Summary

Teams have emerged as a widespread unit of accomplishment in educational and professional settings. One of the expected yields of team-based education is stimulation of collaborative learning through peer interactions and shared efforts to solve complex problems (Barron, 2000; Kirschner, 2009). Similarly, whether we are referring to medicine, aviation, software development, or even football, teams are frequently at the center of how work is carried out (Kozlowski & Ilgen, 2006). Work teams interacting and exchanging ideas are expected to acquire and expand their knowledge and skills, and in turn achieve high coordination and performance. In both professional and educational settings, teams are not static entities but dynamic groups. As such, to perform well, they need to continuously iterate cycles of reflection and action during which they can analyze underlying reasons for success and failure and derive lessons for their future actions accordingly (et al., 2010; Edmondson, 1999). In other words, they need to learn collectively. While the importance of team learning is widely accepted, a current challenge for research and practice is to identify interventions that can facilitate the learning potential of teams, since team learning may simply not occur (Edmondson, 1999; Kozlowski & Ilgen, 2006). To date, too little attention has been paid to the combined effects of different learning processes on team coordination and team performance and on interventions that could instigate team learning and in turn enhance performance. In this dissertation, we contribute to the literature on teams and team learning by 1) identifying key conditions and learning processes enabling efficient coordination and high performance (chapter 2), 2) empirically investigating two interventions (i.e., feedback and guided team reflexivity) that help establish and reinforce positive team behaviors (chapters 2,3,4,5).

Chapter 2 approaches knowledge coordination (i.e., bringing necessary and unevenly distributed knowledge to bear) through the lens of a learning perspective (Wittenbaum, Vaughan, & Stasser, 1998). In this chapter, we identify four antecedents of team knowledge coordination. First, shared reflection upon team goals, performance, and strategies and development of improvement
plans (i.e., team reflexivity) are expected to help teams develop and exploit their synergies efficiently (Schippers, Den Hartog, & Koopman, 2007). Second, coordination also requires knowledge sharing and building (i.e., team learning behaviors). In fact, sharing ideas and knowledge (i.e., construction), collectively building new understandings and insights (i.e., co-construction) and constructively addressing and discussing disagreements (i.e., constructive conflict) are likely to provide teams with more opportunities to learn about each other’s knowledge more directly and accurately (Van den Bossche, Gijselaers, Segers, & Kirschner, 2006). Finally, we hypothesize that team members will be more likely to interact and engage in collective learning when they strongly believe in their capacity to complete their task (i.e., group potency) and when they are committed to the team task (e.g., task cohesion). Our results validate the importance of these success factors of team coordination. We show that task cohesion is a significant precondition of team learning processes (team learning behaviors and team reflexivity), that in turn set the stage for effective team coordination, which is a strong predictor of team performance. Further, team members are more likely to use their expertise effectively when they believe they can be effective than when they do not. All these social, cognitive, and motivational factors combine to determine the team’s success or failure in coordination, which is related to team performance. In sum, these results suggest that coordination success requires learning moments during which confident and committed team members can share and build upon ideas and information, gently disagree, and monitor progress by reflecting and planning to build on what’s working and repair what isn’t working optimally. Although this study sheds light on antecedents of team knowledge, more research is needed on understanding predictors of team learning processes. While initial levels of coordination, task cohesion, and group potency combine to explain 28% of the variance in team learning behaviors, these antecedents account for only 10% of the variance in team reflexivity. It remains a matter of concern to identify team-level inputs or planned interventions that can develop team learning and extent teams’ opportunities to do so. Thus, this gap encourages additional research on how team-level interventions instigating team learning can impact future performance, which is the core question addressed in chapters 3, 4, 5.

**Chapter 3** presents a review of the literature on team feedback (i.e., information provided by an external agent about aspects of team performance or processes) and identifies the boundary conditions of its effectiveness. Feedback is widely acknowledged to be central not only to motivation by promoting team efforts, but also to learning due to its informational value (Hattie & Timperley, 2007). Through feedback, teams receive information about the quality of their
work and knowledge about the effectiveness of their strategies. As such, it is an error detection device and thus can act as a trigger of problem identification and strategy development. By contrast to the well-known effects of individual-level feedback, the effects of feedback on team processes and performance are not as well understood. The review integrates the findings of fifty-nine studies that provide insights into the conditions under which team-level feedback leads to performance improvement. Following conclusions can be drawn. First, feedback has been shown to enhance important team processes (e.g., motivation, team goal, and collaboration) and emergent states (e.g., collective efficacy, cohesion, outcome expectations, and task interest), while not all feedback interventions lead to performance improvement. Second, the review describes several conditions under which feedback has positive effects on performance. Feedback should be (a) of high quality (i.e., specific, well-timed, regular, non-threatening, shared, directed at teams it targets, and fairly distributed amongst team members); (b) more appropriate and profitable in certain optimal situations, with higher effects expected in teams comprising no redundant members, working in projects, setting their own goals and strategies or receiving information about goal attainment, given incentives and rewards, believing they are high-performing, and having no unsolved intragroup conflicts and a flexible workload; (c) attended to, perceived as being relevant and useful and (g) processed. However, very little attention has been paid to how feedback is perceived (only empirically investigated in Walter & Van der Vegt, 2013) and processed (not investigated), while it has been recognized as a core boundary condition of feedback effectiveness in theoretical work [e.g., London & Sessa, 2006]. This research gap has fueled the two empirical studies presented in chapters 4 and 5. In chapter 4, we focus on how teams naturally deal with performance feedback they receive over a series of tasks and in chapter 5, we compare performance improvement (and deterioration) of teams only given feedback and no processing instruction with teams given feedback and reflective instructions and teams not given feedback nor instructions.

Chapter 4 zooms into how and when teams process feedback they receive about their performance. We propose that teams process feedback by collectively reflecting on their objectives, strategies, and processes (i.e., team reflexivity) [Boud & Molloy, 2013]. The concept of team reflexivity is introduced as a set of relevant indicators of feedback processing, more specifically evaluating performance and strategies, looking for alternatives, and making decisions about new ways to tackle the task. Second, we address the issue of time and timing of team reflexivity. For example, does team reflexivity during action and during feedback increase, decrease, or stay stable over time? Additionally, we
explore the relation between the timing at which team reflexivity occurs (during action or during feedback and during the early interactions or later interactions of the team) and its relation to performance. In the study presented in chapter 4, dyads performing a flight simulation, more specifically four landing tasks of increasing complexity, were given time-outs from action during which feedback about their prior performance was made available. We coded reflective communication on the basis of utterances of reflective behaviors and explored phases (or “when”, specifically action or feedback, earlier or later interaction) in which some performance events (i.e., crashes and errors) were related to team reflective behaviors. The results show that teams do not spontaneously perform sequences of all three behaviors that altogether form complete reflective cycles. They only complete sequences of two behaviors starting by evaluating and looking for alternatives and ending with a decision (or conclusion). This is an indication of teams’ natural tendency to regularly “skip” the analysis of their performance or the inventory of possible alternative ways of performing the task (which is the less frequent behavior overall). Surprisingly, the frequencies of evaluating (the most frequent behavior overall) and making decisions grow over time during action only, suggesting a sub-optimal use of feedback times to stop and reflect and thus missed opportunities to act upon feedback. Additionally, timing of team reflectivity appears to have a key role in its effects on performance. For example, whereas early decision-making impedes subsequent performance (van Ginkel & van Knippenberg, 2009), evaluating during subsequent feedback is associated with improved subsequent performance. Thus, when in the workflow reflection occurs might have an impact on whether or not it will positively influence future performance. Finally, the study challenges the common assumption that more reflection leads to better performance since we do also find a relation between initial performance and subsequent reflection. This finding suggests that bi-directional relationships exist between team processes and performance. To conclude, since teams seldom reflect in a systematic way, it might be that an intervention instigating reflection during time-outs is beneficial to team performance. This is the focus of chapter 5 that presents and empirically tests a targeted intervention stimulating an iterative three-step reflective cycle that involves evaluating performance and strategies, looking for alternatives, and making decisions (e.g., Schippers et al., 2007; Yukawa, 2006).

In Chapter 5, we introduce “Guided reflexivity”, which is a structured intervention providing time, space, and guidelines (or steps that teams are expected to follow) explicitly instructing team members to attend to and reflect upon feedback as a team and thus to analyze prior performance, brainstorm
about alternatives, and derive new goals, strategies, and procedures between performance episodes (Gurtner et al., 2007; van Ginkel & van Knippenberg, 2009). The chapter describes a study which investigated whether team feedback itself and its combination with guided reflexivity as tool to foster feedback processing have an impact on team performance change compared to a control group in a series of tasks in a PC-based flight simulator. Latent growth curve modeling shows that teams in the feedback and guided reflexivity condition show better performance than the teams in the feedback only condition and in the control condition at the second and third of four measurement points (times 2 and 3). These teams even start with a sharper learning curve (faster rate of change from Time 1 to Time 2) suggesting the combination of these two interventions can speed up the learning of a new task. At time 4, however, the teams of the three conditions differ no more with regard to their performance. Several alternate explanations can be advanced to explain why the effects of both components seem to fade away with time. For example, it might be explained by the more rapid increase in complexity and thus cognitive load from task 3 to task 4. Performing the very complex task might cognitively overwhelm teams and as a consequence they may abandon the implementation of previously agreed upon strategies that would require additional cognitive resources (Kirschner, Paas, & Kirschner, 2009). Also, limited expertise increases the amount of cognitive load necessary to obtain and use relevant information to succeed in a task. Another plausible explanation for this outcome is the lack of transfer between tasks due to the team inability to perceive sufficient similarities between the previous tasks and the more complex task. This failure in perception of analogies may have lead teams to drop strategies and remedies identified as being obsolete and inapplicable. To conclude, by investigating reflexivity as a tool to support feedback processing the study contributes to theoretical development in the area of feedback research. The investigation of feedback and reflexivity as interventions to support team performance is of great importance for different application contexts. Moreover, we demonstrate that we cannot consider feedback delivery without considering feedback reception. Teams are at the heart of the feedback process; they have an important role in the impact of feedback on their own behaviors. Since these benefits do not endure over time in our study, more research in applied settings and for longer periods of time seems warranted to identify possible enabling conditions (such as the level of support and guidance).
REFERENCES


