University of Groningen

Fostering teacher learning in VET colleges

Oude Groote Beverborg, Arnoud; Slegers, Peter J.C.; Van Veen, Klaas

Published in:
Teaching and Teacher Education

DOI:
[10.1016/j.tate.2015.01.015](https://doi.org/10.1016/j.tate.2015.01.015)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2015

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Oude Groote Beverborg, A., Slegers, P. J. C., & Van Veen, K. (2015). Fostering teacher learning in VET colleges: Do leadership and teamwork matter? *Teaching and Teacher Education*, 48, 22-33.
<https://doi.org/10.1016/j.tate.2015.01.015>

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Fostering teacher learning in VET colleges: Do leadership and teamwork matter?

Arnoud Oude Groote Beverborg ^{a,*}, Peter J.C. Sleegers ^a, Klaas van Veen ^b

^a University of Twente Faculty of Behavioural Sciences, Department of Educational Research, PO Box 217, 7500 AE Enschede, The Netherlands

^b University of Groningen Faculty of Behavioural and Social Sciences, Department of Teacher Education, Landjeven 1, 9747 AD Groningen, The Netherlands

HIGHLIGHTS

- We examined perceptions of workplace conditions affecting VET college teachers' learning.
- Self-efficacy and task interdependence affect self-reflection and feedback asking.
- TL-individualized consideration affects task interdependence only.
- TL-vision building affects asking for feedback through goal interdependence.
- TL-intellectual stimulation affects asking for feedback directly.

ARTICLE INFO

Article history:

Received 24 January 2014

Received in revised form

15 January 2015

Accepted 21 January 2015

Available online 14 February 2015

Keywords:

Transformational leadership

Teamwork processes

Interdependence

Self-efficacy

Reflective learning

Workplace learning

ABSTRACT

This study explores teacher learning in Vocational Education and Training colleges, combining organizational and psychological factors, such as transformational leadership, teamwork, and self-efficacy. 447 teachers participated in a survey study. Multilevel structural equation modeling was used to test 7 hypotheses derived from previous research. The results show that transformational leadership has direct and indirect effects on teacher learning as mediated by teamwork processes. Moreover, the impact of teamwork processes on teacher learning was mediated by self-efficacy. The study contributes to research on workplace learning by giving insight into the role organizational and psychological factors play in stimulating teacher learning.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

During the last decade, governments, local politicians, and school managers across the globe have been involved in efforts at improving educational systems in support of better student performance. In the Netherlands, where this study takes place, schools in general, and Vocational Education and Training (VET) colleges in particular, have been confronted with ongoing reforms, including restructuring movements, educational reform efforts, and rigid accountability policies, as strategies to improve the quality of

education. VET colleges have gone through many mergers with the formation of massive educational institutions as a consequence. These institutions also are involved in educational reforms aimed at the development of learning environments designed to stimulate self-regulated, reflective, independent, authentic and social-interactive learning. To implement these reforms, VET teachers are organized into multidisciplinary teams. Teachers from different disciplines and different subjects are called to collaborate for imparting the competences students *need* to become strong professionals and thus function in a continuously changing labor market. The challenge facing individual VET teachers is to learn how to work effectively in teams directed at strengthening their professional expertise and practice, with the ultimate goal of improving student performance.

Research has shown that the implementation of teams in educational settings is not an easy task and that altering teachers'

* Corresponding author. Tel.: +31 6 17146879.

E-mail addresses: a.oudegrootebeverborg@utwente.nl (A. Oude Groote Beverborg), p.j.c.sleegers@utwente.nl (P.J.C. Sleegers), klaas.van.veen@rug.nl (K. van Veen).

practices is even more difficult (e.g. Crow & Pounder, 2000; Fullan, 2002; Scribner, Sawyer, Watson, & Myers, 2007; Somech & Drach-Zahavy, 2007). As VET colleges are expected to improve instruction through fostering individual and collaborative learning in teams, building school- and team-level capacity through professional developing initiatives seems to be an important prerequisite for sustained improvement (Hopkins & Reynolds, 2001; Parise & Spillane, 2010; Stoll, 2009; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006; Toole & Louis, 2002).

To better understand how schools can enhance their school wide capacity for improvement, different studies into organizational learning, professional learning communities, and schools as learning organizations have been conducted (Bryk, Camburn, & Louis, 1999; Leithwood & Louis, 1998; Silins, Mulford, & Zarins, 2002; Wahlstrom & Louis, 2008). Findings from these studies have shown that such school organizational conditions as participative decision making, teacher collaboration, trust, and transformational leadership can clearly foster teachers' professional learning in schools. Many of these studies have used a system theory of change to understand the links between the structural and cultural dimensions of the school as a workplace and professional learning.

Additionally, research has also shown that psychological factors such as self-efficacy, teacher autonomy, and sense making affect teacher learning (Coburn, 2004; Richardson & Placier, 2001; Spillane, Reiser, & Reimer, 2002). This paper meets the call for studies wherein attention is paid to the interplay between psychological and work environmental factors (Kwakman, 2003; Richardson & Placier, 2001; Smylie, Lazarus, & Brownlee-Conyers, 1996), and builds on studies that recently examined organizational and psychological antecedents to the professional learning and classroom practices of teachers. These studies have shown that the impact of transformational leadership practices and workplace conditions on professional learning appears to be mediated by psychological factors, such as self-efficacy beliefs of teachers (Geijsel, Sleegers, Stoel, & Kruger, 2009; Thoonen, Sleegers, Oort, Peetsma, & Geijsel, 2011; Kwakman, 2003; Smylie et al., 1996).

However, most of the relevant studies have been conducted in primary schools, being relatively small communities, and thus concerned relatively long and intense connections between the teachers with the schools and also between the teachers and students within the schools. VET colleges, in contrast, involve a higher level of education, have gone through many mergers, and have attracted experienced professionals from the actual field to teach their students with a wide variety of experiences and expectations as a consequence — particularly when the multidisciplinary teams are formed. Additional research is thus needed to validate previous findings.

Those organizational conditions and psychological factors studied to date have been found to explain only a small to moderate portion of the variance in the professional learning of teachers. It is thus likely that *additional* factors may also affect teacher learning. Although the few available studies provide some evidence for the relationship between teamwork, especially perceived task and goal interdependence, and professional learning of teachers, more research is needed, thereby validating and expanding existing models on teacher learning in schools.

This study aimed to contribute to these lines of research by exploring the role of self-efficacy in the relationship between transformational leadership, teamwork (i.e. perceived task and goal interdependence) and teacher learning in VET colleges, which seem important antecedents of teacher learning. By placing a strong emphasis on principals' behaviors that stimulate social identification, intrinsic motivation and extra effort, transformational leadership may mobilize the interpersonal relationships for the enactment of professional learning in schools. Through facilitating

interaction between teachers, teamwork may create opportunities for knowledge sharing, open discussions, exchanging information, and thus for learning. A strong sense of self-efficacy motivates teachers to meet challenges, and thereby may positively influence the professional learning of teachers. These and other assumptions will be explained and discussed in more detail in the theoretical background.

The following research question guided our study: To what extent do transformational leadership practices and teamwork affect teacher learning, as mediated by self-efficacy?

2. Theoretical framework

The framework used to guide this study is based on a model of teacher learning as developed in research on the interplay between teachers' psychological states and organizational conditions in teacher learning in elementary schools (Geijsel et al., 2009; Thoonen et al., 2011). Teacher learning was conceptualized as the engagement of teachers in a variety of professional learning activities within an educational context. Variations in teacher learning are viewed a function of the capacities and motivations of teachers, the characteristics of the organizational setting and transformational leadership practices.

In the model that guide this study (see Fig. 1) it is assumed that self-efficacy beliefs and teamwork will have direct effects on the engagement of teachers in professional learning activities. Teamwork also has indirect effects on teachers' engagement in professional learning activities through self-efficacy. Transformational leadership practices have indirect effects on the engagement of teachers in professional learning activities through teamwork and self-efficacy. Although not measured in this study, it is assumed that teacher learning in school will affect teachers' instructional practice, and in turn enhance student learning. We will test the relationships among these factors, using data from 447 teachers and 66 teams of 6 VET colleges. In order to elaborate the model more fully, we will now describe the different variables and pose hypotheses around the relationships between the variables of the model.

2.1. Teacher learning: engagement in professional learning activities

Research on professional development programs in the late 80's and early 90's provided evidence for the failure of earlier conceptions of teacher change as something that is done to teachers often based on a training paradigm that implied a deficit-mastery model and consisted of 'one-shot' professional development approaches (Clarke & Hollingsworth, 2002; Richardson & Placier, 2001). These findings caused many researchers to reconceptualize teacher professional development by using the "change as professional growth or learning" perspective to professional development. Teacher learning in the workplace is seen as an active and constructive process that is problem oriented, grounded in social settings and circumstances, and takes place throughout adults' lives (Jarvis, 1987; Marsick & Watkins, 1990; Smylie, 1995). In line with this view, researchers have emphasized the notion of ongoing and lifelong teacher learning embedded in schools as a natural and thus expected component of professional activities of teachers and a key component to build school-level capacity to change and sustained improvement (Clarke & Hollingsworth, 2002; Jarvis, 1987; Kwakman, 2003; Marsick & Watkins, 1990; Putnam & Borko, 2000; Smylie, 1995). The focus of teacher learning is on teachers' engagement in a variety of professional learning activities within schools and on becoming a participant in a community of learners (ten Dam & Blom, 2006; Sfard, 1988). This perspective on learning implies that teachers take responsibility for their own actions and

Fig. 1. Theoretical model of the relations between transformational leadership practices, teamwork processes, teacher self-efficacy beliefs, and professional learning activities (hypotheses are in parentheses).

acquire the necessary knowledge, skills and repertoire of activities to increase their participation in the school workplace environment. Via engagement in professional learning activities, teachers can stimulate both their own professional development and the development of the school and thus make a significant contribution to improving educational practice and, in turn increasing student performance (Desimone, 2009; Vescio, Ross, & Adams, 2008).

As research has shown that active learning (observing, discussion, planning, feedback, reflection) affect teaching practice and student learning (Garet, Porter, Desimone, Birman, & Yoon, 2001; Runhaar, Sanders, & Yang, 2010; Supovitz, 2002), we selected two professional learning activities for this study that are considered crucial for promoting professional development and school improvement: self-reflection and asking for feedback (Korthagen, 2001; Kwakman, 2003; Lohman & Woolf, 2001; Smylie, 1995). Although both learning activities stimulate reflection, the sources for self-reflection and thereby the nature of these learning activities, differ. Self-reflection can be seen as an *individual* learning activity, which recreates an experience of acting in a situation. To this 'relived' experience insights are added to create a new, altered, experience. This new experience serves as a basis for future actions of the one reflecting teacher (e.g., Barsalou, 2008). Through self-reflection, teachers are thus bound to their own experiences, values, beliefs and abilities to gain new insights, skills and knowledge. Asking for feedback is a *social* learning activity, in which a teacher asks a team member, the leader, or a student, to verbally model how to act in a situation. The teacher can use this advice to adapt future actions. By asking feedback, teachers thus gain new knowledge, skills, and ideas in social interaction with others. As such, self-reflection and asking for feedback are ways to discover the proper script for future actions aimed at adaptation to changing circumstances. In addition, both activities are nested in a social context, because both activities are about making implicit knowledge explicit (Nonaka & Takeuchi, 1995; van Woerkom, 2004). Because explicit knowledge is communicable, it is valuable for both the individual teacher and team members to find solutions to

changes and challenges at work, and to formulate and monitor goals to come to such solutions. As such, self-reflection and asking for feedback are complementary ways to adapt to changing circumstances and learning.

However, engagement in these professional developmental activities is not self-evident, because of three, related, reasons. First, teachers flow with the issues of the day, and find it hard to disengage from the immediacy of their work to make time to reflect. Second, teaching traditionally had a high degree of autonomy (Clement & Vandenberghe, 2000), teachers are thus not used to interact frequently with team members to share information, knowledge or ideas, and ask for feedback. Third, asking for feedback means to expose oneself to possible criticism of others, which teachers may want to evade to avoid interpersonal conflicts.

2.2. Teacher learning and self-efficacy

One of the most important psychological factors that have been found to affect the engagement of teachers in professional learning activities is self-efficacy (Bandura, 1997). Self-efficacy beliefs are future-oriented beliefs about the level of competence that a person expects he or she will display in a given situation. These beliefs stem from past experiences with similar – in this case teacher workplace – situations, and will be positive when these situations have been resolved positively (Bandura, 1997; Truijten, 2012). Self-efficacy works in two related ways. First, it strengthens teachers in pursuing interests and involvement in activities through setting themselves challenges (Geijsel et al., 2009; Bandura, 1997). Second, it takes away fear of failure and it strengthens persistence in pursuit of interests and goals (Runhaar et al., 2010).

When teachers engage in professional learning activities, they run the risk of receiving information which disconfirms their positive self-efficacy beliefs. Such experiences may then limit some teachers while others, who trust in their capacity to resolve problems and/or receive sufficient support, will feel competent enough

to meet the new challenges; they will also more easily engage in professionalization learning activities than teachers who no longer believe in their own self-efficacy. Research has confirmed the association between self-efficacy and professional learning (Geijssels et al., 2009; Thoonen et al., 2011). Beliefs about their own effectiveness can thus, motivate (or demotivate) teachers to meet challenges, and thereby may have a positively impact on teachers' engagement in professional learning activities (Geijssels et al., 2009; Thoonen et al., 2011; Simbula, Guglielmi, & Schaufeli, 2011; Yost, 2006). Based on the aforementioned, we expect that self-efficacy positively affects teachers' engagement in professional learning activities, including self-reflection and asking for feedback (hypothesis 1).

2.3. Perceived task and goal interdependence in the facilitation of teacher learning

Previous studies into schools as professional communities have shown that organizational factors such as cooperation, participative decision making, and a climate of trust, can foster teachers' professional learning in schools (Kwakman, 2003; Leithwood, Jantzi, & Steinbach, 1999; van Woerkom, 2004). Additionally, collaborative experiences, peer interaction, and the exchange of knowledge and ideas are at the core of professional learning communities and can facilitate effective teamwork.

Teachers traditionally had a high degree of autonomy, and teachers are thus not used to work effectively in teams (Clement & Vandenberghe, 2000). Research has shown that the implementation of teams in educational settings is not an easy task, mainly because teachers do not support teamwork (Crow & Pounder, 2000; Fullan, 2002; Scribner et al., 2007; Somech & Drach-Zahavy, 2007; Truijen, 2012). For effective teamwork a certain degree of interaction between team members is required to complete tasks and attain goals. The more teachers perceive that task and goal interdependence can facilitate interaction and thus create opportunities for learning, the more they will learn to work effectively in a team (e.g., Aritzeta & Balluerka, 2006).

2.3.1. Task interdependence

Task interdependence refers to the degree of interaction between team members required to complete tasks. When teacher perceive that they are more interdependent on their team members to complete their tasks successfully, they will exchange more information and resources with them (Campion, Medsker, & Higgs, 1993; Cummings, 1978; de Jong, van der Vegt, & Molleman, 2007; van der Vegt, Emans, & van de Vliert, 2000). It may facilitate further collaboration, both collective and individual learning and, in turn, enhance team effectiveness (Truijen, 2012; Wageman, 1995).

Research on the role of collaboration between teachers for promoting professional learning has provided evidence for the positive impact of teacher interaction on teacher learning. In addition, teachers' self-efficacy beliefs have shown to mediate the effect of teacher interaction on professional learning and work engagement (Geijssels et al., 2009; Thoonen et al., 2011; Runhaar et al., 2010; Simbula et al., 2011; Staples & Webster, 2008). Collaboration and teacher interaction can thus offer teachers an "efficacy boost" (Hoy & Spero, 2005) and thereby facilitate their engagement in professional learning activities. Based on these findings, we derived the following hypotheses: perceived task interdependence will affect teachers' professional learning activities, including self-reflection and asking for feedback positively (hypothesis 2), and the effect of perceived task interdependence on teachers' professional learning activities will be mediated by teachers' sense of self-efficacy (hypothesis 3).

2.3.2. Goal interdependence

Goal interdependence refers to the degree of interaction needed to mutually pursue and reach a team's common goal (Deutsch, 1980; Weldon & Weingart, 1993). For teachers, perceiving goal interdependence means that their own benefits and costs depend upon not only their own goals but also those of other team members (Runhaar et al., 2010). Goal interdependence thus requires teachers to pursue a shared goal (van der Vegt, & van de Vliert, 2002). We know little about how perceived goal interdependence affects teacher learning. The few available studies indicate that perceived goal interdependence is positively related with knowledge sharing, open discussions and exchanging information (Runhaar et al., 2010; Tjosvold, 2008).

When teachers perceive that they are goal interdependent, not only their engagement in professional learning activities can be expected to be enhanced but also their self-efficacy for the completion of these activities; that is, the facilitation of teacher learning by goal interdependence can be expected to be mediated by their self-efficacy. Pursuing a common goal may specify a course of action and thus reduce teachers' feelings of uncertainty and strengthen their beliefs in their ability to foster both individual and collective learning (e.g., Staples & Webster, 2008). Research on the role of collaboration on teacher learning has shown that the more teachers collaborate, the stronger they believe in their capabilities to achieve desired results and the more they are engaged in professional learning (Geijssels et al., 2009; Thoonen et al., 2011; Tjosvold, Tang, & West, 2004). Based on these findings, we expect that perceived goal interdependence has a positive effect on teachers' professional learning activities, including self-reflection and asking for feedback (hypothesis 4), and that the effect of perceived goal interdependence on teachers' professional learning activities will be mediated by self-efficacy (hypothesis 5).

2.4. Transformational school leadership and the enhancement of teacher learning

Leadership is widely regarded as playing a significant role in school improvement and educational change, especially as it is inspired by the concept of transformational leadership (Leithwood et al., 1999). The concept of transformational leadership, as developed by Bass (1985), has been well studied both outside and within education and provides an empirically grounded theory on the role of leadership in supporting organizational change (Bass & Avolio, 1994). Transformational leadership aims to develop teacher capacities and foster personal commitment to the organizational goals of the school, motivates teachers to do more than they originally expected and often even more than they thought possible, resulting in extra effort and changed practices (Leithwood et al., 1999; Ross & Gray, 2006). Research on transformational leadership in educational settings demonstrated positive relationships between transformational leadership and various organizational and teacher conditions (Sun & Leithwood, 2012).

Three specific dimensions of transformational leadership are identified: 1) identifying and articulating a vision which refers to the development of goals and priorities; 2) individual consideration, which includes attending to the feelings and needs of individual teachers; and 3) intellectual stimulation, which entails sufficient support of teacher professional development and the challenging of teachers to readdress their knowledge and daily practice (Geijssels et al., 2009; Thoonen et al., 2011; Leithwood & Jantzi, 2006; Leithwood et al., 1999).

Whereas direct effects of these three dimensions of transformational leaders on professional learning have been assumed in the literature, findings regarding these effects have not been consistent, however. The influence of transformational leadership

on teacher learning has been sometimes positive, sometimes negative and sometimes absent (Geijsel et al., 2009; Thoonen et al., 2011; Runhaar et al., 2010). Findings from these studies also suggest that the impact of transformational leadership practices is strongly mediated by teacher commitment and self-efficacy. In addition to these insights, quite robust direct effects of transformational leadership on teacher commitment, motivation and self-efficacy and extra effort have been reported in the literature (Leithwood et al., 1999; Ross & Gray, 2006). Therefore we expect that the effect of transformational leadership on teachers' engagement in professional learning activities will be mediated by teachers' sense of self-efficacy (hypothesis 6).

Far less evidence has been found for the claim that transformational leadership can enhance teamwork in schools. Recently, some studies have shown that transformational leadership can enhance the prerequisites for effective teamwork — including related work place conditions such as teacher participation in decision making, collaboration, and trust (Thoonen et al., 2011; Moolenaar, 2012). A conceptual link can be thus be drawn between the three key dimensions of transformational leadership and the promotion of teamwork in a school. By identifying and articulating a vision or the first dimension of transformational leadership identified as critical for teacher learning, the transformational school leader inspires teachers to formulate shared goals, connect to these, identify with, commit to them, and try to attain them with increased teacher cooperation as a result (Thoonen et al., 2011). This increasingly collective effort may help teachers to better attain both their own goals and those of the school.

Individual consideration is needed as part of transformational school leadership because this requires school leaders to understand, recognize, understand, and meet the needs and concerns of team members. Acting as a role model, a transformational leader coaches, delegates challenging tasks, and provides feedback to help teachers to reach their personal potential. Teachers should feel empowered by a supportive, transformational school leader and—as a consequence—seek out to interact with other teachers to complete their task successfully and pursue common goals (Geijsel et al., 2009; Dionne, Yammarino, Atwater, & Spangler, 2004).

Intellectual stimulation, or the third dimension of transformational leadership critical for the enhancement of teacher learning, involves the encouragement of teachers to continually question their beliefs, assumptions and values. Teamwork can be improved with the articulation of shared goals but also the establishment of a supportive environment and collective trust which enables the open discussion of new ideas, alternatives and solutions to problems (Dionne et al., 2004). Intellectual stimulation can enhance the teachers' ability to solve individual, group and organizational problems and thus help them to complete their task and formulate shared goals (Geijsel et al., 2009; Dionne et al., 2004).

In sum, it is likely that transformational leaders can have a modest, indirect impact on the engagement of teachers in professional learning activities provided sufficiently supportive workplace conditions. We therefore expect that the effect of transformational leadership on the engagement of teachers in professional learning activities will be mediated by their perceived goal and task interdependence (hypothesis 7).

3. Method

3.1. Sample

The data collection for this study was conducted at different multidisciplinary teams of six VET colleges. A multidisciplinary team is responsible for the coaching of a group of students, the guiding of these students' learning processes, curriculum planning

and the assessment of these students. In multidisciplinary teams, teachers with different specializations work together on professional tasks aimed at preparing students for their future professions.

We used convenience sampling to obtain a sample as large as possible. The VET colleges were contacted via their board of directors. To increase the response, we aimed to present the study as personal as possible to the teacher teams by informing each team about the goal of the research and the content of the questionnaire with presentations, and we also offered them a presentation of the main findings. This was only possible in four of the six VET colleges. Within those four colleges team leaders were asked whether their teams were willing to participate. This strategy resulted in a total of 30 teams that were willing to participate. In the other two colleges, teachers were asked directly to participate in the study by email. This strategy resulted in a total of 37 teams.

The questionnaires were administered through the online program survey-monkey. Questionnaires were sent to 853 teachers of 67 teams. In one VET college 14 teachers were not part of a team, and were excluded from further analysis. Moreover, teachers from one team did not respond, resulting in an effective amount of 66 teams for further analysis. A total of 447 teachers completed the questionnaire (total response rate: 52%). Response rates of the two VET colleges whose teachers were contacted directly (by email) showed to be considerably lower (30 percent, respectively 50 percent), than those of the VET colleges whose teams were asked through their team leaders (all above 70%). Apparently, a personal approach did increase responses of teachers within teams (see Appendix A for more details about response rates). As the response rates differed, we tested whether means and variances of the variables from the directly contacted teachers differ from the teachers who were asked to participate by their team leader. We did not find significant differences, indicating that the way we asked the teachers to participate did not influence the interpretation of the results.

The teams differed in size. The smallest team held 4 teachers. The largest team held 25 teachers. Of the teachers who participated in this study 67% were men. The average age was 48 years (standard deviation 9 years, minimum age was 22, maximum age was 62). Most of the teachers that participated in our study worked more than 32 h per week (61%). Most of the teachers had worked as a teacher for more than 20 years (33%). A sizeable portion of them had worked as a teacher for about 10 years (20%), and a small portion had just begun working as a teacher (4%). Most of the teachers had a bachelor degree (72%). 16% of the teachers had a Master degree, while 12% did not have a bachelor or master degree (secondary education as highest educational level).

3.2. Measures

The constructs were measured using existing, well validated scales on asking for feedback and reflection (Runhaar et al., 2010; van Woerkom, 2003), self-efficacy (Runhaar et al., 2010; Schyns & Von Collani, 2002), task interdependence and goal interdependence (Runhaar et al., 2010; Vegt et al., 2000), and transformational leadership vision building, individual consideration, and intellectual stimulation (Geijsel et al., 2009; see also Leithwood, Dart, Jantzi, & Steinbach, 1993; Silins, 1994). All items used 5-point Likert scales (1 = strongly disagree, 2 = partially disagree, 3 = do not disagree, do not agree, 4 = partially agree, 5 = strongly agree).

Originally, the questionnaire contained 43 questions, divided over 8 scales. We performed exploratory factor analyses (with oblimin rotation) and item analyses using SPSS 20 to select the best items for each scale. This resulted in a decrease in the number of items to 39. In these initial analyses, we found that the items

assessing ‘asking for feedback’ did not constitute one factor because the items referred to asking feedback from different people (e.g. team members, managers and students). As too few items remained for constructing separate scales, we therefore decided to remove 2 items about asking feedback from students and use one scale including 5 items referring to asking feedback from team members and managers.

We used Mplus7 (Muthén, & Muthén, 1998–2012) to analyze a measurement model. A confirmative factor analysis of the remaining 39 items measuring 8 factors showed a sufficient fit to the data: $\chi^2(674) = 1485.357$, $p < .010$, RMSEA = 0.052, CFI = 0.928, SRMR = 0.057. The internal consistencies of the scales indicated that all factors had a good reliability (Cronbach's α 's ranged between .77 and .94). The parameter estimates (i.e., the factor loadings, and residual variances), as well as the reliabilities, are presented in Appendix B. On the basis of the results of the measurement model, scales were constructed by averaging the item scores. For the means, and standard errors of the scales, and the correlations between the scales see Appendix C.

3.3. Analyses

The relationships between the variables depicted in Fig. 1 were investigated through multilevel structural equation modeling (MSEM), using the computer program Mplus7 (Muthén & Muthén, 1998–2012). Given the nested structure of our sample (teachers nested within schools), and the possible dependence between subjects within schools that may result, we computed, the intra-class correlations (ICC's). ICC is the proportion of the total variance that is explained by group membership. Larger ICC's indicate that respondents are more alike (Bliese, 2000). ICC values of .10 are considered as medium, and those of .15 as large, in educational contexts (Hox, 2002, page 184). Five variables had ICC's larger than .10, see Appendix C. Ignoring the nested structure of the data would therefore lead to incorrect results. That is, standard errors would be underestimated, leading to a higher type I error rate (i.e., finding a parameter significant when it is actually zero in the population). Given the fact that our variables were all assessed at the individual level and the fact that the study focused on important regression parameters (fixed effects) and not on school- or team-level variance (random effects), we decided to perform further analyses on the within-school covariance matrix by means of testing the “complex structure” in Mplus (Muthén & Muthén, 1998–2012). This option separates the team level from the individual level variance in which we are interested, and allows for modeling of the individual level, while taking the nested nature of the data into account. It gives maximum likelihood estimates with robust standard errors and a robust chi-square measure of overall goodness of fit (Yuan & Bentler, 2000). In addition, we also report the associated root mean squared error of approximation (RMSEA), the Comparative Fit Index (CFI, Hu & Bentler, 1999), and the standardized root mean square residual (SRMR). The fit of the model is good when the SRMR $\leq .08$ and RMSEA $\leq .06$ and the CFI is above .95 (Hu & Bentler, 1999; see also Kenny, 2012). We compared nested models by using the Satorra–Bentler scaled chi-square difference test ($\Delta\chi^2_{SB}$, Satorra & Bentler, 2001) with degrees of freedom (df) equal to the difference in numbers of parameters that are free to be estimated. If appropriate, model modifications were carried out on the basis of standardized residuals and modification indices. Effect sizes are small at .05, moderate at .15, and large at .35 (Field, 2009).

4. Results

The structural path model was fit to the data. This model included correlations between the three transformational

leadership dimensions, the two interdependence variables, and the two variables measuring teachers' engagement in professional learning activities. The first fit of the structural model (model 1) to the data was not good as indicated by an RMSEA of .143, a CFI of .848, an SRMR of .071, and a $\chi^2(6)$ of 60.851 ($p = .0000$). Based on the modification indices we added three relations to the model. These were the effects of TL vision, TL consideration, and TL stimulation, on asking for feedback. The fit of this second model was good, RMSEA = .000, SRMR = .004, CFI = 1.000, $\chi^2(3) = 1.100$, $p = .777$. The second model improved the model fit significantly, $\Delta\chi^2_{SB}(3) = 63.976$, $p = .000$. Thus, we continued with the second model. Based on the principal of parsimony, we removed all non-significant effects from the model. This resulted in a model 3 with a good fit, RMSEA = .005, SRMR = .034, CFI = 1.00, and a $\chi^2(12) = 12.148$, $p = .434$. The findings showed that this model fits as good to the data as model 2 ($\Delta\chi^2_{SB}(9) = 10.985$, $p = .277$). Correlations among the constructs are presented in Appendix C. Effect-sizes are presented in Fig. 2. Direct, indirect and total effects are reported in Table 1.

Results of the final structural model showed that leadership, teamwork and psychological factors jointly explain variation in teachers' engagement in professional learning activities, with percentages of 29.3 for asking for feedback and 22.9 for reflection. A closer look at the relations found shows that, in line with our expectations, teachers' engagement in professional learning activities is directly influenced by self-efficacy (hypothesis 1). When teachers believe stronger in their capabilities to achieve a desired result, they are more engaged in professional learning activities. The findings also show that the effect of teachers' sense of self-efficacy on reflection (.34) is stronger than on asking for feedback (.12).

Besides teachers' sense of self-efficacy, perceived task interdependence appeared to affect teachers' engagement in professional learning activities directly (Hypothesis 2). This indicates that the more teachers perceive that they have to exchange information and resources with other team members to complete their tasks successfully, the more they are engaged in professional learning. The findings show that the effects of task interdependence on asking for feedback (.26) and self-reflection (.25) are moderate. Furthermore, the results showed that task-interdependence, also has a moderate effect on self-efficacy (.25), confirming hypothesis 3. Teachers who perceive more that they have to work together to complete their tasks successfully have stronger beliefs in their capabilities to perform effectively.

The effects of perceived goal interdependence on teachers' engagement in professional learning activities were different than we expected (hypothesis 4). The results show that goal interdependence only had a small effect on one of the professional learning activities, asking for feedback (.15). Teachers who perceive more that they work on a common goal together with their team members are more engaged in asking for feedback. In addition, the results show that goal interdependence does affect teachers' sense of self-efficacy as expected (hypothesis 5). Teachers who perceive more that they work on a common goal together with their team members have stronger beliefs that they are capable to perform effectively. This effect appeared to be small (.10) and less strong than the effect of the other teamwork process factor included in our study, task interdependence.

With regard to the influence of transformational leadership practices, the results show that the effects were different than expected. First of all, it appeared that intellectual stimulation had a modest direct effect on one of the professional learning activities, namely asking for feedback (.18). Encouraging teachers to question their own beliefs, assumptions, and values seems to increase the degree to which teachers ask feedback. Vision building also appeared to have a modest direct effect on asking for feedback (.10).

Fig. 2. The differentiated effect of transformational leadership, perceived team interdependence and self-efficacy beliefs on teachers' engagement in professional learning activities. All bold effects are significant at $p < .01$, the italic effects are significant at $p < .05$.

The more school leaders share their vision with teachers, the more they are engaged in asking for feedback.

Furthermore, we did not find direct effects of transformational leadership practices on teachers' sense of self-efficacy as expected (hypothesis 6). Neither building a vision, encouraging teachers to question their own beliefs, assumptions, and values, nor supporting teachers individually, appeared to enhance teachers' beliefs in their capabilities to achieve a desired result.

In addition, the findings show that the effects of the three dimensions of transformational leadership on teamwork process factors also differed from what we expected. Individual consideration appeared to have a small effect on task interdependence (.10), but not on goal interdependence. Teachers' perceptions of working together in the execution of tasks seem to be facilitated by leaders who support teachers individually. Vision building on the other hand appeared to have a moderate effect on goal interdependence (.32), but not on task interdependence. The more leaders share a vision with their teachers, the more teachers perceive that they work on a common goal. Finally, we did not find any effects of intellectual stimulation on both task and goal interdependence. These findings thus indicate that the effects of two of the three transformational leadership practices (vision building and individual support) on teachers' engagement in professional learning activities seem to be mediated by task and goal interdependence, partially confirming hypotheses 7.

5. Conclusion and discussion

Based on previous research in primary education, we formulated and tested a model of how transformational leadership practices, perceptions of team interdependence, and teachers' self-efficacy beliefs can facilitate teachers' engagement in professional learning activities. We tested a path model with a sample of 447 Dutch vocational education teachers in 66 teams in 6 VET colleges.

Summarizing, we found effects of self-efficacy beliefs on both asking for feedback and self-reflection. These findings indicate that teachers' sense of self-efficacy can be beneficial for teachers for becoming engaged in reflective learning. Subsequently, we may conclude that self-efficacy helps teachers to make their knowledge explicit, and to communicate it. Our results confirm the important role of teachers' sense of self-efficacy for teacher learning as found in earlier studies (Geijssels et al., 2009; Thoonen et al., 2011; Bandura, 1997; Simbula et al., 2011; Yost, 2006). Having said that, the effect of self-efficacy on asking for feedback was less strong than the effect of self-efficacy on reflection. As self-efficacy beliefs stem from positive 'relived' insights from past experiences with similar

workplace situations, teachers with a high sense of self-efficacy feel more competent in resolving workplace problems effectively and meet new challenges more easily. As a consequence, they may be less inclined to share their experiences and problems with their colleagues and feel less need for asking for feedback. This may explain the differences in the impact self-efficacy has on individual (self-reflection) and social learning activities (asking for feedback). To validate our findings, future studies should focus on the differential effect teachers' self-efficacy beliefs can have on teachers' engagement in different learning activities.

Teamwork processes, including perceptions of task and goal interdependence, seem to have differential effects on teachers' engagement in professional learning activities. The data offer support for the impact of task interdependence on teacher learning in VET colleges. Perceiving to be interdependent in their tasks may stimulate them to make their knowledge more explicit and to ask for feedback from their team members. Goal interdependence, however, had an effect on asking for feedback, but not on self-reflection. These findings highlight the different role perceived task and goal interdependence may play in stimulating individual (self-reflection) and social learning activities (asking for feedback) in teacher teams. Although both task and goal interdependence facilitate teacher interactions, these teamwork processes differ in purpose. Task interdependence refers to interaction between team members required to complete *their tasks* successfully, while goal interdependence facilitates interaction needed to reach a *team's common goal*. Most teachers in Dutch schools in general, and the VET teachers in our study in particular, traditionally had and still have a high degree of autonomy, especially with regard to their core task: managing their classrooms and teaching their students. Moreover, given the so-called egg-crated structure of colleges, VET-teachers work most of their time isolated in their classrooms, separated from their colleagues. The more teachers perceive that task interdependence can improve their classroom practices, the more they are willing to collaborate with their team members. Moreover, by providing opportunities to learn from each other, for instance by providing feedback and advice, sharing knowledge, and solving problems related to teaching and student learning, task interdependence may stimulate the extent to which teachers try out new things and reflect individually on their classroom practices.

Goal interdependence means that teachers in teams mutually pursue a team's common goal. The more teachers perceive goal interdependence, the more they are willing to identify themselves with their team and internalize team goals into personal goals, resulting in higher levels of personal commitment to pursue shared

Table 1

Direct, indirect and total effects of transformational leadership practices, task and goal interdependence, and self-efficacy on learning activities.

	Feedback			Reflection		
	Direct	Indirect	Total	Direct	Indirect	Total
TL-Vision	.10 ^b	.05 ^a	.15	.01 ^b		.01
TL-Consideration		.03 ^a	.03	.03 ^a		.03
TL-Stimulation	.18 ^a		.18			
Task interdependence	.26 ^a	.03 ^b	.29	.25 ^a	.08 ^a	.33
Goal interdependence	.15 ^a	n/s	.15	.03 ^a		.03
Self-efficacy	.12 ^b		.12	.34 ^a		.34

^a = significant at $p < .01$.

^b = significant at $p < .05$.

goals, and extra effort to reach the team's common goal. By stimulating personal and social identification, increased commitment and extra effort, goal interdependence mobilizes interpersonal relationships between team members and offers them the opportunities to exchange ideas, explore and understand mutual perspectives and become engaged in open discussions to achieve mutually pursued goals. Although both task and goal interdependence thus facilitate teacher interaction, goal interdependence seems to be less directed towards improving teachers individual classroom practice, and thus enhance self-reflection than task interdependence. This may explain the different impact task and goal interdependence have on fostering social (asking for feedback) and individual learning activities (self-reflection) of VET teachers.

In the literature, it is often proposed that the nature of the work has to be assessed on whether both task and goal interdependence are needed for the team to function effectively. Incongruence between the amount of task and goal interdependence can have detrimental effects (van der Vegt, & van de Vliert, 2002). However, at the time we administered the questionnaire working in multi-disciplinary teams was relatively new for VET teachers and their practice was thus in a state of transition. VET teachers in this study had been used to working rather independently, and need to adapt to working in teams. Also, no clear policy about the way teachers were interdependent was present, so that teachers had to discover for themselves what working in a team means, and how to function in one. Because of this, we hypothesized task and goal to have a unique impact on teachers' learning. Furthermore, the congruence hypothesis assumes that teachers would benefit only from congruent high levels of task and goal interdependence. The mean scores, however, show that this assumption does not hold for our case: levels of perceived task interdependence were high, and levels of goal interdependence were on the mean of the scale. Whereas this could mean that these forms of interdependence were not suited to the teachers' work demands, our results indicate that perceptions of task and goal interdependence impact teacher learning activities in their own distinctive way. Future research must assess how these VET teachers' perceptions of collaborating on tasks and goals unfold over time.

Additionally, the findings show that the effects these teamwork process factors have on teachers' engagement in professional learning activities are mediated by teachers' sense of self-efficacy. These results confirm the key role self-efficacy plays in fostering teacher learning in schools and underline the need for conducting more research that focuses on the interplay between psychological factors and organizational conditions (e.g., Staples & Webster, 2008).

Although not expected, we found a moderate direct effect of intellectual stimulation on asking for feedback. Being challenged by their school leader may raise teachers' awareness that exchanging knowledge, skills, information and ideas in social interaction may

help them to improve their professional expertise and craftsmanship. So, school leaders appeared to be strong sources of support for enhancing social learning activities, including asking for feedback, of their teachers.

We also found that vision building had a direct effect on asking for feedback, although this effect was small to moderate. In the context of the different change processes going on in the VET colleges that participated in our study, including the implementation of teaming, this finding suggests that a vision may stimulate teachers to find a meaningful content to elaborate on. Especially when these different change processes coincide, the sharing of a vision may enhance teachers to seek advice and to ask feedback from colleagues. In addition, vision building appeared to have a strong effect on goal interdependence. By sharing a vision, teachers perceive to be working together on a common goal more. This supports the theoretical claim that by initiating and identifying a vision, a transformational school leader inspires teachers to formulate, identify with, commit to, and reach shared goals (Thoonen et al., 2011) and concurs with findings from previous research (Geijsel et al., 2009; Thoonen et al., 2011).

In contrast to vision building, individual consideration had an effect on task interdependence. This means that when teachers' needs are noticed and attended to by a transformational leader, teachers tend to exchange information and resources more with other team members to complete their tasks successfully. These findings suggest that teacher perceptions of interdependence in goals and tasks can be enhanced by specific transformational leadership practices and that these enhancements seem to follow differentiated paths.

Intellectual stimulation, however, seems to play a totally different role, as for this transformational leadership practice the found effect on teachers' engagement in professional learning activities is not mediated by task and goal interdependence. Encouraging teachers to question their beliefs, assumptions, and values may play a more important role in fostering affective and cognitive team processes, such as trust and collective problem solving than in creating opportunities for teachers to coordinate their actions. This may explain the different effect found for intellectual stimulation. Future studies should therefore include more and different work processes at the team-level, including affective and cognitive ones. The findings from these studies can help to increase our understanding of the role different teamwork processes may play in the link between leadership and individual and collective learning.

Unlike previous research done in elementary schools that showed a convincing role of teacher self-efficacy as a mediator between transformational leadership practices and teacher professional learning activities (Geijsel et al., 2009; Thoonen et al., 2011), our results did not confirm these findings. Contrary to our expectations self-efficacy was not affected by any of the transformational leadership practices. Possibly, this lack of an effect may be explained by the more complex and multi-level nature of leadership practices in VET colleges. As mentioned earlier, most of the studies have been conducted in elementary schools, being relatively small communities, with often relatively intense and long term relationships among teachers and between teachers and students. Contrary to elementary schools, where the lines between all people working in one building are much shorter, VET colleges are more loosely coupled organizations with multiple levels or subsystems. As such, VET-teachers may feel less empowered by school leaders who are responsible for a subsystem at a higher organizational level, such as a faculty or department, of which their team is just one of the organizational subunits. In this situation, interaction with team members may have a stronger impact on their motivation, as expressed by the effects of perceived goal and

task interdependence on self-efficacy, than their formal leader who is less visible and approachable. Although the few available studies provide some evidence for the relationship between perceived task and goal interdependence, and professional learning of teachers, more research is needed, thereby validating our findings.

By including teamwork processes, especially perceived task and goal interdependence, this study has expanded existing models on teaching in schools as used in previous research. The findings clearly show that these variables play an important role in enhancing learning activities. Whereas task interdependence affects both learning activities, goal interdependence specifically affects teachers' engagement in asking for feedback. Including these additional variables have deepened our understanding about the interplay between organizational and psychological factors in teacher learning and the school as a workplace. Moreover, two clearly differentiated paths can be discerned to explain the variation of teachers' engagement in learning activities. The first path leads from a leader who shows consideration for teachers individually, through teachers' perceptions of working together on tasks and their senses of self-efficacy, to both teacher reflection and their asking for feedback. From a care for their individual needs and the possibility to observe a role model, teachers may feel empowered to interact with team members, further strengthening their beliefs to overcome problems, and subsequently to individually reflect on their interactions and experiences, as well as engage in making their knowledge explicit for, and asking for such knowledge from team members. As such, teacher learning is situated in a context of past experiences of collaboration and can be cultivated through a leader's consideration of needs and individual support.

The second path leads from a leader that shares a vision, through teachers' perceptions of being goal interdependent, to teachers asking for feedback. Vision building seems to help teachers to work together and pursue their common goals as a team. Subsequently, they ask each other for advice, possibly to monitor the collective progression towards their goals. As such, asking for feedback seems to be situated more in a context of immediate interaction towards a common goal and can be cultivated when a leader keeps sharing the school's vision.

These findings add to the evidence (Thoonen et al., 2011) in support of the model of Dionne et al. (2004). Like in their model, specific transformational leadership practices improved specific teamwork processes, and specific teamwork processes differentially enhanced teachers' engagement in specific professional learning activities. As such, the argument that researchers should focus on the impact of particular leadership practices, rather than the total effect of leadership, has just become more important to increase knowledge about effective leadership practices in educational settings (Thoonen et al., 2011; Leithwood, Harris, & Hopkins, 2008). But these findings also show that particular leadership practices are only effective through specific workplace conditions. Teacher perceptions of these conditions have an impact on their engagement in learning activities in more or less the same degree. These findings suggest that both knowing how, and to what aim, team members function in their teams, is of equal importance for enhancing teacher learning in schools.

6. Limitations and further directions

A first limitation is the single source nature of our data. The data for this research were gathered with self-report questionnaires. Despite that these instruments correspond to the lingual and reflective nature of the constructs we were interested in, surveys may result in response shifts. The formulation, ordering, and

presentation of the scales in one survey may evoke teachers unknowingly to make overly consistent evaluations that result in invalidly found correlations. Other methods, such as large-scale observations, individual logs, and case studies may provide a detailed picture of the mechanisms through which leadership practices and teamwork processes affect teachers' engagement in professional activities. Also more in-depth studies may bring to light how VET teachers cope with diversity in their teams, conflict resolution, and the possibility of the emergence of sub cultures (Grossman & Stodolsky, 1995; Grossman, Wineburg, & Woolworth, 2001; van Knippenberg, de Dreu, & Homan, 2004; van Veelen, Otten, & Hansen, 2013). The findings from these studies may validate the results found here.

As leadership inspired by the concept of transformational leadership can have an important facilitating role in fostering conditions for effective teamwork and teacher learning, we focused on three leadership practices. Our findings indicate that these transformational leadership practices are differentially effective, depending on the circumstances (see also Hallinger & Heck, 2011). More recently, different scholars have proposed to use a more integrated model, in which transformational leadership and instructional leadership coexist as a further 'challenge' to future research on school leadership (Thoonen et al., 2011; Hallinger, 2003; Marks & Printy, 2003; Robinson, Lloyd, & Rowe, 2008). We agree with the argument that researchers should focus more on a broader set of leadership activities, including transformational and instructional ones and distributed forms of leadership (Spillane et al., 2002). Findings from these studies may help to increase our understanding of the complex paths through which leadership has an impact on school improvement.

Additionally, despite the relatively high explained variance of the professional learning activities, the residual variance is high enough to warrant more or other variables to be included in the model. Future research should furthermore explore the influence of other organizational characteristics and team attributes often considered as crucial to enhance professional learning, including participation in decision making, collective efficacy, trust and team processes such as constructive conflicts and consensus (Geijsel et al., 2009, 2011). Additionally, professional learning is not limited to self-reflection and asking for feedback. Other individual and social learning activities as used in previous studies into teacher learning in schools, such as keeping up to date (Geijsel et al., 2009; Kwakman, 2003), innovative practices (Runhaar et al., 2010), and sharing knowledge (van Woerkom, 2003) may also be included in future research. The model tested in our study might function as a useful framework for follow-up research as it can help to hypothesize the relations between variables on more than just the individual level. With such multi-level models we can adequately capture the complexity of education today and yield useful information about the interplay between organizational characteristics, team features, and psychological factors in teacher learning and the school as a workplace (House, Rousseau, & Thomas-Hunt, 1995).

A last possible limitation of our study is its cross-sectional nature. This means that the structural equation analysis we used cannot ascertain causal relations. As the study shows a "snapshot image" of the situation, it may have exposed coincidental temporary relationships. In order to ensure causality, more longitudinal studies are needed than the few available yet (e.g. Hallinger & Heck, 2011; Heck & Hallinger, 2009). Findings from these studies could indicate whether teachers engage more in learning activities over time, how this is caused by leadership practices, teamwork processes, and efficacy beliefs, and how forms of learning communities can be sustained over time (Giles & Hargreaves, 2006).

Acknowledgment

This work was supported by the NWO Programming Council for Educational Research (PROO) [grant number 411-07-302]

Appendix A

Response rates per VET college and the manner in which teams were contacted.

VET college	Lowest response from one team within a VET college	Mean response from VET college	Highest response from one team within a VET college	# Teams approached	Manner of contact
1	50%	70%	92%	7	team leader
2	28%	50%	100%	23	directly
3	11%	71%	94%	7	team leader
4	0%	32%	100%	14	directly
5	50%	75%	100%	8	team leader
6	54%	74%	100%	8	team leader

Note: percentages are rounded.

Appendix B

Transformational leadership – vision building. Refers to the development of a shared vision, goals, and priorities (Geijssels et al., 2009).

My leader ...	Factor loading	Residual
... uses all possible occasions to share the vision of the department to the team, students, parents, and others	.797	.430
... refers during decision making processes explicitly to the goals of the department	.859	.312
... clarifies for the team the relation between the vision of the department and initiatives from the board of directors	.885	.279
... describes from a vision for the future of the department in a clear way the current problems	.909	.260
... sketches during meetings the consequences of the vision for the department's current ins and outs	.917	.237

Scaling = (1) strongly disagree, (2) partially disagree, (3) do not disagree, do not agree, (4) partially agree, (5) strongly agree. Alpha = .94.

Transformational leadership – individual consideration.

Includes attending to the feelings and needs of individual teachers (Geijssels et al., 2009).

My leader ...	Factor loading	Residual
... takes the opinions of individual teachers seriously	.872	.335
... shows appreciation when a teacher takes initiative for educational improvement	.845	.355
... listens carefully to ideas of team members	.900	.259
... has an eye and an ear for problems teachers experience during policy implementation	.892	.269
... helps teachers to express their emotions	.772	.517

Scaling = (1) strongly disagree, (2) partially disagree, (3) do not disagree, do not agree, (4) partially agree, (5) strongly agree. Alpha = .93.

Transformational leadership – intellectual stimulation.

Entails the support of teacher professional development and the constant challenging of teachers to readdress their knowledge and daily practice (Geijssels et al., 2009).

My leader ...	Factor loading	Residual
... encourages teachers to try new things in line with their own interests	.868	.309
... stimulates teachers to reflect on how to improve in our department	.921	.201
... encourages teachers to seek and discuss new information and ideas that are relevant to the direction in which the department is developing	.923	.194
... engages individual teachers in ongoing discussion about their individual professional goals	.860	.280
... encourages teachers to experiment with new teaching methods	.807	.459
... creates sufficient opportunities for teachers to work on their professional development	.711	.617

Scaling = (1) strongly disagree, (2) partially disagree, (3) do not disagree, do not agree, (4) partially agree, (5) strongly agree. Alpha = .94.

Task interdependence.

Refers to the degree to which the interaction and coordination of team members is required to complete tasks (Runhaar et al., 2010).

	Factor loading	Residual
For executing our jobs we in our team need information from each other	.785	.136
To do our jobs well we have to work together in our team	.864	.092
The work of one team member influences the execution of other team members' tasks	.447	.628
To do our work well we in our team need to coordinate our work	.809	.160

Scaling = (1) strongly disagree, (2) partially disagree, (3) do not disagree, do not agree, (4) partially agree, (5) strongly agree. Alpha = .79.

Goal interdependence.

Refers to the degree to which coordination and interaction is required to reach a team member's own goals as well as the goals of the other team members (Runhaar et al., 2010).

	Factor loading	Residual
In our team we all want to reach the same	.678	.595
We agree on what quality is for our team	.897	.292
If the work does not satisfy quality demands, a team member is addressed on this by other team members	.616	.765

Scaling = (1) strongly disagree, (2) partially disagree, (3) do not disagree, do not agree, (4) partially agree, (5) strongly agree. Alpha = .77.

Occupational Self-efficacy.

A future-oriented belief about the level of competence that a person expects to display in a given situation (Runhaar et al., 2010).

	Factor loading	Residual
I can remain calm when I am confronted with difficulties in my work, because I can fall back on my competences	.547	.442
When I am confronted with a problem in my work, I usually find different solutions	.552	.369
Whatever happens in my work, I can usually manage	.819	.223
My past experiences have prepared my well for my current work	.580	.407
In my work I achieve the goals that I set for myself	.605	.407
I am appropriately equipped to face the demands of my work	.711	.309

Scaling = (1) strongly disagree, (2) partially disagree, (3) do not disagree, do not agree, (4) partially agree, (5) strongly agree. Alpha = .80.

Asking for feedback.

A social learning activity aimed at making implicit knowledge explicit (Geijssel et al., 2009; Runhaar et al., 2010).

	Factor loading	Residual
If I think that I have not done my work well, I discuss this with my team members	.511	.536
I regularly ask my team members for feedback	.479	.561
I observe colleagues' lessons to learn from them	.553	.926
If I think that I have done my work badly, I discuss this with my leader	.774	.543
I regularly ask my leader for feedback	.775	.580

Scaling = (1) strongly disagree, (2) partially disagree, (3) do not disagree, do not agree, (4) partially agree, (5) strongly agree. Alpha = .77.

Self-reflection.

An individual learning activity aimed at making implicit knowledge explicit (Runhaar et al., 2010).

	Factor loading	Residual
I ponder on what I find important in my work	.746	.146
I monitor the progressions of my goals in my work	.760	.220
I reflect on the way I do my work	.796	.146
I compare my performance with how I performed one year ago	.614	.495
I think about my communication with colleagues	.615	.286

Scaling = (1) strongly disagree, (2) partially disagree, (3) do not disagree, do not agree, (4) partially agree, (5) strongly agree. Alpha = .82.

Appendix C

Means, Standard Errors, Intraclass Correlations, Correlations.

Variables	Mean	S.E.	ICC	1	2	3	4	5	6	7
1. TL-Vision	3.18	.049	.307							
2. TL-Consideration	3.54	.048	.280	.69*						
3. TL-Stimulation	3.30	.047	.280	.77* .80*						
4. Task interdependence	4.41	.026	.076	.07* .11* .08*						
5. Goal interdependence	3.12	.043	.139	.34* .25* .22* .08*						
6. Self-efficacy	4.09	.026	.042	.12* .11* .10* .08* .10*						
7. Asking for feedback	3.26	.026	.096	.33* .29* .32* .12* .23* .10*						
8. Reflection	4.17	.035	.133	.08* .06† .05† .10* .07* .13* .15*						

* = significant at p < .01
† = significant at p < .05.

References

- Aritzeta, A., & Balluerka, N. (2006). Cooperation, competition and goal interdependence in work teams: a multilevel approach. *Psicothema*, 18(4), 757–765.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.
- Barsalou, L. W. (2008). Grounded cognition. *Annual Review of Psychology*, 58, 617–645.
- Bass, B. (1985). *Leadership and performance beyond expectations*. New York: Free press.
- Bass, B. M., & Avolio, B. J. (1994). *Improving organizational effectiveness through transformational leadership*. Thousand Oaks, CA: Sage.
- Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis, 349–381. In J. K. Katherine, & S. W. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions*. San Francisco: Jossey-Bass Inc., Publishers.
- Bryk, A., Camburn, E., & Louis, K. S. (1999). Professional community in Chicago elementary schools: facilitating factors and organizational consequences. *Educational Administration Quarterly*, 35, 751–781.
- Campion, M. A., Medsker, G. J., & Higgs, A. C. (1993). Relations between work groups characteristics and effectiveness: implications for designing effective work groups. *Personnel Psychology*, 46(4), 823–847.
- Clarke, D. J., & Hollingsworth, H. (2002). Elaborating a model of teacher professional growth. *Teaching and Teacher Education*, 18, 947–967.
- Clement, M., & Vandenberghe, R. (2000). Teachers' professional development: a solitary or collegial (ad)venture? *Teaching and Teacher Education*, 16, 81–101.
- Coburn, C. E. (2004). Beyond decoupling: rethinking the relationship between the institutional environment and the classroom. *Sociology of Education*, 77, 211–244.
- Crow, G. M., & Pounder, D. G. (2000). Interdisciplinary teacher teams: context, design, and process. *Educational Administration Quarterly*, 36(2), 216–254.
- Cummings, T. G. (1978). Self-regulating work groups: a socio-technical analysis. *Academy of Management Review*, 3, 625–634.
- ten Dam, G., & Blom, S. (2006). Learning through participation: the potential of school-based teacher education for developing a professional identity. *Teaching and Teacher Education*, 22, 647–660.
- Desimone, L. M. (2009). Improving impact studies of teachers' professional development: toward better conceptualizations and measures. *Educational Researcher*, 38(3), 181–199.
- Deutsch, M. (1980). Fifty years of conflict. In L. Festinger (Ed.), *Retrospections on social psychology* (pp. 46–77). New York: Oxford University Press.
- Dionne, S. D., Yammarino, F. J., Atwater, L. E., & Spangler, W. D. (2004). Transformational leadership and team performance. *Journal of Organizational Change Management*, 17, 177–193.
- Field, A. (2009). *Discovering statistics using SPSS*. London: Sage Publications, Ltd.
- Fullan, M. (2002). The change leader. *Educational Leadership*, May, 16–21.
- Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, 38, 915–945.
- Geijssel, F. P., Slegers, P. J., Stoel, R. D., & Kruger, M. L. (2009). The effect of teacher psychological and school organizational and leadership factors on teachers' professional learning in Dutch schools. *The Elementary School Journal*, 109(4), 1–22.
- Giles, C., & Hargreaves, A. (2006). The sustainability of innovative schools as learning organizations and professional learning communities during standardized reform. *Educational Administration Quarterly*, 42(1), 124–156.
- Grossman, P. L., & Stodolsky, S. S. (1995). Content as context: the role of school subjects in secondary school teaching. *Educational Researcher*, 24(8), 5–23.
- Grossman, P., Wineburg, S., & Woolworth, S. (2001). Toward a theory of teacher community. *The Teachers College Record*, 103(6), 942–1012.
- Hallinger, P. (2003). Leading educational change: reflections on the practice of instructional and transformational leadership. *Cambridge Journal of Education*, 33(3), 329–352.
- Hallinger, P., & Heck, R. (2011). Exploring the journey of school improvement: classifying and analyzing patterns of change in school improvement processes and learning outcomes. *School Effectiveness and School Improvement*, 22, 149–173.
- Heck, R. H., & Hallinger, P. (2009). Assessing the contribution of distributed leadership to school improvement and growth in math achievement. *American Educational Research Journal*, 46, 626–658.
- Hopkins, D., & Reynolds, D. (2001). The past, present and future of school improvement: towards the third age. *British Educational Research Journal*, 27(4), 459–475.
- House, R., Rousseau, D. M., & Thomas-Hunt, M. (1995). The meso paradigm: a framework for the integration of micro and macro organizational behavior. *Research in Organizational Behavior*, 17, 71–114.
- Hox, J. J. (2002). *Multilevel analysis: Techniques and applications*. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
- Hoy, A. W., & Spero, R. B. (2005). Changes in teacher efficacy during the early years of teaching: a comparison of four measures. *Teaching and teacher education*, 21(4), 343–356.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1–55.
- Jarvis, P. (1987). *Adult learning in the social context*. London: Croom Helm.

- de Jong, S. B., van der Vegt, G. S., & Molleman, E. (2007). The relationships among asymmetry in task dependence, perceived helping behavior, and trust. *Journal of Applied Psychology*, 92, 1625–1637.
- Kenny, D. A. (2012). *Measuring model fit*. Published online on <http://davidakenny.net/cm/fit.htm> (Retrieved at 4 september 2012).
- van Knippenberg, D., de Dreu, C. K., & Homan, A. C. (2004). Work group diversity and group performance: an integrative model and research agenda. *Journal of applied psychology*, 89(6), 1008.
- Korthagen, F. (2001). *Linking practice and theory: The pedagogy of realistic teacher education*. Paper presented at the Annual Meeting of the American Educational Research Association, Seattle, WA.
- Kwakman, K. (2003). Factors affecting teachers' participation in professional learning activities. *Teaching and Teacher Education*, 19, 149–170.
- Leithwood, K., Dart, B., Jantzi, D., & Steinbach, R. (1993). *Building commitment for change and fostering organizational learning (Final report for phase 4 of the implementing British Columbia's education policy research project)*. Victoria, Canada: British Columbia Ministry of Education.
- Leithwood, K., Harris, A., & Hopkins, D. (2008). Seven strong claims about successful school leadership. *School Leadership and Management*, 28(1), 27–42.
- Leithwood, K., & Jantzi, D. (2006). Transformational school leadership for large-scale reform: effects on students, teachers, and their classroom practices. *School Effectiveness and School Improvement*, 17, 201–227.
- Leithwood, K., Jantzi, D., & Steinbach, R. (1999). *Changing leadership for changing times*. Buckingham: Open University Press.
- Leithwood, K., & Louis, K. S. (1998). *Organizational learning in schools*. Lisse, The Netherlands: Swets and Zeitlinger.
- Lohman, M. C., & Woolf, N. H. (2001). Self-initiated learning activities of experienced public school teachers: methods, sources, and relevant organizational influences. *Teachers and Teaching*, 7, 59–74.
- Marks, H. M., & Printy, S. M. (2003). Principal leadership and school performance: an integration of transformational and instructional leadership. *Educational Administration Quarterly*, 39, 370–397.
- Marsick, V. J., & Watkins, K. (1990). *Informal and incidental learning in the workplace*. London and New York: Routledge.
- Muthén, L. K., & Muthén, B. O. (1998–2012). *Mplus user's guide* (7th ed.). Los Angeles, CA: Muthén & Muthén.
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge creating company: How Japanese companies create the dynamics of innovation*. New York: Oxford University Press.
- Parise, L. M., & Spillane, J. P. (2010). Teacher learning and instructional change: how formal and on-the-job learning opportunities predict change in elementary school teachers' practice. *The Elementary School Journal*, 110(3), 323–346.
- Putnam, R. T., & Borko, H. (2000). What do new views of knowledge and thinking have to say about research on teacher learning? *Educational Researcher*, 29(1), 4–15.
- Richardson, V., & Placier, P. (2001). Teacher change. In V. Richardson (Ed.), *Handbook of research on teaching* (pp. 905–947). Washington, DC: American Educational Research Association.
- Robinson, V. M., Lloyd, C. A., & Rowe, K. J. (2008). The impact of leadership on student outcomes: an analysis of the differential effects of leadership types. *Educational administration quarterly*.
- Ross, J. A., & Gray, P. (2006). Transformational leadership and teacher commitment to organizational values: the mediating effects of collective teacher efficacy. *School Effectiveness and School Improvement*, 17(2), 179–199.
- Runhaar, P., Sanders, K., & Yang, H. (2010). Stimulating teachers' reflection and feedback asking: an interplay of self-learning goal orientation, and transformational leadership. *Teaching and Teacher Education*, 26, 1154–1161.
- Satorra, A., & Bentler, P. M. (2001). A scaled difference chi-square test statistic for moment structure analysis. *Psychometrika*, 66(4), 507–514.
- Schyns, B., & Von Collani, G. (2002). A new self-efficacy scale and its relation to personality constructs and organizational variables. *European Journal of Work and Organizational Psychology*, 11, 219–241.
- Scribner, J. P., Sawyer, R. K., Watson, S. T., & Myers, V. L. (2007). Teacher teams and distributed leadership: a study of group discourse and collaboration. *Educational Administration Quarterly*, 43(1), 67–100.
- Sfard, A. (1988). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher*, 27, 4–13.
- Silins, H. C. (1994). The relationship between transformational and transactional leadership and school improvement outcomes. *School Effectiveness and School Improvement*, 5, 272–298.
- Silins, H., Mulford, B., & Zarins, S. (2002). Organisational learning and school change. *Educational Administration Quarterly*, 38, 613–642.
- Simbula, S., Guglielmi, D., & Schaufeli, W. B. (2011). A three-wave study of job resources, self-efficacy, and work engagement among Italian schoolteachers. *European Journal of Work and Organizational Psychology*, 20(3), 285–304.
- Smylie, M. A. (1995). New perspectives on teacher leadership. *Elementary School Journal*, 96, 3–7.
- Smylie, M. A., Lazarus, V., & Brownlee-Conyers, J. (1996). Instructional outcomes of school-based participative decision making. *Educational Evaluation and Policy Analysis*, 18, 181–198.
- Somech, A., & Drach-Zahavy, A. (2007). Schools as team-based organizations: a structure-process-outcome approach. *Group Dynamics: Theory, Research, and Practice*, 11(4), 305–320.
- Spillane, J. P., Reiser, B. J., & Reimer, T. (2002). Policy implementation and cognition: reframing and refocussing implementation research. *Review of Educational Research*, 72(3), 387–431.
- Staples, D. S., & Webster, J. (2008). Exploring the effects of trust, task interdependence and virtualness on knowledge sharing in teams. *Information Systems Journal*, 18(6), 617–640.
- Stoll, L. (2009). Capacity building for school improvement or creating capacity for learning? A changing landscape. *Journal of Educational Change*, 10, 115–127.
- 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.
- Sun, J., & Leithwood, K. (2012). Transformational leadership effects on student achievement. *Leadership and Policy in Schools*, 11(4), 418–451.
- Supovitz, J. A. (2002). Developing communities of instructional practice. *Teachers College Record*, 104, 1591–1626.
- Thoonen, E. E. J., Slegers, P. J. C., Oort, F. J., Peetsma, T. T. D., & Geijsel, F. P. (2011). How to improve teaching practices: The role of teacher motivation, organizational factors, and leadership practices. *Educational Administration Quarterly*, 47(3), 496–536.
- Tjosvold, D. (2008). The conflict-positive organization: It depends upon us. *Journal of Organizational Behavior*, 29(1), 19–28.
- Tjosvold, D., Tang, M. M., & West, M. (2004). Reflexivity for team innovation in China. The contribution of goal interdependence. *Group & Organization Management*, 29(5), 540–559.
- Toole, J. C., & Louis, K. S. (2002). The role of professional learning communities in international education. In K. Leithwood, & P. Hallinger (Eds.), *Second International Handbook of Educational Leadership and Administration* (pp. 245–279). Dordrecht: Kluwer Academic Publishers.
- Truijen, K. (2012). *Teacher Teaming: Exploring factors that influence effective team functioning in a vocational education context* (Doctoral dissertation). Retrieved from http://doc.utwente.nl/80028/1/thesis_K.Truijen.pdf.
- van Veelen, R., Otten, S., & Hansen, N. (2013). A personal touch to diversity: self-anchoring increases minority members' identification in a diverse group. *Group Processes & Intergroup Relations*, 16(6), 671–683.
- van der Vegt, G., Emans, B., & van de Vliert, E. (2000). Team members' affective responses to patterns of intragroup interdependence and job complexity. *Journal of Management*, 26(4), 633–655.
- van der Vegt, G., & van de Vliert, E. (2002). Intragroup interdependence and affectiveness: review and proposed directions for theory and practice. *Journal of Managerial Psychology*, 17(1), 50–67.
- Vescio, V., Ross, D., & Adams, A. (2008). A review of research on the impact of professional learning communities on teaching practice and student learning. *Teaching and teacher education*, 24(1), 80–91.
- Wageman, R. (1995). Interdependence and group effectiveness. *Administrative Science Quarterly*, 40(1), 145–180.
- Wahlstrom, K. L., & Louis, K. S. (2008). How teachers experience principal leadership: the roles of professional community, trust, efficacy, and shared responsibility. *Educational Administration Quarterly*, 44(4), 458–495.
- Weldon, E., & Weingart, L. R. (1993). Group goals and group performance. *British Journal of Social Psychology*, 32, 3007–3334.
- van Woerkom, M. (2003). *Critical reflection at work: Bridging individual and organizational learning* (Unpublished doctoral dissertation). Enschede, The Netherlands: University of Twente.
- van Woerkom, M. (2004). The concept of critical reflection and its implications for human resource development. *Advances in Developing Human Resources*, 6(2), 178–192.
- Yost, D. S. (2006). Reflection and self-efficacy: enhancing the retention of qualified teachers from a teacher education perspective. *Teacher Education Quarterly*, Fall, 59–76.
- Yuan, K. H., & Bentler, P. M. (2000). Three likelihood-based methods for mean and covariance structure analysis with non-normal missing data. *Sociological Methodology*, 30, 167–202.