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Collaborative spirit: Understanding distributed leadership practices in and around teacher teams

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ABSTRACT

While the effects of distributed leadership are widely studied, how to understand this practice in sociocultural contexts is relatively unknown. Mostly only one contextual level — such as the school level — is studied. We included individual, team, *and* school levels, and investigated differences in distributed leadership among 14 collaborative innovation-oriented teacher teams (130−168 teachers and their principals). Using a mixed-method design, we found that distributed leadership is associated with experiencing no threshold when it comes to asking advice, as well as with teachers looking beyond their classrooms. This occurs when teachers and school principals generate a 'collaborative spirit' to improve education.

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International research indicates that teachers increasingly have roles in educational innovation and leadership (Brown et al., 2020; Daniëls et al., 2019; Fullan, 2016; Tian et al., 2016). Various leadership models include teachers and their expertise, such as distributed, shared, team, and teacher leadership (Daniëls et al., 2019; Liu, 2020; Tian et al., 2016). Within schools, in particular interest in 'distributed leadership' has grown significantly over the last decade, because it can be regarded as a model for collaboration and shared responsibility with an active role of teachers (Daniëls et al., 2019; García Torres, 2019; Harris & DeFlaminis, 2016). The effects of distributed leadership are oriented towards organisational commitment (e.g. Hulpia et al., 2009; Hulsbos et al., 2016; Snoek et al., 2019) and the job satisfaction of teachers (e.g. García Torres, 2019). In addition, research indicates that schools benefit from the capacities of multiple members when leadership is distributed (e.g. Azorín et al., 2020). Because distributing leadership practices means that responsibilities are shared and experiences used, which can lead to more innovative solutions to school challenges (e.g. Snoek et al., 2019). While effects of distributed leadership are widely studied, several researchers suggest that further knowledge is needed on how distributed leadership practices are embedded within wider organisational, social, and cultural contexts; in short, within wider *sociocultural contexts* (Liu, 2020; Liu et al., 2018a; Or & Berkovich, 2021). This study aims to identify those aspects of the sociocultural context on individual, team, and school level that are critical in constituting distributed leadership practices in teacher teams.

Distributed leadership theory interprets leadership as a fluid 'co-performance process' (Bennett et al., 2003; Gronn, 2002; Leithwood & Mascall, 2008; Spillane, 2005a). Distributed leadership practices result from interactions between leaders and followers, and the situation in which these interactions are embedded (Jackson & Temperley, 2007; Murphy, 2005; Spillane, 2005). A situation includes material artefacts, tools, and organisational structures and cultures at a specific moment (Spillane & Sherer, 2004). Leaders are seen as persons who exert influence over others' motivation, knowledge, or practices (Daniëls et al., 2019; Yukl,

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2002). When persons have the required expertise that is necessary within a specific situation, they can influence and thus lead others, who are called followers (they can be teachers, school principals, and staff members) (Daniëls et al., 2019; Harris & Spillane, 2008; Spillane, 2005). Consequently, we define distributed leadership as a contextually embedded social interaction process in which multiple persons exert influence over others (de Jong et al., 2022; Gronn, 2002; Mayrowetz, 2008; Spillane, 2005a). The focus on leadership practices means that leadership revolves *less* around individuals and personal leadership acts, and *more* around practices that are the outcome of interactions (Gronn, 2002; Harris & DeFlaminis, 2016; Spillane et al., 2004).

1. Distributed leadership practices in sociocultural contexts

Distributed leadership practices have been argued to be embedded in, and defined by, a wider sociocultural context (Rogoff, 1990; Spillane & Sherer, 2004; Tian et al., 2016). The recognition of the importance of sociocultural contexts is theoretically anchored in sociocultural activity theory. This theory examines the link between activities of individuals, such as leadership practices, and the social contexts in which these activities occur (Pea, 1993). Teachers and school principals act in school organisations and interact with each other. Their interactions are mediated by aspects of the wider sociocultural context (Pea, 1993; Rogoff, 1990). This means that leadership practices have to be understood in the contexts in which they are embedded (Powell & DiMaggio, 1991). Furthermore, various levels of the wider sociocultural context are linked to each other. There are no clear boundaries between context levels, such as individual, interpersonal, and institutional levels of analysis (Giddens, 1984; Orton & Weick, 1990; Rogoff, 1990; Spillane & Sherer, 2004). Within schools, three interrelated levels can be distinguished: the individual level or the level of *teachers* within schools; teachers working in teacher teams, thus forming a *team* level; and the *institutional* or school level, including school principals, support staff, structures, and resources.

While these theoretical underpinnings suggest that the sociocultural context needs to be considered in studying leadership practices, only a few researchers have studied this (e.g. Liu et al., 2018a). Therefore, several have highlighted the importance of identifying those characteristics of the sociocultural context that are critical in constituting distributed leadership practices (Daniëls et al., 2019; Harris, 2013; Liu, 2020; Liu et al., 2018a; Or & Berkovich, 2021; Spillane & Sherer, 2004).

2. The link between sociocultural context levels and distributed leadership

When researchers study distributed leadership practices in sociocultural contexts, they mainly focus on one contextual level, and thus cannot address relatedness between context levels. The studies either focus on individual (e.g. Liou & Daly, 2014; Tam, 2019), team (e.g. Mehra et al., 2006), school level (e.g. Liu, 2021; Liu et al., 2018a), or national contexts (e.g. Liu, 2020). Below, we summarize the literature on individual (e.g. teacher), team, and school sociocultural characteristics linked with distributed leadership practices.

2.1. Individual context level linked to distributed leadership practices

Only a few studies have focussed on the link between characteristics of individuals, mostly background characteristics, and

distributed leadership practices in schools. Liu et al., 2018a indicated that teachers' gender is a predictor of distributed leadership practices. They found that female teachers perceived more distributed leadership practices within a team. Additionally, homophily − which means that people approach others whom they perceive to be like themselves − seems to be important in asking advice (Coburn et al., 2012; McPherson et al., 2001). In line with the definition of leaders, someone who is asked for advice can exert influence, and thus is a leader (Daniëls et al., 2019; Yukl, 2002). Previous studies indicate that teachers will ask others when they perceive that these others have relevant expertise (Liu, 2021; Spillane, 2006; Tam, 2019). Liou and Daly (2014) studied distributed leadership practices in the context of data-driven instructional improvement. They also found that more experienced teachers are more often asked for advice. A last characteristic is friendship (Brouwer, Downey, & Bokhove, 2020). Various studies indicate the positive influence of friendship on asking someone for advice, which can result in the assignation of a leadership role to the other person (Brouwer, Flache, Jansen, Hofman, & Steglich, 2018; Nebus, 2006), as friends are very accessible and there is a high probability of response from them (Nebus, 2006).

2.2. Team context level linked to distributed leadership practices

Team characteristics rarely seem to be included within studies on distributed leadership practices. Karriker et al. (2017) and Mehra et al. (2006) studied team size and team gender composition, but they did not find a link with the degree of distributed leadership. However, both studies call for a further exploration of the possible link. Pitts and Spillane (2005, 2009) studied the link between themes of interaction and distributed leadership practices, and they found that teachers approached several others for subject knowledge, planning, teaching strategies, and assessment (Pitts & Spillane, 2009; Spillane, 2005). However, these authors did not study how themes of interaction positively or negatively link to the degree of distributed leadership.

2.3. School context level linked to distributed leadership practices

School level characteristics seem to be divided in terms of the school as an organisation, the background characteristics of school principals, and the leadership role of school principals. With regard to the school as an organisation, school culture was found to represent whether members are open to distributing leadership practices (März et al., 2018). School culture can be a stimulus for distributed leadership practices to become embedded if it includes all school members, and builds upon collaboration (Harris, 2014; Liu et al., 2018a; Muijs & Harris, 2006; Tam, 2019). Liu et al., 2018a found that mutual respect, as an aspect of school culture, results in more distributed leadership practices. In addition, the reasons for schools to engage in innovation and collaboration processes might be linked to distributed leadership practices. One such reason might be the pressure to innovate in terms of educational practices (Makoelle, 2014; Scheerens & Demeuse, 2005).

Lastly, in a range of review studies, the leadership role of school principals and their background characteristics are indicated as keys to creating conditions for distributed leadership practices (Drewes et al., 2019; Jambo & Hongde, 2020; Liu et al., 2018a; März et al., 2018; Tian et al., 2016). However, the ways in which school principals' leadership foster distributed leadership practices is relatively understudied (Drewes et al., 2019; Mentink et al., 2021).

3. The current study: multiple teams, multiple levels

We investigated teacher teams in the Netherlands. In the Dutch educational system, strong school autonomy is combined with the monitoring of quality standards by the national government (Nusche et al., 2014; OECD, 2018). Our study is part of a larger research project in which a collaborative innovation programme was evaluated; this means that teachers and school principals collaboratively approach innovation processes (Bekkers & Noordegraaf, 2016; Torfing, 2019). In an earlier study on how to measure distributed leadership practices in such collaborative innovation-oriented teacher teams,[1] differences were found in distributed leadership practices between teams (de Jong et al., 2022). Within the current study, we use these differences between teacher teams to study the role of wider sociocultural contexts. We go beyond previous research, by using a *combination* of three contextual levels, namely, individual, team, and school contexts. This leads to the following main research question: *how can differences in distributed leadership between collaborative innovation-oriented teacher teams be understood from their sociocultural context, including at individual, team, and school levels?* We aim to provide insights to teachers, school principals, and teacher educators into how distributed leadership practices within teacher teams are embedded in sociocultural contexts.

4. Methods

4.1. Context of the study: collaborative innovation programme (CI-programme)

In 2016, the OECD highlighted that the educational quality of Dutch schools could be further improved by strengthening collaboration within schools. In response, an independent foundation developed a programme with this aim. The programme distinguishes from other programmes by its large scale. So far, more than a thousand Dutch primary, secondary, and vocational education schools have implemented it voluntarily. Because it is implemented by a large number of schools, the impact of the programme is evaluated. Our study is part of the larger research project in which this collaborative innovation programme was evaluated.

The programme uses 'Agile' principles, meaning a team-based approach, including the teachers and school principal(s), to improve processes step by step (see Rigby et al., 2016). The method is based on cycles of eight weeks and at the core of it, there are four tools: (1) stand-up sessions of 15 min, where teachers and school principals meet each other and where ideas are translated into jointly goals and action plans. (2) Within-school lesson visits to observe colleagues. (3) Codesigning lessons. (4) Students' voice, a structured possibility to get the students' view as a source of inspiration.

In terms of the time allocation, firstly, a "start team" is trained by a coach from the external programme (see Fig. 1), who remains involved for two years. This team includes 2−3 coach-teachers (teachers with a coach role) and their school principal. Afterward, smaller groups of teachers are formed (8−10 persons) within school and within each team a coach-teacher is present, who helps the other teachers to collaboratively work on education with the four tools in, preferably, a weekly routine. These teams are new formed teams, not the pre-existing teams in schools, such as secondary school departments (see Leithwood, 2016 and Vanblaere & Devos, 2018 for research on the department level in secondary schools). The school principal is expected to be quite actively involved in the teams and practicing of the tools but not steering.

4.2. Design and procedure

With our study we aim to contribute to understanding of how distributed leadership practices within teacher teams are embedded in a sociocultural context. To answer our research question, we collected both quantitative and qualitative data. With regard to analyses, we, firstly, used quadratic assignment procedures (QAP) to analyse our questionnaire data and we performed qualitative analyses on interview data. Secondly, we merged the results of the QAP's and the interviews to study links between sociocultural context and degree of distributed leadership. Because of this, the design of our study is a convergent parallel design, which enhances the validity and reliability of our study (Burke Johnson & Onwuegbuzie, 2004).

We randomly selected 12 schools from the larger research project database based on school identification numbers. In the Netherlands, schools from primary (students aged 4 to 12), secondary (students aged 12 to 18), and vocational education (students aged 16 and older) work with the CI-programme. Therefore, a selection criteria was including primary, secondary, and vocational schools. Previous studies on distributed leadership practices were mostly conducted within primary or secondary education (Bryk & Schneider, 2002; Daly, 2012; Jambo & Hongde, 2020; Liou & Daly, 2014; McLaughlin & Talbert, 2001). We invited the schools to randomly select one of their teacher teams to complete a social network questionnaire, which formed the starting point of our study. A response rate of 88% was reached which Borgatti et al. (2006) refer to as "excellent". Next, we included the data of sociocultural characteristics on three levels; see Fig. 2.

The data for the individual and team level were collected via the social network questionnaire, in Spring 2019, by 130 teachers and 12 school principals. For the school level various data gathering instruments were used, namely, the school website for tracing the educational sector, a questionnaire on school culture, a questionnaire on reasons to implement the CI-programme, cognitive student results, and interviews with school principals about their leadership. For the questionnaire on school culture specifically, no teacher identification number was included in the dataset of the CI-programme. While this is no problem for the school level analyses since culture is a school context level variable, we cannot present an exact number of teachers who completed both the social network and school culture questionnaire.[2]

4.3. Participants

Since one large vocational education organisation was included in our sample, which tend to be rather large compared to primary and secondary schools in the Netherlands, we included three teacher teams from this organisation. These three teams had the same school principal. Our sample thus consisted of 14 teams of 12 schools, including 130 teachers and 12 school principals. The teams were well-distributed across the Netherlands and all were in their first year of working with the CI-programme.

See Table 1 for information on the teacher teams, such as their sample sizes in relationships,[3] which is the common unit of analysis in social network research, and in individuals.

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[1] We continue to refer to these collaborative innovation-oriented teacher teams as teacher teams.

[2] The school culture questionnaire was completed by 168 teachers in total.

[3] Formula for number of observations per team network: n * (n − 1) (Borgatti et al., 2013).
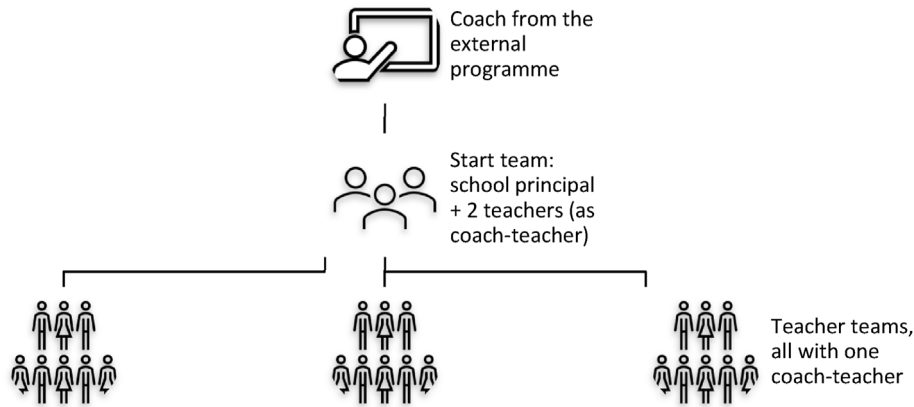
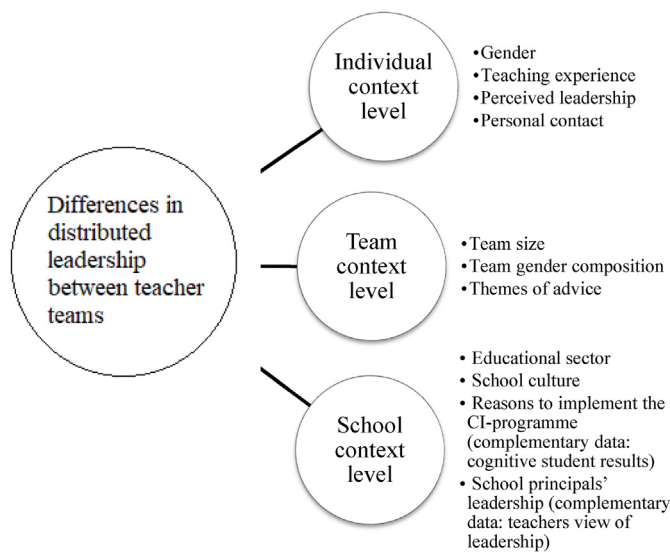**Fig. 1.** Representation of Coaching from the Programme to a School.

Fig. 2. Overview of variables to study the sociocultural context of distributed leadership in teacher teams.

4.4. Measurements

4.4.1. Distributed leadership practices within teacher teams

To answer our research question on the link between distributed leadership practices within teacher teams and their sociocultural context, we first need to indicate the degree of distributed leadership within teams.

Until now distributed leadership is often measured with self-perception questionnaires, in which team members are asked for perceptions of their team. This results in aggregated scale scores (D'Innocenzo et al., 2016; Hulpia et al., 2009; Joo, 2020; Liu & Werblow, 2019; Sun & Xia, 2018). Consequently, these methods are not suitable for revealling each individual relation, interactions, nor influence processes on others' knowledge and skills (D'Innocenzo et al., 2016). We addressed this by applying a social network perspective to operationalize distributed leadership. Such a perspective studies informal interactions, each team member's perception of all other team members, and all relations between teachers and school principals within a school team (Cullen-Lester & Yammarino, 2016; D'Innocenzo et al., 2016; Naumov et al., 2020; Rodway & Farley-Ripple, 2020; Sinnema et al., 2020). Based on this perspective, we decided to measure the interactions and influence processes between persons, by asking all team members to

Table 1
Sample information of the teacher teams ordered by team size.

Teacher teams	Team size: relationships	Team size: individuals	Age in years M (SD)	Gender distribution (% of women)	Teaching experience (year) M
A (voc.)	240	16	46.1 (13.1)	92	10
B (voc.)	182	14	39.5 (12.9)	50	5
C (voc.)	132	12	39.4 (13.7)	10	10
D (voc.)	132	12	48.6 (10.6)	27	5
E (sec.)	132	12	40.5 (13.4)	55	5
F (prim.)	132	12	41.8 (11.8)	72	10
G (prim.)	110	11	39.7 (11.8)	89	10
H (prim.)	90	10	35.8 (11.8)	90	5
I (prim.)	72	9	43.1 (13.5)	78	10
J (voc.)	56	8	38.4 (9.9)	86	1
K (voc.)	56	8	48.4 (10.3)	86	5
L (voc.)	56	8	51.3 (8.6)	86	5
M (prim.)	56	8	36.2 (9.4)	80	10
N (prim.)	30	6	35.8 (4.9)	83	10

Note. Voc. = vocational education, sec. = secondary education, prim. = primary education.

complete an advice-seeking question about all their team members. Since someone who is asked for advice can exert influence on others by providing these others with advice (Daniëls et al., 2019; Yukl, 2002). This advice-seeking question thus helps us to study whether one or multiple persons are influencing others, i.e., being a leader, and consequently whether a team has a higher or lower degree of distributed leadership. The "advice network"-question that we asked was: to whom do you turn for advice on working with the CI-programme? Such an advice-network question is asked in several earlier studies (e.g. Moolenaar et al., 2011; Pitts & Spillane, 2009) to study leadership.

In a previous study, we measured distributed leadership practices in the same teacher teams that are included in the current paper with this "advice network"-question (de Jong et al., 2022). Within this previous study, we piloted the questionnaire, including the advice-network question and the questions on Personal contact and Perceived leader (see heading Sociocultural Context Characteristics). We asked the team members that completed the pilot questionnaire whether the social network questions were clear and how they interpreted it. They experienced no constraints when completing the questionnaire.

Respondents, namely teachers and their school principal, answered the advice question for all team members. This resulted in a data matrix describing who turns to whom. These data were analysed by a coherent combination of three social network measures: density, reciprocity, and indegree centrality. These measures together were used to determine the degree of distributed leadership of each teacher team and resulted in a relative order of the included teacher teams, from higher to lower distributed leadership practices. Teacher teams with relatively high scores on density and reciprocity and low on indegree centrality were interpreted as teams with a higher degree of distributed leadership. Teacher teams that scored relatively low on density and reciprocity and high on indegree centrality were interpreted as teams with a lower degree of distributed leadership. See Appendix D for the specific scores on these social network measures and the relative order of teams. The relative order of teacher teams on distributed leadership practices is used for the current study, see Table 4 in the results for the order.

4.4.2. Sociocultural context characteristics: individual, team, and school level

To answer our research question, we included sociocultural characteristics on individual, team, and school level that seem relevant for distributed leadership practices, based on previous literature as presented in the theoretical framework. In Table 2 we present the included variables per level and how we measured them. We examined the individual level mostly with respect to background characteristics. In the analysis section, we present how open answers of Themes of advice and Reasons to implement the CI-programme were coded and analysed in the first analysis step.

The school variable School principals' leadership requires a bit more explanation than will fit in the table. The three leadership patterns, namely, mean the following. First, the Team player leadership pattern included school principals who enacted leadership practices intended to promote innovation becoming a joint process of teachers and school principals. Second, the Key player leadership pattern included school principals who enacted leadership practices to direct the innovation process, but also stated that it was a collaborative process. Third, the Facilitator leadership pattern included school principals who enacted leadership practices such as 'controlling from a distance', and left the collaborative innovation to the teachers.

4.5. Analysis

The analyses for answering our research question consisted of two steps. Firstly, we conducted quadratic assignment procedures (QAP) within teams to study which individual level variables predict advice-seeking, the latter is the measure of distributed leadership practices. We included the significant individual variables to team level. In this way, we were able to include these in the second and main analysis step, namely to study our unit of analysis: teacher teams and how their context influences their degree of distributed leadership. Secondly, we analysed links by comparing teams with higher and lower degrees of distributed leadership and their team and school level sociocultural characteristics.

4.5.1. First step: individual level: quadratic assignment procedures (QAP)

Firstly, we conducted quadratic assignment procedures (QAP),

Table 2
Overview of How Sociocultural Context Characteristics on Individual, Team, and School Level were Measured.

Level	Variables	How we measured the variable
Individual	Gender, Teaching Experience, Perceived leader,	Gathered along with the social network questionnaire. Gender was indicated with: 1 = man, 2 = woman, 3 = other
		All team members were asked: who act(s) as (a) leaders in this teacher team? This resulted in a list of persons who are perceived as leaders by the person who completed the questionnaire.
	Personal contact	All team members were asked: out of your team members, with whom do you have personal conversations? This resulted in a list of persons with whom the person who completed the questionnaire has personal contact with.
Team	Team size,	Along with the social network questionnaire, the school principal was asked about team size
	Team gender composition,	The percentage of women was calculated per team based on Gender
	Themes of advice	Following on from the question about advice, an additional open question was posed to all team members: on what themes do you seek advice when approaching this specific team member? The respondents were able to provide multiple answers.
School	Educational sector,	Schools were from primary, secondary, and vocational education
	School culture: Collaboration on lesson practices-scale,	One scale of a culture questionnaire, designed by the management of the CI-programme. We conducted a confirmatory factor analysis and analysed scale reliability based on the data of the larger research project and discovered good internal consistency (α = .73, 7 items, see Appendix B).
	Reasons to implement the CI-programme,	Three sources of data: interviews with school principals, a questionnaire for external advisors, cognitive student results. School principals were asked: what is the reason that your school started to implement the CI-programme? Interviews were audiotaped, transcripts were made, and member checks were conducted (see de Jong et al., 2020). In the Analysis section, we present how the other two data sources were used complementary.
	School principals' leadership	Leadership patterns of school principals in the context of collaborative innovation, identified in an earlier study (de Jong et al., 2020): Team player, Key player, Facilitator. We triangulated these patterns by including teachers' perspectives on their school principal's leadership with a scale called School principals' leadership from the culture questionnaire (α = .92; see appendix B for the confirmatory results and items).

multiple regression analysis, in Ucinet for each teacher team to test the link between individual characteristics and advice seeking relationships, which is our measure of distributed leadership practices. We conducted the QAP's per teacher team since the teacher team is the unit of analysis and the boundary of the network (which means that persons could not select team members from other teams than their own team). The QAP is suited for social network data, since it can analyse observations that are interdependent, and social network data is interdependent. More conventional statistical tools are not appropriate, because network data violate the assumption of independent observations (Borgatti et al., 2013). All characteristics showed weak (.3) to moderate (0.4−0.6) correlation. The individual characteristics that were significant were aggregated to the team level and included in the next analysis step, in which our main unit of analysis, the team level, i.e. teacher teams, are studied.

4.5.2. Second step: team and school level: analysing links between distributed leadership and sociocultural characteristics

To answer our research question on the link between distributed leadership practices within teacher teams and their sociocultural context, we qualitatively analysed the links between distributed leadership of each teacher team and its sociocultural characteristics on team and school level. As stated, significant predictors of the individual level were included in the analysis on team level.

Preparing two qualitative variables to be included in the analysis. For Themes of advice on team level and Reasons to implement the CI-programme on school level we first had to code the data into categories to be able to include these in the main analysis of how sociocultural characteristics link with distributed leadership practices. For Themes of advice, two authors categorised half the dataset of teachers' answers. After achieving sufficient agreement, the first author continued categorising, and had several peer debriefings. This resulted in the following themes of advice: collaboration, designing lessons, lessons, organising improvement of education, policy and vision, role as coach-teacher, stand-up meetings, students and classes, and visiting lessons. See Appendix A for descriptions and number of mentions of the themes that were used for categorisation. The most mentioned theme of each teacher team was included in the analysis.

Regarding Reasons to implement the CI-programme, the first and third author had multiple peer debriefing sessions, and after achieving a sufficient agreement of 83%, the first author continued to categorise all data. See Appendix C for indicators that helped with the categorising and number of mentions. This resulted in the following reasons: improving learning culture, improving the quality of education, improving data-informed ways of working, a new school start, working more efficiently, and low educational quality. We triangulated these reasons with external advisors' given reason for each specific school, see Appendix C. More specifically, for the reason low educational quality, we added cognitive student results.[4] Both the external advisor and the students' results confirmed the reason mentioned by school principals.

The qualitative analysis on team and school level. We ordered the teacher teams as cases from higher to lower distributed leadership practices in a meta-matrix in Excel. The team and school

sociocultural characteristics were included in the columns (Miles & Huberman, 2014). We investigated whether there was a link between the range of distributed leadership practices and each sociocultural characteristic. To do so, we compared teacher teams with lower distributed leadership practices to teacher teams with higher distributed leadership practices with regard to the sociocultural characteristics. If the teams with higher distributed leadership practices indicated a reverse link with a specific sociocultural characteristic than the teams with lower distributed leadership practices, we interpreted this as a link. All authors discussed the found links and the variables that we did not find a link for, to reach consensus on the findings.

This study was approved by the Ethical Review Committee for social and behavioural sciences of our university (number 20−056).

5. Results

Within this results section, we firstly present how individual characteristics (based on the social network questionnaire) link to advice-seeking. Advice-seeking is how we measured distributed leadership practices. After that, the significant findings of the analysis on individual level will be included in the analysis of team characteristics. In one large table, we ordered the teacher teams on their degree of distributed leadership. We present which team characteristics link to distributed leadership practices and which school characteristics link to distributed leadership practices. This is a combination of qualitative and quantitative data. Lastly, we summarize the results of the three levels in a table.

5.1. Characteristics of individuals linked to advice-seeking (measure of distributed leadership practices)

Table 3 presents the regression results on background characteristics of individuals and advice-seeking. A significant contribution was found for the Perceived leader within eight out of 14 teams. This meant that within these teams, when someone perceived another person as a leader, it was more likely that this other person would be asked for advice. Next, Personal contact was found to be significant within five teams. This meant that within these teams, when someone had personal contact with another person, it was more likely that this person would be asked for advice. Furthermore, the Teaching experience of teachers was only significant within one team, and thus did not add additional explained variance overall to the Perceived leader and Personal contact for asking someone for advice. Finally, Gender was not significant in any team, and thus did not add additional explained variance. This means that being of the same gender (or not) did not matter when it came to asking someone for advice.

These regression results indicated that in most teams, perceiving someone as a leader (Perceived leader) mattered most when it came to asking someone for advice. When the Perceived leader was not significant within a team, it was Personal contact that related to who is asked for advice.

5.2. Characteristics of teams and school linked to distributed leadership practices

5.2.1. Characteristics of teams

The significant individual characteristics Perceived leader and Personal contact were aggregated to team level to analyse the link between sociocultural characteristics and distributed leadership practices. Within Table 4, these characteristics are presented, next to the other team characteristics.

In Table 4, teacher teams with higher distributed leadership practices are shown at the top, and those with lower distributed

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[4] We chose data from the school year 2016−2017, the year before the schools implemented the CI-programme. For the primary schools this meant including the mean of the final exam that primary school students make in the Netherlands, for the vocational schools this meant percentage of passed students. Both are relative to the national norms, which are provided by the Dutch National Inspectorate of Education.

Table 3
QAP, multiple regression, per teacher team on advice-seeking.

Teacher team	Personal contact β	Perceived leader β	Gender[a] β	Teaching experience β	Model fit R^2
A	0.13	0.31*	0.01	0.01	13
B	0.06	0.19	0.03	−0.22	2
C	0.28*	0.16	−0.20	−0.05	18
D	0.40*	0.31*	0.11	0.06	40
E	0.07	0.25*	0.06	−0.06	9
F	−0.01	0.26*	0.11	0.11	10
G	0.37*	0.05	−0.13	0.43*	29
H	0.62*	0.08	−0.01	−0.04	40
I	0.27	−0.21*	0.15	0.25	18
J	0.10	0.28*	0.34	−0.07	24
K	0.10	−0.25	−0.07	−0.29	11
L	−0.16	−0.08	0.04	0.18	6
M	−0.01	0.89*	−0.18	0.28	68
N	0.39*	0.51*	−0.23	0.13	43

Note.
*$p < .05$ one-tailed.
[a] Gender matrix via exact matches (same gender = 1). Other characteristics via differences.

Table 4
Distributed leadership practices of teacher teams and team and school characteristics.

	Team					School			
Distributed leadership: teams ranging from high to low[a]	Most mentioned theme asked for advice (% of mentions compared to total)	Personal contact sig. β	Perceived leader sig. β	Team size	Team gender composition (% women)	School principals' leadership[b]	Culture: collaboration on lesson practices	Reason to implement the CI-programme: Low educational quality	Educational sector[c]
L	Organising improvement (26%)			8	**86**	F	2.77		Voc.
H	Organising improvement (44%)	0.62		*10*	**90**	T	**3.76**		Prim.
N	Organising improvement (46%)	0.39	0.51	6	**83**	T	2.66		Prim.
I	Lessons (30%)		−0.21	9	**78**	T	2.70		Prim.
K	Organising improvement (34%)			8	**86**	F	2.77		Voc.
G	Organising improvement (29%)	0.37		*11*	**89**	T	*2.98*		Prim.
B	Organising improvement (57%)			14	*50*	F	2.67	x	Voc.
F	Stand-up meetings (19%)		0.26	12	**72**	K	2.58		Prim.
D	Lessons (39%)	0.40	0.31	*12*	27	F	2.67	x	Voc.
M	Lessons (42%)		0.89	8	**80**	F	*3.04*	x	Prim.
J	Lessons (54%)		0.28	8	**86**	F	2.77		Voc.
E	Students, Classes (33%)		0.25	*12*	55	F	2.89		Sec.
C	Organising improvement (33%)	0.28		*12*	10	F	2.84	x	Voc.
A	Lessons (30%)		0.31	**16**	**92**	K	*3.08*	x	Voc.

Note. The highest one-third scores are indicated in bold, the middle one-third scores are italicised.
[a] Based on de Jong et al., 2022.
[b] T = Team player, K = Key player, F = Facilitator.
[c] Prim. = primary education, Sec. = secondary education, Voc. = vocational education.

leadership practices are shown at the bottom. Teams with higher distributed leadership practices include teachers who have many relationships with their colleagues, and who seek advice from each other. They have an even distribution of advice. Teachers from teams with lower distributed leadership practices have fewer relationships with their colleagues and there are some teachers with a central role and thus an uneven distribution, who are more often asked for advice and thus perform a leadership role.

Regarding links between characteristics of teams and their distributed leadership, we see that the teams with higher distributed leadership practices sought advice on the theme Organising improvement of education most often, whereas the seven teams with the lowest distributed leadership, except one, sought advice on the themes of Students and classes and Lessons. How often this most mentioned theme was mentioned in a teacher team is indicated by the percentage of mentions in Table 4.

Next, within teams with higher distributed leadership practices it did not seem to matter whether you perceived someone as a leader (Perceived Leader) as to whether you turned to that team member for advice. On the other hand, within the seven teams with the lowest distributed leadership, except one, perceiving someone as a leader did matter in terms of asking them for advice.

We did not find a link between distributed leadership practices and the following team characteristics: personal contact, team size, and team composition.

5.2.2. Characteristics of schools

Regarding the third and last level, namely characteristics of schools and their distributed leadership practices, we see that most of the teams with higher distributed leadership practices have school principals who described themselves as a Team player, one who participates within the educational improvement processes.

Table 5
Overview of our Results on Links Between Sociocultural Context and Distributed Leadership (DL).

Variables (level)	Higher DL	Lower DL
Perceived leader (individual and team)		Negative link
Theme asked for advice (team)	Organising improvement	Students, classes, Lessons
School principals' leadership (school)	Team player	Facilitator
Reason to implement (school)		Low educational quality

Note. An empty cell means that there was no link.

The teams with lower distributed leadership practices all have school principals who described themselves as Facilitators who steer from a distance, and two teams had a Key player who direct the process. As discussed in the methods section, we found that teachers' perceptions underline the school principals' leadership patterns. This means that teachers perceive school principals' leadership as more involved within teams with higher distributed leadership practices.

In addition, with regard to a Reason to implement the CI-programme, low educational quality indicates a link. Only teams with the lowest distributed leadership, and teams within the middle of the range, started to implement the CI-programme because they perceived their educational quality to be too low. We found that both the external advisor and the cognitive students' results confirmed the remark of the school principal who mentioned that low educational quality was a reason to implement the programme.

We did not find a link between distributed leadership practices and the following school characteristics: Collaboration on lesson practices, Educational sector, and several Reasons to implement the CI-programme. These Reasons are not included in Table 4 to improve legibility but are shown in Appendix C2.

Lastly, we summarized the results in Table 5, by presenting the four sociocultural context characteristics that we found to be linked to distributed leadership practices.

6. Discussion

This study responded to prior calls to direct more attention to the study of the sociocultural context of distributed leadership practices (Liu, 2020; Liu et al., 2018a; Or & Berkovich, 2021). Using a mixed-method design, we studied characteristics of three contextual levels, in order to answer the research question: how can differences in distributed leadership between collaborative innovation-oriented teacher teams be understood from their sociocultural context, including at individual, team, and school levels? We reached a better understanding of distributed leadership in teams by finding links with four sociocultural context characteristics. We will summarize these characteristics from the perspective of teams with higher distributed leadership practices.

Firstly, teachers in teacher teams with higher distributed leadership practices clearly asked each other for advice on schoolwide organising improvement processes, instead of mainly or only focusing on their own classrooms. Secondly, team members of these teams approach each other for advice irrespective of perceiving someone as a leader. Thirdly, the school principals of these teams are more focussed, in their leadership, on innovation becoming a joint process of teachers and school principals. Fourthly, these teams started the CI-programme for reasons other than low educational quality. These four characteristics all refer to a kind of togetherness and shared commitment in improving education. Consequently, we call this the *collaborative spirit* to improve education together. This collaborative spirit manifests itself in teachers talking about improving educational standards at their school, and thus (daring to) look beyond their own classroom. These teams have an intrinsic incentive to improve their education

collaboratively. This is in contrast with teams with lower distributed leadership practices and a lack or lower degree of collaborative spirit, which have an extrinsic incentive, namely the improvement of the quality of their education, but it seems that they do not collaborate as much to solve it.

We thus conclude that teacher teams with higher distributed leadership practices have a more *collaborative spirit* to improve education together. This *collaborative spirit* adds a combination of four characteristics that seem important for distributed leadership to previously found characteristics (e.g., Tian et al., 2016, who mention: formal leaders' support, climate of trust, strategic staff policy, utilisation of artefacts in leadership). As stated in our theoretical framework, previous research mainly studied one contextual level in relation to distributed leadership and thus cannot address relatedness between context levels. We studied a combination of three contextual levels, namely, individual, team, and school contexts, and continue by interpreting these — together — in the remainder of this discussion paragraph.

A collaborative spirit in teacher teams with higher distributed leadership practices is linked to the wider debate about 'professionalism in transition', which is visible in organisational literature (e.g. Andersen et al., 2018; Noordegraaf, 2007; Noordegraaf, 2011; Noordegraaf, 2015; Wu et al., 2017). We especially recognize how Hoyle (1975) and Windmuller (2012) distinguish 'extended' from 'restricted' professionals. They describe 'extended' professionals as teachers who are involved in professional activities outside the classroom, and collaboratively improve education and their own professional development by collaboration, evaluating (their own) education, and asking for advice. They see 'restricted' professionals as teachers who act autonomously and are especially concerned with effectiveness of their own class, subject content, and didactics. The differences that we found between the teacher teams and their degree of distributed leadership seem to link to these two 'types' of professionals. This can also be related to the distinction made by Evans (2008), focusing on educational professionals, between 'demanded, prescribed and enacted' professionalism. This highlights extrinsic versus intrinsic 'reconfigurations' of professionalism as well (cf. Noordegraaf, 2015): teachers who are committed to go beyond routinised ways of working show 'enacted professionalism'. All in all, teachers from teams with higher distributed leadership practices in our study can be recognized by the term 'extended professionals' who are able to 'enact' new forms of professional action.

Furthermore, in our study we found that school principals in teams with higher distributed leadership participate in the innovation process, as team players. The team player is one of the leadership patterns identified by de Jong et al., 2020. They did not yet study the relatedness of these leadership patterns to other concepts. As stated by among others Drewes et al. (2019) and Mentink et al. (2021), the ways in which school principals' leadership foster distributed leadership practices is relatively understudied. Our study adds to the study of de Jong et al., 2020 and other previous research by providing new insights into the link between school principals' leadership and distributed leadership, with an emphasis on team relations.

Teachers from teams with lower distributed leadership in our

study, act more like 'restricted' team professionals in terms of Hoyle's (1975), first and foremost concerned with the effectiveness of their own class, subject content, and didactics. This professional attitude is also recognized in other research, stating that some teachers are strongly focussed on everyday professional practice in their classroom (Giesbers & Bergen, 1991; van Gennip & Sleegers, 1994). Within teams with lower distributed leadership, perceiving someone as a leader seems to still plays a role in asking someone for advice. This finding relates to previous research that indicated that teachers ask others for advice when they perceive these others as having relevant expertise or experience, or when they see others as some sort of 'leader' (Liu, 2021; Spillane, 2006; Tam, 2019). Our study adds to this current body of knowledge by indicating that perceiving someone as a leader might relate to having relevant teaching experiences, or other kinds of experiences or features. We, namely, did not find teaching experience to play a role in asking for advice, but perceiving someone as 'leader' does. A possible reason for this more self-focussed characteristic of the teachers and the experienced threshold of asking others who are experienced as leaders, in the teams with lower distributed leadership, might be the low educational quality. This provides an extrinsic incentive to improve education rather than an intrinsic incentive or intrinsic motivation. Furthermore, the school principal in these teacher teams with lower distributed leadership may have felt the urge — because of the lower educational quality — to tighten the reins in terms of leadership.

In addition, Kessels (2018) mentions a paradoxical leadership dynamic that might also help to interpret these results in the teams with lower distributed leadership. He reviewed four studies on school principals' leadership and found that school principals respond to teachers' attitude. He argues that if teachers mainly focus on their own classroom, are reluctant in taking initiatives, and avoid collaboration, teacher teams seem like an organisational administrative unit. This impedes a shared values orientation and professional social exchange and provokes more directive leadership of school principals. Subsequently, this might result in a restriction of teachers' professional spaces and this then influences how teachers behave.

One might wonder about the causality; namely, whether the collaborative spirit within teacher teams results in higher distributed leadership, or vice versa. However, following the distributed leadership perspective, we interpret the link between distributed leadership practices and its sociocultural context as a reciprocal process; leadership and context influence each other. The notion of 'mutual influence' is introduced by the interpersonal theory, acknowledging that persons mutually influence each other's behaviour (Horowitz & Strack, 2010; Veldman et al., 2017). Furthermore, many cultural researchers stress this mutual influence, by showing how sociocultural contexts affect leadership practices (e.g. Pea, 1993; Rogoff, 1990), and how these contexts are also transformed through leadership practices, at the same time (Spillane & Sherer, 2004). An example is the role of culture: this constitutes leadership practices, *and* is created and potentially transformed by leadership practices (Giddens, 1979). The more specific Kessels' (2018) paradoxical leadership dynamic implies that school principals' leadership is provoked by teachers' attitude and vice versa, as mentioned. Or and Berkovich (2021) observed the mutual influence between school principals' leadership and contextual characteristics such as school culture as well. They argue that school principals should reflect on how their practices fit cultural characteristics. We contribute by stating that school principals and also teachers should be aware of their attitude, how they influence others, and that they are influenced by others, and that they are able to proactively create new practices by changing their own attitude.

We did not find evidence that teaching experience, personal contact, team size and team gender composition, collaboration on lesson practices, educational sector, and several reasons to implement the CI-programme were linked to distributed leadership practices. The lack of a link with teaching experience and personal contact seems to indicate that these individual characteristics matter less for distributed leadership than their collaborative spirit. The same holds for team size and team gender composition (Karriker et al., 2017; Mehra et al., 2006) and educational sector. With regard to collaboration on lesson practices, all teacher teams seem to collaborate little. The lack of a link might be caused by the collaboration being focussed on lessons, while the characteristics that did indicate a link seem to be more about collaboration beyond lessons, such as improving education and having a spirit of 'we do it together'.

6.1. Future research and limitations

We advocate the inclusion of multiple sociocultural contexts in future research, as our findings confirm the relatedness of the different levels (Rogoff, 1990). Future research could further study how several contextual levels relate to each other and how their combination link to distributed leadership practices. Diving deeper into the relationship between a collaborative spirit and distributed leadership practices could help schools in achieving more of such collaborative and distributed practices. We were only able to gather data in one country, and we were not able to include the international level. However, according to Liu (2020), this level also plays a role in distributed leadership in schools since countries differ in cultures. In addition, we would recommend that future research should preferably include multiple teams from one school, but we acknowledge this is labour-intensive for respondents to complete the questionnaires and for researchers to perform the social network analyses per teacher team. A limitation is that we worked with an existing dataset, and thus could only examine the individual level background characteristics only. We could not include characteristics of individuals such as intrinsic incentives (Hirschler, 2013; Windmuller, 2012) and the engagement of teachers with their schools (Schaufeli, 2013). Based on our findings, we would expect these to be linked to distributed leadership practices, and therefore recommend that future studies include these. Another limitation is that because of a limited dataset in various distributions of men and women and educational sector (especially secondary education), we held back from drawing conclusions. Still, our study reveals interesting insights into the links between sociocultural context characteristics and distributed leadership practices. Lastly, since three teacher teams of the same vocational education organisation were included, the scores on school level, thus school principals' leadership and the school culture variable, weigh more. However, the links we found between the contextual characteristics and distributed leadership practices remain the same if we would ignore the three teams. An option would have been not to include two of the three teams but then we would have had less variation in our sample on the team and individual level.

6.2. Implications for educational practice

Our study aimed to identify aspects of the sociocultural context on individual, team and school level that are critical in constituting distributed leadership practices in teacher teams. Based on our findings, we see several implications for educational practice. First, the results of our study encourage teachers to collaborate (more), talk about improving education, dare to ask preferably all other team members for advice, and believe in the strength of team members' expertise. Second, higher distributed leadership is found

in teacher teams where school principals enact leadership practices to promote improving education becoming a joint process. This insight into which role to take is relevant for school principals who want to distribute leadership and build a collaborative spirit within their teacher teams. Being aware of the influence you have on others and processes such as mutual influence with teams, helps in breaking down attitudes and practices that are not suitable for distributing leadership. Finally, teacher educators have a key role in training teachers to exert a productive role regarding distributing leadership practices within their team. Teacher educators need to train teachers to be able to collaborate and ask advice from and provide advice to others, to believe in their own expertise and the expertise of others, and to have a collaborative spirit. They need to stimulate 'enacted' professionalism by way of which educational professionals try to reshape their work on the basis of an intrinsic desire to do so. The educational context − schools and teams − should facilitate this.

These implications might also be relevant for other countries than the Netherlands. However, the national socio-cultural context seems to be of influence on degrees of distributed leadership practices. Liu (2020) for instance studied the degree of distributed leadership in 32 countries and found that countries form Anglo, East Europe, Germanic Europe, and Nordic Europe demonstrate higher degrees of distributed leadership than countries from Latin America, Confucian Asia and Latin Europe. She explains this based on countries' cultural norms and leadership styles (e.g. House et al., 2004). That these countries share the same norms and styles probably means that the implications mentioned above and the collaborative spirit to which we refer to in the current study, are most likely also applicable in these countries with higher degrees of distributed leadership. School principals and teachers in other contexts, where relationships between school principals and teachers are more hierarchical, might be less likely to adopt a distributed leadership model and work from a collaborative spirit to improve education.

7. Conclusion

Among the available empirical research, most studies treat distributed leadership as an independent variable when investigating its effect on individuals and schools (García Torres, 2019;

Harris, 2008; Hulsbos et al., 2016; Tian et al., 2016). We studied how distributed leadership practices are embedded in sociocultural contexts, based on a rich dataset with a mixed-method design. Our study further develops the argument that studying the sociocultural context of distributed leadership practices with multiple related context levels helps to generate knowledge for the (practical) understanding of distributed leadership practices. In sum, our findings provide insights for academia and practice that show that distributed leadership works well with team members sharing a collaborative spirit to improve education, backed by intrinsic desires to do so. That's the (collaborative) spirit.

Declaration of competing interest

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Data availability

The authors do not have permission to share data.

Appendix A

Table A
Description of Themes of Advice, Ordered Most to Least Mentioned

Themes of Advice	Description and answers	Number of mentions of teams (% of total number of mentions (90))
Organising improvement of education	On organising improvement of education. Answers such as: organising education, process of improvement, systems of collaborative innovation, how and where to go, collective	14 (15%)
Lessons	On lessons in the classroom. Answers such as: lessons, teaching, lesson ideas, lesson situations, lesson topics	12 (13%)
Collaboration	On the collaboration of teachers. Answers such as: team issues, team meetings, communication, atmosphere, colleagues	12 (13%)
Visiting lessons	On visiting lessons of other teachers, which is part of the CI-programme. Answers such as: visiting lessons, providing feedback, asking for feedback on lessons, class visit, observing lessons	11 (12%)
Stand-up meetings	On stand-up meetings, which is part of the CI-programme. Answers such as: goals, set goals, design of the white board, actions following goals	11 (12%)
Students and classes	On student and classes, and questions that teachers have about this. Answers such as: student affairs, student participation, supervising students and classes	11 (12%)
Designing lessons	On designing lessons, which is part of the CI-programme. Answers such as: lesson designs, plans, application of lesson methods	9 (10%)

Table A (*continued*)

Themes of Advice	Description and answers	Number of mentions of teams (% of total number of mentions (90))
Role as coach-teacher	On the role that some teachers have (the internal coach-teacher). Answers such as: development, questions about the role	6 (7%)
Policy and vision	On policy issues and school vision. Answers such as: school developments, policy development, specific policies such as reading, vision	4 (4%)

Note. All teacher teams mentioned four or more themes.

Appendix B

School culture questionnaire scales

Collaboration on lesson practices

1. I provide feedback to colleagues on what is going well
2. I provide feedback to colleagues on what could be better
3. I regularly talk with colleagues about education
4. I regularly exchange lesson practices with colleagues from other schools
5. I design new lesson practices together with colleagues
6. I ask colleagues to visit my lessons and give feedback
7. My colleagues and I collaborate on studying our own lesson practices

School principals' leadership

1. The school principal(s) challenges me and my colleagues to examine problems in our teaching practice
2. The school principal(s) regularly visits my lessons
3. The school principal(s) regularly visits team meetings
4. The school principal(s) removes obstacles allowing me to focus on my classes
5. The school principal(s) develops the school's vision in collaboration with all teachers
6. The school principal(s) adjusts their own actions in response to feedback
7. The school principal(s) discusses my personal goals with me
8. The school principal(s) encourages me and my colleagues to be the best teachers we can be
9. The school principal(s) encourages me and my colleagues to implement solutions to problems in our teaching practice
10. The school principal(s) asks me for feedback

Table B

The table below indicates that the perceptions of teachers were in line with the leadership patterns, as all teams with lower scores had a Facilitator or Key player school principal, and teams with higher scores on Teacher perspective mostly had a Team player school principal.

School Principals' Perspective resulting in Leadership Patterns and Teachers' Perspective on School Principals' Leadership.

Teacher teams	School principal perspective	Teacher perspective
A	Key player	2.67
C	Facilitator	3.33
E	Facilitator	2.56
J	Facilitator	3.09
M	Facilitator	2.52
D	Facilitator	2.80
F	Key player	2.89
B	Facilitator	2.80
G	Team player	3.46
K	Facilitator	3.09
I	Team player	3.40
N	Team player	3.26
H	Team player	4.28
L	Facilitator	3.09

Appendix C

Table C1
Indicators that Describe the Reasons to Implement the CI-Programme, Ordered Most to Least Mentioned

Reasons	Indicators that describe the reasons	Number of mentions of schools (% of total number of mentions (33))
Improving learning culture	Wanting to become a professional organisation, learning culture, stimulating collaboration, talks about education instead of issues that are not important	12 (36%)
Improving the quality of education	Wanting to improve education, to renew, a high quality of education for students	10 (30%)
Low educational quality	Wanting, and in need of, tools to improve and achieve basis level, an urgent situation that needs to change, excessively low judgement of educational inspection	5 (15%)
Working more efficiently	Wanting to optimise the work processes of teachers, less lengthy meetings, no waste of time	3 (9%)
New school start	Wanting to have a smooth merger of two schools, and a tool for starting a new school	2 (6%)
Improving data-informed ways of working	Wanting to gather more data, working in a data-informed way, recognising the usefulness of using data	1 (3%)

Note. Schools were allowed to mention more than one reason.

Questionnaire completed via email by external advisors about reason to implement the CI-programme

Please let us know why each school that you train started to implement the CI-programme.

Questionnaire Completed by External Advisors on Reasons of Schools to Implement the CI-programme

School name	Reason to implement
	1.Improving the learning culture
	2.Improving the quality of education
	3.Improving data-informed ways of working
	4.New school start
	5.Working more efficiently
	6.Low educational quality
	7.Other … (explain)

Table C2
The Reasons did not indicate a link with distributed leadership practices, as they are either described by all teams or solely by one to three teams across the range of distributed leadership
Reasons to Implement the CI-Programme Linked to Distributed Leadership Practices.

Distributed leadership: teams ranging from low to high	Working more efficiently	Improving the learning culture	Improving the quality of education	Improving data-informed ways of working	New school start
A		X	x		
C	X	X	x		
E		x			
J		x			
M	X	x	x		x
D		x	x		
F		x			x
B		x	x		
G		x			
K		x			
I		x			
N		x			
H	X	x		x	
L		x			

Appendix D

Descriptives of Advice-seeking

The networks of Advice-seeking (41–86%) were moderately to highly dense, see the table below. Regarding reciprocity, the teacher teams scored moderately to high (42–86%). Regarding network indegree centralisation, the teacher teams scored low to medium.

Table D
Descriptive Network Statistics per Teacher team on Advice-seeking, ordered From High to Low Distributed Leadership

Team	Advice-Seeking		
	Density	Reci.	Centr.
L	0.857	0.810	0.122
H	0.800	0.861	0.099
N	0.833	0.800	0.200
I	0.764	0.800	0.125
K	0.857	0.762	0.122
G	0.611	0.618	0.110
B	0.718	0.589	0.166
F	0.678	0.659	0.214
D	0.636	0.659	0.207
M	0.686	0.417	0.163
J	0.551	0.593	0.265
E	0.521	0.444	0.273
C	0.464	0.588	0.273
A	0.405	0.456	0.289

Note. Reci is reciprocity, Centr. is indegree centrality. The standard deviations of density were between 0.2 and 0.4 in all teams. The scores on density, reciprocity, and indegree centrality for advice-seeking were used to determine the degree of distributed leadership of each teacher team. Teacher teams are relatively ordered, compared to each other, from higher to lower degrees of distributed leadership.

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