scientific knowledge, pedagogical knowledge, and didactic knowledge. In this sense, the basic subject for the socio-environmental component is general ecology, and the professional subjects within this component are history and EE, landscape culture, environmental problems I, environmental problems II, education and sustainable development, and school environmental projects. To pass the program, students must complete a monograph that must be articulated with any of the curricular components and therefore with the lines of research.

Mejía-Cáceres (2019) found that in the Colombian context, EE is viewed in relation to SE, which is shown in the approaches of the bachelor's degrees of natural sciences, biology, and chemistry. This characteristic is more of a response to interest in science didactics, in which the environment is a topic that allows students to generate interest in science from a social and ethical perspective of scientific activity (Sauvé, 2005).

We consider EE to be more than the natural sciences, and incorporates other areas of knowledge, such as economy, politics, and ethic, as well as the practical knowledge and traditional knowledge of the communities . In this sense, EE would broaden the notion of SE.

Consequently, we recognize new elements of study and discussion within EE, such as the question of power, which appears in the different dimensions of the social structure as part of the capitalist system but also in appropriation strategies of knowledge. This last aspect can be studied within the teacher's pre-service education processes, through the identification of knowledge systems, cognitive strategies, forms of justification, validation, and verification with reality, motivations, and interests, since these will influence social transformation and the appropriation of nature (Leff, 2006).

In this sense, assuming the existence of the articulation between SE and EE, we must understand SE as a space for reflection so that teachers in pre-service education think about the objectivity of science and about different issues that are part of the scientific knowledge production process, including personal, political, social, and economic issues, as well as the influence of social networks.

Science education and environmental education: Are they different fields of research?

Considering that our context of study is a bachelor's degree in science and environmental education, it is necessary to open the debate on SE and EE as research fields. We clarify that the object of our investigation is not one field or the other; here, we present the discussion between the fields in order to understand the context in which the degree is immersed, which could influence the manner of translating and interpreting the policy.

In this case, SE is a recognized field based on SE research. Willard (1971, as cited in Fensham, 2004) explained that:

> Science education research is the systematic attempt to define and investigate problems involved in the learning and instruction in science. It is desirable that the research be cumulative so that investigation builds on the research of others. Hopefully, research will also influence practice. These digests are designed to serve as a guide to reports of science education research and to make the result of research more readily available (p. 12).

SE as an academic discipline was a consequence of the projects for curriculum development that were launched in the United States and Britain at the end of the 1950s, the SE developed in those countries influences other countries and has an impact on the character and quality of school science teaching and learning (Fensham, 2004). With time, the field changed to include social theory, moving towards cultural theory, cognitive science, psychology, and others.

In Colombia, a group of researchers studied the epistemological status of SE research offered in the country between 2000 and 2011, establishing as research lines:

> The relationship between scientific knowledge and common knowledge; the teaching, learning and evaluation (metacognition and conceptual change, solving problems, and history of sciences); the relation between theory and practice in experimental sciences through the school lab; the technologies of information and communication; curricular development; cultural context, environmental education, and science education in unconventional environments; knowledge, belief and education of the teachers (Zambrano et al., 2013, p. 78).

In this context, it was necessary to study research about the pre-service education of teachers in connection with EE from a critical perspective. We noted fewer research resources in Europe than in Latin America. In Europe, we found authors such as Bonnett (2013), Reid (2003), and Wals et al. (2014) who debate the relationship between EE and SE; and Bonnett (2007), Jickling and Wals (2008), Novo (2009), and Scott (2013) who critically discuss EE policy. In Latin America, specifically in Brazil, we found a larger volume of critical research on EE (Andrade et al., 2012; Carvalho et al., 2009; Giuffré et al., 2007; Gonzáles-Gaudiano & Arias Ortega, 2014; Loureiro, 2006; Marcos, 2012; Mejía-Cáceres et al., 2018; Sorrentino et al., 2005; Tristão, 2013).

Mejía-Cáceres (2019) identified two types of relationships; the first is of inclusion, which is defined by the fact that one field surrounds another, that is, it includes the other. A common finding is that EE is considered immersed in SE, and not vice versa. The objective of this relationship is dissemination, popularization, and scientific literacy, in addition to generating interest in science. The means of putting this inclusion into practice are through the use of socio-environmental issues in SE processes, as well as in specific disciplines. So, SE is considered an EE practice field. The second relationship is of association, in which the basis of the relationship is independence, being able to generate an emerging field. In this sense, EE interacts with SE as two different fields of study, but the ultimate goal is the exercise of citizenship. The means of practicing this association are by approaching the scientific contents in their socio-environmental context, as well as the use of integrating axes such as knowledge, ethics, and politics. On the other hand, it is considered that although EE and SE are different fields, in which one can influence the other, for some authors (Chambers, 2008; Guimarães & Vasconcellos, 2006) EE is based on the scientific paradigm.

These disagreements between SE and EE as a field have generated a fundamental gap. According to de Vries and Pieters (2007, as cited in Vanderlinde & Van Braak, 2010), this fundamental gap reflects differences in opinion about the nature of knowledge and theory, vocabulary, and reward systems, resulting in a practical gap that impacts political issues, the collaboration of organizational boundaries, the allocation of time and resources, and authority issues.

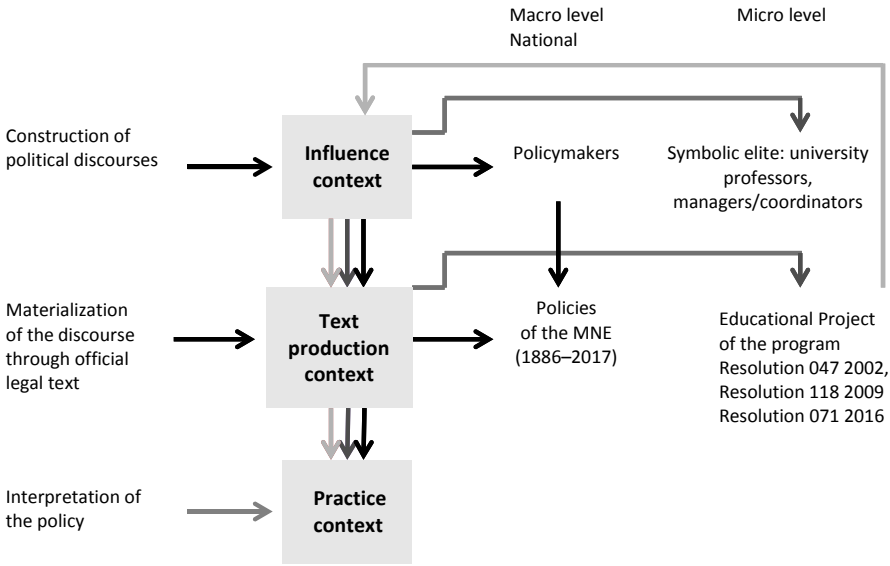
Another point that needs to be highlighted is the difference between the fields of research and practice. Policy is close to the field of practice. The discussion of the influence of policy on pre-service education also falls within the field of practice. However, this field as social practice communicates with other dimensions of society.

Research methodology

This study was conducted using qualitative methodology considering that it is composed of different components (research question, methods, context frame, goals, and validity) that structured our decisions (Borda & Güelman, 2017). We also used the critical analysis discourse as a theoretical and methodological perspective. Furthermore, this perspective was linked with the policy cycle proposed by Ball. The first stage aims to identify the educational policy guidelines used in the bachelor's degree. In order to do this, we reviewed official texts from 1886 to 2017 including laws, decrees, and resolutions on the pre-service education of teachers. Finally, we reviewed the policies enacted by the University del Valle.

Figure 1 shows that the power groups within the Colombian social structure depending on the pre-service teacher education have different roles in different contexts. At the macro level are the policymakers who are influential in the construction of texts, such as resolutions, laws, and decrees approved by the Ministry of National Education (MNE). After being approved and promulgated in the context of production, this policy is subject to interpretation by another social group: the symbolic elite represented by university professors, who sometimes change their role to assume the direction or administration in the collegiate bodies of the universities, in this way having influence in the compliance with the regulations of the MNE. In addition to participating in the context of practice of the texts of the MNE, these become a context of influence by producing the texts that will guide the degree at the micro level, for example, in the educational projection of the program. In turn, these texts are influenced by the context of practice, which we analyzed elsewhere by interviewing teachers and analyzing monographs. However, this article focuses on the analysis of the policy.

Figure 1
Cycle of politics of the degree



Source: Mejía-Cáceres (2019), adapted from Ball (1992, 1994)

Although we organize the methodological procedure in two sub-stages, we want to clarify that the practice context is present in the two stages (it does not correspond to a linear process); therefore, they have direct relationships.

These sub-stages refer to the context of influence, that is, to the stage where political discourses are constructed. For data collection, a bibliographic review was made of the laws, decrees, and resolutions of Colombia on the pre-service education of teachers. For the analysis of the context of influence, the concept of context by Van Dijk (2012) was assumed, establishing that, at the general level, the political social domain will be addressed; at the higher level, collective control (laws, politics, administration) will be addressed; and at the lower level, the control of actions. The categories used are:

- Global action: begins by establishing the communicative event, which will be related to collective control, that is, laws, decrees, and resolutions created by the Ministry; accompanied by the date, place and function/intention of the communicative event.
- Global participants: the actors, their roles, professions, and the circumstances of their participation and political ideology.

Once the above categories have been identified, it is possible to have a better understanding and interpretation of why and for what purpose the texts are produced. Subsequently, the focus was shifted to the text production context, which is materialized through official legal texts on the pre-service education of teachers and EE.

Sub-stage political orientations on pre-service teacher education and EE

In order to identify the political guidelines, we conducted exploratory research about educational policy in the pre-service education of teachers and EE in Colombia. According to Sampieri et al. (2006), descriptive studies are useful for analyzing types of phenomena, how a phenomenon is manifested, and the components of a phenomenon.

To collect data on pre-service teacher education, a description was made of the texts of the laws, decrees, and resolutions related to pre-service teacher education established by the MNE of Colombia between 1886 and 2017; these consisted of eight laws, nineteen decrees, and eight resolutions about pre-service teacher education. Additionally, we made use of the document of the Colombian System of Educator Education and Policy Guidelines. Finally, in the Universidad del Valle, we studied five resolutions that guided the pre-service education process for teachers of SE from 2002 to 2017.

Table 1
Laws on the pre-service education of teachers in Colombia

Law	**Declares that**	**Government representative**
Law 10 1880	Foreign secretary change	No avaliable information
Law 0007 of 1886 (August 25th)	Number, nomenclature, and precedence of the Executive Office Ministries	J. M. Campo Serrano Aristides Calderón
Law 0056 of 1927 (November 10)	Provisions on public instruction	Emilio Robledo Marquéz C. Julio D. Portocarrero Fernando Restrepo Briceño Miguel Abadía Méndez J. Vicente Huetas
Law 62 of 1916 (December 12)	Promotion of some pedagogical corporations	Jorge Roa R. Quijano Gómez Julio D. Portocarrero Fernando Restrepo Briceño José Vicente Concha Emilio Ferrero
Law 25 of 1917 (November 6)	National Pedagogical Institutes	Jorge Holguín Luis Cuervo Márquez Julio D. Portocarrero Fernando Restrepo Briceño José Vicente Concha Emilio Ferrero
Law 71 of 1922 (November 14)	Convention on the exchange of teachers and students on the equivalence of academic qualifications between the Republic of Colombia and the Eastern Republic of Uruguay	Ismael J. Insignares Gerardo Arias Mejia Julio D. Portocarrero Fernando Restrepo Briceño Pedro Nel Ospina Jorge Velez
Law 24 1976 (September 13)	Exercise of the profession of graduates in education science, in their different specialties	Alfonso López Michelsen, Hernando Durán Dussan
Law 115 of 1994 (February 8)	General Education Law	Cesar Gaviria Trujillo Héctor José Cadena Clavijo Maruja Pachón

Source: Mejía-Cáceres (2019)

Table 2
Decrees on teacher pre-service education of teachers in Colombia

Decree	**Declares that**	**Government representative**
Decree 1238 of 1892 (January 1st)	The National University	Carlos Holguín José Trujillo
Decree 1047 of 1912 (November 29)	Conditions for issuing the title of Professor	Carlos E. Restrepo Cuervo Márquez
Decree 670 of 1912 (June 25)	Provisions on Normal Schools	Carlos E. Restrepo Cuervo Márquez
Decree 1605 of 1930 (September 27)	Amendments to Some Provisions on Normal Schools	Enrique Olaya Herrera Abel Carbonell
Decree 10 of 1932 (January 7)	Provisions on Departmental Normal Schools and the Faculty of Education is created	Enrique Olaya Herrera Julio Carrizosa V.
Decree 0533 of 1938 (March 21)	The curriculum for normal studies is established and other provisions are given	Alfonso López José Joaquín Castro M.
Decree 77 of 1943 (January 18)	Provisions on Normal Schools	Alfonso López Arcesio Londoño Palacio
Decree 936 of 1945 (April 13)	Modification of number 77 of 1943 and other provisions are given	Alfonso López Antonio Rocha
Decree 1426 of 1961 (June 28)	Equivalence of the certificates of the National Institute of education and improvement of the Primary Education Teaching for the purposes of the respective level	Alberto Lleras Alfonso Ocampo Londoño
Decree 2188 of 1962 (August 2nd)	Transformation of the name to the Women's Pedagogical University of Bogotá and other provisions are given	Alberto Lleras Jorge Mejía Palacio Jaime Posada
Decree 1955 of 1963 (September 2)	Reorganization of normal education	Guillermo León Valencia Pedro Gómez Valderrama

Decree 1883 of 1963	Repeals article 6 of Decree number 2188 of 1962, regulates the operation of the National Institute of education and Improvement of the Primary Teaching Magisterium, and other provisions are given	Guillermo León Valencia Pedro Gómez Valderrama
Decree 1964 of 1969 (November 20)	Authorization of higher education institutions to organize short and medium-term courses in educational sciences	Carlos Lleras Restrepo Octavio Arizmendi Posada
Decree 1348 of 1990 (June 27)	Creation of the Special Teacher education System and other provisions are given	Virgilio Barco Manuel Francisco Becerra Bersey Luis Fernando Alarcón Mantilla
Decree 1860 1994 (August 3)	Law 115 of 1994 is partially regulated in general pedagogical and organizational aspects	Cesar Gaviria Trujillo Maruja Pachón
Decree 1743, 1994 (August 3)	The environmental education project is instituted for all levels of formal education, giving criteria for the promotion of non-formal and informal environmental education	Cesar Gaviria Trujillo Maruja Pachón Manuel Rodríguez Rafael Pardo
Decree 180 of 1997	Modification of decree 1869 of 1994	Ernesto Samper Pizano Jaime Niño Diez
Decree 5012 of 2009	Transformation of the Structure of the Ministry of National Education	Oscar Iván Zuluaga Isabel Segovia Ospina Elizabeth Rodríguez
Decree 1075 of 2015	The Single Regulatory Decree of the Education Sector	Juan Manuel Santos Calderón Gina Parody

Source: Mejía-Cáceres (2019)

Table 3
Resolutions on pre-service education of teachers in Colombia

Resolutions	**Declares that**	**Government representative**
Resolution 1036 of 2004	Specific quality characteristics for graduation and specialization programs in education	Cecilia María Vélez
Resolution 5443 of 2010	Specific characteristics of quality for professional formation programs in education within the framework of quality conditions	Cecilia María Vélez
Resolution 6966 of 2010	Specific characteristics of quality for professional formation courses in education	Cecilia María Vélez
Resolution 2041 of 2016	Specific characteristics of the quality of the bachelor's programs for obtaining, renewing, or modifying the qualified registry	Gina Parody
Resolution 18583 of 2017	The specific quality characteristics of the bachelor's programs are adjusted to obtain, renew, or modify the qualified registry, and Resolution 2041 of 2016 is repealed	Yaneth Giha Tovar
Resolution 25113 of 2017	The request for renewal and modification of the qualified registry of the Bachelor of Basic Education with an Emphasis in Natural Sciences and Environmental Education of the Universidad del Valle, offered under the face-to-face methodology in Cali (Valle del Cauca) is resolved	Natalia Ruiz Rodgers
Resolution 10715 of 2017	The request for High Quality Accreditation of the Bachelor of Basic Education with an Emphasis on Natural Sciences and Environmental Education of the Universidad del Valle, offered under the presence methodology in Cali- Valle del Cauca, is resolved	Yaneth Giha Tovar
Resolution 10261 of 2018	Resolution number 10715 of May 25, 2017 is modified	Yaneth Giha Tovar

Source: Mejía-Cáceres (2019)

A description was provided of the documents produced within the Universidad del Valle that guide the pre-service education of science teachers between 2002 and 2017. Consequently, in the corpus of study of the texts produced at the micro level, we find:

Table 4
Resolutions on the BBEENSEE program of the Universidad del Valle.

Resolution	**Declares that**	**Government representative**
Resolution 047 of 2002	The BBEENSEE is defined	The Academic Council
Resolution 118 of 2009	The curricular structure of the BBEENSEE program is modified and updated	Approved by Academic Council Resolution 47 of 2002
Resolution 071 of 2016	The name of the Universidad del Valle program is modified, issued by the Academic Council, by which it is modified as Bachelor in Natural Science and Environmental Education (BNSEE)	The Academic Council
Resolution 095 of 2017	Resolution 118 of 2009, which defines the curriculum, is modified and the name of the BBEENSEE program is changed to BNSEE	The Academic Council
Resolution 053 of 2017	Resolution 118 of 2009 of the Academic Council that defined the curricular structure of the Academic Program BBEENSEE and Physics is modified and the curricular structure of the Academic Program BNSEE is approved	The Academic Council

Findings

Public policy related to the pre-service education of teachers in sciences and environmental education in Colombia

In order to understand the impact of public policy, we consider the premise that policies after 1988 were considered influential in everyday practice and those prior to this date were believed to have little impact (Power, 1992 as cited in Ball, 2006). From 1800 to 1900, there was only one decree regarding the pre-service education of teachers; in this period of time there was no clear public policy. Only in 1892 is there recognition of the program "Professor in Natural Sciences" by decree 1238 article 20, which was offered by the National University within the Professional University Faculty (República de Colombia, 1892). It is important to note that it does not express its characteristics or the guidelines to be followed by the institutions. The lack of interest in educational processes is understandable since at the time the main objective of President Carlos Holguín of the conservative party was to regain political power by generating a conservative hegemony for 44 years.

EE was cited for the first time at the educational policy level through Decree 1743 of 1994 (Ministry of National Education, 1994) and the school environmental project (PRAE) was institutionalized, establishing a framework for environmental, local, regional, and national diagnoses for all levels of formal education, both private and public, and building relationships between the ministries of education and the environment.

It subsequently established its guiding principles, by which EE must respond to the principles of interculturality, formation of values, regionalization, interdisciplinarity, participation, education for democracy, management, and problem solving, in addition to being present in all components of the curriculum. To achieve the objectives described above, the ministry and the secretaries of education must design and implement continuing teacher education programs, in addition to undergraduate education, and incorporate the national EE policy (Ministry of National Education, 1994).

The responsibility of the educational community was also instituted, in which the teachers of a certain area are responsible not only for the construction and implementation of the PRAE:

> Students, parents, teachers and the educational community in general have a shared responsibility in the design and development of the School Environmental Project. This responsibility will be exercised through the different organs of the School Government. In addition, educational establishments will coordinate their actions and seek advice and support from higher education institutions and other public and private organizations located in the locality or region (Ministry of National Education, 1994).

In the second chapter, they established the instruments for the development of the PRAE, the advice and institutional support, the permanent evaluation, the compulsory social service, the compulsory military service in EE, and the pre-service education of teachers. In the third chapter, they made references to inter-institutional and inter-sector relations through participation in the National Environmental System, dissemination and promotion strategies, inter-institutional technical committees on EE, territorial participation, relations with the band oards of education, progress in environmental material from recognized institutes, advice and coordination in the EE area, ending with the environmental information system, execution of the National Policy of Environmental Education of Colombia (NPEEC), and project financing.

The NPEEC does not have an item dedicated to EE teacher education; however, it does refer to it:

> The organization of education programs for university professors in those issues considered fundamental in the environmental field is essential; preferably programs of an unschooling nature in order to achieve a true

> contextualization as far as the particular environmental problem is concerned. These programs can be led by universities that are committed to developing them within quality parameters (strengths both in the Environmental concept and in the Educational concept and particularly in Environmental Education, strengths in the field of Research, strengths in projection work and significant theoretical production) to achieve the required impacts. This education must cover the needs of all disciplines and areas of knowledge which have to do with environmental issues and management (Ministry of Environment & Ministry of National Education, 2002).

In this sense, there is a contradiction between the NPEEC and practice, since the pre-service education of teachers is being given mainly through degrees, especially associated with natural sciences although the NPEEC does not establish a favored area of knowledge for education in EE but refers to education in general.

In consequence, one controversial and often ignored situation in the educational process is the government's establishment of hegemonic relationships through public regulations and the centralization of decisions such as the way forward for the universities responsible for teacher training To strengthen the connections between government and education, some researchers have argued the ideological and structural contradiction of educational policies (Grace, 1995, as cited in Ball, 2006). In identifying educational policies as contradictory, policies on the pre-service education of teachers do not take into account policies on EE. In examining this argument, we find how the Ministry of Education in Colombia included and associated EE with a natural perspective. In other words, EE was suspended and omitted from bachelor's degrees in other fields such as mathematics, history, and chemistry, although the NPEEC affirms that EE needs to be present in all fields. We find a concrete example of this contradiction in Resolution 02041 of 2016, which sets the names of Colombia's bachelor's degrees programs. Another contradiction is seen in the obligation to include EE in educational institutions without any policy on pre-service education in this domain. The state demands that it be implemented but does not make provisions for pre-service education in EE.

We recognize the impact of public policy in the educative process. It is necessary to understand the historic context of public policy that affects current decisions about education, and specifically the "autonomy" of the universities. Although the state establishes that there is university autonomy,

> The political constitution will guarantee university autonomy, developed in articles 29 and 29 of Law 30 of 1992, recognizing the right of higher education institutions to:
> Give and modify the statute, designate academic and administrative authorities, create, organize and develop academic programs, define and organize formation,

> academic, educational, scientific and cultural work, give the corresponding titles, select teachers, admit students and adopt regimes, establish, arbitrate and apply the resources for the fulfillment of the social mission and the institutional function (República de Colombia, 1992).

We highlight autonomy because is clear that the educative process is established by the Ministry of Education. It formulates guidelines that teacher training needs to have regarding curriculum, pedagogy, didactic content, and basic competency or standards, in Decree 2082 of 1996 (República de Colombia, 1996a), Resolution 2041 of 2016 (Ministry of National Education, 2016), and Resolution 5443 of 2010 (Ministry of National Education, 2010); it assigns the responsibility of teacher training to universities and normal schools in Decree 670 of 1912 (República de Colombia, 1912) and Decree 0709 of 1996 (República de Colombia, 1996b). However, despite the guidelines, universities have relative autonomy to design their curriculums. Another consequence of globalization is that education is made and measured with basic competency and standards. The result has been the reduction of education to a homogenous, mechanical, instrumentalized practice that prioritizes market-driven competition. Besides, for the most part, policymakers ignored research findings and academic suggestions in the field of education, as well as those in the field of the environment. As Ball (2006) affirmed, "they are not captured by assumptions and inscriptions of policymakers" (p. 25).

Political guidelines conveyed a certain standardization of education regarding the position of Colombian education in response to international and specifically North American influence. An example of this was found in an instructional design from 1922 (Law 71) (República de Colombia, 1922), which proposed cultural exchange as part of the pre-service education of teachers. We considered it an important dimension; however, we found it was in response to United States requirements, not a consequence of local initiatives or necessities. It is, perhaps, not a coincidence that some governments have low political autonomy over their country, but it reinforces the idea that some Latin American countries responded in favor of international interests, leaving aside local and cultural needs. According to Mainardes (2006), this is a consequence of the dialectical interaction between global and local policies.

Colombian law is associated with international requirements. UNESCO (2005) puts an emphasis on quality education in their report which reiterated the World Declaration on Education for All. The report identifies quality as a prerequisite for achieving the fundamental goal of equity and helps to increase children's cognitive development. Therefore, it is considered to be "at the heart of education" (UNESCO, 2005). We argue that quality is associated with the efficacy of implementation or the influence of educational reforms that are forms of the recolonization of European

hegemony, materialized now through the Bologna Process. In Colombia, the concept of quality is articulated through the accreditation processes, which are not only raised through legislation (resolutions, decrees, and laws), but also through the Colombian System of Education for Educators and Policy Guidelines (SCFELP).

The SCFELP also guides the educational process for teachers, such as the profile of the educator in initial education that points to education for participation:

> Another of the characteristics of the profile of the educator of this subsystem is based on the formation of political subjects who empower, self-determine and organize in groups that promote quality education for Colombia, with a deep formation and cultivation of moral conditions, in ethics and bioethics, as well as democracy and citizenship (República de Colombia & Ministry of National Education, 2013, p. 75).

The concept of quality is prioritized, as is articulated through the accreditation processes, which are not only raised through the previous resolutions, but also from the SCFELP. For their part, normal schools must comply with a verification process of 14 quality conditions that authorize the operation of the corresponding complementary educational program. In both cases, normal and bachelor's degrees, the process is led by the Vice Ministry of Higher Education with the support of the National Intersectorial Commission for the Quality Assurance of Higher Education (CONACES) and the National Accreditation System of the National Council of Accreditation (CNA) (República de Colombia & Ministry of National Education, 2013).

Taking this into consideration, we argue that the established political procedures such as the establishment of the curriculum components, the profile of the educator, and the criteria of "quality of education," can confine the pre-service education of teachers to repetitive structures, lacking means to generate social and institutional transformations. This underlines the importance of having greater participation in political affairs, searching for new public policies for the improvement of educational practices over the improvement of the education market, and the generation of democratic scenarios within the political structures of education.

We found that there is relative autonomy at the university level, the educational system sacrifices educational quality for economic market-driven demands, Colombia's educational policies respond to global addresses, the assumptions of policymakers do not take into account the research results, there are no clear policies on SE, and there are no policies on EE in the pre-service education of teachers. On the other hand, there are constitutive contradictions between the NPEEC and practice (area of educative knowledge).

Sociopolitical context of bachelor's degrees

In a local context, such as within a university, some specific policies are also produced as a result of the interpretations, translations, and/or reproduction of the policies that are generated nationwide.

We began by identifying that the curriculum of the BBEENSEE program is defined through Resolution 047 of 2002 (Universidad del Valle, 2002a). Subsequently, through Resolution 0026 of 2002 (Universidad del Valle, 2002b), the BBEScEE program was created, which considers Law 30 of 1992 on the authorization of universities to confer university degrees in the different disciplinary fields, the curriculum reform of the university, and the results of the degree in primary education (first through fifth grade) creating a new program, and the approval of the curriculum by the academic council through Resolution 047 of 2002. The curricular structure was organized into basic, professional, complementary elective, professional elective, and compulsory law subjects until 2016. The basic and professional subjects were grouped into four components: environmental, scientific, pedagogical, and didactic.

When analyzing the objectives and the curricular structure, EE is identified as an objective of independent education of SE. However, when analyzing the curricular structure, EE is a discipline included in the Bachelor of Science program. The modifications of the degree begin with the modification of the name of the BBEENSEE program for the BNSEE through Resolution 071 of 2016 (Universidad del Valle, 2016a). They continue through Resolution 095 of September 2016 (Universidad del Valle, 2016b), which resolved to change the name of the BBEENSEE to BNSEE program, which applied to students entering the program from the date of approval by the MNE.

Subsequently, it was resolved to modify the curricular structure and update the academic program corresponding to the BNSEE program. Article 5 established the curricular structure of the program, which was in response to the resolutions proposed by the MNE and was organized into four components: general foundations, specific and disciplinary knowledge, pedagogy and educational sciences, and didactic component of the disciplines. These modifications did not affect the objective of having an educational program in EE. However, it can be analyzed how most of the subjects of the teaching component of the disciplines address SE. In this way, the hegemony of the dominant discourse of science on the curriculum is reproduced and perpetuates the inclusion relationship of EE-SC and not an association relationship.

Conclusions

This study has allowed us to identify the importance of the analysis of the socio-political context, and to recognize the conception of education in terms of the mechanization process, making it possible to expose the participation of the state, the government, and the public policymakers in a social network, not in terms of a linear relationship, but as a dynamic relationship in which the social actors participate in the different contexts that are part of the construction of the policy.

As part of this special issue, our article shows the interaction between educational policies and curriculum; likewise, we have been able to recognize how policies are based on ideological productions that will influence and condition, but not determine, certain social relationships and interactions.

This allows for discussion on the commodification of education through the search for "quality" and products, forgetting the process and the importance of education in society as well as the restricted "freedom" given as "university autonomy," identifying through context reading that this autonomy is conditioned by state policies and the proposed nation project. This is seen in the incorporation of educational reform speeches proposed by the World Bank and other international entities in Colombian education policy, leading to the vulnerability of university autonomy from the political direction, with regard to the names of the programs, and to the characteristics, competences, and other elements to be considered by the programs accredited by the Ministry of National Education.

In conclusion, there are no clear policies regarding the content of the discipline, such as on the emphasis on natural sciences. There are only general approaches to the initial education of future teachers, although we do note that some policies attempt to define the content of that education in certain cases. We observe that while there is no specific policy on EE, there is a policy concerning its inclusion in educational institutions that is contradictory in the sense that it is a demand of the state but there is no education provided to teachers to prepare them.

Declaration of conflicting interest

The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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