



Revealing the balancing act of vertical and shared leadership in Teacher Design Teams

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HIGHLIGHTS

- Providing adequate leadership in teacher teams is challenging.
- Both shared and vertical leadership are needed.
- This study illustrates how shared and vertical leadership can be combined.
- This study provides insights into how leadership can support the process.

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ABSTRACT

Teacher Design Teams (TDTs) are professional learning communities in which teachers collaborate to (re) design educational materials. Although studies have indicated that leadership is vital for TDTs' functioning, providing adequate leadership is challenging. Both shared and vertical leadership are needed, and how to combine them is not obvious. TDT participants and coaches might benefit from insight into what shared and vertical leadership look like in practice. In this study, we monitored two TDTs that used a stepwise method that integrates shared and vertical leadership. Findings reveal that combining shared and vertical leadership in TDTs is possible, but remains a challenging balancing act.

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1. Introduction

Designing educational materials is increasingly considered to be a core aspect of teachers' work (Carlgren, 1999; Cober, Tan, Slotta, So, & Könings, 2015; Koehler & Mishra, 2005; McKenney, Kali, Markauskaite, & Voogt, 2015). Being engaged in the process of designing new educational materials contributes to a sense of ownership (Cviko, McKenney, & Voogt, 2013; Visser, Coenders, Terlouw, & Pieters, 2012), increasing the probability that teachers will actually implement these new materials in practice (Wikeley, Stoll, Murillo, & De Jong, 2005). Therefore, engaging teachers as designers can support sustained implementation of educational innovations in practice (Bakah, Voogt, & Pieters, 2012a; McKenney,

Boschman, Pieters, & Voogt, 2016). The aim of engaging teachers as designers is reflected in national educational policies. The Dutch government, for example, recently articulated the intention to give teachers a substantial role in the design of educational materials (Platform Onderwijs2032, 2016).

One way of having teachers take on the role of designers is to encourage their participation in Teacher Design Teams (TDT). TDTs are a specific type of Professional Learning Community (PLC) in which teachers collaborate in (re)designing educational materials (Binkhorst, Poortman, & van Joolingen, 2017). While designing materials in TDTs, teachers can share expertise and experiences, allowing them to gain new knowledge and skills and use these to improve their overall teaching practice (Bakah, Voogt, & Pieters, 2012b; Kafyulilo, Fisser, & Voogt, 2014). In this way, TDTs can contribute to teachers' professional growth, potentially leading to increased student achievement (Voogt et al., 2011). Furthermore, professional growth can lead to greater professional satisfaction for teachers, which makes the teaching job more attractive (Guskey, 2002).

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As with other types of PLCs, TDTs can have either participants from the same school (school-based TDTs) or participants from various schools (networked TDTs). This study is focused on networked TDTs, as several studies have indicated that teacher networks have the potential to move beyond the knowledge that is available within the school to create even higher quality learning than when teachers from a single school work together (Binkhorst et al., 2017; Bryk, Gomez, & Grunow, 2011; Chapman, 2014; Hofman & Dijkstra, 2010; Stoll, 2010).

1.1. The role of leadership

Although the potential outcomes of TDTs are promising for teachers, as they can contribute to both the design of renewed educational materials and to teachers' professional development, various studies have indicated that the effectiveness of the process and the quality of the outcomes produced by TDTs are mixed (Binkhorst, Handelzalts, Poortman, & van Joolingen, 2015; Binkhorst et al., 2017; Huizinga, Handelzalts, Nieveen, & Voogt, 2014). Previous research has shown that collaboration in the workplace or in teacher teams is not always as easy as it may seem (Brouwer, 2011; Horn & Little, 2010). In teacher teams, leadership behaviour plays a vital role in shaping the process, and hence the outcomes (Binkhorst et al., 2017; van Driel, Meirink, van Veen, & Zwart, 2012). However, providing adequate leadership is challenging (Becuwe, Tondeur, Pareja Roblin, Thys, & Castelein, 2016; Huizinga, Handelzalts, Nieveen, & Voogt, 2013; Vangrieken, Meredith, Packer, & Kyndt, 2017). On the one hand, TDTs are self-regulating teams in which participants have the authority to make decisions themselves (Handelzalts, 2009). Therefore, team coaches are expected to create an environment in which teachers take the lead by participating in making decisions, sharing ideas, initiating activities and carrying them out (Binkhorst et al., 2017; Bouwmans, Runhaar, Wesselink, & Mulder, 2017). On the other hand, team coaches need to enact top-down or vertical leadership to provide structure, clarity and quality during the team's design process. For example, they are expected to organize the TDT meetings, to provide basic process support and to bring in expert knowledge about designing and pedagogy (Becuwe et al., 2016; Huizinga et al., 2013; McKenney et al., 2016).

1.2. Problem statement

How to combine these shared and vertical leadership behaviours in practice is not obvious, and is sometimes even described as paradoxical (Binci, Cerruti, & Braganza, 2016; Elloy, 2006; Meirink, Imants, Meijer, & Verloop, 2010). For example, in our previous study participants and team coaches explained that it was important that participants could take the lead in defining the team goals, as this promoted their sense of ownership. At the same time, however, participants expected the team coach to take the lead more in defining the team goals, as this could have supported greater clarity and focus in the team's work process (Binkhorst et al., 2017). In this example, the participants and team coaches indicated that both shared and vertical leadership were needed, but they struggled with combining these leadership behaviours. Many other TDTs or teacher teams have reported similar leadership difficulties (Becuwe et al., 2016; Binkhorst et al., 2015; Huizinga et al., 2013; van Driel et al., 2012).

Therefore, TDTs could benefit from practical insights into what vertical and shared leadership behaviours look like in practice and how they can be balanced. Such insights could help TDTs in three ways: (1) by helping them to recognize their own leadership behaviours, (2) by helping them to become more aware of how leadership can support the design process and (3) by helping them

to avoid potential pitfalls related to leadership.

Therefore, the present study investigated how shared and vertical leadership behaviour are manifested in TDTs and how these behaviours might support the TDT process, and identified leadership challenges for TDTs.

1.3. Nine-step method for TDTs

To promote blending of shared and vertical leadership behaviours, we developed a nine-step method that integrates both types of leadership (Binkhorst, Poortman, McKenney, & van Joolingen, 2018). The method was inspired by agile product development, which is very common in self-regulating teams of software developers (Highsmith, 2010). Similar to teams of software developers, TDTs aim to develop complex products such as curricular units and lesson series. TDTs that follow this method work in small, achievable iterations, which stimulates participants to be creative, bring in ideas and formulate their own plans on a planning board. In order to make clear the procedure, we will describe each of the nine steps using the model displayed in Fig. 1.

- A. The method starts with collaboratively brainstorming about the team goal.
- B. When the team agrees on the team goal, it is articulated on a planning board.
- C. The participants brainstorm which activities or tasks are needed to achieve this team goal.
- D. These tasks are spelled out on the planning board resulting in a list of tasks.
- E. The participants collaboratively brainstorm about a sub-goal for the time period from step G to step I, which is referred to as a 'term', and participants select which tasks they want to perform this term.

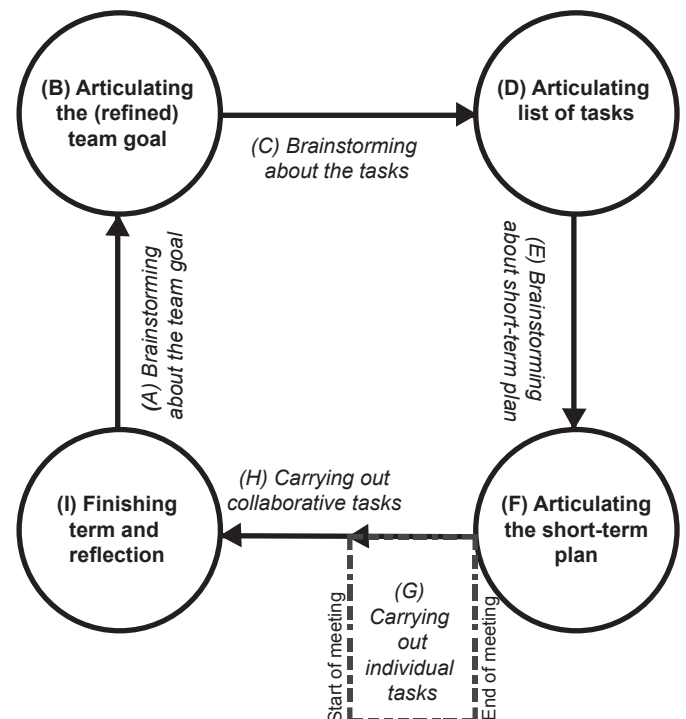


Fig. 1. Model of the nine-step method for TDTs that integrates shared and vertical leadership.

- F. The short-term plans are written down on the planning board. After this step, the meeting ends.
- G. Between the two meetings, participants carry out the individual tasks that they chose to take on.
- H. When the next meeting starts, participants briefly report on the individual tasks and perform the collaborative tasks.
- I. To finish the term, the team reflects on the process by looking back at the short-term plan and asking themselves whether they achieved the sub-goal for the term

After finishing the term, the nine-step method starts over. First, the team discusses whether the formulated team goal is still relevant. If necessary, the team goal can be changed or refined. Then the team discusses the backlog of tasks and makes adjustments if needed. After that, the team starts planning and spelling out the goals and tasks for the next term.

2. Theoretical framework

In section 1.1, we explained that two main types of leadership are needed in TDTs: vertical leadership and shared leadership. Traditionally, leadership was construed as involving one appointed leader who guides his followers, which is termed *vertical leadership* (Pearce & Sims, 2002). As team-based knowledge work in organisations became more common, a shift towards horizontal, distributed or *shared leadership* occurred (Carson, Tesluk, & Marrone, 2007). With this type of leadership, all participants are engaged in leading the team and guiding their fellow participants (Kocolowski, 2010; Pearce & Sims, 2002), for example by influencing and directing fellow members to maximize team effectiveness (Carson et al., 2007). In teams with shared leadership, there is little distinction between leader and follower, because all team members may enact leadership tasks (Nicolaidis et al., 2014).

Empirical research suggests that poor-performing teams tend to be dominated by a team leader, and that high-performing teams display more shared leadership patterns (Bergman, Rentsch, Small, Davenport, & Bergman, 2012; Pearce, 2004). On the other hand, the importance of a vertical leader should not be underestimated, as high-performing teams are more likely to have managers who encourage and motivate the team members, and structure the team processes (Yeatts & Hyten, 1998). Furthermore, vertical leadership is needed to ensure focus, to provide high quality and to prevent unstructured meetings (Yukl, Gordon, & Taber, 2002). In the nine-step method, shared leadership can occur in the steps where the team is brainstorming or carrying out tasks (Fig. 1, A, C, E, G and H), whereas vertical leadership can occur in the steps where goals and plans are articulated or evaluated (Fig. 1, B, D, F and I).

Besides the question of *who* is in charge of leading the team, it is important to question *what type* of leadership behaviours should be expressed. In our previous study, we used literature about TDTs to identify ten essential process features for TDTs (Binkhorst et al., 2018). Subsequently, we linked this with literature about

leadership and team management. This resulted in a list of ten leadership behaviours that are essential to TDTs. Below we describe these ten leadership behaviours, and we explain how they might support different aspects of the TDT process. These leadership behaviours are summarized in Table 1.

2.1. Shared process of defining the team goals

In all types of teamwork – such as TDTs – having goals that are engaging for all participants is essential, as it gives participants a sense of why the team exists (Wageman, 1997). These goals are best aligned with the teachers' own practice if participants and leaders articulate the goals together (Wageman, 2001). Therefore, shared leadership behaviours aimed at defining the goals – such as exchanging individual views and creating a shared vision – are powerful (Pearce, 2004).

2.2. Explicitly expressing the team goals

Team coaches are not always aware of the important role they play in helping to establish clarity regarding the team goals (Scribner, Sawyer, Watson, & Myers, 2007). However, repeated explanation of the team goal in TDTs is essential, as it could promote a shared interpretation (Binkhorst et al., 2017). Therefore, vertical leadership behaviours by team coaches play a key role in clarifying the group's shared vision (Hoch, 2013; Pearce, 2004).

2.3. Shared process of defining and carrying out (short-term) plans

Having the authority to manage and to make decisions about the activities that take place in a teacher team helps to ensure that the activities are relevant for participants' own practice (Vescio, Ross, & Adams, 2008; Wageman, 1997). Therefore, shared leadership behaviour – such as encouraging one another to choose and to carry out tasks – is needed (Pearce, 2004).

2.4. Explicitly expressing (short-term) plans

Despite the importance of shared leadership behaviour to make decisions for the team, vertical leadership behaviour to clarify the team's plans is also essential in teams, to prevent unstructured meetings and to make sure that all participants have the same understanding regarding the tasks (Yukl et al., 2002). This also includes looking back at the (short-term) plan, and prompting reflection on whether this plan was realistic, as the team can learn from this, and improve the plan the next time (Sliger, 2006).

2.5. Bringing expert knowledge into the team

The quality of activities is considered one of the core characteristics of professional development programs (van Veen, Zwart, Meirink, & Verloop, 2010). To ensure that the activities in TDTs

Table 1
Ten vertical and shared leadership behaviours to support the TDT process.

Process features	Shared leadership behaviour	Vertical leadership behaviour
Goals	1. Shared process of defining the team goals	2. Explicitly expressing the team goals
Activities	3. Shared process of defining and carrying out (short-term) plans	4. Explicitly expressing (short-term) plans 5. Bringing expert knowledge into the team
Team interaction	6. Interacting openly and encouraging each other to share ideas and experiences	7. Engaging all participants in the discussions 8. Providing direction in the discussions
Organization of the TDT		9. Organizing and facilitating the team meetings 10. Following a fixed method during the meetings

are of high enough quality and to facilitate the team's collective learning, team coaches can enact vertical leadership behaviour by bringing in their expert knowledge (Yukl, 2012). If the team coaches are not experts in the field themselves, they can act as knowledge brokers (Park & Datnow, 2009), by connecting participants to one another or by bringing external experts into the team in order to share knowledge and expertise.

2.6. Interacting openly and encouraging each other to share ideas and experiences

An open climate for team interactions in which participants share experiences and ideas is essential for teacher teams (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). In part, this can be seen as a precondition; participants should be autonomously motivated to participate in the TDT and they should be willing to modify their teaching practice (Gorozidis & Papaioannou, 2014). But participants can take it one step further and motivate, praise and inspire one another, by enacting shared leadership behaviours (Pearce, 2004; Wageman, 1997; Yukl, 2012). This provides participants with opportunities to gain access to and build upon each others' ideas (Hoch, 2013).

2.7. Engaging all participants in the discussions

Equal participation in the team discussions can strengthen commitment to the team (Stoll et al., 2006). Team coaches can ensure that all participants remain engaged in the discussions. Enacting vertical leadership behaviour, such as suggesting active working methods that involve all participants in the discussions, or explicitly asking for the views and opinions of the participants who do not actively participate in the discussions, fosters collaboration and allows the team to do the best work they possibly can (Sliger, 2006). With this type of vertical leadership behaviour, team coaches can make the participants feel trusted and supported (Ritchie & Woods, 2007).

2.8. Providing direction in the discussions

One major pitfall of team interactions in TDTs is that discussions are too long and sometimes end up going nowhere (Binkhorst et al., 2017). Team coaches can play a facilitating role to keep the discussions on track and to ensure that the discussions remain relevant and meaningful (Park & Datnow, 2009). If a situation occurs in which the discussion tends to lose focus, team coaches can exert vertical leadership behaviour, by providing explicit direction during the discussion (Pearce, 2004).

2.9. Organizing and facilitating the team meetings

Team coaches are responsible for providing organization and facilitating the work of TDTs, by providing basic material resources (Wageman, 1997), such as basic tools, catering and an appropriate meeting space. This facilitating role can be categorized as vertical leadership behaviour (Yukl, 2012). Furthermore, team coaches are expected to ensure that the meetings take place on a regular basis (Handelzalts, 2009).

2.10. Following a fixed method during the meetings

Following a specified method for team meetings promotes the clarity and structure of the team's work process (Binkhorst et al., 2017). This type of vertical leadership behaviour is particularly important in newly-formed or re-formed teams (Pearce, 2004).

2.11. Research questions

The nine-step method was developed to integrate vertical and shared leadership behaviours, which are both needed in TDTs (Binkhorst et al., 2018). However, as explained in the problem statement, TDTs could benefit from practical insight concerning what these leadership behaviours look like in practice. To develop this practical insight, in-depth insights from practice are needed. Therefore, the main research question is: how does the nine-step method support TDT processes? The following sub-questions were addressed:

- How were vertical leadership and shared leadership **enacted** when applying the nine-step method?
- In what ways did these leadership behaviours appear to **support** the team's work processes?
- Which leadership **challenges** did the TDTs encounter?

3. Methods

We studied two networked TDTs that applied the nine-step method for one academic year. We collected qualitative data from multiple perspectives to gain in-depth insights into the leadership behaviour and the team work process of the TDTs. We observed the team meetings, collected logbooks and interviewed participants and team coaches by the end of the year. The ethical committee of our university approved the design of this study beforehand.

3.1. Case descriptions and participants

Our university has been organizing TDTs since 2010. The duration of a TDT is always one academic year (from September to June), but teachers can decide to participate for several years. The TDTs in this study had monthly 3-h meetings.

TDT 1 was a group of five chemistry teachers from various secondary schools in the east part of the Netherlands. The team coach was a full-time chemistry teacher educator at the university, who has been leading TDTs since their start in 2010. The team held ten meetings in total. In this TDT, the participants collaboratively determined the team goals during the TDT meetings. The materials they designed were for their own use.

In TDT 2, the team goal was determined beforehand: redesigning a ten-week module on Dynamic Modeling for the multidisciplinary secondary school subject Nature, Life and Technology (NLT). They planned to complete this revision in two years, but we monitored only the first year. The TDT collaboratively chose a sub-goal for this year: defining a new structure for the module. The final module was meant for all NLT teachers across the country. TDT 2 was newly-formed, with three core participants who all teach NLT and another science subject (physics, chemistry, mathematics) at different schools in the Netherlands. Furthermore, this TDT had a 'following group' consisting of teachers, scientists and software developers who kept an eye on the team's progress and joined the meetings now and then. The team coach was a part-time teacher educator at the university and also a part-time biology and NLT teacher at a secondary school. This team coach had experience with leading TDTs since their start in 2010. Over the year, the team held a total of seven meetings.

In both TDTs, the first author was present as technical chair to ensure the nine-step method was followed as intended. Furthermore, she made observations as a researcher. The team coaches were not involved as researchers or authors of this paper.

3.2. Data collection

During the year, the 17 TDT meetings were audiotaped. After each meeting, both the team coach and the technical chair completed a logbook entry about the meeting. This logbook was structured according to the nine steps of the method and addressed explicit open-ended questions about which leadership behaviours were demonstrated during each of the nine steps, and how they were enacted.

After the last meeting, we held semi-structured interviews with the team coaches and the eight core participants of the two TDTs. In these interviews we asked the participants to reflect on the leadership behaviours they experienced. Furthermore, we asked them how specific leadership behaviours supported the process and what difficulties they encountered.

3.3. Data analysis

All interviews were audiotaped and then transcribed verbatim. We first developed a coding scheme based on the theoretical framework. The ten leadership behaviours were defined as separate codes. The transcripts were coded by labeling text sections based on this coding scheme. To ensure that the coding scheme was reliable, a researcher from our department who was not involved in this study double-coded 10% of the codes. The calculated reliability based on Cohen's kappa was .80.

Second, for each leadership behaviour, we coded data related to how they were **enacted**, how they appeared to **support** the teams work processes and which leadership **challenges** the teams encountered. Subsequently, within each of those three categories (enactment, support and challenges), inductive analysis was undertaken to identify themes and patterns.

The logbook entries were coded by labelling text sections according to the leadership behaviours. As the logbooks were already structured according to the nine steps, this analysis revealed the steps during which the ten leadership behaviours were evident. Furthermore, the codes were analysed similar to the interviews.

Furthermore, the logbooks were used to identify situations during the meetings that could serve as examples of the combination of vertical and shared leadership. We selected three situations in which the logbooks for both the team coach and the technical chair explicitly described collaboration between participants and input from the team coach. After selecting these three situations, the audio recordings of these situations during the meetings were transcribed verbatim.

4. Results

For each of the nine steps, we describe how one or more vertical and shared leadership behaviours were **enacted**, and how participants and team coaches perceived that the leadership behaviour **supported** the team's work process. Furthermore, we explain what **challenges** the TDTs encountered. These findings are summarized in Table 2.

Additionally, to make these results more vivid, we provide three examples from the team meetings. In these examples, we used the overview in Table 5 to identify which shared and vertical leadership behaviours were evident and which leadership behaviours were missing. Furthermore, we explain how the leadership behaviours supported the TDT's work process in these examples.

4.1. Brainstorming about the team goal (step A)

In this step, the participants demonstrated the first leadership behaviour: **1. Shared process of defining the team goals.**

Enactment: Participants provided input for the team goals, by addressing issues, mentioning ideas or by pointing out the relevance of these ideas. For example, a participant from TDT 1 explained in the final interview: "Yes, we all provided input in defining the goals. We could put forward all kinds of topics."

This supported: Participants from both TDTs indicated that collaboratively defining goals was important for the team's work process, as it provided opportunities to find a shared meaning for the TDT. One participant from TDT 2 explained: "It gave me this feeling like, hey, this is what we all want. This is what we want to achieve together." The team coach from TDT 1 also explained why shared leadership behaviour in defining the goals was important: "These are not my decisions to make. I'm not going to teach this, they are. So they must decide what is most relevant for their teaching".

4.2. Articulating the (refined) team goals (step B)

In this step, the second leadership behaviour was demonstrated in both TDTs: **2. Explicitly expressing the team goals.**

Enactment: The technical chair wrote down the goals on sticky notes, placed them on the planning board and repeated them every meeting. The goals of TDT 1 were formulated as: "Designing practical exercises on the theme of green chemistry" and "Getting familiarized with the new chemistry examination program." In the fifth meeting they added an extra goal related to language skills in chemistry education. In TDT 2, the initial goal was: "Designing a new structure for the existing module on Dynamic Modeling". In the fifth meeting, this formulation was tightened: "Providing outlines for each part of the module, which can be used as building blocks for the renewed module". One participant from TDT 1 explained: "Every time, the technical chair pointed out the goals and we discussed: these are the goals, are we still on track?"

This supported: Explicating the goals was useful for the process, as TDT 2's team coach explained: "Because we discussed the goal every meeting, it was possible to keep the process realistic along the way." Consequently, the goals were clear for everyone and everyone had the same interpretation of them.

Challenge: Participants from TDT 2 indicated that just clarifying the goals was not enough. They felt that although the goals were clear, the goals were still too broad. Despite the fact that their goal was tightened in the fifth meeting, it remained too broad, according to this participant: "It was clear that we worked on a new structure, a revision. [...] But this was still rather broad. I would have preferred to work towards concrete products."

4.3. Example from the meeting: goal setting

As steps A and B both addressed the team goals, these steps were closely related. Moreover, in the team meetings, the conversations often covered both steps simultaneously. An example of such a conversation is shown in Table 3. This conversation occurred in the fifth meeting of TDT 1.

When participant 1 brought up one of the goals, participant 2 and 3 both indicated that they were interested in a new perspective: the role of language. In this way, participants put forward their own ideas for the team goal, which can be recognized as the first (shared) leadership behaviour. Subsequently, the technical chair emphasized that this goal could be added to the planning board and the team coach clarified the situation by summarizing what had been done so far and what could be the next step. In this way, both the technical chair and the team coach demonstrated the second (vertical) leadership behaviour. Then participant 4 brought in an idea to make this new goal more

Table 2
Shared and vertical leadership behaviours in practice.

	Shared leadership behaviour	Vertical leadership behaviour
Goals	<p>1. <i>Shared process of defining the team goals</i> When: Step A. Enactment: Participants address issues, mention ideas or point out the relevance of these ideas for goals, based on their own needs in the classroom. This supported: Shared meaning and relevance.</p>	<p>2. <i>Explicitly expressing the team goals</i> When: Step B Enactment: Writing down concrete formulation of goals and repeating them every meeting. This supported: Clarity regarding goals, realistic goals and shared interpretation.</p>
Activities	<p>3. <i>Shared process of defining and carrying out (short-term) plans</i> When: Steps C, E, G and H Enactment: Participants discuss which tasks are needed, divide tasks, set boundaries, make plans, and complete the tasks. This supported: Initiating and dividing tasks ensured that plans remained doable and supported sense of responsibility. Completing tasks provided opportunities to actually learn and produce educational materials.</p>	<p>4. <i>Explicitly expressing (short-term) plans</i> When: Steps D, F and I Enactment: Writing down tasks, repeating plans and initiating reflection. This supported: Clarity regarding tasks and plans, realistic plans, visualizing progress.</p> <p>5. <i>Bringing expert knowledge into the team</i> When: Step H Enactment: Explaining concepts, providing examples, raising quality issues and inviting external experts. This supported: Quality of the activities, progress in developing products and learning opportunities.</p>
Team interaction	<p>6. <i>Interacting openly and encouraging each other to share ideas and experiences</i> When: Step H Enactment: Participants provide feedback, ask each other for feedback and encourage each other to share experiences. This supported: Acceleration of the team's work process.</p>	<p>7. <i>Engaging all participants in the discussions</i> When: Step F and H Enactment: Asking participants to complete specific tasks and proposing active working methods. This supported: Whole team engagement and commitment.</p> <p>8. <i>Providing direction in the discussions</i> When: Step H How: Using the planning board to stay on track. This supported: Relevance of discussions</p>
Organization of the TDT		<p>9. <i>Organizing and facilitating the team meetings</i> When: Step G Enactment: Providing resources (e.g. meeting room, catering) and sending invitations for meetings. This supported: Basic needs for TDT.</p> <p>10. <i>Following a fixed method during the meetings</i> When: Start of all steps Enactment: Initiating the steps of the fixed method. This supported: Active participation in making decisions and clarity regarding goals, plans and focus of the TDT.</p>
Challenges	<ul style="list-style-type: none"> - Participants sometimes felt the need to ask the coach for approval. - Participants were not always willing to volunteer for tasks. - Participants did not always openly share ideas and experiences. 	<ul style="list-style-type: none"> - Some goals were too broad. - There were some difficulties with formulating concrete tasks. - Less concrete tasks were not always enacted as intended. - Expert knowledge was not always connected to goals and plans.

Table 3
Conversation in fifth meeting of TDT 1: goal setting.

Participant 1	I think this goal, 'getting familiar with the new examination program', is more or less finished, right?
Participant 2	Well, maybe if we link it to ...
Participant 3	Language!
Participant 2	Indeed, I think it might be interesting to know more about the role of language in the examinations.
Technical chair	Ok, you mean that the role of language should be added as a goal?
Participant 1	Yes!
Participant 3	Indeed.
Team coach	Yes, we now have some insights into the direction of the new examination program, but we could pay some more attention to the linguistic aspects.
Participant 4	Yes, until now we just focused on the role of chemistry. We could pay more attention to language. How do you formulate good questions? We could formulate test questions ourselves.
Technical chair	So you want to add this as a goal?
Participant 4	Yes, I think that is relevant for all of us.
Participant 5	I agree

concrete, and pointed out its relevance for all of them. By including a mix of shared and vertical leadership behaviours regarding the team goal, the TDT's work process was supported in two ways: (1) Enacting shared leadership behaviour created opportunities to focus on a topic that was relevant for all participants: the role of language in chemistry education (2) Enacting vertical leadership behaviour ensured that concrete plans were formulated, which brought focus and clarity.

4.4. Brainstorming about tasks (step C)

In this step, the third leadership behaviour was demonstrated: **3. Shared process of defining and carrying out (short-term) plans.**
Enactment: Participants from both TDTs mentioned ideas for tasks. One participant from TDT 1 explained: "As a group, we decided everything. We discussed what we had to do, and what tasks were needed for that." Although in the nine-step method, brainstorming

about tasks was planned after articulating the (refined) team goals, in practice, many ideas for tasks were mentioned during step H, while enacting the collaborative tasks.

Challenge: This particular leadership behaviour was more present in TDT 1 than in TDT 2. One participant from TDT 2 indicated that she always felt the need to ask for approval from the team coach: “*I could take the initiative by mentioning tasks, but I was never sure it was in line with the expectations of the team coach.*”

4.5. Articulating list of tasks (step D)

In this step, part of the fourth leadership behaviour was demonstrated: **4. Explicitly expressing (short-term) plans.**

Enactment: The technical chair wrote down the tasks when they were mentioned, even though they were mentioned in step H. Examples of such tasks were: “*Searching for relevant contexts for the practical exercise about green chemistry*” (TDT 1), or: “*Making a list of topics that should be addressed in the introduction of the module*” (TDT 2). The technical chair repeated the tasks she wrote down, in order to receive confirmation from the participants.

This supported: Writing down the concrete tasks fostered clarity in the process. One participant from TDT 1 explained: “*I really liked having a technical chair, because she noticed everything during the conversations and directly wrote it down. By the end she said: you mentioned all these tasks, are we going to do this? This made everything very clear.*”

Challenge: Although the ideas for tasks were mentioned by the participants themselves, in both TDTs the technical chair or the team coach sometimes helped them to provide more concrete formulations of the tasks. Despite this help, the logbooks from the team coach and technical chair in TDT 2 both indicated that the team kept having difficulties with defining concrete and small tasks. In the interviews, the participants explained that this was related to the fact that the defined team goal was too broad.

4.6. Brainstorming about short-term plan (step E)

In step E, part of the third leadership behaviour was enacted: **3. Shared process of defining and carrying out (short-term) plans.**

Enactment: In TDT 1, all participants provided input during the brainstorming about the short-term plan (Fig. 1; E). Every meeting, they each volunteered to perform some tasks for the next term. The team coach from TDT 1 explained how this worked: “*At the end of the meeting you make plans for the next time with this method. This gives the participants many opportunities to express their preferences.*”

This supported: The participants explained that this enabled them to set boundaries, to ensure that the plans remained doable for them. Furthermore, one of the participants explained how this shared leadership behaviour promoted her sense of responsibility: “*We collaboratively decided, you are going to do this, you are going to do that. This made me feel responsible to actually do the things I had agreed to.*”

Challenge: In TDT 2, this was sometimes a difficult process, as participants were not always willing to volunteer for tasks. This primarily happened when some of the participants were absent. The participants explained that if only some of the participants are present to volunteer for tasks, the team cannot really make progress.

Furthermore, during this step both team coaches sometimes demonstrated the seventh leadership behaviour: **7. Engaging all participants in the discussions.**

Enactment: This mainly happened in TDT 2, where the team coach felt the need to engage all participants by asking them to take on specific tasks.

This supported: The team coach from TDT explained how this contributed to their engagement to the team: “*If I saw someone who was quiet, but maybe wanted to do something, then I needed to find ways to actively engage him, for example by proposing tasks.*”

4.7. Articulating short-term plan (step F)

In this step, the technical chair enacted the fourth leadership behaviour in both teams: **4. Explicitly expressing (short-term) plans.**

Enactment: The technical chair always wrote down the sub-goal for the next term that the participants had defined. This was put up on the planning board, along with the selected tasks. The technical chair summarized the plan at the end of each meeting. One participant from TDT 1 indicated: “*At the end of the meeting we discussed what we were going to do next time. Everyone knew what to do.*”

This supported: Expressing the plans ensured that the plans remained clear and manageable. TDT 1's team coach explained: “*It is very pleasant to end each meeting with concrete plans. This makes it more explicit, tangible and clear.*”

4.8. Example from the meeting: making short-term plans

Similar to steps A and B, steps C to F were closely related, as they all addressed development and articulation of tasks and plans. Again we will provide an example of a conversation that covered both shared and vertical leadership regarding planning the activities. The conversation in Table 4 comes from the first meeting of TDT 2.

In this situation, participant 1 demonstrated the third leadership behaviour by making a suggestion for the plan for the next term. She set her boundaries by indicating that she had so many new ideas, and that she just wanted to go back to the module again, to determine for herself what she thinks belongs to the three different levels. By indicating that doing more than that would be too difficult, she created opportunities to digest the new information and actually learn new things. Subsequently, the team coach followed up on this idea; he clarified it and formulated a concrete plan for the next term. Then the technical chair moved the relevant sticky notes onto the planning board. In this way, both the team coach and the technical chair demonstrated the fourth leadership behaviour. As both shared and vertical leadership behaviours were enacted, the team made concrete plans to move forward in a direction that was relevant for the participant.

However, only one of the participants was engaged in this conversation. To ensure that all participants were engaged and committed to the plans, the team coach could have enacted the seventh leadership behaviour, by asking the other participants to join the conversation and express their preferences.

4.9. Carrying out individual tasks (step G)

In this step, part of the third leadership behaviour was enacted: **3. Shared process of defining and carrying out (short-term) plans.**

Enactment: Between the meetings, the participants of both TDTs carried out almost all of the tasks they had agreed to. However, the depth of fulfilment of the tasks varied from person to person.

This supported: One participant from TDT 1 explained that carrying out individual tasks provided learning opportunities, as long as the experiences were shared during the following meeting: “*He [another participant] came back with many results. It was interesting to see how he had to make adjustments. You learn a lot from these experiences.*”

Table 4
Conversation in first meeting of TDT 2: making short-term plans.

Participant 1	Can I make a suggestion for the next meeting?
Technical chair	Yes.
Participant 1	Maybe we can all just think about our ideas for the three different levels. What do we consider the basic level, what is intermediate and what is expert? Because now I have heard so much new information, and I have so many new ideas ... Now I just want to read the module again and see for myself what I think belongs to the basic level and what belongs to expert. I think for now it is too difficult to do one of the other tasks.
Team coach	Ok, so basically you mean, let's all do the same. You all have an idea about the different levels, with your own experiences in the classroom. And you can all work that out in your own language.
Participant 1	Yes.
Team coach	Then I can imagine we will all give a short presentation next meeting, in which you all say: this is how I see it. Then we all will get more feelings about where we want to go with this module.
Technical chair	Ok, then we can take this task you just mentioned, 'mapping the characteristics of the different levels', and put it on the planning board.
Team coach	Yes, but then it is not a task that we divide, but a task we are all doing.

Table 5
Conversation in eighth meeting of TDT 1: enacting collaborative activities.

Participant 1	Shouldn't we go back to what we were doing? [Points at the planning board]
Participant 2	Yes, maybe we should get back to finalise this
Team coach	Yes, let's go back
Participant 2	Okay, this roadmap we created, is it ehm. Do we have to adjust it further, or do you think it can be used like this? Are you planning to use it?
Participant 1	Well, like I just said ...
Participant 3	I'm going to use it.
Participant 1	I signed up for a committee within my school that deals with language issues, so I'm definitely going to use it. But I think that starts next year.
Participant 2	Okay, I e-mailed you what I just wrote down, so you can use it. So this version is specifically aimed at the science subjects.
Participant 4	Oh great, because I forgot to write it down myself
Team coach	Okay, but actually, I think it is a good idea to test it first with a few students. To see what they do and how they do it. Because, we can just guess this might work, but students always use it in their own ways. I think testing might help to refine it. But for now it looks good. Good enough to test it.

Challenge: The concrete tasks – such as “*Developing a modeling assignment in a biology context*” – were completed most of the time, whereas the less concrete tasks – such as “*Considering which topics should be addressed in the introduction to the module*” – were not always understood correctly, and hence not always completed properly.

Furthermore, in the time between the meetings, both team coaches demonstrated the ninth leadership behaviour: **9. Organizing and facilitating the team meetings.**

Enactment: Both team coaches provided the teams with the resources they needed, such as facilitating the meeting rooms and catering. Furthermore, they always sent an invitation by e-mail prior to the next meeting.

This supported: All participants indicated that they were happy with how the TDT meetings were organized.

4.10. Carrying out collaborative tasks (step H)

In both TDTs, this step took the most time during every meeting: between 1.5 and 2.5 h. Again, the participants enacted the third leadership behaviour: **3. Shared process of defining and carrying out (short-term) plans.**

Enactment: Participants completed the collaborative tasks they had agreed to in the previous meeting. Examples of collaborative activities were: discussing outlines of educational materials, collaboratively constructing materials and sharing experiences from practice.

This supported: Working on concrete collaborative tasks was highly valued, as one participant from TDT 2 explained: “*The moments we were actually constructing something, resulted in the most discussions and coherence in the group. I think this contributed most.*”

Furthermore, both team coaches demonstrated the fifth leadership behaviour during step H: **5. Bringing expert knowledge into the team.**

Enactment: The team coaches provided expert knowledge about science education and pedagogy, for example by explaining

concepts, by providing relevant examples or by raising issues related to the quality of the designed material. Additionally, the team coach of TDT 1 invited other experts from his network on two occasions: one to provide content knowledge about green chemistry, and two experts on the role of language skills in chemistry education. In TDT 2, the team coach also made connections with external experts outside of the TDT meetings.

This supported: This expert knowledge improved the quality of the activities and provided opportunities to make progress and to learn, as a participant from TDT 1 explained: “*There is certain expertise within the TDT, which improves the quality. For example, the team coach brings in his knowledge. Therefore we could move forward and learn new things.*”

Challenge: Although two participants from TDT 2 explained that the team coach's connections with experts outside the TDT were very valuable, one participant explained that the added value of this external knowledge was not always clear, as its relation with the goals and plans were unclear: “*Sometimes the team coach kept talking about some congress he had attended. I didn't really understand the added value of all this information in relation to what we were doing.*”

The participants also demonstrated the sixth leadership behaviour during step H: **6. Interacting openly and encouraging each other to share ideas and experiences.**

Enactment: In TDT 1, the participants openly asked each other for feedback, provided feedback and asked each other to share experiences. One participant from TDT 1 stated: “*We dared to make ourselves vulnerable. Nobody was afraid to give his opinion or to ask for feedback.*” Although this leadership behaviour was also present in TDT 2, the participants provided fewer examples of how they prompted or motivated each other.

This supported: This leadership behaviour appeared to accelerate the process. For example one participant from TDT 2 suggested that their process could have been accelerated if the participants had been more inclined to share expertise: “*We were all experts in our own subject. [...] But people didn't react to each*

other's ideas immediately. [...] The process could have been accelerated if people had shared their expertise more openly."

Both team coaches also demonstrated the seventh leadership behaviour in step H: **7. Engaging all participants in the discussions.**

Enactment: This mainly happened in TDT 2, where the team coach sometimes proposed active working methods to engage all participants in the collaborative tasks they had defined in the previous meeting.

This supported: In this way, all participants contributed to the collaborative activity.

The eighth leadership behaviour was also enacted in step H: **8. Providing direction in the discussions.**

Enactment: In TDT 1, the participants explained that it was not always the coach or technical chair that kept the discussions on track, but that the planning board provided direction for the discussions: "When that happened [loss of focus in the discussions], as participants we said, well, maybe we need to go back to ... And because we used the planning board, it was clear where the discussion needed to go".

This supported: Participants indicated that in this way, the discussions all remained relevant.

4.11. Example from the meeting: enacting collaborative activities

Again we will provide an example of a conversation that covered various leadership behaviours. This third example comes from step H during the eighth meeting of TDT 1, while participants were collaboratively constructing a roadmap for strategies for reading and answering test questions in the science subjects. The aim of this roadmap was to help students to read test questions correctly and to formulate their answers clearly. In this example, shown in Table 5, the discussion just has gotten off-track, and one of the participants looks at the planning board to go back.

In this example, participant 1 used the planning board to provide a direction in the discussion, which is the eighth leadership behaviour. Subsequently, participant 2 asked the other participants whether they are planning to use the roadmap they just created. Two participants explicitly confirmed that they were planning to use it. In this way, the participants prompted one another to use the materials in practice, which is the sixth leadership behaviour. Then the team coach demonstrated the fifth leadership behaviour, as he raised a quality issue by adding that the roadmap should be tested first. In this way, the team coach supported the quality of the design process.

4.12. Finishing term and reflection (step I)

In this step, part of the fourth leadership behaviour was enacted again: **4. Explicitly expressing (short-term) plans.**

Enactment: As step H took most of the time in the meetings of both TDTs, often there was not much time left for reflection. When the TDT did take time for reflection, they concluded that the process was going well and everyone was satisfied. Concrete issues were raised on only a few occasions, such as that they wanted to spend more time on collaboratively constructing educational materials. At the end of their last meeting, both TDTs concluded that their goals had been met. They had designed the educational materials that they planned to design and furthermore, they indicated that they had gained new knowledge and skills along the way.

This supported: Participants indicated that it gave them a good feeling to reflect on their planning and to move the tasks to 'done' on the planning board, as this made their progress more visible.

To conclude, in the overall process the tenth leadership behaviour was demonstrated: **10. Following a fixed method during the**

meetings.

Enactment: This leadership behaviour was enacted by the technical chair, by initiating the nine steps of this method in all of the meetings.

This supported: In the final interviews, the participants and team coaches from both TDTs indicated that this nine-step method supported the overall process. One of the participants from TDT 1 explained that the method forced them to formulate clear goals and concrete tasks, which promoted achievement of the intended outcomes: "Maybe it's an open door, but if the goals are clear, the outcomes are better. And because the goals were clear, we could define clear tasks that are directed towards that goal". Furthermore, they indicated that the nine-step method stimulated them to participate in making decisions for the team.

5. Discussion

This study reveals the balancing act involved in combining shared and vertical leadership behaviours in TDTs. The main research question was: How does the nine-step method support TDT processes? More specifically, we aimed to understand how shared and vertical leadership were enacted in TDTs while using this method, how these leadership behaviours appeared to support the team's work process, and what leadership challenges the TDTs encountered.

5.1. How shared and vertical leadership behaviours were enacted

All ten leadership behaviours that we defined in our previous study (Binkhorst et al., 2018) were observed to be enacted at some point during the nine-step method the TDTs used. In Table 2, we summarized how these leadership behaviours were demonstrated and during which steps. By means of three examples from the meetings, we illustrated how this table can be used to recognize the various leadership behaviours and to indicate which leadership behaviours could be expected. In this way, this overview can be used as a tool for researchers to monitor leadership behaviour in teacher teams. Furthermore, it can raise awareness among team coaches and participants, which might help them to successfully facilitate teacher teams (Borko, Jacobs, Seago, & Mangram, 2014).

Furthermore, findings from this study strengthened our theoretical understanding about combining vertical and shared leadership in teacher teams. As expected from the literature (Pearce, 2004; Yukl, 2012), we found that shared leadership behaviour mostly occurred in the brainstorming steps and task completion steps, when participants proposed ideas for goals or tasks and carried them out (Fig. 1; A, C, E, G and H), whereas vertical leadership behaviours mostly occurred in the articulating steps (Fig. 1; B, D, F and I). As these steps alternated in the nine-step method, the successive steps were not always enacted in a linear way, and sometimes vertical and shared leadership were carried out almost simultaneously. This meant that the conversations often included both shared and vertical leadership. The nine-step method helped the team coach and technical chair to remind them of the important steps (such as articulating the goals and plans) that should not be overlooked. In contrast to previous research that indicated that combining shared and vertical leadership could be experienced as paradoxical (Binci et al., 2016; Elloy, 2006; Meirink et al., 2010), none of the participants experienced these leadership behaviours as conflicting. It could therefore be suggested that explicitly mentioning 'brainstorming' and 'articulating' as separate steps emphasizes the importance of both shared and vertical leadership behaviours, even if they are exhibited in the same conversation.

5.2. How shared and vertical leadership behaviours appeared to support the process

This study also deepened our understanding of how shared and vertical leadership supported the work process of the TDTs. These findings were also summarized in the overview in Table 2. In practice, this overview might help participants and team coaches to become more aware of how their leadership behaviour might affect the team's design process.

First, we showed how shared leadership behaviours supported the design process in various ways. Participants indicated that being able to propose ideas for the team goals contributed to shared meaning and relevance for the team. Furthermore, they explained that the fact that they chose their own tasks made them feel responsible to complete the tasks, which is needed to actually learn new things and design materials. Participants also explained that sharing their own experiences and ideas could accelerate the process. These findings about how shared leadership supported the process are in line with other studies that have indicated that shared leadership is positively related with shared purpose (Carson et al., 2007; Wageman, 2001), that it can create a sense of ownership (Ritchie & Woods, 2007) and that it can accelerate the process if the team interdependence is high (Nicolaidis et al., 2014).

Second, we showed how vertical leadership behaviour could be supportive for the team's work process. Participants and team coaches indicated that vertical leadership behaviour contributed to clarity regarding the goals and the plans, and that the overview on the planning board made the team progress visible. Furthermore, participants indicated that vertical leadership contributed to the quality of the team's design process, as the team coaches brought in expert knowledge and they provided basic resources for the TDT. Vertical leadership behaviour also ensured that all participants were actively engaged in the discussions. These findings further support the idea that both shared and vertical leadership behaviours are needed to support the team's work process (Binci et al., 2016; Gronn, 2009; Pearce, 2004).

Additionally, the three examples from the meetings showed how the combination of vertical and shared leadership behaviours contributed to the process. In all these examples, the participants took the lead by exhibiting shared leadership behaviour. In this way, the participants had opportunities to make the goals or the activities relevant or doable for their own practice. In all examples the team coach or the technical chair subsequently exhibited vertical leadership behaviour to provide focus, clarity or quality. Therefore, these examples showed how a blend of shared and vertical leadership behaviours created opportunities to promote clarity and structure in the team's work process, without impeding participants' initiative and creativity.

5.3. Remaining leadership challenges

Although this study showed how shared and vertical leadership behaviours could be combined in TDTs when using the nine-step method, we also identified several challenges, which are listed in Table 2. This overview can help researchers, participants or coaches to avoid these potential pitfalls in their TDTs. Furthermore, the overview of leadership challenges contributes to our theoretical understanding about leadership in TDTs. These items could be summarized as two general leadership challenges.

The first challenge is related to shared leadership behaviour. All shared leadership difficulties that we found were related to purpose, culture and mindset. In this study, all participants volunteered to join the TDT, they committed to investing a considerable amount of time in the TDT and their schools supported their participation. Previous research has indicated that these preconditions could

instigate enthusiastic, pro-active attitudes, and hence stimulate shared leadership behaviour (Admiraal et al., 2015; Gorozidis & Papaioannou, 2014; Stoll et al., 2006). Furthermore, the nine-step method was designed to stimulate shared leadership behaviour, as it explicitly incorporated time to put forward ideas and plans (Binkhorst et al., 2018). However, the participants from TDT 2 did not always feel they had the autonomy to make decisions for the team, as they tended to ask for approval from the team coach when initiating tasks. Furthermore, they were not always willing to volunteer for tasks during the planning phase. They explained that this was related to the fact that the team struggled with participants being absent from the meetings and they found it difficult to volunteer for tasks, knowing that the team would not really make progress if only part of the team was present. Additionally, the participants from TDT 2 did not always openly share their ideas and experiences, which could have accelerated the process. All these issues point to limited engagement or commitment to the TDT. This is in line with other studies, which have suggested that teachers are often individually occupied with everyday issues, and they may find it difficult to completely commit themselves to the team (Bouwman et al., 2017; Vangrieken, Dochy, Raes, & Kyndt, 2015). In the present study, the team coach took care of this to some degree, as he enacted vertical leadership behaviour to stimulate engagement by all participants, for example, by asking participants to take on tasks or by suggesting active working methods. However, he could not enforce *intrinsic* engagement in the TDT's work. Therefore, we argue that TDTs need more than effective preconditions and a method that stimulates shared leadership behaviour. An ongoing sense of relevance and urgency is needed to ensure intrinsic engagement. Team coaches need to be aware of this and they need to actively address participants' intrinsic engagement in the meetings. In particular in TDTs such as TDT 2, with a very large task, assigned from the outside, and extending beyond the personal teaching practices of the participants.

The second major challenge is related to vertical leadership behaviour. While applying the nine-step method, the vertical leaders explicitly took time to formulate the goals and tasks, which could create focus and clarity (Scribner et al., 2007; Yukl et al., 2002). However, we observed that the TDTs sometimes struggled with formulating tangible goals and defining concrete tasks. This has also been found in other studies, where the conclusion was drawn that successful goal setting in teacher teams is not a given (Binkhorst et al., 2017; Van Gasse, Vanlommel, Vanhoof, & Van Petegem, 2016). It is very challenging for teachers to think about goals and tasks and therefore, they need help from the vertical leader to create clarity. Our findings suggest that this help should move beyond *expressing, repeating and clarifying* goals and tasks; vertical leaders need to actively help the team with formulating a clear, concrete operationalization of the goals and tasks. However, in this study, we illustrated that thinking in goals and tasks was difficult for team coaches as well. For example, the team coach from TDT 2 sometimes brought in expert knowledge that was not directly related to the team's goals, which caused confusion among participants. Therefore, we argue that TDTs could benefit from having team coaches be more aware of how they could promote effective thinking about goals and tasks.

5.4. Limitations and future research

A limiting factor in this study is that the research is mainly based on perceptions. However, we used various sources of evidence in terms of both data and methods (i.e., interviews, observations, logbooks), which is a well-known strategy to reduce bias (Poortman & Schildkamp, 2011). Furthermore, we chose an in-depth qualitative research design, which could be relevant for

teacher teams in various contexts, as the findings could serve to some extent as an example. However, this type of research comes with the limitation that the generalizability of our findings is limited, given the very specific contexts in which these data were obtained.

Therefore, as a next step, more research in different settings is needed to obtain a broader understanding of vertical and shared leadership behaviours in teacher teams. Additionally, future research could be aimed at solving the remaining leadership challenges that were identified in this study. For example, studies could investigate how team coaches could be trained or prepared beforehand, to promote effective thinking about goals and tasks.

5.5. The balancing act

TDTs are specific types of PLCs that have the potential to contribute to the design of improved educational materials and to teachers' professional development (Bakah et al., 2012a; Huizinga et al., 2014; Voogt et al., 2011). In the introduction we provided examples from TDTs or teacher teams that reported various leadership difficulties, in particular with combining shared and vertical leadership (Becuwe et al., 2016; Binkhorst et al., 2015, 2017; Huizinga et al., 2013; van Driel et al., 2012). This study shows how these TDTs could benefit from using the stepwise method, as this method was developed in order to combine shared and vertical leadership.

More specifically, the overview in Table 2 can help to support these TDTs in three ways. First, the overview could help TDTs to recognize their own leadership behaviours related to the team's goals. By comparing their own leadership to the examples in Table 2, they can see how shared and vertical leadership behaviours can be combined. For example, they can notice that participants can take the lead in mentioning ideas for the goals and that team coaches ensure these goals are articulated and repeated regularly. Second, for each of these leadership behaviours, the overview can help TDTs by providing insights as to how this type of behaviour might support the team's work process. For example, they can see that mentioning ideas for goals might strengthen participants' shared meaning of the goals, and that articulating the goals might contribute to the clarity of the team's purpose. This helps to raise awareness of the importance of both shared and vertical leadership. Third, teams can recognize potential pitfalls by looking at the list of leadership challenges in Table 2. For example, they could be warned that the defined goals should not be too broad.

Effective workplace collaboration is difficult, and providing adequate leadership in teacher teams is challenging. The findings of this paper offer insights into what vertical and shared leadership behaviours look like in practice, how specific leadership behaviours appear to support the process and what challenges teams might encounter when blending these types of leadership in TDTs. This information has value for those who would organize, participate in or study TDTs or other types of PLCs.

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