Effective Interactions in Learning Communities; The Role of Relations-Oriented Behaviour and Learning

Koen Wissink

University of Twente – BMS - faculty

Master Thesis Educational Science & Technology

1st Supervisor: Dr. A. M. G. M. Hoogeboom

2nd Supervisor: Prof. Dr. M. D. Endedijk

Student number: s2599686

Date: 05-06-2023

Author notes

With pride, I present my Master's thesis. The writing process took the necessary time, which was more intense than I had anticipated. Undoubtedly, the mental pressure it gave was something beyond my expectation. Was this pressure only due to me? Yes, but it was a truly valuable experience.

First off, I would like to thank Marcella Hoogeboom, for her never-ending support, motivating words when I needed them and some reality checks when I lost perspective for the umpteenth time. At the first meeting, I informed her that this was going to be hard for me, but she had the power to keep me calm and motivated after every time we spoke. Additionally, I would like to express my gratitude to the whole Hit the Gas! team for making this thesis possible. From workers to facilitators, everyone gave a small insight into their work and/or school life, which was really interesting to see from another perspective. I would also like to thank my manager, Joep Holland, for granting me an opportunity and inspiring me with our conversations. Of course, I cannot forget my other colleagues at Veolia.

Lastly, I would like to express my gratitude to my girlfriend, family, and friends, who never stopped supporting me. I could ask them anything, and they always came up with some interesting insights for how to tackle the problem that arose.

With this thesis, another chapter of my school career is finished. After completing the HR study at the University of Applied Sciences, I chose to work for a year to save up money for this Master. My work at that time never gave me the energy I hoped for, so I made a promise: never be bored again. Shortly thereafter, I got an opportunity at my company, Veolia, which I could not resist. I decided to take on both, the Master's and the new role, with all challenges involved.

Since that moment, I've never been bored again.

Abstract

The rapid pace of technological innovations in the energy sector poses a challenge for installation companies to keep their employees' knowledge and skills up-to-date in order to keep up with the innovations and deliver a high level of quality to their customers. Learning communities (LCs) have been proposed as an effective method to assist installation workers and companies in keeping pace with this innovation. A crucial element in LCs and a potential driver to pro-actively deal with the challenges in the installation sector, is how the members of the LC learn together. Such learning is also seen as the primary indicator of an effective learning community. To examine the LCs, focussing on how its members interact and learn with each other, their learning behaviour and relations-oriented behaviour and in the LC will be studied. In an effective LC the aim is to accelerate knowledge sharing in the technology sector. Relations-oriented behaviour is identified as a key factor in promoting team learning and knowledge sharing in the LC (Edmondson, Dillon, & Roloff, 2007). However, we currently do not know much about the learning processes and drivers of these processes in the context of LCs. Also, limited research is available on how relationships within in the LC accelerate knowledge sharing. Therefore, the study seeks to answer the following research question: What are the effects of relations-oriented behaviour on team learning behaviour in LCs, and how does this change over time?

To examine how relation-oriented and team learning behaviour manifests in the LC, it is crucial to see what exactly happens in the LC. Therefore, the study employed an exploratory case study approach to observe and systematically code interactions within two LCs of Dutch installation companies over ten weeks. The results of this study indicate that relations-oriented behaviour does not influence team learning behaviour in the LC, but that it changes over time in one LC. Both relations-oriented behaviour and team learning behaviour did increase over time in one of the LCs. This might be mainly due to the topic of the LC. The study recommends using a larger sample size in future research and building on these results to gain a fine-grained understanding of how relations-oriented behaviour influences team learning behaviour in LCs.

Keywords: Relation-oriented behaviour, team learning, learning communities, energy transition

Table of contents

1. Introduction

Rapidly changing technologies, governmental agreements (such as the Paris 2050 Agreement), and conflicts with suppliers of traditional energy sources (Deng et al., 2022) increase the demand for new energy solutions and employees who can build, repair, and develop them. In this vein, Vermeulen et al. (2018) state that employees of the installation sector need to rapidly develop their skills and update their knowledge continuously to work with new technologies and more complex systems to cope with the rapid energy transition and technological innovations in this sector.

Topsectoren (2019) proposes that learning communities (LCs) are a powerful method to accelerate this process of learning and innovating in this sector. LCs are defined as a group of people, either linked by shared interest or geography, that addresses their needs for learning through proactive partnerships (Kearns et al., 1999). With multiple LCs starting a trajectory, knowledge development will speed up and will result in more solutions for challenges in the sector (Leroy, et al., 2017). However, how LCs can become effective, or what specific interactions in an LC contribute to higher levels of knowledge sharing to tackle the challenges that the installation sector faces, remain questions to be further explored.

In these LCs, members are expected to learn as a team through the exchange of knowledge with others, such as storytelling, and sharing experiences, but also provide each other with feedback and try out new technologies, which is also called 'learning by social phenomenon' (Horvath, 1999; in Ardichvili et al., 2004). In LCs the amount of learning is also seen as a primary indicator of how effective an LC is (Wong, 2004; Zellmer-Bruhn & Gibson, 2006; Bolam et al., 2005). This study, therefore, explores the actual learning behaviours that members display in the LCs, based on actual behaviour recorded in the meetings of the LC. This will provide insight in how members of the LC interact with each other, and how this may change over time. Next to that, it will provide insights into variables that may influence or initiate certain (learning) behaviour, which will help with exchanging knowledge within the LC. The conceptualization of Decuyper et al. (2010) is used, which categorises three learning processes: sharing, co-construction, and constructive conflict. This conceptualization based on Decuyper et al. is useful to study learning in LCs since the processes of team learning offer a framework on how actual behaviours from members in the LC can be coded.

To accelerate actual learning behaviours and higher levels of learning in the LC, interpersonal relationships are seen as an important predictor. According to Baumeister and Leary (1995) an 'interpersonal relationship' refers to the connection, interaction, and social

bond that individuals form with each other. A way to analyse the interpersonal relationship between members, is through analysing relations-oriented behaviour.

For analysing relations-oriented behaviour, Yukl et al. (2002) provide insight into how the learning process is influenced by the interpersonal relationships that are built over time in the LCs. This is expected, since expressing relations-oriented behaviour can enhance trust between members (Mikkelson et al., 2015), which leads to honest interactions and constructive feedback (Wenger et al., 2002). Although Hildebrand (2011) and Burke et al. (2006) concluded that relations-oriented leadership behaviour positively influences team learning, research has not yet examined the relationship between relations-oriented behaviour and team learning over time, and also not in the context of a LC. However, given that trust leads to honest interactions and constructive feedback, supplemented with the findings of Hildebrand and Burke, it can be inferred that relations-oriented behaviour can be considered a powerful behaviour in an LC to accelerate knowledge exchange.

When examining behaviour, such as relations-oriented behaviour and team learning, it is important to take a temporal perspective and examine how this behaviour changes over time. The temporal perspective is important to be taken into account since it is expected that one variable influences the other. Results from several moments in time provide an overview of the actual effect of the influencing variable. In general, the interactions and behaviours in teams change over time, Kozlowski and Bell (2008) state that this process is not studied as extensively as of yet, but that it could provide great insights on how teams change their interactions and behaviours over time. For team learning, the concept of time is seen as the golden ticket by Dooner et al. (2008). They state that, before becoming constructive and co-constructing knowledge, the group needs to get acquainted with each other and afterwards the group starts to learn from each other. The same applies to relations-oriented behaviour. The expression of relations-oriented behaviour is expected to be observed more often later in the community since members first examine if they share enough common grounds to work together and later will focus on establishing relationships with each other (Weick, 2015). Hence, both relations-oriented behaviour and team learning are seen to fluctuate over time; thus, examining how and when these crucial behaviours fluctuate can enhance our insights into the integral processes of the LC, and how these influence the actual goal of the LC: accelerating knowledge sharing.

This exploratory study of two Dutch LCs aims to contribute to current research on LCs, by providing missing insights into the role of relations-oriented behaviour on team learning, and whether time will play an important role in the LC. Based on the behavioural

approach of this study, the LC can be analysed more in-depth, resulting in a better understanding on how the LC performs. This study will contribute to the limited research on LCs, and therefore help in understanding the conditions and factors that will contribute to the effectiveness of LCs, for example, the role of relations-oriented behaviour (Decuyper et al., 2010). Next to that, this study provides more insight into another suggestion for future research of Decuyper et al., focussing on the 'time of development' when it comes to learning within teams.

2. Theoretical framework

2.1 Learning Communities

There are many different definitions of learning communities (LCs) (Stoll, Bolam, McMahon, Wallage, & Thomas, 2006). LCs explicitly use learning as a way of promoting social cohesion, regeneration and economic development (Kearns, McDonald, Candy, Knights & Papadopoulos, 1999). "Learning" reflects collaboratively discussing subjects, where every member gives input from their own experience or work field (Kearns, et al. 1999). Members of the LC are present voluntarily, often have different positions and backgrounds, and are in charge themselves of the agenda, to-dos, and other formal activities, again, without a leader (Kearns et al., 1999).

LCs are characterized by an informal structure and the manner of how knowledge is shared, such as through team meetings or reflective group dialogues (Blankenship & Ruona, 2007). These two characteristics are shared by a Community of Practice (CoP), which is a similar form of a working group. The biggest difference between the two forms of communities is that the members of a LC are put together purposefully, whereas for a CoP this does not have to be the case.

LCs are present in many different forms, such as action learning teams and project-based learning teams. The LCs that act as project-based learning teams, focus on fine-tuning the needs of the participants to the possibilities offered by the organization to grasp the essence of the connection between learning and working on group projects. Core questions before identifying the goal of the learning projects are: "What should be learned to successfully accomplish the project?" or "How can the LC accomplish this?" A facilitator is present to guide the process in the LC (Poell, Van der Krogt, & Warmerdam, 1998). Action learning LC teams tackle specific challenges by first asking questions to clarify the exact nature of the problem, reflecting and identifying the possible solutions, and then taking action

guided by an action learning coach (Marquardt, Banks, Cauwelier, & Seng, 2018). LCs can differ in form, dependent on why the LC is introduced (e.g., software implementation or improving internal cooperation), but they share the main characteristics; the informal structure, knowledge sharing by dialogue and a coach or facilitator guiding the process.

As mentioned by Poell et al. (1998), action learning teams differ from project-based learning teams by focusing more on *learning by doing*. Whereas project-based learning adds more components of reflection in the whole process. Marsick and Watkins (1990) describe the method of the project-based learning teams as an *action-reflection* method.

How people participate and interact with each other over time heavily contributes to the effectiveness of the LC, and how members learn with each other trough their interactions (Ardichvili, Page, & Wentling, 2003). Although interaction and shared activity sometimes result in tension or conflict (Dooner et al., 2008), it supports in relation-building and shaping the LC for future development (Heemskerk et al., 2021). This development within the LC is a process of multiple phases.

Different sorts of interactions can contribute to the effectiveness of an LC in different phases. A model to understand these different phases is developed by Weick (2015): the means-convergence model. In the first phase, the so-called *diverse ends* phase, members try to find out if they share enough common ground to work together. In a LC, members figure out others' motivation for joining the LC and if their learning goals were alike (Dooner et al., 2008). In the second phase, *common means*, members' interdependence becomes centred when a shared group interest has been identified. In a LC, an example could be focussing on a theoretical concept, where all of the members are assigned to read a certain paper and discuss their findings. If members do not understand certain concepts, other members can help them with answering questions or explaining the theory. The third phase, *common ends*, arises when members' expectations are unmet. This asks for role clearance and possible sanctions for disappointing personal results. An example from a LC is the loss of momentum, members do not engage with the same motivation as before, since they have changed expectations of the LC. Members started to rely on more outspoken members, to keep the LC on track. In the final last phase, *diverse means*, groups fade away since people are pursuing different goals instead of the group goal. Here, the group splits or fades away (Weick, 2015). In a LC, the big group often splits into focus groups, based on the specific learning goals of a small group of members (Dooner et al., 2008).

Concluding, Weick (1970) states in his means-convergence model that people/members first tend to get to know each other in the early stages of a community, and

later try to get along with each other. Subsequentially, Wenger et al. (2002) state that becoming effective as a group of people takes time. They state that people first need to build relationships (i.e., which is also part of the first phase from Weick), whereafter they can discuss the how and what within the LC itself.

Hence, in addition to the means-convergence model, there are other, more general models, that provide information about the specific phases through which teams or groups usually go through. In the group developmental model, it is often stated that collaborative power grows over time (Tuckman, 1977). Another argument which states that a personal connection between members of the LC takes time, lies within the definition of a 'community' by Conrad (2005) "a general sense of connection, belonging, and comfort that develops over time among members of a group who share purpose or commitment to a common goal" (Conrad, 2005, p. 2). This is also reflected in the different stages that a LC goes through (Weick, 1970).

To understand and enhance the feeling of connection, belonging and comfort between members, the behavioural taxonomy of Yukl et al. (2002) is consulted to examine the social interaction in LCs, in which he specifically focuses on relations-oriented behaviour.

2.2 Relations-oriented behaviour

In LCs, relations-oriented behaviour can be an important behaviour to enhance the relationship-building between members of the LC, for example through the development of trust between the members (McLaughlin & Talbert, 2006). Relations-oriented behaviour is part of the behavioural taxonomy of Yukl et al. (2002) and is defined by Burke et al. (2006) as "person-focused behaviours that facilitate the behavioural interactions, cognitive structures, and attitudes that must be formed before members can function effectively as a team" (p. 291). Or, in other words, behaviour which reflects the focus on the quality of the relationship between the members of a team (Brown, 2003). To achieve meaningful interaction and discussion in the LC, relations-oriented behaviour is expected to assist in creating a safe environment where the members trust each other and dare to speak up.

The conceptualization of relations-oriented behaviour in this study is built upon the work of Hoogeboom and Wilderom (2019), who followed the tradition of Fleishman's Ohio state leadership model (1973). This model examines how behaviour impacts group performance, and is focused on two dimensions: *consideration* and *initiating structure.* Relations-oriented behaviour is referred to as *consideration* in Fleishman's research (Hoogeboom and Wilderom, 2019). The reason why Hoogeboom and Wilderom only used

these two dimensions, comes from the research of Behrendt et al. (2017), who stated that leader behaviour could be seen as a dichotomy, where task-oriented behaviour and relations-oriented behaviour are the core of the behavioural paradigm in a team.

The added value of relations-oriented behaviour in LCs is indicated by McLaughlin and Talbert (2006), who state that the lack of trust is one of the most common reasons for failure in a LC. Relations-oriented behaviour can enhance trust between members through appropriate communication, showing respect and granting the feeling of belonging in the group (Mikkelson et al., 2015). Also, Wenger et al. (2002) state that if the relationships of members are built on trust, the LC can generate honest interactions, challenging questions, and constructive feedback.

Relations-oriented behaviour promotes, as mentioned, the quality of relations between group members. In order to show concern, provide support and show appreciation, specific observable behaviours that can be distinguished are 'asking for ideas' (to stimulate a team member to come up with ideas or solutions); 'Agreeing' (to show compliant behaviour), 'Being friendly' (to show sympathy and to create a friendly environment), 'Providing positive feedback' (to evaluate and reward good behaviour), 'Encouraging' (to positively stimulate behaviour or challenge professionally), and 'Showing personal interest' (to show interest or empathy for feelings or situations) (Hoogeboom & Wilderom, 2019).

The research from Conrad (2005), Weick (1970), Wenger et al. (2002), and Tuckman (1977) state that being friendly, opening up to teammates and providing feedback takes time. With regard to LCs, Dooner et al. (2008) suggest that this is due to the fact that the first priorities of the LC are negotiated agendas, shared authorities and compromised actions (i.e., which are conceptualized as task-oriented behaviours). Another priority among the members of the LC is examining if they share enough common grounds with other members to work together, later they will focus on establishing relationships with each other (Weick, 2015). Based on the above, this study aims to find out whether more relations-oriented behaviour will occur in the later stages of the LC.

Therefore, the following research question was constructed:

RQ 1: Does relations-oriented behaviour occur more frequently in the later stages of the LC?

2.3 Team Learning Behaviour

As stated before, LCs are defined as a group of people who collaboratively learn through proactive partnerships (Kearns et al., 1999). Learning is a vital component of the LC

since one of the building principles of a LC is collaborative learning through interaction with other members (Corporaal et al., 2020). Group learning and team learning are used interchangeably in the literature, throughout this thesis the terms will also be used interchangeably. To define a concept of a team: "A team is a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems." (Cohen & Bailey, 1997, p. 241). The characteristics of a team are also reflected in a LC, therefore we see a LC as a team.

Team learning is often defined as "an ongoing process of reflection and action characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions." (Edmondson, 1999, p. 353). The essence and importance of team learning is first described by Senge in 1990, where he identified team learning as a building block for a learning organization (Senge, 1990). Later, studies by Edmondson, Dillon, and Rollof (2007), London and Sessa (2007), Decuyper, Dochy, and Van den Bossche (2010), and many others followed shortly after the publication of Senge in which they link team learning to higher performance and identify triggers for higher levels of learning.

This study will focus on team learning behaviours, based on the work of Decuyper et al. (2010). Decuyper et al. describe three team learning behaviours that can be observed in a team context. The three learning behaviours are defined as: *'sharing,'* '*co-construction,' and 'constructive conflict.'*

The process of communicating new knowledge, competence, opinions or creative thoughts with other team members who did not know that this knowledge is present in the team is referred to as *sharing* (Decuyper et al., 2010). By sharing, team members will try to interpret the newly gained knowledge and give it an explanation. When other teammates also start to share information, skills or ideas, the team is obligated to do something with this information and other learning behaviours will eventually follow, such as co-construction and constructive conflict (Raes et al., 2015). Sharing is therefore an indispensable behaviour (or even condition) for team learning. In the context of a LC, sharing gives members the opportunity to start the interaction, collaboratively go into dialogue, or explore possible learning opportunities by sharing or providing information or knowledge.

The next learning behaviour, triggered by sharing is *co-construction*. It is defined as the mutual process of developing shared knowledge and building shared meaning by refining, building on, or modifying an original offer in some way (Baker, 1994). The outcome of the

process of co-construction is that the team explores a new meaning to emerge in collaborative work, which was not previously available to the group (Van den Bossche, Gijselaers, Segers, Woltjer, & Kirschner, 2011). In the context of a LC, co-construction is the shared activity or conversation through which members are learning, clarifying objectives, discussing innovations or discussing tasks at hand (Tang & Lam, 2014).

Negotiating or going into dialogue with team members are processes of *constructive conflict*, which uncovers diversity in the identity, based on their individual expertise, and opinions within the team (Decuyper et al., 2010). The communication surrounding diversity leads to a temporary kind of agreement and team members going out of their comfort zone, which eventually will more likely lead to more team learning (De Drue & Weingart, 2003). In a LC, constructive conflict engages open-minded discussions, where members can change their way of thinking about how they perceive things (Ryman et al., 2009).

2.4 The effect of relations-oriented behaviour on team learning

Earlier work has shown that relations-oriented behaviour can be an important trigger for team learning (Edmondson, 1999; Edmondson, Bohmer, & Pisano, 2001; Edmondson, Dillon, & Roloff, 2007). Relations-oriented behaviour will be expressed by members if they feel acquainted. When they become acquainted, they are more likely to trust each other, which results in more risk taking, sharing information within the team, and discussing mistakes without fear of negative reactions in groups, are indicators of a psychologically safe environment (Edmondson, 1999). Such an environment, which can be created with the assistance of relations-oriented behaviour, is strongly related to team learning behaviour.

Research by Hildebrand (2011) argues for a positive impact of relations-oriented behaviour on team learning. According to Hildebrand's' study based on leadership activities, relations-oriented behaviour formed the basis for team learning, since relationship building and maintaining these relations positively related to team learning behaviour. This was due to (1) the creation of a safe climate, and (2) due to maintaining relations. Creating these conditions would mostly prevent conflicts to happen, which made sure that the team would not become individually focused, which negatively impacts team learning (Hildebrand, 2011).

Continuing, a meta-analysis from Burke et al. (2006) studied, among others, relations-oriented behaviour in the context of leadership research. Burke et al. found a relationship between a leader displaying more relations-oriented behaviour and team learning. In their research, relations-oriented behaviour is captured by person-focused behaviour, such as 'consideration' (Fleishman et al., 1991), 'transformational' (Bass, 1985), 'empowerment'

(Pearce et al., 2003), and 'motivation' (Fleishman et al., 1991). Burke et al. found evidence that person-focused leadership behaviour positively affects team learning, due to the use of 'empowerment,' which refers to emphasizing self-management and self-leadership development.

Transposing this to the context of LC, we assume that relations-oriented behaviour expressed by members positively influences the initiation of team learning. The empowering or encouraging aspect of the expressed relations-oriented behaviour towards members of the community is assumed to directly initiate team learning in the LC. Based on the above standing knowledge and the context of this study, we aim to explore whether relations-oriented behaviour initiates team learning behaviour in meetings of the LC and whether this changes over time.

RQ 2.1: Does relations-oriented behaviour initiate team learning behaviour?

RQ 2.2: Does relations-oriented behaviour initiating team learning change over time?

In a study conducted by Raes et al. (2014), who focussed their research on whether the developmental stages of a team related to team learning behaviour, it was concluded that teams show more team learning behaviour in the later stages of Wheelan's model (2009). This developmental stages model separates four stages of group development, I 'dependency and inclusion,' II 'counter dependency and fight,' III 'trust/structure,' and IV 'work/productivity' (Wheelan, 2009). Looking at their research, it was expected that team learning behaviour will be more frequent in the later stages of a group's process.

As stated in the research of Raes et al. (2014), in the first two stages of Wheelan's model, learning does not happen as a (whole) team, but as an individual or as a subgroup. From the third stage, group productivity begins to increase since members start to trust each other, with 'trust' being a basic condition for effective knowledge sharing and team learning (Wu, Yeh, and, Huang, 2007). The team is able to express disagreements without it being taken as a personal rejection, which results in meaningful discussions. In stage 4 the groups start with providing feedback to each other and enter a 'continuous learning stage'. According to the research of Dechant et al. (2003), which Raes et al. refer to, the team now spends time discussing problems and decisions and encourages innovation. In these final stages, learning happens for the whole team, rather than just the individual or subgroups.

Based on the study of Raes et al., supplemented with the research of Dechant et al. (2003) and Wheelan (2009), we constructed the following research question, aiming to explore whether team learning behaviour occurs more frequently in the later stages of the LC.

RQ 3: Does team learning behaviour occur more frequently in the later stages of the LC?

3. Method

3.1 Research design

This exploratory case study aims to explore relations-oriented behaviour and team learning behaviour in learning communities over the course of 10 weeks. The LCs are video-captured and systematically coded; this provides a rich account of actual relation-oriented behaviour and team learning behaviours that are displayed by the members of the LCs and how this emerges over time. Given the aim and scope of this study, a qualitative and quantitative longitudinal research design was applied based on observational data, where the qualitative approach was used to identify relations-oriented behaviour and team learning behaviour through the coding of transcriptions. Quantitative analysis was later conducted to analyse the codes. Raes et al. (2015) state that observational data is a better choice for studying behaviour than questionnaires or interviews because behaviour emerges out of interaction.

3.1.1. Participants and context of the study

Two LCs are used as case studies, respectively LC 1 and LC 2, who met almost every week. The observational data used for this study is obtained by videotaping 18 meetings of two learning communities, 8 meetings from LC 1 and 10 meetings from LC 2, using a 360-degree camera or the record function within Microsoft Teams. The camera is placed in a fixed position in an unobtrusive manner, which results in reliable video footage which is valid (or representative) to use in observing behaviour (Brand, 1976). Next to that, possible social desirability bias can be avoided in our method, since the members do not report on their own actions (Nederhof, 1985).

3.2 Context description

To assist installation companies in their transition to meet the current rapidly changing technical innovations and demands in the energy transition phase, a large-scale research project ("Hit the Gas!" or "Gas erop" in Dutch) established several LCs, divided over eight installation companies in the eastern regions of the Netherlands, to help the installation

workers to adapt to new ways of working and to proactively develop new practices. To establish these goals, the LCs are implemented in the installation companies according to three design principles, being 1. reciprocity between learners (i.e., learning from each other's expertise), 2. integration of informal and formal learning in the daily work context (i.e., next to peer feedback and experimenting, more formal ways of learning will be integrated; or example micro-lectures or workshops), and 3. supporting active learning using adaptive technology (i.e., videotaping, technology will help in identifying learning goals and stimulate active learning towards them).

3.3 Participants

The LCs were already assigned within the companies, the LCs consisted of eight to ten members, a facilitator and a research assistant. The two LCs will last a total of ten weeks in which the LC members will have one LC meeting every week. The topics of the LCs differed, LC1 focused on the implementation of a new software program and LC2 focused on optimizing the prefabrication process for heat pump systems. LC1 had a total of eight meetings, which were held online due to COVID-19 measures. Participants logged into Microsoft Teams software to participate in the LC. LC2 had a total of ten meetings, which were held in the hosting companies building of the LC. The duration of each meeting lasted from 45 minutes to 90 minutes.

The LCs are facilitated by a facilitator, which is in LC1 an HRD-teacher and researcher at a university of applied sciences in the Netherlands, and the facilitator for the other LC is self-employed and specialises in change management and HR management. A research assistant from the research project will also be present to help in the LC with practical matters such as recording and filling out an observation schedule for analysis of the happenings in the LC, which will not be used for this study (Endedijk, 2020).

The LCs consisted of eight to ten members, which were all male. All of the members signed ethical approval for the use of data generated from the LCs. The majority of participants in the LCs worked at the specific company (roughly 80%), and their positions varied from mechanic to IT support. Other participants, who did not work at the specific company, had positions such as teachers from schools. They were teaching topics such as structural engineering.

3.4 Data collection

The meetings of the LC were videotaped using a 360-degree camera or recorded with Microsoft Teams, which allowed for analysis afterwards. The output of the meetings was

transcribed and uploaded into coding software (Atlas.ti). The meetings were coded using the coding scheme from Wilderom and Hoogeboom (2019) on relations-oriented behaviour, see Table 1, where a total frequency of 538 codes were given in LC1 and LC2 combined, and the work of Decuyper et al. (2010) on team learning behaviours, see Table 2, where in total a frequency of 205 codes were observed in LC1 and LC2 combined. Both of the codebooks were mutually exclusive which means that two observances cannot happen simultaneously. Two students from the University of Twente, transcribed and coded the meetings on team learning behaviours. Inter-rater agreement of the two different raters was 70.1% using Atlas.ti software, indicating an agreement. The codes were assigned independently by the coders. In total, 18 meetings have been recorded, transcribed and coded. The data was transcribed in the Dutch language.

Table 1

Relations-oriented behaviour based on Wilderom and Hoogeboom (2019)

Code	Description	Example from data (Dutch + English translation)
Agreeing	Agreeing with a follower; showing compliant behaviour	Dat is het absoluut. Als we dit niet zouden oplossen, en als we gaan zeggen bij de volgende bijeenkomst, van we gaan het zo afronden. Dan ben ik bang dat we de basis niet goed hebben staan voor volgende projecten. - That is absolutely the case. If we do not fix this, and in the next meeting we say, "we will round it up like this". Then I am afraid that we do not have a solid basis for upcoming projects.
Asking for ideas	Stimulating followers to come up with ideas or solutions; inviting followers for a discussion	Wat hebben we nodig van [G]? Voor volgende week? - What do we need from [G]? For next week?

Being friendly	Showing sympathy; creating an open and friendly environment	Zo'n fijne collega he. - Such a nice colleague.
Encouraging	Positively stimulating the behaviour of followers; challenging professionally; laughing, joking.	Ja. [G2] mag ik jou het woord geven? - Yes. [G2], can I give you the floor?
Providing positive feedback	Evaluating and rewarding the behaviour of followers positively	Ehm, nee, eigenlijk niet haha. Mooi overzicht, ik hoop dat de andere zich daar een beetje in herkennen. - Ehm, no, actually not. Great overview, I hope that the others can relate to it as well.
Showing personal interest	Showing interest in the follower's feelings or situation; showing empathy	Veel revalidatie of euh? - Much rehabilitation?

Table 2

Codebook regarding team learning behaviours, based on Bron and Endedijk (submitted)

Code	Definition	Description	Exclusion criteria	Example (Dutch + English)
Sharing	The process of communicating knowledge, competencies, opinions or	When all topic-relevant information introduced to the team in the episode		Persoonlijke top drieën, wie wil starten, wie wil beginnen? Ja hiertegen over

	creative thoughts of one team member to other team members, who were not previously aware that these were present in the team.	is coming from one team member, only interrupted by (verification) questions, confirmations or statements that do not add information to the topic at hand.		mij, hiertegen over mij. Geweldig. - Personal top threes, who would like to start? Yes, here in front of me, in front of me. Awesome.
Co-construction	The mutual process of developing shared knowledge and building shared meaning by refining, building on, or modifying an original offer in some way. Team members take the interaction one step further as they engage in repeated cycles of acknowledging, repeating, paraphrasing, enunciating, questioning,	When other team member(s) build further on the information presented by a first team member by: - Asking for more information by means of an open question - Adding information (e.g., additional arguments, specifying conditions, etc.) - Presenting contradicting information - Coming up with possible solutions	Disagreement is possible, but mainly about factual information. Disagreement is directly accepted, rejected or ignored. Co-construction can also end with a disagreement in opinions without further elaboration.	[F]: Jongens missen we nog aspecten … Communicatie intern, ehm. [G2]: Draagvlak vind ik ook een mooie. - [F]: Guys, are we still missing aspects, … Internal communication, um. [G2]: I would also like support

	concretizing, and completing the shared knowledge, competencies, opinions or creative thoughts.		
Constructive conflict	A process of negotiation or dialogue that uncovers diversity in identity, opinion, etc. within the team. It is defined here as a conflict or an elaborated discussion that stems from diversity and open communication.	When a difference in opinion between team members is expressed and actively discussed by: - Providing arguments and counterarguments - Asking questions about presented (counter)arguments and information	Constructive conflict is a *between person* process and is *not*: different perspectives elaborated upon by one person.	Misschien nog even mensen die we niet hebben gehoord en ook persoonlijke doelen hebben aangegeven in de gesprekken, [M] misschien? - Maybe some people we haven't heard from and who also indicated personal goals in the conversation, [M] perhaps?

Note. Definitions cited from Decuyper et al. (2010)

3.5 Data analysis

For the data analysis, the transcripts of the 18 meetings were analysed. For team learning behaviours, the data first had to be coded into episodes, following the method provided by Raes et al. (2015) and Zoethout et al. (2017). These episodes are based on sequences of utterances on a particular topic, which, for example, could be sentences from a discussion between members with regard to the topic of the LC, information about the

upcoming meeting or information that did not have a link to the LC (e.g., technological issues). The end of an episode is determined by the switch of a topic (Bron & Endedijk, submitted). The length of episodes varies, depending on the complexity of information or the nature of the information, which might be conflicting with their current knowledge of the topic, which might result in discussion (Wiese & Burke, 2019). These episodes consisted of team learning and non-team learning, an overview of the episodes can be found in Appendix A.

The episodes that reflected team learning were then coded with the team learning behaviours: Sharing, Co-construction, and Constructive conflict, based on the study of Decuyper et al. (2010), examples of the behaviours are displayed in Table 2.

Following the study of Raes et al. (2015), this study considers moments when members of the LC are sharing information one-sided with the group as sharing behaviour, in these moments no further questions are asked about the given information except verification or confirmation. When members interact further on the sharing behaviour of a member, the members start engaging in other learning behaviours such as co-construction or constructive conflict.

Co-construction was assigned when other members of the LC reacted to the given information in the form of a question, asking more information or introducing a (possible) solution. Constructive conflict was assigned when, between members of the LC, different opinions were expressed and discussed by critical questions and argumentation.

For relations-oriented behaviour, the codebook provided by Hoogeboom and Wilderom (2019) has been used. This codebook is designed to capture interactions between team members in a team or group setting. Table 1 shows the codes, definitions and examples. Subsequently, the data was transferred to IBM SPSS Statistics 26 to proceed with the quantitative analysis in order to answer our research question. Relations-oriented behaviour has been coded throughout the whole meeting (i.e., also in non-team learning episodes).

In the video observations, a total of 832 behaviours were coded (relations-oriented behaviour: 538, team learning episodes: 205, other codes: 89). Due to our data being coded mutually exclusive, meaning that each segment of the text is classified under a single code, some codes, such as technical issues, are unusable for our study since they are not relevant in the aim of our study, therefore the coded 743 behaviours were used for the present study.

The study aims to find out whether more relations-oriented behaviour occurs in the later stages of the LC. Thereafter we examine if relations-oriented behaviour initiates team learning in the LC, and whether this changes over time in the LC. Hence, since we expect that

relations-oriented behaviour occurs more in the later stages, we also expect that there will be more team learning in the latter stages of the LC

The data of the two LCs are also presented separately since the topics, the aim, and the settings differed since one was held online and the other face to face. These differences could influence our results, therefore we have chosen to separate the data. Next to that, the values were standardized, since the length of the meetings differed. Standardization has been done based on the length of episodes.

To answer the first research question, a frequency analysis was conducted first for both LCs where the meetings are divided into two sets (first and last); in addition, we also show how often relations-oriented behaviour and team learning behaviour occurred for each meeting and how this changes over time. Based on standardized frequencies, the research question was answered.

For the second research question, we first tested whether relations-oriented behaviour led to team learning behaviour using Fisher's exact test, chi-square tests could not be used due to the violation of assumptions of interdependence. These assumptions imply that 20% of the expected values cannot be lower than five. Our data partially violates the assumptions of chi-square, therefore Fisher's exact test is used. Secondly, to find out whether the initiation of a team learning episode with relations-oriented behaviour changes over time, Fisher's exact and chi-square tests were conducted. To also compare the meetings over time, the data is first separated into two equal sets of meetings, to compare the first with the last set of meetings. And secondly, the data is separated per meeting, to compare results over the various meetings. For the second sub-research question, Fisher's exact test could not be computed due to failure of the SPSS software, for the second sub-research question, the assumptions for chi-square were not violated, chi-square is used instead. Comparison and interpretation of these results should be done with caution (Kim, 2017).

For the third research question, the data is divided into two equal sets of meetings and later separated per meeting to conclude whether team learning episodes occur more in the later stages of the LC. The research question is answered based on standardized descriptives.

4. Results

The present study aimed to examine the relationship between relations-oriented behaviour and team learning behaviour in LCs. In this section, we present the results of our analyses.

Descriptive results

We first start with a descriptive overview of the statistics of our variables and their specific behaviours. Table 1 shows how often the behaviours occurred on average in the meetings of the LCs. The frequencies that are displayed in the table are standardized, meaning that the frequencies have been transformed in such a way that they can be compared across different LCs, as the meetings differed in their lengths.

As shown in Table 1, relations-oriented behaviours for the LCs combined had a high standard deviation ($SD = 5.3$) and a mean of 25.6. This implies that the frequencies of relations-oriented behaviours across the meetings differed substantially. For team learning behaviour, the standard deviation is also considered high ($SD = 2.6$) with a mean of 10.0. Meaning that we see much variation in how often team learning behaviour is coded in the meetings of the LCs.

Table 3

Descriptive statistics of the relations-oriented and team learning behaviours for the LCs combined

	Mean	SD	Min	Max
Agreeing	8.3	3.5	2.5	15.5
Asking for ideas	3.4	1.9	.9	6.8
Being friendly	2.8	2.1	.0	7.0
Encouraging	5.8	3.0	.9	12.4
Providing positive feedback	4.5	3.0	.0	9.8
Showing personal interest	.8	1.2	.0	4.0
Total ROB	**25.6**	**5.3**		
Sharing	.5	.7	.0	2.5
Co-construction	7.6	2.0	4.7	11.3
Constructive Conflict	1.9	1.7	.0	6.2
Total TLB	**10.0**	**2.6**		

Note. Measured in the combined sample of LC1 and LC2; including a total of 18 meetings.

In the LCs combined, relations-oriented behaviour was examined, and out of all behaviours, 'agreeing' was coded the most with a mean of 8.3 ($SD = 3.5$), followed by 'encouraging' with a mean of 5.8 ($SD = 3.1$). 'Showing personal interest' was observed the least with a mean of 0.8 ($SD = 1.2$). Regarding team learning behaviour, 'co-construction' was observed the most with a mean of 7.6 ($SD = 2.0$), while 'sharing' was observed the least with a mean of 0.5 ($SD = 0.7$).

The below the descriptive statistics are shown separately for LC1 and LC2 in Tables 4 and 5, respectively.

Table 4

Descriptive statistics of the relations-oriented and team learning behaviours for LC1

	Mean	SD	Min	Max
Agreeing	7.7	3.5	3.5	12.7
Asking for ideas	3.8	2.2	1.0	6.8
Being friendly	2.3	2.2	.0	7.0
Encouraging	5.8	1.9	2.7	7.6
Providing positive feedback	5.4	2.8	1.3	9.0
Showing personal interest	1.4	1.4	.0	4.0
Total ROB	**26.4**	**3.4**		
Sharing	.5	.7	.0	1.9
Co-construction	7.0	2.0	4.7	10.7
Constructive Conflict	1.3	1.1	.0	2.7
Total TLB	**8.8**	**2.1**		

Note. The frequencies reported are standardized frequencies from 8 meetings

In LC1, the total relations-oriented behaviour had a mean of 26.4 (*SD* = 3.4), and the total team learning behaviour had a mean of 8.8 (*SD* = 2.1). Furthermore, 'agreeing' was coded most, with a mean of 7.7 (*SD* = 3.5), and 'showing personal interest' was coded the least with a mean of 1.4 (*SD* = 1.4). For team learning, 'co-construction' was coded the most with a mean of 7.0 (*SD* = 2.0), and 'sharing' was coded the least with a mean of 0.5 (*SD* = 0.7).

Table 5

Descriptive statistics of all continuous variables for LC2

	Mean	SD	Min	Max
Agreeing	8.4	3.5	2,4	14,7
Asking for ideas	2.9	1.6	.8	6.1
Being friendly	3.0	2.1	.0	5.4
Encouraging	5.5	3.7	.9	11.8
Providing positive feedback	3.6	2.9	.0	9.3
Showing personal interest	.2	.5	.0	1.5
Total ROB	**23.6**	**6.1**		
Sharing	.5	.8	.0	2.5
Co-construction	7.7	1.9	5.0	10.7
Constructive Conflict	2.3	1.9	.6	5.9
Total TLB	**10.5**	**2.5**		

*Note.* The frequencies reported are standardized frequencies from 10 meetings

In LC2, the total relations-oriented behaviour had a mean of 23.6 ($SD = 6.1$) and team learning behaviour had a mean of 10.5 ($SD = 2.5$). Furthermore, 'agreeing' is coded most, again, with a mean of 8.4 ($SD = 3.5$), and 'showing personal interest', is coded least with a mean of 0.2 ($SD = 0.5$). For team learning, 'co-construction' was coded the most with a mean of 7.7 ($SD = 1.9$) and 'sharing' was coded the least with a mean of 0.5 ($SD = 0.8$).

The LCs differ slightly, where for LC1 the mean of relations-oriented behaviour is higher than in LC2. For team learning behaviour, however, a larger mean is observed for LC2, compared to LC1. Next to that, the means for 'asking for ideas' and 'providing positive feedback' are substantially larger in LC1 than in LC2. Furthermore, the mean for 'constructive conflict' in LC2 is larger, with 2.3 compared to 1.3 in LC1.

For the separate LCs, how often the relations-oriented and team learning behaviours occur per meeting is visualized. Note that the standardized frequencies are presented to enable comparison between the meetings.

Figure 1
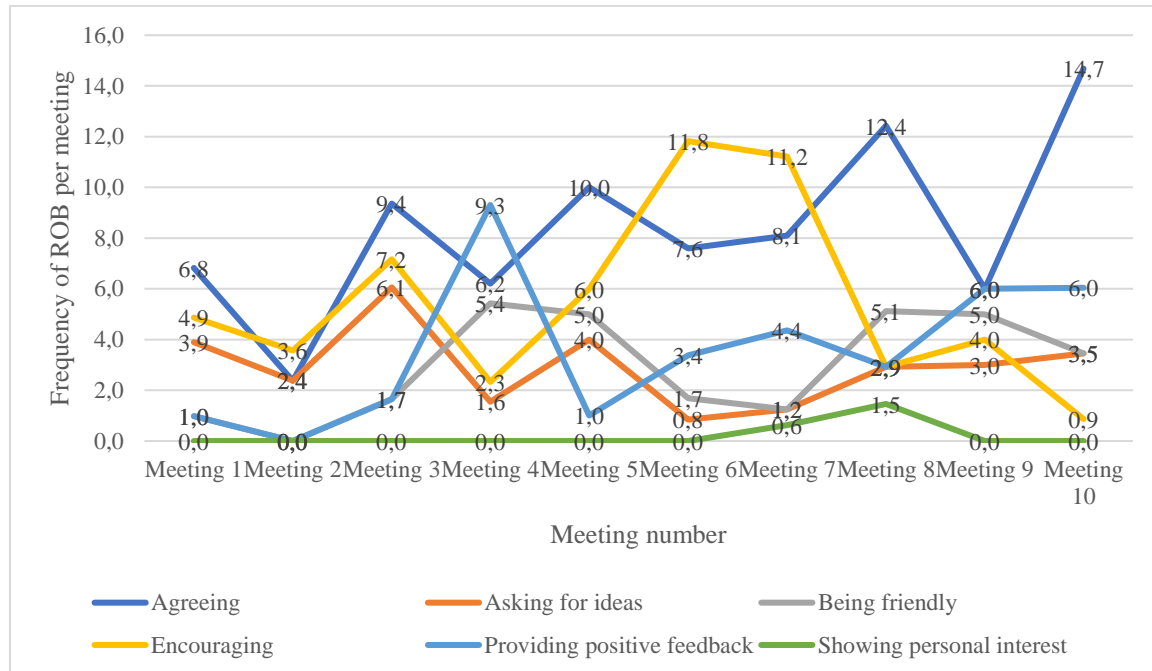
Relations-oriented behaviour per meeting for LC1
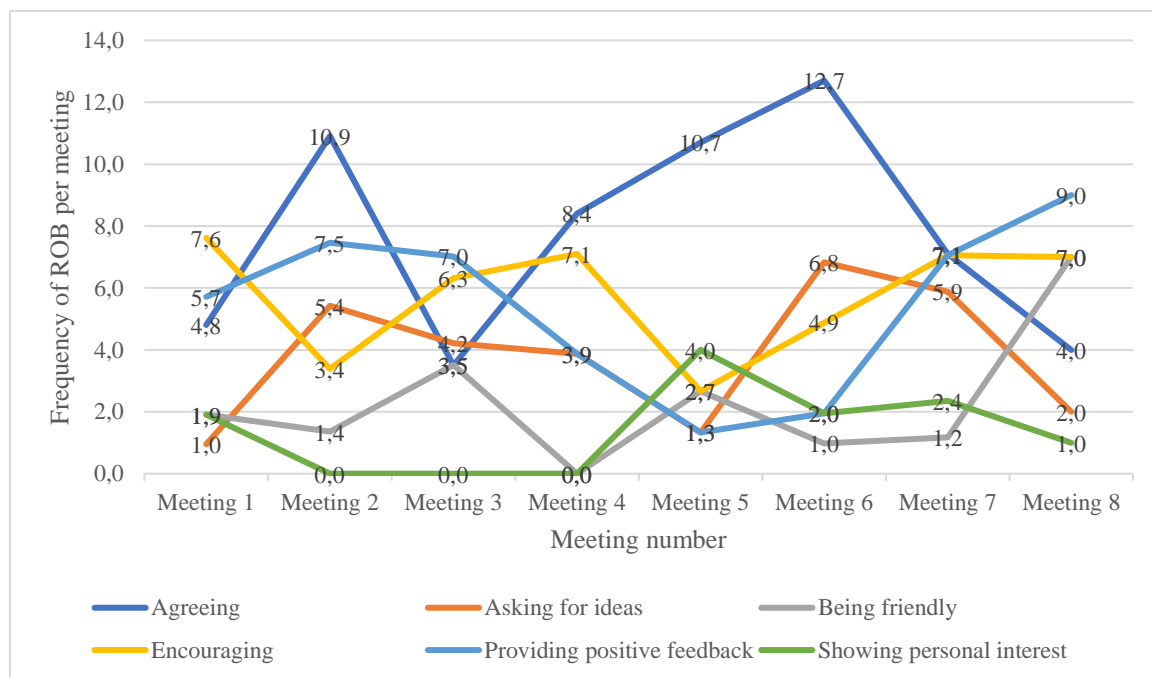
Note. Standardized frequencies per meeting for LC1.

In LC1, it can be observed that 'agreeing,' 'encouraging,' and 'providing positive feedback' are observed most in all of the meetings. 'Showing personal interest' and 'being friendly' are observed the least. Furthermore, it is interesting to note that 'showing personal

interest' is observed more in the later meetings, whereas 'agreeing' is observed less in the later meetings.

Figure 2

Relations-oriented behaviour per meeting for LC2

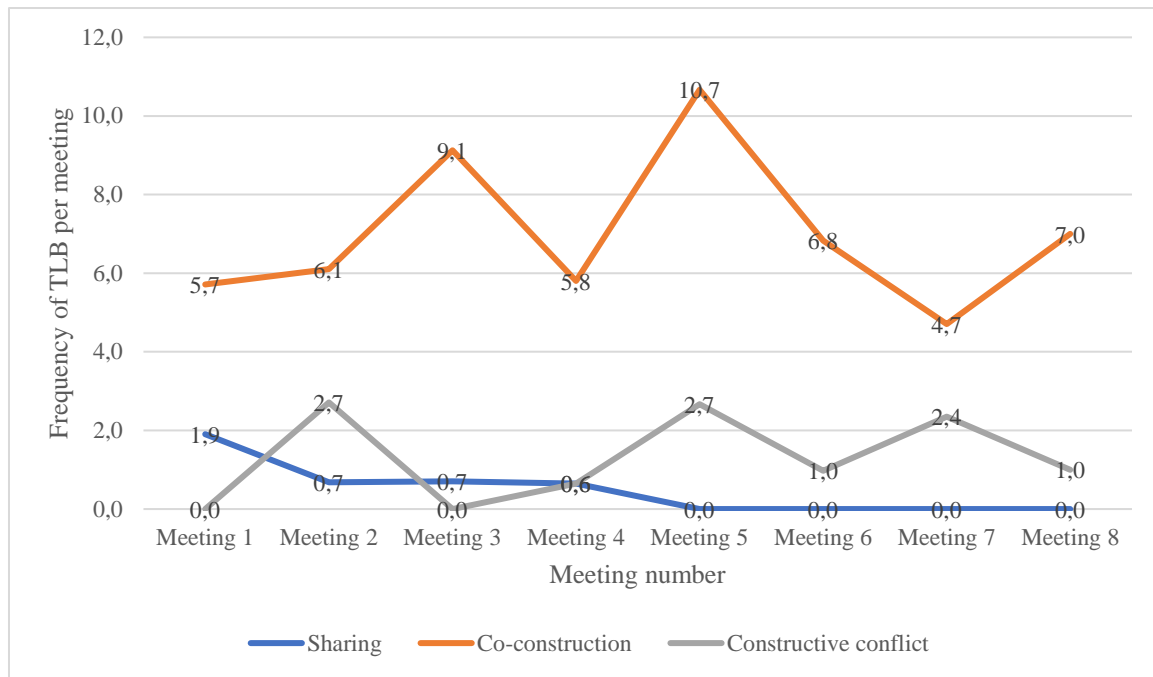*Note.* Standardized frequencies per meeting for LC2.

In LC2, 'agreeing', 'encouraging', and 'providing positive feedback' are again observed most. 'Showing personal interest' and 'being friendly,' are observed the least. Interesting to note is that 'asking for ideas' is observed less in the later meetings. For 'encouraging', we see large frequencies in the 6th and 7th meeting, whereafter it decreases again. 'Providing positive feedback' is seen to increase in the later meetings of LC2.

With comparing the two LCs, it's notable that 'showing personal interest' is rarely observed in LC2, whereas in LC1 it can be observed in the last four meetings. Next to that, the frequencies of 'providing positive feedback' are standing out, where it is observed much more in LC1, than in LC2. Similarities are the presence of the 'encouraging' and 'agreeing' behaviours, in both LCs they are present the most

The standardized frequencies for each meeting for the team learning behaviours in LC1 and LC2 are displayed below in Figures 3 and 4.

Figure 3

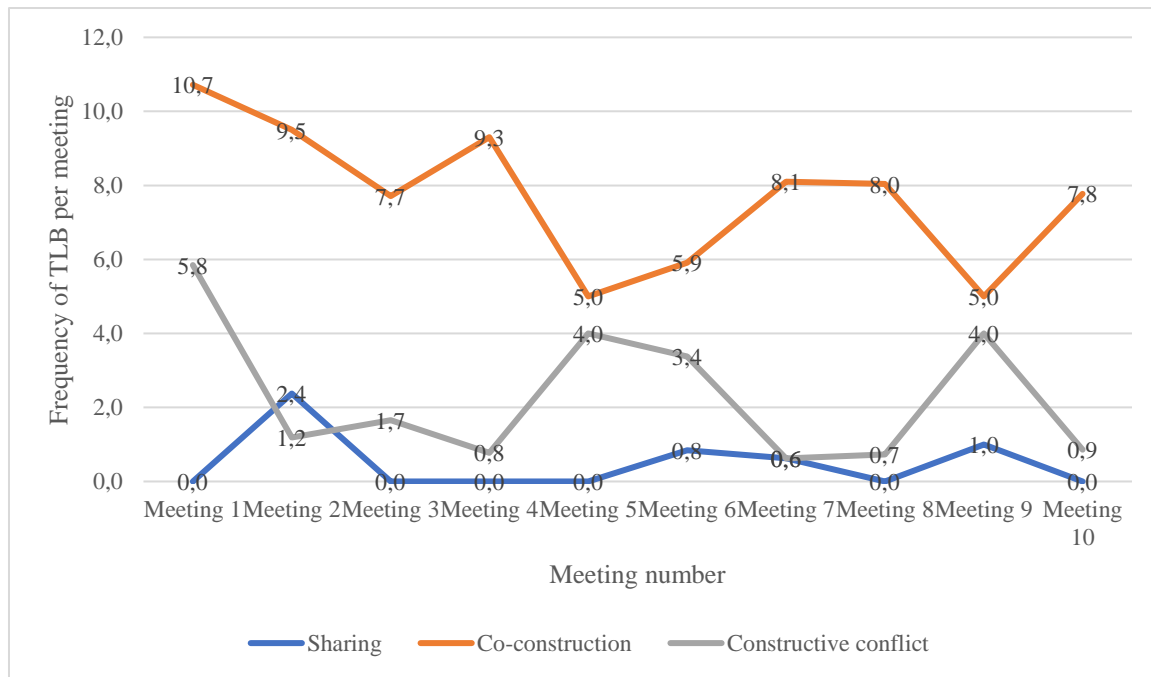*Team learning behaviour per meeting for LC1*

Note. Standardized frequencies per meeting for LC1.

It can be observed that in LC1 (Figure 3), 'sharing' is coded in the first four meetings, whereafter it is not coded again in the following meetings. 'Co-construction' is coded the most in LC1. The frequency of 'constructive conflict' varies over the meetings, with the highest frequency of 2.7 per meeting and the lowest is 0.

Figure 4

Team learning behaviour per meeting for LC2

Note. Standardized frequencies per meeting for LC1.

For LC2 (Figure 4), 'sharing' is coded the least, but is coded in the later meetings as well. Also, in LC2, 'co-construction' is coded the most. 'Constructive conflict' varies much in frequency over the meetings, with the highest frequency of 5.8 and the lowest of 0.6.

When the two LCs are compared, it is visual that 'constructive conflict' is observed more in LC2. Next to that, in LC1 'sharing' is only observed in the first four meetings. In LC2, 'sharing' is observed also in the later meetings of the LC.

RQ 1: Does relations-oriented behaviour occur more frequently in the later stages of the LC?

The present study aimed to find out whether relations-oriented behaviour occurs more frequently in the later stages of the LC. The standardized frequencies of relations-oriented behaviour in the first and last set of meetings for the LCs combined and for both LCs separately are examined to answer our research question. In Table 6, we present the standardized frequencies for the specific relations-oriented behaviours across the first and last set of meetings for the combined LCs. In the next two tables, Tables 7 and 8, we present the standardized frequencies per behaviour across the first and last set of meetings for the separate LCs. Furthermore, to explore the pattern of relations-oriented behaviour across the meetings of the LCs in more detail, we show how often relations-oriented behaviour is displayed in each meeting, visualised in a stacked graph in Figures 5 and 6.

By examining these standardized frequencies and graphs, we can gain a better understanding of whether relations-oriented behaviour occurs more frequently in the later stages of the LC. This information is important because it can help us to understand how the development of the LC over time impacts the use of relations-oriented behaviours and can provide insights into how team processes temporarily develop.

Table 6

Relations-oriented behaviour in the first and last set of the combined LCs

	First		Last	
Behaviour	Mean	SD	Mean	SD
Agreeing	7.1	3.1	9.5	3.7
Asking for ideas	3.7	1.7	3.1	2.1
Being friendly	2.3	2.1	3.2	2.2
Encouraging	5.5	1.9	6.0	4.0
Prov. Pos. Fb.	4.2	3.5	4.8	2.6
Showing. P. Int.	0.2	0.6	1.3	1.3
Total	**23.0**	**6.2**	**28.0**	**2.7**

Note. Frequencies are standardized, the first set represents meetings 1-5 and the last set represents meetings 6-10

Data separated into the first and last set of meetings. Based on Table 6 above, it appears that there are differences in the mean frequency of behaviours between the sets. Specifically, 'agreeing,' 'being friendly,' 'encouraging,' and 'providing positive feedback' behaviours increased in the last from the first to the last set of meetings. 'Asking for ideas,' and 'showing personal interest' behaviour decreased from the first to the last set of meetings. Overall, an average increase in relations-oriented behaviour is observed, with a mean of 23.0 ($SD = 6.2$) in the first set of meetings, and a mean of 28.0 ($SD = 2.7$) in the last set of meetings.

Table 7

Relations-oriented behaviour in the first and last set of meetings of LC1

	First		Last	
Behaviour	Mean	SD	Mean	SD
Agreeing	6.9	3.4	8.6	3.9
Asking for ideas	3.6	1.9	4.0	2.8
Being friendly	1.7	1.5	3.0	2.8
Encouraging	6.1	1.9	5.4	2.1
Prov. Pos. Fb.	6.0	1.6	4.8	3.8
Showing. P. Int.	0.5	1.0	2.3	1.3

| Total | 24.8 | 2.6 | 28.1 | 3.7 |

Note. Frequencies are standardized, the first set represents meetings 1-4 and the last set represents meetings 5-8

The average frequency of relations-oriented behaviour in LC1 is shown in Table 7 above. In the first set, the average frequency is 24.8 (*SD* = 2.6), and for the last set, the average is 28.1 (*SD* = 3.7). Therefore, we can conclude that relations-oriented behaviour occurs more frequently in the later stages of LC1. Looking at Table 7, it appears that there are differences in the mean frequency of behaviours between the sets. Specifically, 'agreeing,' and 'encouraging' behaviours increased from the first set of meetings to the last set of meetings, whereas the mean frequency of 'asking for ideas,' 'being friendly,' 'providing positive feedback,' and 'showing personal interest' decreased from the first to the last set of meetings.

These findings suggest that as the team progressed through the meetings, there was a shift towards more 'encouraging' and 'agreeing' behaviour and a decrease in behaviours such as 'being friendly' and 'showing personal interest.'

Table 8

Relations-oriented behaviour in the first and last set of meetings of LC2

	First		Last	
Behaviour	Mean	SD	Mean	SD
Agreeing	7.0	3.0	9.8	3.6
Asking for ideas	3.6	1.7	2.2	1.2
Being friendly	2.6	2.5	3.3	1.8
Encouraging	4.8	1.9	6.2	5.0
Prov. Pos. Fb.	2.6	3.8	4.5	1.5
Showing. P. Int.	0.0	0.0	0.4	0.6
Total	**20.5**	**7.7**	**26.5**	**1.8**

Note. Frequencies are standardized, the first set represents meetings 1-5 and the last set represents meetings 6-10

Based on the data in Table 8, it appears that there is a difference in the occurrence of relations-oriented behaviours between the first and the last sets of meetings. The means for most behaviours increased for the first to the last meetings, with differences observed for 'agreeing,' 'being friendly,' 'encouraging,' and 'providing positive feedback.' However, there was a decrease in 'asking for ideas' from the first to the last meetings. It is important to note that 'showing personal interest' was not observed at all in the first set of meetings but was observed in the last set of meetings. Overall, based on the total average of relations-oriented

behaviour between the first meetings ($M = 20.5$, $SD = 7.7$) and the last meetings ($M = 26.5$, $SD = 1.8$), we can conclude that more relations-oriented behaviour occurs in the last set of meetings.

Data separated per meeting. To explore the pattern of relations-oriented behaviour across the meetings of the LCs in more detail, Figure 5, below displays the average frequency of each behaviour per meeting for the LCs combined. Figures 6 and 7 display the average frequency of each behaviour per meeting for the LCs apart.

Figure 5

Relations-oriented behaviour per meeting for the combined LCs
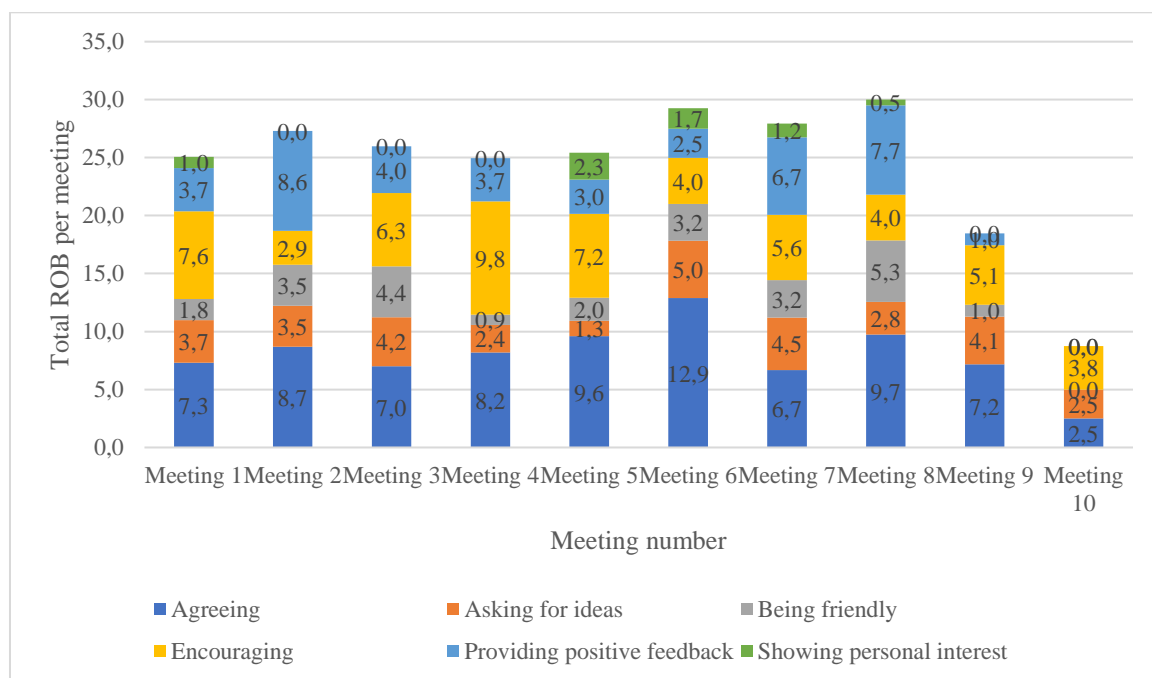
*Note.* LC1 had 8 meetings, and LC2 had 10 meetings.

In Figure 5 above, the distribution of average relations-oriented behaviour is shown per meeting for the combined LCs. Based on the graph presented, we can observe that 'agreeing,' 'encouraging,' and 'providing positive feedback' are coded most in the meetings. The behaviour 'showing personal interest' is, on average, coded least in the meetings. Based on the total frequency, a relatively stable amount of coded behaviours is observed in the first five meetings, with a slight increase in meeting 6 and meeting 8, whereafter the total frequency decreases in meeting 9 and 10. Meetings 2, 7 and 8 stand out, concerning providing positive feedback. Meetings 1, 4, and 5 show, respectively, a considerable frequency of

'encouraging' behaviour. Concerning 'agreeing' behaviour, meeting 6 stands out with an average frequency of 12.9.

For the separate LCs, Figures 6 and 7 below show the distribution of relations-oriented behaviour per meeting. In LC1 it can be observed that the frequency of relations-oriented behaviour is variating but rising from meeting 5 to 8. 'Showing personal interest' behaviour is also increasing during the last meetings while being absent in meetings 2, 3 and 4. Also, in meeting 8, 'being friendly' behaviour is coded most, with an average of 7.

Figure 6

Relations-oriented behaviour per meeting for LC1
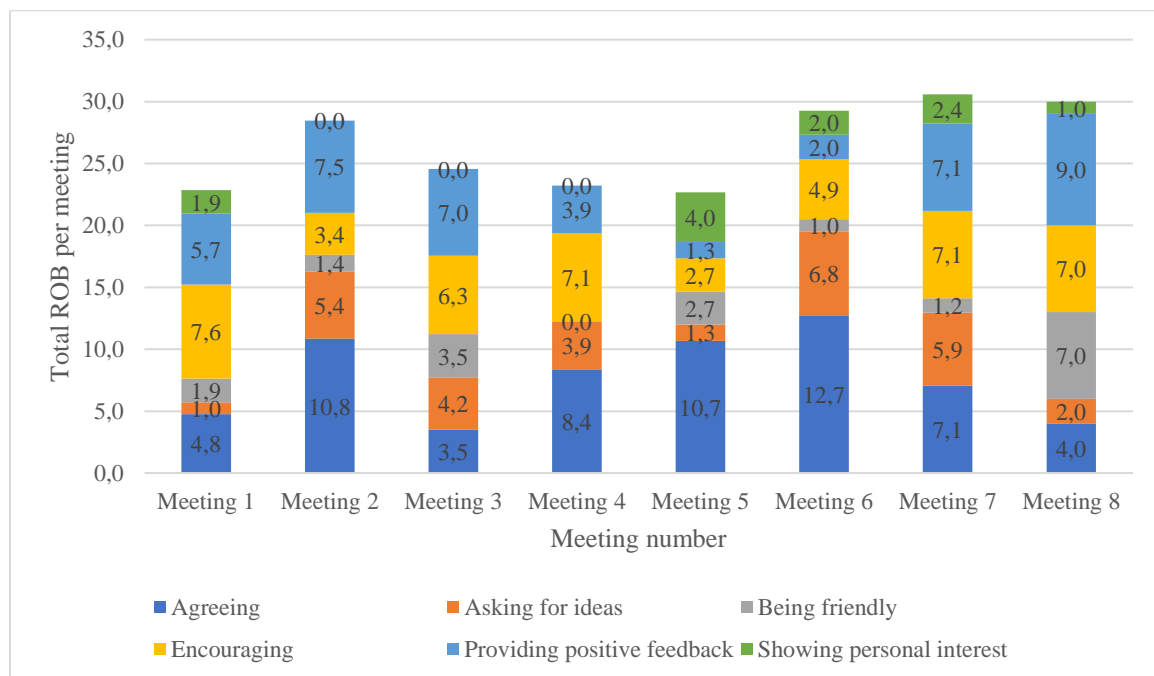
The distribution of relations-oriented behaviour in LC2 is shown in Figure 7 below. The lowest frequency of relations-oriented behaviour is observed in meeting 2, where 'providing positive feedback,' 'being friendly,' and 'showing personal interest' are not observed at all. In meeting 10, the highest average of relations-oriented behaviour is observed. For example, 'agreeing' averages 14.7 in meeting 10, being the highest observed behaviour of all. It is also worth noting that 'showing personal interest' is not observed in this meeting, and 'encouraging' behaviour has the second lowest average, with 0.9.

Figure 7

Relations-oriented behaviour per meeting for LC2
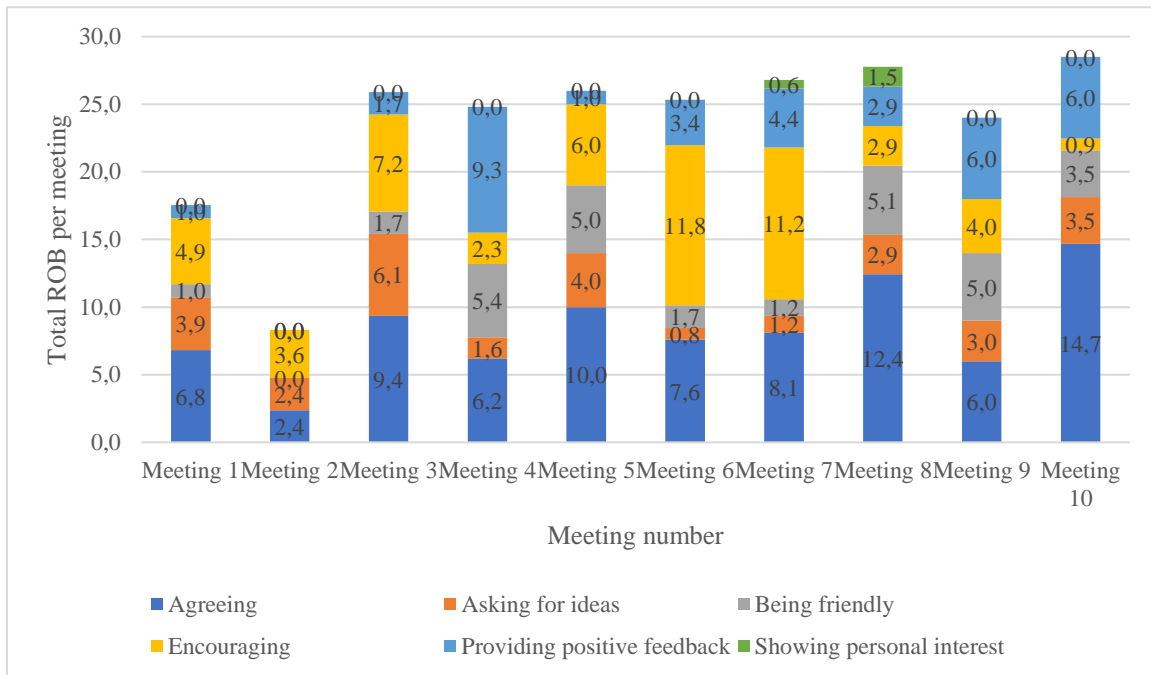
Based on the results presented, it can be concluded that relations-oriented behaviour does occur more frequently in the later stages of the LC. Specifically, behaviours such as 'agreeing,' 'being friendly,' and 'providing positive feedback' increased, while 'asking for ideas', and 'showing personal interest' decreased in frequency. The results were consistent across the combined LCs and the separate LCs.

RQ 2: Does the way of initiating team learning episodes with relations-oriented behaviour change over time in a LC?

This research question aimed to investigate whether relations-oriented behaviour initiates team learning. We first investigate whether LC members initiate team learning behaviour by expressing relations-oriented behaviour. Subsequently, we investigate whether initiating team learning with relations-oriented behaviour changes over time.

RQ 2.1: Does relations-oriented behaviour initiate team learning behaviour

To answer this research question and investigate whether relations-oriented behaviour initiates team learning in an LC, we first present tables which show how often team learning occurs after relations-oriented behaviour. Hence, the tables below show how often team learning episodes are started after relations-oriented behaviour is expressed (ROB) and how often it happens without expressing relations-oriented behaviour (i.e., Other). We do this first for the two LCs combined in Table 9, then we show this for LC1 in Table 10 and then present this for LC2 in Table 11. After this, we also show whether specific forms of relations-oriented behaviour more frequently initiated team learning episodes, as compared to other behaviours.

Team learning episodes initiated by relations-oriented behaviour

Table 9

Team learning episodes initiated with or without relations-oriented behaviour for the LCs combined

Behaviour	Sharing		Co-construction		Constructive conflict	
	n	*%*	*n*	*%*	*n*	*%*
ROB	4[4]	40.0	74[71]	54.3	11[14]	65.6
Other	6[6]	60.0	88[91]	45.7	21[18]	34.4
Total	**10**	**100**	**162**	**100**	**32**	**100**

Note. Formatted as Observed[Expected]

Table 10

Team learning episodes initiated with or without relations-oriented behaviour for LC1

Behaviour	Sharing		Co-construction		Constructive conflict	
	n	*%*	*n*	*%*	*n*	*%*

ROB	2[3]	40.0	39[37]	59.1	3[4]	42.9
Other	3[2]	60.0	27[29]	40.9	4[3]	57.1
Total	**5**	**100**	**66**	**100**	**7**	**100**

Note. Formatted as Observed[Expected]

Table 11

Team learning episodes initiated with or without relations-oriented behaviour for LC2

Behaviour	Sharing		Co-construction		Constructive conflict	
	n	*%*	*n*	*%*	*n*	*%*
ROB	2[2]	40.0	35[34]	36.5	8[9]	32.0
Other	3[3]	60.0	61[62]	63.5	17[16]	68.0
Total	**5**	**100**	**96**	**100**	**25**	**100**

Note. Formatted as Observed[Expected]

First, there was no significant relationship found between relations-oriented behaviour and the team learning episodes in the LCs combined (Fisher's exact value (2) = 1.439, *p* = .532). Similarly for the LCs apart, no significant relationship between relations-oriented behaviour and team learning was found for LC1 (Fisher's exact value (2) = 1.387, *p* = .514) or LC2 (Fisher's exact value (2) = 0.345, *p* = .936).

From the tables, it can be observed that for the LCs combined or separately for the LCs, it did not differ whether the team learning episode was initiated with relations-oriented behaviour or with other behaviour. What is notable in Table 10 is that for LC1, however, 'co-construction' is initiated more often with relations-oriented behaviour with 39 (59.1%), than without with 27 (40.9%).

Team learning episodes initiated by specific relations-oriented behaviour

For focussing on which relations-oriented behaviour is used most when initiating a team learning episode, the relations-oriented and team learning behaviours are listed below in several cross tables. Below, Tables 12, 13, and 14 provide observed and expected frequencies and percentages of the relations-oriented behaviours at the beginning of a team learning episode. Table 12 provides the numbers for the combined LCs, Table 13 for LC1, and Table 14 for LC2.

Table 12

Team learning behaviour initiated by specific ROBs for the combined LCs

ROB	Sharing		Co-construction		Constructive conflict		Total	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Agreeing	0[0.3]	0.0	6[5.6]	3.7	1[1.1]	3.1	7	3.4
Asking for ideas	1[1.3]	10.0	23[20.6]	14.2	2[4.1]	6.3	26	12.7
Being friendly	0[0]	0.0	0[0]	0.0	0[0]	0.0	0	0.0
Encouraging	3[2.5]	30.0	41[41.3]	25.3	8[8.2]	25.0	52	25.5
Providing positive feedback	0[0.2]	0.0	4[3.2]	2.5	0[0.6]	0.0	4	2.0
Showing personal interest	0[0]	0.0	0[0]	0.0	0[0]	0.0	0	0.0
Other behaviour	6[5.6]	60.0	88[91.3]	54.3	21[18.0]	65.6	115	56.4
Total	**10**	**100**	**162**	**100**	**32**	**100**	**204**	**100**

Note. Formatted as Observed[Expected]

Table 13

Team learning behaviour initiated by specific ROBs for LC1

ROB	Sharing		Co-construction		Constructive conflict		Total	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Agreeing	0[0.3]	0.0	5[4.2]	7.6	0[0.4]	0.0	5	6.4
Asking for ideas	1[0.9]	20.0	12[11.8]	18.2	1[1.3]	14.3	14	17.9
Being friendly	0[0]	0.0	0[0]	0.0	0[0]	0.0	0	0.0
Encouraging	1[1.5]	20.0	20[19.5]	30.3	2[2.1]	28.6	23	29.5
Providing positive feedback	0[0.1]	0.0	2[1.7]	3.0	0[0.2]	0.0	2	2.6
Showing personal interest	0[0]	0.0	0[0]	0.0	0[0]	0.0	0	0.0
Other behaviour	3[2.2]	60.0	27[28.8]	40.9	4[3.1]	57.1	34	43.6
Total	**5**	**100**	**66**	**100**	**7**	**100**	**78**	**100**

Note. Formatted as Observed[Expected]

Table 14

Team learning behaviour initiated by ROB per behaviour for LC2

ROB	Sharing		Co-construction		Constructive conflict		Total	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Agreeing	0[0.1]	0	1[1.5]	1.0	1[0.4]	4.0	2	1.6
Asking for ideas	0[0.5]	0	11[9.1]	11.5	1[2.4]	4.0	12	9.5
Being friendly	0[0]	0	0[0]	0	0[0]	0	0	0
Encouraging	2[2.1]	40.0	21[22.1]	21.9	6[5.8]	24.0	29	23.0
Providing positive feedback	0[0.1]	0	2[1.5]	2.1	0[0.4]	0	2	1.6
Showing personal interest	0[0]	0	0[0]	0	0[0]	0	0	0
Other behaviour	3[3.2]	60.0	61[61.7]	63.5	17[16.1]	68.0	81	64.3
Total	**5**	**100**	**96**	**100**	**25**	**100**	**126**	

Note. Formatted as Observed [Expected]

Table 12 shows that 'encouraging' behaviour, is responsible for the most initiations of team learning episodes for the combined LCs. 'Being friendly,' and 'showing personal interest' did not initiate a team learning episode in either of the LCs.

Example of 'encouraging' behaviour in starting a 'co-construction' episode:

"And our assignment from the learning community, which we are working on now, prefabrication, standardization, is this an item to discuss?"

The analysis revealed no significant relationship between relations-oriented behaviour and the team learning episodes for LC1 (Fisher's exact value (8) = 2.587, *p* = .994), LC2 (Fisher's exact value (8) = 5.617, *p* = .743), and the LCs combined (Fisher's exact value (8) = 2.724, *p* = .952). These results suggest that the initiation of team learning episodes through relations-oriented behaviour does not lead to different team learning behaviour. Concerning the observed and expected frequencies, few discrepancies are observed. For the LCs combined the largest difference is found in 'asking for ideas', which is observed more than expected for 'co-construction', whereas it was expected to be observed more in 'constructive conflict'. Focussing on the separate LCs, the discrepancy for 'asking for ideas' is found in LC2. For LC1, all observed frequencies were within one standard deviation of the expected frequencies, indicating no large discrepancies.

RQ 2.2: Does relations-oriented behaviour initiating team learning change over time?

To answer this research question, we analysed whether initiating team learning with relations-oriented behaviour changes over time. First, the differences between the first and last set of meetings will be analysed, and subsequentially the differences per meeting.

Data separated into the first and the last set of meetings. To analyse whether the behaviour changes over time, we have separated the meetings into the first and last set of meetings. To answer our research question, we conducted chi-square tests on the combined LCs and the separate LCs. Table 15 below, gives the observed and expected frequencies of team learning initiated with relations-oriented behaviour in the first and last set of meetings for the combined LCs, for LC1 and LC2

Table 15

Team learning initiated by ROB in the first and last set of meetings

Set	LCs				LC1				LC2			
	Starts with ROB				Starts with ROB				Starts with ROB			
	Yes		No		Yes		No		Yes		No	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
First set	52[49.3]	46.0	61[63.7]	54.0	29[25.9]	63.0	17[20.1]	37.0	23[23.9]	34.3	44[43.1]	65.7
Last set	37[39.7]	40.7	54[51.3]	59.3	15[18.1]	46.9	17[13.9]	53.1	22[21.1]	37.3	37[37.9]	62.7
Total	**89**		**115**		**44**		**34**		**45**		**81**	

Note. Formatted as Observed [Expected]. Percentages are row-percentages

For the combined LCs, the results showed no significant difference with a chi-square value of ($X^2(1) = 0.588$, $p = .443$), indicating that the relationship between initiating team learning behaviour with relations-oriented behaviour does not change over time. Table 15 also shows no major discrepancies between the observed and expected values.

For LC1, the chi-square test also reported no significant difference with a chi-square value ($X^2(1) = 2.006$, $p = .157$). This implies that there was no change in the relationship between initiating team learning behaviour with relations-oriented behaviour over time in LC1. In LC2, the chi-square test reported a non-significant difference with a chi-square value of ($X^2(1) = 0.120$, $p = .729$), indicating that the relationship between initiating team learning

behaviour with relations-oriented behaviour is not changing over time in LC2. Table 14 also showed no major discrepancies between the observed and expected values.

Only in the first set of meetings from LC1, relations-oriented behaviour was responsible for initiating the most team learning. In the other sets, most team learning was started with other behaviour than relations-oriented behaviour. Overall, more team learning is initiated in the first set of meetings from the LCs combined, as well as for the separate LCs.

Data separated per meeting. To investigate whether the behaviour changes over time, the meetings have also been analysed separately. Figure 11, Figure 12, and Figure 13 provide observed and expected frequencies per meeting, for the LCs combined, LC1 and LC2. For the combined sample, Fisher's exact test could not be computed due to insufficient memory in SPSS software. Since the assumptions for a chi-square test were not violated, chi-square is used to test our hypothesis. Comparison of these results should be done with caution.

For the LCs combined, the chi-square test reported significant differences with (X^2 (9) = 21.259, $p < .05$), although these results should be interpreted with care. For the separate LCs, Fisher's exact was used. Fisher's exact test indicated no significant difference for LC1 (Fisher's exact value (9) = 11.709, $p = .103$. In LC2, there is a significant difference for initiating team learning with relations-oriented behaviour per meeting (Fisher's exact value (9) = 19.774, $p < .05$).

The observed and expected numbers can be found in Figure 11 for the LCs combined, Figure 12 for LC1, and Figure 13 for LC2. For LC1, the expected numbers are close to the observed numbers, with exceptions for meeting 3 and 5. In meeting 3, team learning episodes initiated with relations-oriented behaviour are observed more than expected. Where on the contrary, in meeting 5, team learning initiated with relations-oriented is observed less than compared to what is expected. The observed numbers for LC2 deviate more from what is expected. In meetings 1 and 7, team learning initiated with relations-oriented behaviour is observed more than expected, while in meetings 2 and 10, it is observed less than expected.

Figure 11

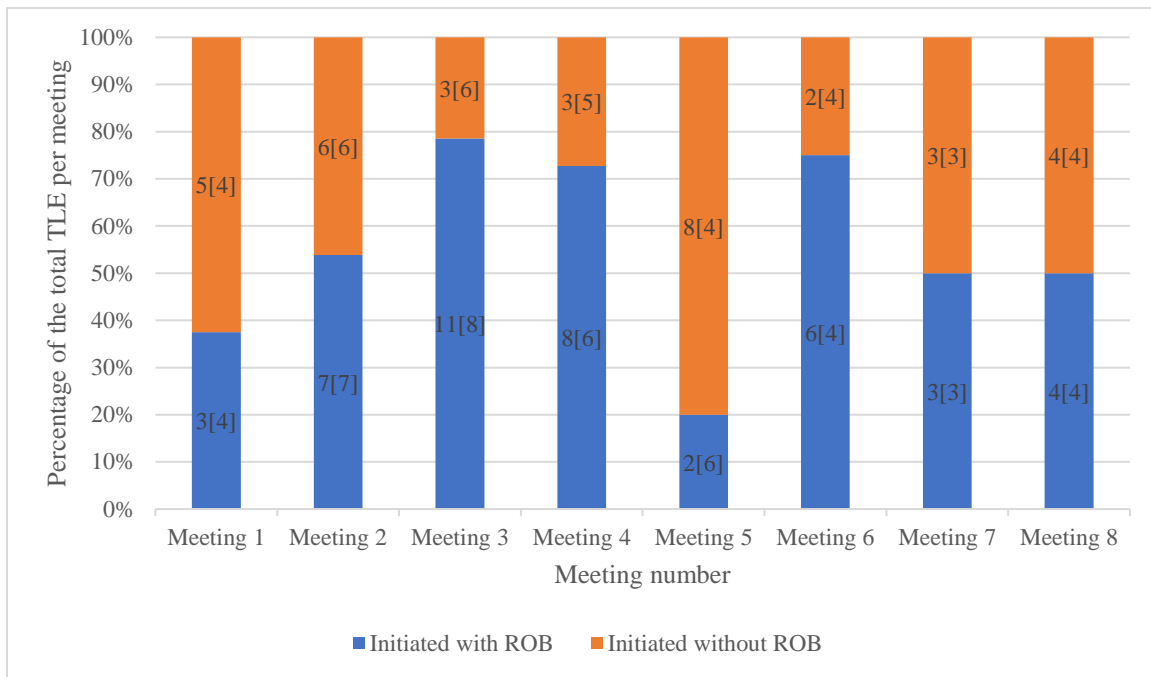*Number of team learning episodes initiated with or without ROB for the LCs combined*
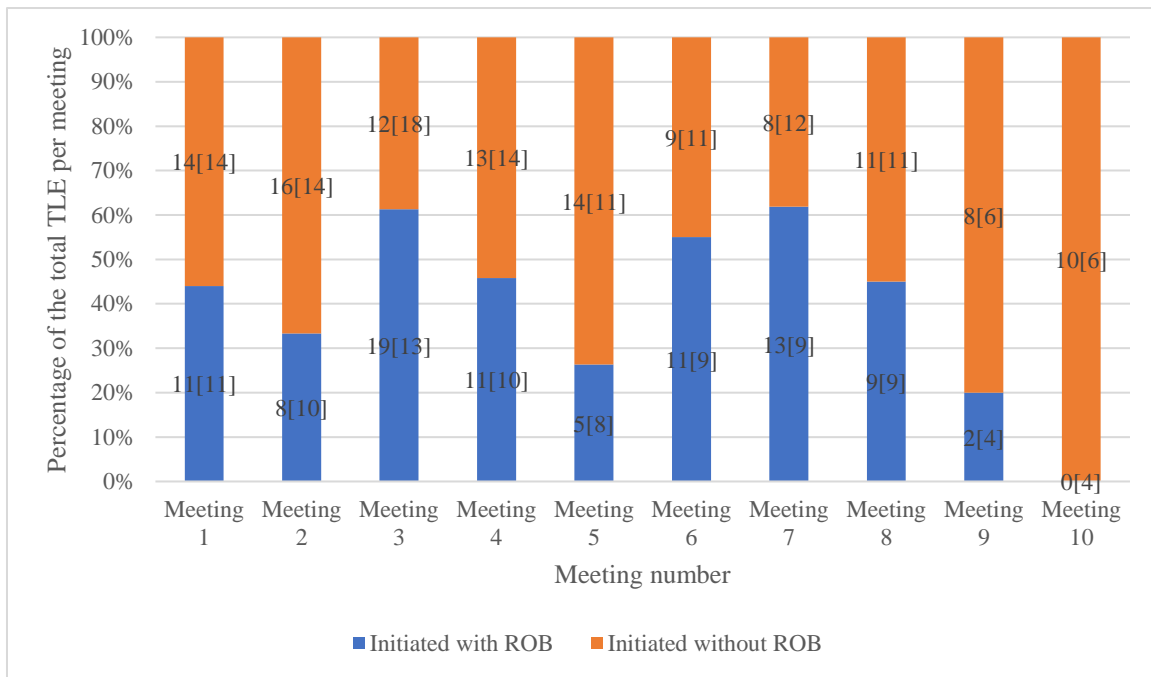
Note. Formatted as Observed[Expected]

Based on our results, we do see a pattern where more team learning is initiated with relations-oriented behaviour in the final meetings. Therefore, we can state that, for the LCs combined and LC2, team learning is initiated more with relations-oriented behaviour in the later set of meetings of the LC.
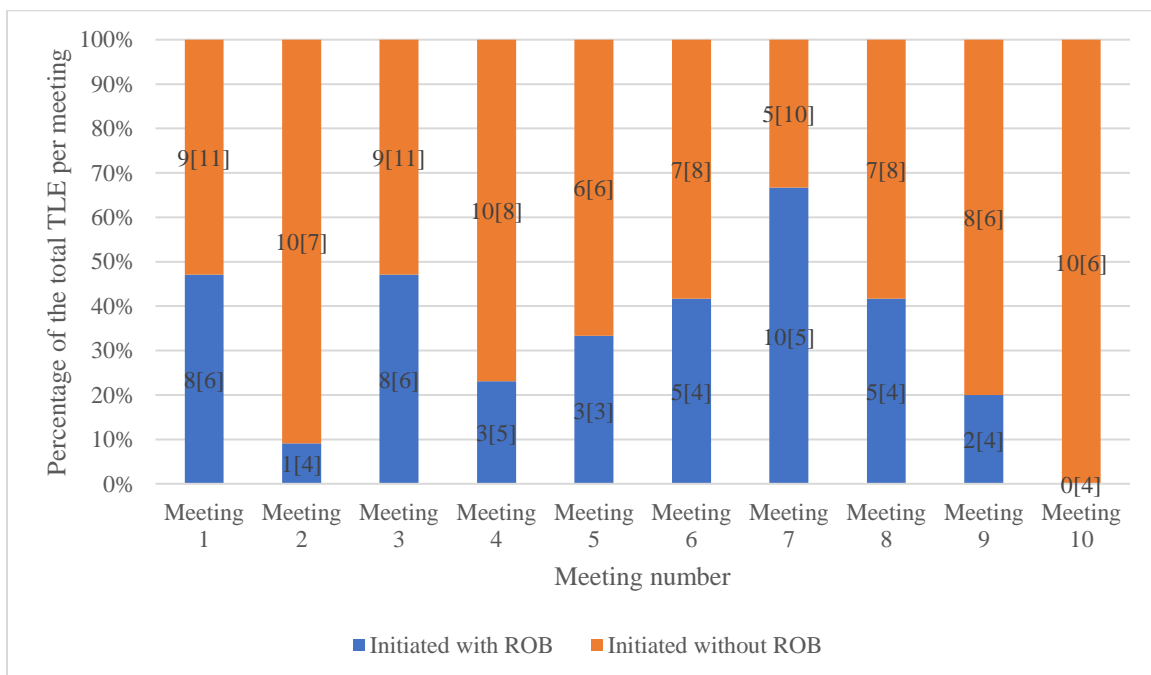
Figure 12

Number of team learning episodes initiated with or without ROB for LC1

Note. Formatted as Observed[Expected]

Figure 13

Number of team learning episodes initiated with or without ROB for LC2

Note. Formatted as Observed[Expected]

RQ 3: Does team learning behaviour occur more frequently in the later stages of the LC?

The research question aims to investigate whether team learning behaviour occurs more frequently in the later stages of the LC. To answer the research question, we examined the standardized frequencies of team learning behaviour across the LCs combined and the two LCs separately. In the first table, Table 16, we present the standardized frequencies per team learning behaviour across the first and last set of meetings for the combined LCs. In the following two tables, Tables 17 and 18 respectively, we present the standardized frequencies per behaviour across the first and last set of meetings for the separate LCs. Furthermore, to explore the pattern of team learning behaviour across the meetings of the LCs in more detail, we calculated the frequency of each behaviour per meeting, visualised in Figures 14 and 15. These figures display the average frequency of each behaviour per meeting for the LCs. By examining these standardised frequencies and graphs, we can gain a better understanding of whether team learning behaviour occurs more frequently in the later stages of the LC.

Table 16

Team learning behaviour in the first and last set of the combined LCs

	First		Last	
Behaviour	Mean	SD	Mean	SD
Sharing	0.7	0.9	0.3	0.4
Co-construction	7.9	2.3	7.3	1.9
Constr. conflict	2.0	2.1	1.9	1.3
Total	**10.6**	**3.2**	**9.5**	**1.9**

Note. Frequencies are standardized, the first set represents meetings 1-5 and the last set represents meetings 6-10

Data separated into the first and the last set of meetings. For the combined sample, in the first set of meetings team learning behaviour is coded more, with a mean of 10.6 ($SD =$ 3.2), against a mean of 9.5 ($SD =$ 1.9) of the last set. Focussing on the specific team learning behaviours, we see a decrease in all mean values.

Table 17

Team learning behaviour in the first and last set of LC1

	First		Last	
Behaviour	Mean	SD	Mean	SD
Sharing	1.0	0.6	0.0	0.0

Co-construction	6.7	1.6	7.3	2.5
Constr. conflict	0.8	1.3	1.8	0.9
Total	**8.5**	**1.4**	**9.1**	**2.9**

Note. Frequencies are standardized, the first set represents meetings 1-4 and the last set represents meetings 5-8

The standardized frequencies for team learning LC1 in Table 17 show an increase in 'co-construction' and 'constructive conflict,' while 'sharing' behaviour decreased to zero (*SD* = 0.0) in the last set of meetings, indicating no sharing behaviour. Overall, LC1 shows an increase in team learning behaviour, with the first set reporting a mean of 8.5 (*SD* = 1.4) and the last set reporting a mean of 9.1 (*SD* = 2.9). It is worth noting that 'co-construction' reports a standard deviation of 2.5 in the last set of meetings, indicating significant variation in the reported data. These findings suggest that as the team progressed through the meetings, more team learning behaviour in the form of 'co-construction' and 'constructive conflict' was observed.

Table 18

Team learning behaviour in the first and last set of LC2

	First		Last	
Behaviour	Mean	SD	Mean	SD
Sharing	0.5	1.1	0.5	0.5
Co-construction	8.5	2.2	7.0	1.4
Constr. conflict	2.7	2.2	1.9	1.6
Total	**11.7**	**3.2**	**9.4**	**0.7**

Note. Frequencies are standardized, the first set represents meetings 1-5 and the last set represents meetings 6-10

Table 18 above, reporting standardized frequencies for LC2 on team learning behaviours, shows that 'sharing' behaviour has a constant mean of 0.5. On closer inspection of the data, a slight increase was observed in the frequency of 'sharing' behaviour from 0.48 in the first set of meetings to 0.49 in the last set of meetings. 'Co-construction' and 'constructive conflict' report a decrease. Overall, based on the total frequency of team learning behaviour in the first set of meetings (*M* = 11.7, *SD* = 3.2) and the last set of meetings (*M* = 9.4, *SD* = 0.7), we can conclude an overall decrease in the total team learning behaviours.

Data separated per meeting. To examine whether team learning behaviour will occur more in the later stages of the LC, the data has been analysed per meeting. The visualised

standardized descriptives below in Figures 14, 15, and 16 give an overview of the LCs combined and the separate LCs per meeting. For the combined LCs, we see a steep increase in the last two meetings with regard to the observed team learning behaviours. Furthermore, relatively stable frequencies are observed in the first 8 meetings, with an increase in meeting 5.

As shown in Figure 14 for LC1, we see that in meeting 3 and 5, team learning behaviour occurs the most. For LC2 in Figure 15, meetings 1 and 2 show the most team learning behaviour. For both LCs in Figure 16, 'co-construction' is the most coded behaviour, with the most in meeting 5 for LC1, and meeting 1 for LC2. 'Sharing' behaviour is coded the least, with 0 codes in meeting 5 till 8 from LC1. In LC2, 'sharing' behaviour is not coded in six of the in total ten meetings.

Figure 14

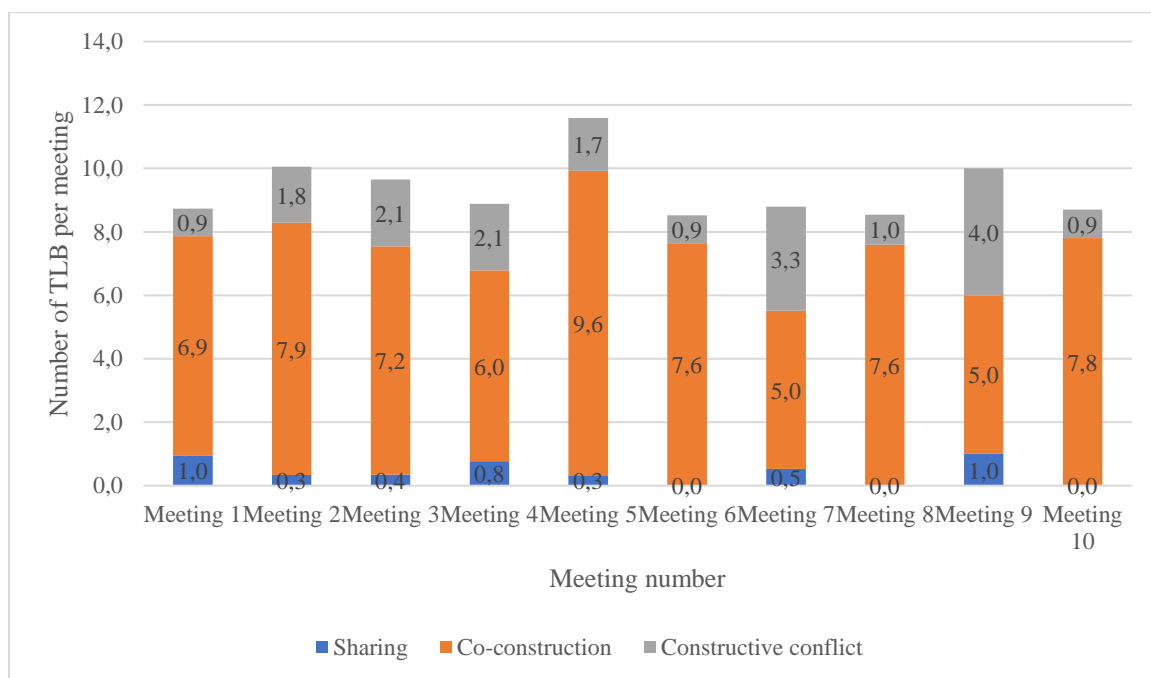*Team learning behaviour per meeting for the combined LCs*

Figure 15

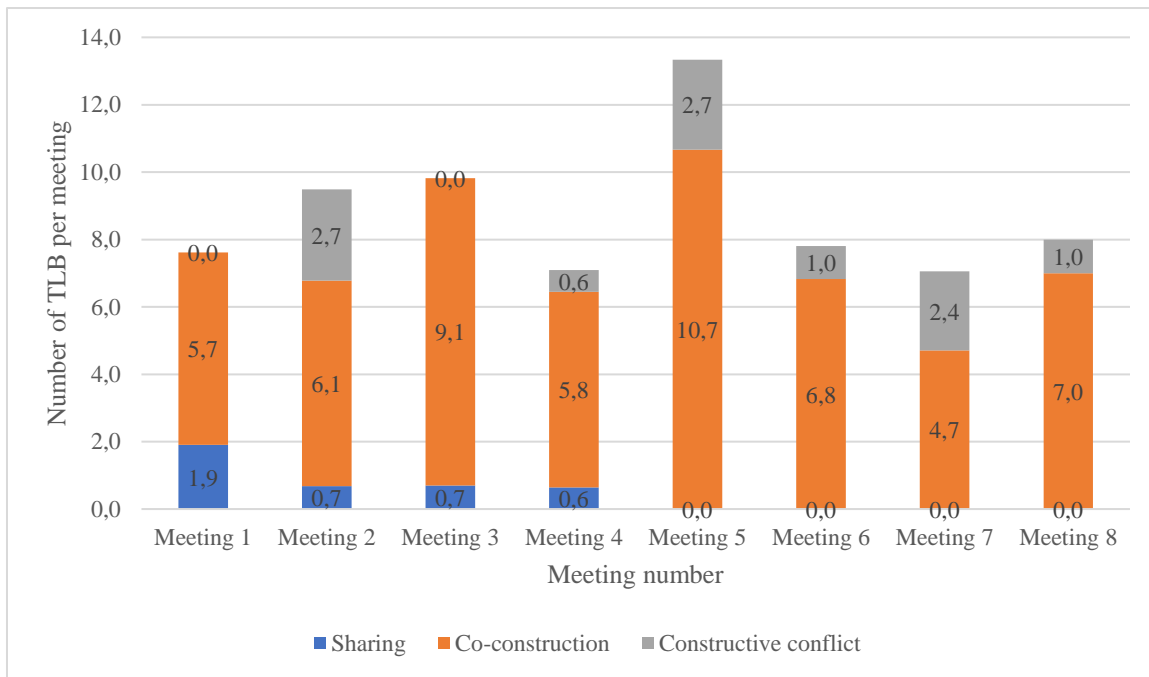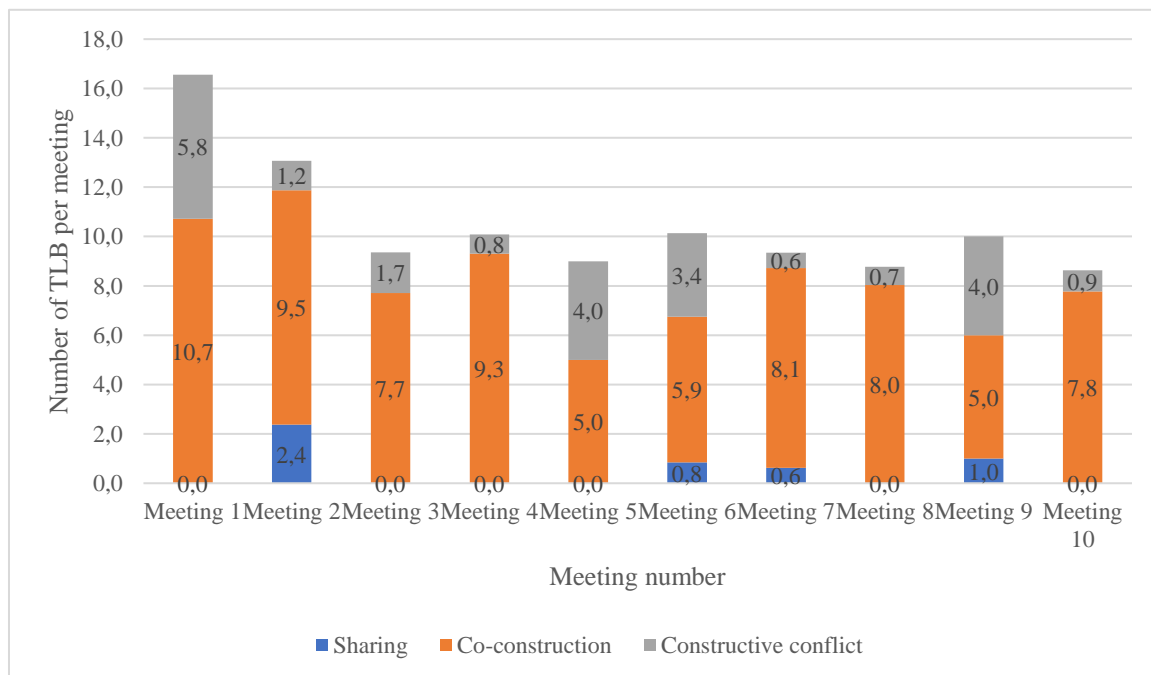*Team learning behaviour per meeting for LC1*

Figure 16

Team learning behaviour per meeting for LC2

After analysing the results, it can be partially concluded that team learning behaviour occurs more frequently in the later stages of the LC, based on the data. The results of the LCs combined did not show an increase in team learning behaviour in the later stages of the LC. However, a closer examination of LC1 revealed an increase in team learning behaviour over time. In contrast, the results of LC2 showed a decrease in team learning behaviour.

5. Discussion

This study aimed to explore whether relations-oriented behaviour influenced team learning behaviour in Dutch learning communities, and how this might change over time. The method of the study provided insights into the specific relations-oriented and learning behaviours between the members. As asked for by Decuyper et al. (2010) this study provides more insight into team learning in the specific phases that a team passes at specific moments in time, and how this may change over time. Subsequentially, this study offers understanding into the role that 'relations-oriented behaviour' has on team learning of a LC.

Firstly, the results show that relations-oriented behaviour occurs more frequently in the later stages of the LCs. Secondly, the results showed that team learning episodes did not occur more frequently when they were initiated with relations-oriented behaviour. Thirdly, initiating team learning behaviour with relations-oriented behaviour, analysed between the first and the last set of meetings, did not seem to change over time. However, by analysing the data per meeting, a change over time was found for the LCs combined and LC2, where a decrease was observed. Lastly, team learning behaviour seems to decrease over the course of the meetings for the LCs combined and for LC2. For LC1 however, team learning behaviour did increase over the course of the meetings.

Relations-oriented behaviour over time in the LC

From our data, it can be concluded that relations-oriented behaviour does occur more in the later stages of the LC. The LCs combined, as well as the separate LCs, show increases in the total relations-oriented behaviour, analysed between two equal sets of meetings. This suggests that members of both LCs express relations-oriented behaviour more, over the course of meetings. Specifically, 'agreeing,' 'being friendly,' and 'showing personal interest' seem to increase, carefully indicating more bonding between the members.

A possible explanation for this result is that both LCs first focused on the tasks at hand, such as setting goals, delegating responsibilities and tasks, and later spend time on building the relationship. This is in line with previous research of Weick (2015), and Dooner et al. (2008). An additional argument is found within the developmental model of Wheelan (2009). Although most of the members of both LCs were colleagues, external members were present in the form of the facilitator, a teacher, and a research assistant. This could imply that the group had to build collective trust among every member. In the stages of the model, members are first focused on more task-oriented behaviours. As the group progresses to the next stage of the model, members have established a sense of trust and cohesion in the group.

As a result, task-oriented behaviour could decrease, leaving more time for building relationships.

Our findings contradict the findings of Gerpott et al. (2019), who did not find an increase in relations-oriented behaviour in their sample. Gerpott et al. argued that this could be due to the fact that the project teams from their study were established to solve problems, and therefore were more likely to express more task-oriented behaviour since these behaviours are more helpful to solve the problem, instead of learning from each other.

Relations-oriented behaviour initiates team learning

Our second research question focussed on the initiation of team learning with relations-oriented behaviour. At first impression, it seems that team learning behaviour is initiated more without relations-oriented behaviour. Statistical tests could not find a significant relationship between the two variables, suggesting that relations-oriented behaviour does not have a substantial influence on team learning behaviour. Therefore, we cannot confirm that relations-oriented behaviour directly initiates team learning (Edmondson, Dillon, & Roloff, 2007).

However, focussing on the specific team learning behaviours provides an interesting finding. For the LCs combined and LC1, 'co-construction' is seen to be initiated more with, than without relations-oriented behaviour. A possible explanation for this finding can be found in literature, such as Burke et al. (2006), which state that in the process of 'co-construction', team members work together to generate new ideas. This process requires a high level of interaction and discussion among team members, which can be engaged with relations-oriented behaviour. An example is found in the relations-oriented behaviour 'encouraging', in which members are encouraging others to share ideas or answer questions.

Focussing on the specific relations-oriented behaviours responsible for initiating team learning, it is seen that 'encouraging' behaviour is responsible for 25.5% of the initiations, followed by 'asking for ideas' with 12.7%. 'Encouraging' behaviour initiated mostly 'co-construction' in the meetings of the LCs. A possible reason lies within the definition given by Hoogeboom and Wilderom (2019): 'to positively stimulate behaviour or challenge professionally.' Challenging and stimulating a member in a meeting, mostly resulted in a conversation or discussion, which would be coded as a 'co-construction' episode.

Example of two members encouraging 'Member 2' in the 7th meeting of LC2:

"I was curious how [Member 2] looks towards prefabrication..."

Followed by

"We are curious about your vision, please tell us [Member 2]"

Continuing, the second sub-research question aimed to explore whether relations-oriented behaviour initiating team learning changes over time. Due to the use of different statistical tests, the results should be interpreted with care. Results showed that team learning initiated with relations-oriented behaviour did change over time when analysing the separate meetings. The LCs combined and LC2 reported significant, indicating change over time for these groups. LC1 however, showed no change over time. The results for the LCs combined and LC2 could be explained by the answer to the first research question, which stated that relations-oriented behaviour does occur more in the later stages of the LC. As the literature states, more relations-oriented behaviour enhances trust in the group (Mikkelson et al., 2015). A higher sense of trust between members gives more opportunities for team learning (Wu, Yeh, and, Huang, 2007).

Team learning over time in the LC

Our third research question aimed to find out whether team learning behaviour changes over time in the LCs. A first indication is that our results suggest that team learning behaviour is decreasing over time in the LCs. For the combined LCs, as well as LC2, frequencies have reported a decrease in mean value between the first and last set of meetings. For LC1, however, an increase is observed.

The findings of a decrease are not in line with what was expected from our literature research, which suggest that team learning occurs more in the later stages of a LC. Raes et al. (2014) for example, analyse the model of Dechant et al. (2003), and conclude that in the later stages, the team spends time discussing problems, taking decisions, and encouraging innovation, which concludes in learning for the whole team. However, our findings conclude otherwise. A possible reason can be found in the (revisited) model of Tuckman (1965; 1977). Tuckman stated first that groups go through four stages; 'forming,' 'storming,' 'norming,' and 'performing'. However, later insights asked for a revision, adding a fifth stage through the model: 'adjourning.' This final stage 'ends' the cycle of a group, where members depart from each other due to various reasons. A reason that could be linked to our study, could be the end of a project. With the LCs having a fixed schedule of 10 weeks, it could be that in the later stages, learning is not the highest priority anymore. Most of the projects are in their closing phase, with the last task, for example, being the presentation to the board of directors.

Complex team learning processes are not asked for any more, which could explain the observed decrease in our data.

Another possible explanation is given in the study of Schippers et al. (2003), which suggests that, as the group becomes more established with members being more familiar with each other, they may become less open to learning and new ideas. Especially for our sample, this reference could explain our results, with most of the members being colleagues with each other already.

On the contrary, for LC1, an increase is observed in both team learning behaviour and relations-oriented behaviour. LC1 focussed on implementing a software package, in comparison to LC2, which focussed on prefabrication challenges. The subject of LC1 provided more opportunity to openly discuss, since in every meeting they were discussing steps of the implementation process that were either finished or next on the to-do list. As observed in the meetings, more open discussions took place between members about the challenges they were facing. For LC2, in the later meetings, it is observed that the discussion was coming to an end. Members were gathering the results of the learning community and were sharing these with the members and guests in the meeting (e.g., an HR manager). Less initiative was observed from the members, which could be linked to entering the last two phases from Weick's (2015) means-convergence model. In these last phases, members engage with less motivation and rely on more outspoken members of the LC, which can be observed in the last meetings of LC2, where some participants are conversating much more than others. Also, the role of the facilitator becomes less active or direct in the group, the facilitator is observed to initiate less discussion in the LC than in the earlier meetings. However, future research is needed to analyse the behaviour of the facilitator over time in the LCs.

5.1 Practical implications

Overall, the results of this study have important implications for the management and development of teams in a variety of settings. This study aimed to explore the influence of relations-oriented behaviour on team learning in the context of Dutch LCs, and whether this changes over time. The results showed that relations-oriented behaviour did not directly influence team learning behaviour in our LCs. We found an increase in relations-oriented behaviour in both of our LCs, however, in our final research question, we found a decrease in team learning behaviour in one of the LCs.

These findings are relevant for the training of facilitators, as they imply that a strict focus on relations-oriented behaviour will not always result in more team learning behaviour.

Moreover, the finding that team learning increases in one LC, and decreases in the other, asks for more detailed research on this topic. Multiple factors could influence this outcome, for example, the subject of the LC (Gerpott et al., 2019).

Although differences are visible with regard to how relations-oriented behaviour and team learning fluctuate over time and how they influence each other; The results from this study reported insignificant. We can therefore conclude that we have found no significant relationship between the two variables, where the increase of one (relations-oriented behaviour), does not directly lead to an initiation in the other (team learning behaviour). Although not proven significant, the results from this study can be used in designing LCs. Instructions for facilitators might be altered in their specific focus on interpersonal relations, based on the topics of the LC and how task-structured they are. A facilitator can benefit from the codes that have been developed for assessing relation-oriented and team learning behaviour in this study. When a facilitator is trained to be able to observe these important behaviours, he or she is better able to understand the dynamic in the LC.

Furthermore, this study provides insight for companies who are willing to start implementing LCs. The study offers basic knowledge about the concept, possible outcomes and methods for shaping a LC. Further data analysis might provide insight into several roles of members, and how these might play a part in team learning.

5.2 Limitations and recommendations for future research

The main findings of this study were gathered through transcribing video observations of two LCs in the Dutch installation sector. Although our data provided some insights on relations-oriented behaviour and team learning behaviour, both of the samples used the LC as a way of "project management" where they focused on implementing a new software system and optimizing their prefabrication process of heat pipe systems. Most of the conversations were task-based, where members were simply asked for an update about their assigned task which they got from an earlier LC meeting. They did not go in-depth on the learning experiences but simply explained their achievements and waited to get new ones assigned. This gave little room for team learning since they did not show much discussion about a topic or shared their own experiences, but also little room for relations-oriented behaviour.

The first direction for future research is therefore to choose a sample LC with a less task-focused topic, such as leadership development, presentation skills or challenge-based learning in the educational sector instead (Gerpott et al., 2019). With regard to our studies in the literature, we can conclude that both LCs are project-based learning teams (Poell et al.,

1998), which could influence the nature of team learning in the LC. It is expected that in non-task-focused topics such as those named above, relations-oriented behaviour, as well as team learning behaviour, will be observed since members are more challenged to think, process new knowledge and provide others with feedback, instead of completing a task.

Secondly, the sample size used for this study might be a limitation. Due to the relatively small sample, several quantitative tests could not be executed. Therefore, correlating variables could not be identified without ignoring assumptions for these tests. Tests such as Pearson Correlation or linear regression were unable to be conducted due to the violation of assumptions with regard to the sample size which was less than 30. Pearson Correlation and linear regression could be of great insights with regard to the analysis of changes over time and the influence of relations-oriented behaviour on team learning. The second direction for future research is therefore to pick a larger sample, in which more data can be processed, and more tests can be executed to find correlations.

Another limitation of our study is that our LCs mainly consisted of employees from the same company. Because of this fact, the members could spend less time on getting to know each other, since most of the members were colleagues already, and therefore less relations-oriented behaviour is expected to be observed (Widmann, Mulder, & Köning, 2018). The third direction for future research is to choose a sample LC with members from various companies, where relations-oriented behaviour is expected to be observed more.

With regard to our coding procedure, for the coding of relations-oriented behaviour, only one student from the University of Twente has been coding. A recommendation for future research is that a minimum of two coders will attend coding all of the variables, to be able to compute the Inter-rater-reliability of the codes, which indicates the quality of the coding process (Klonek et al., 2016).

Next to the recommendations mentioned above, it would be interesting to investigate whether the chosen method is suitable for analysing team learning as well as relations-oriented behaviour. Although the method of video observation allows for insights into all modalities of communication among the members, such as non-verbal communication, which could give further insight into the context of behaviour (Coleman, 2000), the use of transcript and codebooks is merely based on the spoken word. This, however, does not provide information about other forms of communication which could lead to a misconception of a sentence (e.g., joking interpreted as being mean). The last direction for future research will therefore be using a specialised software program to analyse behaviour, such as the Noldus Observer XT, which allows for a more in-depth analysis of behaviour than just the spoken

word. With using the Observer XT, data analysis could also be focused on for example facial expression and physical behaviour of the facilitator, which can be translated into how a member feels when he or she is granted positive feedback or encouraged. It will provide more global information about the setting and mood of the LC, rather than just what is being said (Ice, 2004). This information can then again be used for instructing facilitators, on how their behaviour influences the members of the LC.

6. Conclusion

This study aimed to explore if relations-oriented behaviour would influence team learning behaviour in LC, and how this might change over time. This was assessed by analysing the actual behaviours of members within two LCs in Dutch companies, active in the installation sector. The observed behaviours were transcribed, categorized into episodes (for team learning) and, based on a pre-set codebook, coded, which allowed for quantitative analysis. The results of this study showed that relations-oriented behaviour did not directly influence team learning behaviour. However, the results of our study showed that team learning initiated with relations-oriented behaviour does change over time. A closer examination of our variables showed that relations-oriented behaviour increases over time, for team learning behaviour we saw an increase over time in one LC, and a decrease in the other.

With the findings from this study, LC developers and other researchers gained further insights into the role of relations-oriented behaviour and team learning within a LC. Further analysis, with a different research design, larger sample, or different LC topics, might lead to more insightful results about the role of the variables relations-oriented behaviour and team learning. These insights might also contribute to different roles of facilitators within the LC, perhaps altering their role might lead to other behaviour which might be beneficial. Finally, this study contributes to the acceleration of the energy transition by analysing one of the *engines* of this transition; Dutch installation companies.

References

Ardichvili, A., Page, V., & Wentling, T. (2003). Motivation and barriers to participation in virtual knowledge-sharing communities of practice. *Journal of knowledge management*, 7(1), 64-77. https://doi.org/10.1108/13673270310463626

Baker, M. (1994). A model for negotiation in teaching-learning dialogues. *Journal of Interactive Learning Research*, 5(2), 199-254. Retrieved from: https://www.proquest.com/openview/1fb6bab7a4f8f4a705d482cc4074cb75/1?pq-origsite=gscholar&cbl=2031153

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*(3), 497–529. https://doi.org/10.1037/0033-2909.117.3.497

Behrendt, P., Matz, S., & Göritz, A. S. (2017). An integrative model of leadership behavior. *The leadership quarterly*, *28*(1), 229-244. https://doi.org/10.1016/j.leaqua.2016.08.002

Blankenship, S. S., & Ruona, W. E. (2007). Professional Learning Communities and Communities of Practice: A Comparison of Models, Literature Review. *Online submission*. Retrieved from: https://files.eric.ed.gov/fulltext/ED504776.pdf

Bolam, R., McMahon, A., Stoll, L., Thomas, S., Wallace, M., Greenwood, A., ... & Smith, M. (2005). *Creating and sustaining effective professional learning communities* (Vol. 637). Research report. Retrieved from: http://www.louisestoll.com/wp-content/uploads/2015/11/EPLC-Research-Report-RR637-May-2005.pdf

Brand, M. (1976). Watch what you're doing: Learning to cope with behavior problems through video simulation. *Music Educators Journal*, *63*, 50–53. https://doi.org/10.2307/3395097

Brown, B. B. (2003). *Employees' organizational commitment and their perception of supervisors' relations-oriented and task-oriented leadership behaviors*. Virginia Polytechnic Institute and State University.

Burke, L., Preston, N., Quillen, M., Roe, R., & Strong, E. (2009). Stages of group development: From strangers to partners. In *annual meeting of the Southern Regional Coucnil on Educational Administration, Atlanta, GA*. Retrieved from: https://education.uky.edu/epe/wp-content/uploads/sites/8/2014/11/From-Strangers.pdf

Burke, C. S., Stagl, K. C., Klein, C., Goodwin, G. F., Salas, E., & Halpin, S. M. (2006). What type of leadership behaviors are functional in teams? A meta-analysis. *The leadership quarterly*, *17*(3), 288-307. https://doi.org/10.1016/j.leaqua.2006.02.007

Cohen, S. G., & Bailey, D. E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of management*, *23*(3), 239-290. https://doi.org/10.1177/014920639702300303

Coleman, T. (2000). Using video-recorded consultations for research in primary care: advantages and limitations. *Family practice*, *17*(5), 422-427. https://doi.org/10.1093/fampra/17.5.422

Conrad, D. (2005). Building and maintaining community in cohort-based online learning. *International Journal of E-Learning & Distance Education/Revue internationale du e-learning et la formation à distance*, *20*(1), 1-20. Retrieved from: https://www.ijede.ca/index.php/jde/article/view/78

Corporaal, S., Disberg-van Geloven, M., Endedijk, M., & Hubers, M. (2020) *Gas Erop! Ontwerpprincipes voor learning communities als aanjager voor de energietransitie.* Retrieved from: https://www.researchgate.net/publication/352169640_Gas_erop_Ontwerpprincipes_van_learning_communities_als_aanjager_voor_de_energietransitie

Dechant, K., Marsick, V. J., & Kasl, E. (1993). Towards a model of team learning. *Studies in continuing Education, 15*(1), 1-14. https://doi.org/10.1080/0158037930150101

Decuyper, S., Dochy, F., & Van den Bossche, P. (2010). Grasping the dynamic complexity of team learning: An integrative model for effective team learning in organisations. *Educational Research Review*, *5*(2), 111-133. https://doi.org/10.1016/j.edurev.2010.02.002

De Jong, L., Schipper, T., Endedijk, M. (2020). Het begeleiden van learning communities in de installatiebranche. *Handleiding,* 1-21. Retrieved from: https://surfdrive.surf.nl/files/index.php/s/1Y8LHm963CVvF4S?path=%2FMeetinstrumenten%2FTraining%20facilitators

Deng, M., Leippold, M., Wagner, A. F., & Wang, Q. (2022). Stock Prices and the Russia-Ukraine War: Sanctions, Energy and ESG. *Centre for Economic Policy Research,* 1-50. Retrieved from: https://repec.cepr.org/repec/cpr/ceprdp/DP17207.pdf

Dooner, A. M., Mandzuk, D., & Clifton, R. A. (2008). Stages of collaboration and the
 realities of professional learning communities. *Teaching and teacher education*, *24*(3),
 564-574. https://doi.org/10.1016/j.tate.2007.09.009

Edmondson, A. (1999). Psychological safety and learning behavior in work teams.
 Administrative science quarterly, *44*(2), 350-383. https://doi.org/10.2307/2666999

Edmondson, A. C., Bohmer, R. M., & Pisano, G. P. (2001). Disrupted routines: Team
 learning and new technology implementation in hospitals. *Administrative science
 quarterly*, *46*(4), 685-716. https://doi.org/10.2307/3094828

Edmondson, A. C., Dillon, J. R., & Roloff, K. S. (2007). 6 three perspectives on team
 learning: outcome improvement, task Mastery, and group process. *Academy of
 Management annals*, *1*(1), 269-314. https://doi.org/10.5465/078559811

Fisher, R. A. (1992). Statistical methods for research workers. In *Breakthroughs in
 statistics* (pp. 66-70). Springer, New York, NY. https://doi.org/10.1007/978-1-4612-
 4380-9_6

Fleishman, E. A. (1973). Twenty years of consideration and structure. *Current Developments
 in the Study of Leadership,* Southern Illinois University Press, Carbondale, IL , pp. 1-
 37

Gerpott, F. H., Lehmann-Willenbrock, N., Voelpel, S. C., & Van Vugt, M. (2019). It's not
 just what is said, but when it's said: A temporal account of verbal behaviors and
 emergent leadership in self-managed teams. *Academy of Management Journal*, *62*(3),
 717-738. https://doi.org/10.5465/amj.2017.0149

Heemskerk, W. M., Dauphin, S. L. M., van Dorst, M. A., Bussemaker, M., & Wallner, C.
 (2021). A learning community within nursing practice: The value created by the
 activities and interactions during the early stage of community development. *Nurse
 Education in Practice*, *57*. https://doi.org/10.1016/j.nepr.2021.103242

Hildebrand, D. (2011). *Shared leadership and team learning: the story of three project
 teams* (Doctoral dissertation, Universitat Ramon Llull). Retrieved from:
 https://www.tdx.cat/bitstream/handle/10803/51365/HILDEBRAND_PhD%20thesis%
 20Dagmar%20Hildebrand_12%20June%202011.pdf?sequence=1

Hoogeboom, M. A., Saeed, A., Noordzij, M. L., & Wilderom, C. P. (2021). Physiological arousal variability accompanying relations-oriented behaviors of effective leaders: triangulating skin conductance, video-based behavior coding and perceived effectiveness. *The Leadership Quarterly*, *32*(6), 1-17. https://doi.org/10.1016/j.leaqua.2010.101493.

Hoogeboom, M., & Wilderom, C. (2019). Effective leader behaviors in regularly held staff meetings: Surveyed vs. videotaped and video-coded observations. *The Cambridge Handbook of Meeting Science*. 381-412. https://doi.org/10.1017/CBO9781107589735.017

Ice, G. H. (2004). Technological advances in observational data collection: The advantages and limitations of computer-assisted data collection. *Field Methods*, *16*(3), 352-375. https://doi.org/10.1177/1525822X04266503

Kearns, P., McDonald, R., Candy, P., Knights, S., & Papadopoulos, G. (1999). *VET in the Learning Age: The Challenge of Lifelong Learning for All. Volume 2: Overview of International Trends and Case Studies*. National Centre for Vocational Education Research (NCVER), 252 Kensington Road, Leabrook, South Australia 5068, Australia. Retrieved from: https://eric.ed.gov/?id=ED433430

Keyton, J., & Beck, S. J. (2009). The influential role of relational messages in group interaction. *Group dynamics: Theory, research, and practice*, *13*(1), 14. https://doi.org/10.1037/a0013495

Kim, H. Y. (2017). Statistical notes for clinical researchers: Chi-squared test and Fisher's exact test. *Restorative dentistry & endodontics*, *42*(2), 152-155. https://doi.org/10.5395/rde.2017.42.2.152

Klonek, F. E., Quera, V., Burba, M., & Kauffeld, S. (2016). Group interactions and time: Using sequential analysis to study group dynamics in project meetings. *Group Dynamics: Theory, Research, and Practice*, *20*(3), 209. https://doi.org/10.1037/gdn0000052

Kozlowski, S. W., & Bell, B. S. (2008). Team learning, development, and adaptation. *Group learning*, 15-44. Retrieved from: https://books.google.nl/books?hl=nl&lr=&id=eOnGOIvChyQC&oi=fnd&pg=PA15&

ots=5-CGgqWpMl&sig=1HfmHwXCyAJ3FEP_z0kCrH-
uzBw&redir_esc=y#v=onepage&q&f=false

Leroy, L., Rittner, J. L., Johnson, K. E., Gerteis, J., & Miller, T. (2017). Facilitative
components of collaborative learning: a review of nine health research
networks. *Healthcare Policy*, *12*(3), 19. Retrieved from:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5344361/

Lin, F. R., Lin, S. C., & Huang, T. P. (2008). Knowledge sharing and creation in a teachers'
professional virtual community. *Computers & Education*, *50*(3), 742-756.
https://doi.org/10.1016/j.compedu.2006.07.009

London, M., & Sessa, V. I. (2007). How groups learn, continuously. *Human Resource
Management, 46*(4), 651-669. https://doi.org/10.1002/hrm.20186

Marquardt, M. J., Banks, S., Cauwelier, P., & Seng, N. C. (2018). *Optimizing the power of
action learning: Real-time strategies for developing leaders, building teams and
transforming organizations*. Hachette UK. Retrieved from:
https://questionnaire.app.co.id/portal.nsf/7071d3d6f7f1af93472571b60034412b/8d5f2
59086965a3347256ede0014b446/$FILE/Optimizing%20the%20Power%20of%20Acti
on%20Learning.pdf

Marsick, V. J., & Watkins, K. E. (2001). Informal and incidental learning. *New directions for
adult and continuing education*, *2001*(89), 25-34. Doi: 10.1.1.1010.8270

McLaughlin, M. W., & Talbert, J. E. (2006). *Building school-based teacher learning
communities: Professional strategies to improve student achievement* (Vol. 45).
Teachers College Press.

Mikkelson, A. C., York, J. A., & Arritola, J. (2015). Communication competence, leadership
behaviors, and employee outcomes in supervisor-employee relationships. *Business
and Professional Communication Quarterly*, *78*(3), 336-354.
https://doi.org/10.1177/2329490615588542

Nederhof, A. J. (1985). *Methods of coping with social desirability bias: A review. , 15(3),
263–280.* https://doi.org/10.1002/ejsp.2420150303

Pearce, C. L., Sims, H. P., Cox, J. F., Ball, G., Schnell, E., Smith, K. A., & Trevino, L.
(2003). Transactors, transformers and beyond: A multi-method development of a

theoretical typology of leadership. *Journal of Management development*, *22*(4), 273-307. https://doi.org/10.1108/02621710310467587

Poell, R. F., Van Der Krogt, F. J., & Warmerdam, J. H. (1998). Project-based learning in professional organizations. *Adult Education Quarterly*, *49*(1), 28-42. https://doi.org/10.1177/074171369804900104

Raes, E., Boon, A., Kyndt, E., & Dochy, F. (2015). Measuring team learning behaviours through observing verbal team interaction. *Journal of Workplace Learning*. https://doi.org/10.1108/JWL-01-2015-0006

Raes, E., Kyndt, E., Decuyper, S., Van den Bossche, P., & Dochy, F. (2014). Group development and team learning: How development stages relate to team-level learning behaviour. *Human Resource Development Quarterly*, *26*(1), 5-30. Retrieved from: https://blits-teamleren.be/sites/default/files/group_development.pdf

Ryman, S. E., Burrell, L., Hardham, G., Richardson, B., & Ross, J. (2009). Creating and sustaining online learning communities: Designing for transformative learning. *International Journal of Pedagogies and Learning*, *5*(3), 32-45. https://doi.org/10.5172/ijpl.5.3.32

Stoll, L., Bolam, R., McMahon, A., Wallace, M., & Thomas, S. (2006). Professional learning communities: A review of the literature. *Journal of educational change*, *7*(4), 221-258. https://doi.org/10.1007/s10833-006-0001-8

Tang, E., & Lam, C. (2014). Building an effective online learning community (OLC) in blog-based teaching portfolios. *The Internet and Higher Education*, *20*, 79-85. https://doi.org/10.1016/j.iheduc.2012.12.002

Tuckman, B. W., & Jensen, M. A. C. (1977). Stages of small-group development revisited. *Group & organization studies*, *2*(4), 419-427. Retrieved from: http://faculty.wiu.edu/P-Schlag/articles/Stages_of_Small_Group_Development.pdf

Han, S. J., Lee, Y., & Beyerlein, M. (2019). Developing Team Creativity: The Influence of Psychological Safety and Relation-Oriented Shared Leadership. *Performance Improvement Quarterly*, *32*(2), 159-182. https://doi.org/10.1002/piq.21293

Van den Bossche, P., Gijselaers, W., Segers, M., Woltjer, G., & Kirschner, P. (2011). Team learning: building shared mental models. *Instructional Science*, *39*(3), 283-301. https://doi.org/10.1007/s11251-010-9128-3

Vermeulen, H., den Boer, P., Verhaegh, T., van der Horst, J., & Rossen, L. (2018). *Trends en ontwikkelingen in de technische installatiebranche 2018*. KBA Nijmegen. https://www.kbanijmegen.nl/doc/pdf/Trends-en-ontwikkelingen2018.pdf

Weick, K. E. (2015). The social psychology of organizing. *M@ n@ gement*, *18*(2), 189-193. Retrieved from: https://www.proquest.com/docview/1697028139?pq-origsite=gscholar&fromopenview=true

Wenger, E., McDermott, R., & Snyder, W. M. (2002). Seven principles for cultivating communities of practice. *Cultivating Communities of Practice: a guide to managing knowledge*, *4*. Retrieved from: https://www.clearwatervic.com.au/user-data/resource-files/7Principles_Community-of-Practice.pdf

Wheelan, S. A. (2009). Group size, group development, and group productivity. *Small group research*, *40*(2), 247-262. https://doi/org/10.1177/1046496408328703

Wheelan, S. A., Davidson, B., & Tilin, F. (2003). Group development across time: Reality or illusion?. *Small group research*, *34*(2), 223-245. https://doi.org/10.1177/1046496403251608

Wiese, C. W., & Burke, C. S. (2019). Understanding team learning dynamics over time. *Frontiers in Psychology*, *10*, 1-14. https://doi.org/10.3389/fpsyg.2019.01417

Wong, S. S. (2004). Distal and local group learning: Performance trade-offs and tension. *Organization Science*, *15*(6), 645-656. https://doi.org/101.1287/orsc.1040.0080

Wu, W. L., Yeh, R. S., & Huang, C. C. (2007). Fostering knowledge sharing to encourage R&D team learning. *PICMET'07-2007 Portland International Conference on Management of Engineering & Technology*, 1114-1118. https://doi.org/ 10.1109/PICMET.2007.4349433.

Yeh, Y. C. (2010). Analyzing online behaviors, roles, and learning communities via online discussions. *Journal of Educational Technology & Society*, *13*(1), 140-151. Retrieved from: https://www.jstor.org/stable/jeductechsoci.13.1.140?seq=1Yukl, G., Gordon, A., & Taber, T. (2002). A hierarchical taxonomy of leadership behavior: Integrating a half

century of behavior research. *Journal of leadership & organizational studies*, *9*(1), 15-32. https://doi.org/10.1177/107179190200900102

Yukl, G. (1999). An evaluative essay on current conceptions of effective leadership. *European journal of work and organizational psychology*, *8*(1), 33-48. https://doi.org/10.1080/135943299398429

Yukl, G., Gordon, A., & Taber, T. (2002). A hierarchical taxonomy of leadership behavior: Integrating a half century of behavior research. *Journal of leadership & organizational studies*, *9*(1), 15-32. https://doi.org/10.1177/107179190200900102

Zellmer-Bruhn, M., & Gibson, C. (2006). Multinational organization context: Implications for team learning and performance. *Academy of management journal*, *49*(3), 501-518. https://doi.org/10.5465/amj.2006.21794668

Zoethout, H., Wesselink, R., Runhaar, P., & Mulder, M. (2017). Using transactivity to understand emergence of team learning. *Small group research*, *48*(2), 190-214. https://doi.org/10.1177/1046496417691614

Appendix A – Overview episodes

Table 1

Episodes for coding team learning

Team learning – not team learning	Topic
Team learning	Meeting information
	Information about the learning community
	Learning objectives
	Creating an action plan
	Content about BIM360
	Content about prefabrication
Not team learning	Chitchat
	Introductions
	Practical organisational things
	Research
	Technical issues of meeting