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Promoting VET teachers' innovative behaviour: exploring the roles of task interdependence, learning goal orientation and occupational self-efficacy

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ABSTRACT

Changing employer demands, new technological and pedagogical insights are examples of developments which urge Vocational Education and Training (VET) institutes to continually renew and innovate their educational programmes. This, in turn, requires teachers to show innovative behaviour. Our study focuses on the effects of task interdependence on VET teachers' innovative behaviour. In addition, the mediating roles of learning goal orientation and occupational self-efficacy in this relationship are examined. A two-wave survey study among 342 teachers, from 54 teams of 6 Dutch VET institutes, showed that task interdependence enhanced teachers' learning goal orientation, which enhanced their engagement in innovative behaviour over time. Task interdependence also increased teachers' occupational self-efficacy, which in turn increased their engagement in innovative behaviour. This effect, however, appeared short lived. Apparently, once teachers exceed a certain level of occupational self-efficacy, other variables, like learning goal orientation, play a more important role in sustaining innovative behaviour.

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Introduction

Vocational Education and Training (VET) institutes serve as the main supplier of graduates for labour markets and, as such, play an important role in providing future employees, with competencies they need to meet the increased demands of employers (Kuijpers and Meijers 2012; OECD 2010). More specifically, in western societies employers increasingly expect employees at all levels to have more knowledge and skills, to be more intrinsically motivated and to behave in more proactive ways than was the case several decades ago. Employers' increased demands have urged VET institutes to reform their educational programmes in such a way that the competencies needed in practice form the starting point for curriculum development instead of academic disciplines. This training model has been referred to as competence-based education (CBE; e.g. Biemans et al. 2004).

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Although the importance of CBE in VET is widely acknowledged, its conceptualisation and operationalisation in qualification frameworks and curricula differs across countries (Biemans et al. 2009). In particular, models that specify competencies in terms of highly specific yet fragmented job-related behaviours have been criticised for only covering the routine aspects of tasks (Biemans et al. 2009). Such models fail to cover the broader competencies needed for professional practice. To overcome the risks associated with the disintegrative approach, some authors have advocated a more holistic approach to CBE (Brockmann, Clarke, and Winch 2010; Hyland 2014). These authors argue that competencies should be understood as integrated abilities required to cope with complex tasks. As students must acquire a combination of skills and attitudes required for effective job performance and career advancement, educational programmes have shifted their emphasis from pure knowledge acquisition to career guidance, coaching and competence development (e.g. Kuijpers and Meijers 2012).

Our study aims to identify the drivers of teachers' innovative behaviour, since it appears one of the most critical resources that organisations can draw upon in order to achieve innovation at the organisational level (like the implementation of CBE) (Cohn, Katzenbach, and Vlak 2008). That is, the degree to which VET institutes succeed in making the shift towards CBE, especially when it comes to the holistic approach, depends to a large extent on the effort and performance of teachers to put the principals underlying the concept of CBE into their practice. More specifically, teachers are expected to fulfil new roles (e.g. coach and tutor) and apply contemporary pedagogical approaches (e.g. authentic assessments; Khaled et al. 2014). In this context, we define innovation as the multistage process by which teachers generate a new idea (e.g. a new teaching method, an integrative assignment, an interview guide to be used in coaching trajectories or feedback instruments), seek sponsorship for the idea (e.g. among their team members or supervisors at internships) and finally implement the idea into practice (cf. Scott and Bruce 1994; Van der Vegt and Janssen 2003).

Innovative behaviour is a recurrent topic in organisational research. It has been found to be influenced by both employee characteristics (e.g. mood, self-confidence, wide interest, reflection and openness to new experience) and job features (e.g. job complexity, job demands and supportive supervision) (e.g. Anderson, De Dreu, and Nijstad 2004; Crossan and Apaydin 2010; Hülshager, Anderson, and Salgado 2009). Recently, given that organisations increasingly implement team structures, the focus in innovative behaviour research has shifted from general job-features to team characteristics (e.g. Alexander and van Knippenberg 2014; Hülshager, Anderson, and Salgado 2009). In this study, we build on the growing body of knowledge that mainly derives from research conducted in non-educational organisations (Thurlings, Evers, and Vermeulen 2014). Our article investigates the effects of *task interdependence* – referring to the extent to which teachers must rely on one another to successfully perform a shared work task (Van der Vegt, Emans, and Van de Vliert 1998) – on innovative behaviour.

The reason for the focus on task interdependence lies in the fact that the multidisciplinary character of CBE, at least in the comprehensive approach described above, urges VET teachers to collaborate. This requirement has led VET institutes to implement team structures (e.g. Park, Henkin, and Egley 2005). For instance, in the Dutch secondary VET (where the current study took place), teacher teams are viewed as the core building blocks of VET institutes (Runhaar and Sanders 2013). This means that teacher teams, instead of individual teachers, are held responsible for the development and execution of CBE programmes for specific

vocations, such as hairdressing, nursing or construction (Brouwer, Westerhuis, and Cox 2016; MBO Raad 2012).

Furthermore, assuming that innovative behaviour largely depends on individuals' motivation (Alexander and van Knippenberg 2014), we propose that participation depends on teachers' *learning goal orientation*. Learning goal orientation is defined as the motivation to improve competence through deliberate learning and undertaking challenging tasks (VandeWalle 1997). At the same time, innovative behaviour may be viewed as risky, as it implies uncertainty and ambiguity, the risk of failure and of criticism by colleagues (Amabile 1997). As such, we propose that *occupational self-efficacy* – defined as the conviction that an individual can cope with difficulties s/he encounters in her/his work (Schyns and von Collani 2002) – should embolden teachers to face these risks. Moreover, based on demands-resources theory (Folkman 1984), we propose that occupational self-efficacy and learning goal orientation mediate the relationship between task interdependence and innovative behaviour. As such, both occupational self-efficacy and learning goal orientation are considered here as states which can be modified by appropriate situational cues (cf. respectively, Dragoni 2005; Schyns and von Collani 2002).

Contributions

This study makes several, theoretical, methodological and practical contributions to research on teachers' innovative behaviour. *First*, as the vast majority of innovation research has been carried out in non-educational sectors (Thurlings, Evers, and Vermeulen 2014), this is one of few studies which provides a good understanding of *teachers'* innovative behaviour. Moreover, with the inclusion of teachers' occupational self-efficacy and learning goal orientation, we elucidate the relationship between task interdependence and innovative behaviour (Hülshager, Anderson, and Salgado 2009). *Second*, by analysing a two-wave data-set, our study meets the call for more rigorous research methods (Alexander and van Knippenberg 2014; Bednall 2013). *Third*, because the data allow for conclusions regarding causal relationships among the study variables, we present recommendations for human resources managers working in VET whose role is to stimulate teachers to engage in innovative behaviour.

Study context

The study was conducted in Dutch institutes for VET. In The Netherlands, approximately 40% of the Dutch working population has completed a course to at least a secondary vocational training level (MBO Raad 2012). Pre-vocational education is aimed at 12- to 16-year-old students and secondary vocational education (SVE) is aimed at 16- to 20-year-old students. SVE, wherein our study took place, is further subdivided into four levels, ranging from Level 1 (assistant worker) to Level 4 (middle-management) (MBO Raad 2012). After finalising SVE, students can either enter their profession or enrol in applied sciences vocational programmes at a university. VET students can choose between two learning pathways in which students combine work and study: a school-based route (minimum 20% to maximum 60% in practice in a learning company) and a work-based route (minimum 80% in practice in a learning company) (Brouwer, Westerhuis, and Cox 2016).

Dutch VET institutes were established by law in the middle of the 1990s. They mostly take the form of community colleges, which typically aim to integrate and coordinate all VET

activity in a particular region. There are 54 such colleges in The Netherlands (MBO Raad 2012; www.mbo.nl). VET institutes are represented by the VET council (MBO Raad), which is the prime negotiator with the Ministry of ECS and other parties in the field – such as labour unions – about educational and personnel policy.

Dutch VET institutes have adopted a holistic approach to CBE, with a strong focus on individual competence, based on integrating different forms of knowledge, skills and attitudes, as well as social and personal capabilities (Biemans et al. 2009). This setting requires teachers to cooperate in designing and executing educational programmes (Runhaar et al. 2014).

Theory and hypotheses

Task interdependence and innovative behaviour

Research has distinguished different forms of interdependence, including task and goal interdependence. The latter refers to the extent to which individuals' goal attainment depends on other people (Van der Vegt, Emans, and Van de Vliert 1998). Given the study context, we argue that task interdependence is more relevant to innovative behaviour than goal interdependence. Until recently, teachers have mostly been working separately from each other. The recently implemented multidisciplinary educational programmes have urged teachers to collaborate with each other and, as such, have made them interdependent at the task level. Thus, while teachers face a strong imperative to collaborate on shared tasks, they may nonetheless be concerned with achieving their individual rather than collective goals (Truijen 2012). More specifically, while governments increasingly hold schools responsible for their performance (Gewirtz and Ball 2000), it is still problematic for most schools to hold teachers or teams responsible for students' achievements. That is, although teachers play an important role in student achievement (Rivkin, Hanushek, and Kain 2005), other factors (e.g. students' socio-economic status) cannot be ruled out, making it difficult to hold teachers entirely accountable. Consequently, defining concrete targets in terms of students' achievement may be hard, making goal interdependence difficult to achieve. Therefore, in our study context the focus lies on task interdependence.

The effect of task interdependence on innovative behaviour has been demonstrated in studies conducted in other business sectors (Van der Vegt and Janssen 2003). Two explanations have been proposed for how task interdependence prompts innovative behaviour. *First*, task interdependence increases the frequency of interactions between employees (Campion, Medsker, and Higgs 1993), which is a key antecedent of innovative behaviour (Van der Vegt and Janssen 2003). *Second*, task interdependence leads to employees accepting greater responsibility for other employees' task performance (Kiggundu 1983), and to advice seeking and knowledge sharing when confronted with problems (Allen, Sargent, and Bradley 2003). Through discussing problems with others, employees generate new knowledge and are stimulated to reflect on assumptions and opinions which underlie their practices (Van Woerkom 2004). When teachers, for example, exchange their ways of connecting internships with theoretical lessons or when they share teaching or assessment methods, they can inspire each other. This exchange may also evoke discussions about pedagogy and may as such result in new insights.

Assuming that sharing different viewpoints serves as a requirement for innovative behaviour (cf. Van der Vegt and Janssen 2003), we expect that teachers' innovative behaviour will likely increase as a result of task interdependence, and formulate our first hypothesis as:

Hypothesis 1: Task interdependence will have a positive effect on innovative behaviour.

Learning goal orientation and occupational self-efficacy as mediators

Demands-resources theories in organisational psychological research (for an overview, see Bakker and Demerouti 2007) propose that employees frequently assess their work demands and determine which of their resources can be applied to the situation. If demands are perceived as 'threats' (i.e. demands exceed available resources), employees will try to avoid such demands. If demands are perceived as 'challenges' (i.e. available resources exceed the demands), employees will try to approach and meet the demands (Folkman 1984). It is worthwhile to note that threats and challenges are not mutually exclusive (Gregoire 2003).

In the light of demands-resources theory, the job demand of innovative behaviour may be appraised as a challenge. That is, it holds the potential for competence development, impact and recognition (e.g. Amabile 1997). On the other hand, innovative behaviour may be perceived as a threat, since it entails the risk of being confronted with resistance from colleagues, failure and negative feedback (e.g. Janssen, van der Vliert, and West 2004). Depending on employees' available resources, employees either see innovative behaviour as challenge or as threat (e.g. Bakker and Demerouti 2007). We approach task interdependence as a situational resource and expect that learning goal orientation and occupational self-efficacy can serve as personal resources. For the purpose of clarity, we will discuss the roles of the two mediators separately from each other in the next two sections.

The mediating effect of learning goal orientation

Learning goal orientation has long been treated as a stable trait (DeShon and Gillespie 2005). However, there is a growing body of work which suggests that, although individuals may possess dispositional goal orientations that provide a 'default' orientation across various settings, it is also likely that individuals may develop different 'state goal orientations' in response to specific situational cues (Breland and Donovan 2005). Indeed, there are studies that showed how goal orientation can be stimulated (e.g. Kozlowski and Bell 2003). In our case, we focus on goal orientations as somewhat stable traits which can be modified by appropriate situational characteristics, namely task interdependence.

We propose that task interdependence will enhance teachers' learning goal orientation as interdependence provides individuals with a collaborative learning environment. These kinds of learning environments motivate employees to support their colleagues' endeavours in accomplishing tasks and finding solutions for problems. As a result, such environments enhance employees' motivation to learn (Johnson and Johnson 2009). Moreover, when task interdependence is high, colleagues monitor each other's efforts and give immediate feedback. With feedback being a major source of learning (VandeWalle 2003), it can be expected that task interdependence would encourage teachers to adopt a learning goal orientation. Finally, in collaborative teams (i.e. highly interdependent), team members challenge each other's ideas and assumptions, thereby creating intellectual controversy which enhances the motivation to learn (Johnson and Johnson 2009).

In turn, based on goal orientation theory (Dweck 2000), we propose that individuals with high learning goal orientation are more likely to engage in innovative behaviour. According to this theory, people interpret tasks based on the goals they pursue. A person with a strong learning goal orientation will continuously search for ways to improve their knowledge and skills. Such people are likely to view new and difficult tasks, like innovative behaviour, as challenging and as opportunities to learn (VandeWalle 2003). They are also more likely to persist in the face of obstacles. This feature of learning goal orientation should encourage teachers to persist with innovation when faced with the risks of failure or negative feedback from colleagues. Accordingly, we expect that when learning goal orientation is high, this will lead teachers to view innovative behaviour as challenging and as a means to learn as well. Moreover, employees are likely to see both positive and negative feedback as relevant information that helps them to improve their capabilities (Tuckey, Brewer, and Williamson 2002). Hence, teachers with a strong learning goal orientation should be less discouraged by the risks associated with innovations. Rather, such risks will likely be viewed as challenging and as holding the potential for personal development.

Finally, as described above, employees' available personal and situational resources determine whether they will regard innovation as a challenge or as a risk threat (e.g. Bakker and Demerouti 2007). In search for how these resources are interrelated, it has been suggested that personal resources mediate the effects of situational resources on positive work outcomes. According to the conservation of resources theory (COR; Hobfoll 2002), individuals strive to protect, retain and accumulate resources that help them to reduce job demands, achieve job demands and stimulate personal growth. Based on COR, Xanthopoulou et al. (2007) argued and found that supply of situational (job) resources activated employees' resources (like their self-efficacy), which in turn related to positive outcomes like more engagement. We follow this line of reasoning and propose a mediated model to explain the effect of task interdependence on innovative behaviour by learning goal orientation.

In sum, we formulated the following hypotheses regarding the mediating role of learning goal orientation:

Hypothesis 2a: Task interdependence will have a positive effect on teachers' learning goal orientation.

Hypothesis 2b: Teachers' learning goal orientation will have a positive effect on their innovative behaviour.

Hypothesis 2c: The effect of task interdependence on innovative behaviour will be mediated by teachers' learning goal orientation.

The mediating effect of occupational self-efficacy

We propose a positive relationship between task interdependence and occupational self-efficacy for task interdependence necessitates employees working collaboratively. Based on Bandura's social cognitive theory (Bandura 1977), we expect that such collaboration enhances teachers' occupational self-efficacy. This theory states that the social environment can enhance an individual's occupational self-efficacy in two ways: by the delivery of positive feedback ('social persuasion') and by offering opportunities to learn from others ('vicarious experience'). As explained above, in situations where task interdependence is high, the interaction between teachers will be more frequent and of higher quality because teachers will feel responsible for each other's performance. Teachers should experience more positive

feedback and opportunities to learn from others in such situations, thereby increasing their occupational self-efficacy.

We propose that when teachers' occupational self-efficacy is activated, this will enhance their engagement in innovative behaviour because people with high self-efficacy are likely to believe that the innovative ideas they bring in will be valued by others. Moreover, in case they will not find support for their ideas, this will not strongly affect the self-image of people with high self-efficacy (Bandura 1977) because highly efficacious people are more likely to believe that they can improve themselves with effort. In addition, employees with high occupational self-efficacy are often effective conflict managers (Ergeneli, Camgoz, and Karapinar 2010). Hence, resistance among colleagues, which may co-occur with innovations, will not likely discourage highly efficacious employees from engaging in innovative behaviour. Thus, we expect that highly efficacious teachers will be less likely to allow threats (in particular, social risks) to discourage them from engaging in innovative behaviour. This expectation is supported by research which showed a positive relationship between people's self-efficacy and their tendency to appraise difficult tasks as challenging rather than as threatening (Jerusalem and Schwarzer 1992), especially when it comes to tasks related to educational innovations (Gregoire 2003).

Finally, following the reasoning regarding the mediating role of learning goal orientation we elaborated on above, we propose that occupational self-efficacy will mediate the relationship between task interdependence and innovative behaviour.

In sum, the following hypotheses are formulated regarding the role of occupational self-efficacy:

Hypothesis 3a: Task interdependence will have a positive effect on teachers' occupational self-efficacy.

Hypothesis 3b: Teachers' occupational self-efficacy will be positively related to their innovative behaviour.

Hypothesis 3c: The effect of task interdependence on innovative behaviour will be mediated by teachers' occupational self-efficacy.

Method

Respondents

We collected survey data at two times, a year apart, from teachers in six VET institutes. Wave 2 ($n = 342$) included respondents from the first wave ($n = 402$) as well as new respondents (68% overlap). 64% were men. The age distribution was as follows: 5.5% of the respondents was younger than 30 years; 13.1% had an age between 30 and 39; 28.0% was 40–49 years; 42.4% was 50–59 years; and 10.7% was 60 years or older. Most respondents had received a higher education degree (75%); 17.5% of the respondents had received university education; and 7.5% percent had received SVE. Most respondents worked full-time (59.8%); 26.9% of respondents worked a 60–80% FTE, 10.0% worked a 40–60% FTE and 3.3% worked an FTE of 20–40%.

Procedure

The VET institutes were contacted through the HRM- and research-managers within the schools, who in turn invited unit-managers, team-leaders and teachers to participate in this

study. Unit-managers of the VET institutes provided us with the email-addresses of teachers who were willing to participate. At each wave of data collection, teachers received a letter that explained the purpose of the research, and it assured them that their responses would be kept confidential. After a week, a reminder was sent to the teachers who hadn't yet filled out the questionnaire; a second reminder was sent after two weeks. The online survey software allowed the teachers to fill out part of the questionnaire and resume it at a later time.

Measures

In this study, we used existing scales with items using five-point Likert scales (1 = 'totally disagree', 5 = 'totally agree'). Cronbach's alpha reliability coefficients are presented in the diagonal of Table 1.

Innovative behaviour was measured in both waves 1 and 2 using the same items from a five-item scale based on De Jong and den Hartog's work (2005). An example item is: 'I go searching for new methods and ways to work'.

Task interdependence was measured using the scale from Van der Vegt, Emans, and Van de Vliert (1998). The scale consisted of three items. An example item is: 'In this team, we need information from each other to do our job'.

Occupational self-efficacy was measured using a four-item scale based on Schyns and Von Collani's work (2002). An example of an item is: 'Whatever happens in my work, I usually can cope with it'.

Learning goal orientation was measured using a four-item scale developed by VandeWalle (1997). An example items is 'I am willing to select a challenging work assignment that I can learn a lot from'.

Control variables. Pre-structured questions were used to determine age, gender and tenure (i.e. years employed by the organisation).

Data analyses

All available data were analysed using Mplus 7.11 (Muthén and Muthén 2012). The full-information maximum likelihood (FIML) procedure was used to deal with missing data.

Table 1. Means, standard deviations and correlations among variables.

Variable	Means	SDs	1	2	3	4	5	6	7
1. Task interdependence	4.50	0.56	(0.87)						
2. Learning goal orientation	3.90	0.67	0.22***	(0.77)					
3. Occupational self-efficacy	4.07	0.58	0.24***	0.42***	(0.74)				
4. Innovative behaviour (wave 1)	3.92	0.57	0.27***	0.52***	0.38***	(0.70)			
5. Innovative behaviour (wave 2)	3.95	0.59	0.28***	0.52***	0.25***	0.66***	(0.72)		
6. Age	48.38	10.34	0.18***	-0.17***	0.10*	-0.02	-0.08	-	
7. Gender (0 = F, 1 = M)	0.64	0.48	-0.04	-0.07	-0.10*	-0.06	-0.06	0.15***	-
8. Tenure	5.95	1.86	0.01	-0.24***	-0.04	-0.07	-0.10	0.65***	0.16***

Note: Cronbach's alpha reliability coefficient is presented in the diagonal.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

By using all available data to directly estimate model parameters and standard errors, FIML selects estimates that maximise the probability of the observed data. FIML estimation has been found to be unbiased for data that are missing at random, and more efficient than listwise and pairwise deletion and single-imputation methods (Enders 2011). Close model fit is indicated by a non-significant chi-square, a comparative fit index (CFI) above 0.95, a root mean square error of approximation (RMSEA) below 0.05 and a standardised root mean square residual (SRMR) below 0.08 (Hu and Bentler 1999).

Results

Descriptive statistics

Table 1 presents descriptive statistics, including means, standard deviations and correlations among the variables. Innovative behaviour was associated with task interdependence, learning goal orientation and occupational self-efficacy at both waves 1 and 2.

Confirmatory factor analysis

In order to assess the factor structure (i.e. optimal number of factors, measurement invariance across the waves, discriminant validity of each factor of the study measures), we conducted a series of confirmatory factor analyses (CFA). An initial CFA model that comprised five factors (all study variables with innovative behaviour at two waves) provided good fit to the data, χ^2 (df = 240) = 385.988, CFI = 0.96, RMSEA = 0.03 and SRMR = 0.05. A first alternative model, wherein the items for occupational self-efficacy and learning goal orientation were combined, showed poor fit, χ^2 (df = 178) = 571.376, CFI = 0.87, RMSEA = 0.06 and SRMR = 0.06. A second alternative, wherein all of the items were combined into a single factor, produced a very poor fit: χ^2 (df = 189) = 1387.113, CFI = 0.60, RMSEA = 0.11 and SRMR = 0.11. Based on these analyses, we opted to retain the original measurement model.

To establish measurement equivalence for the innovative behaviour measure over the two waves, we tested additional models using the approach of Widaman, Ferrer, and Conger (2010). The chi-square difference ($\chi^2\Delta$) test was used to evaluate whether introducing additional measurement constraints resulted in significantly worse model fit. A metric equivalence model, in which the innovative behaviour factor loadings were constrained to be equal across the two waves, resulted in significantly worse fit, $\chi^2\Delta$ (df = 4) = 11.618, $p = 0.020$. Inspection of the model revealed the greatest discrepancy in factor loadings was in the innovative behaviour item ('When I get the opportunity, I show creativity in my work'; 0.72 in wave 1 vs. 0.95 in wave 2). To assess the impact of this lack of equivalence, we estimated a partial metric equivalence model in which these factor loadings were freely estimated. Freeing this parameter did not substantially affect the magnitude of the correlations between the factors, nor the pattern of significance. Thus, we proceeded with the metric equivalence model in later analyses. We then tested a scalar equivalence model, in which both the innovative behaviour-factor loadings and intercepts were constrained to be equal across waves. Imposing these constraints did not worsen the fit of the model, $\chi^2\Delta$ (df = 4) = 2.602, $p = 0.63$. The overall fit statistics were: χ^2 (182) = 313.053, CFI = 0.96, RMSEA = 0.04 and SRMR = 0.05. This model was used in subsequent analyses. The factor loadings and associated items are presented in Table 2.

Table 2. Standardised factor loadings for the scalar equivalent measurement model.

	Task inter-dependence	Learning goal orientation	Occupational self-efficacy	Innovative behaviour (wave 1)	Innovative behaviour (wave 2)
In this team, we need information from each other to do our job	0.80				
In this team, we need to work together to do our job well	0.89				
In this team, we need to mutually coordinate our work to do a good job	0.79				
I am willing to select a challenging work assignment that I can learn a lot from		0.73			
I often look for opportunities to develop new skills and knowledge		0.78			
I enjoy challenging and difficult tasks at work where I'll learn new skills		0.76			
For me, development of my work ability is important enough to take risks		0.67			
No matter what comes my way in my job, I'm usually able to handle it			0.67		
My past experiences in my job have prepared me well for my occupational future			0.67		
I meet the goals that I set for myself in my job			0.67		
I feel prepared to meet most of the demands in my job			0.78		
I go searching for new methods and ways to work				0.71	0.76
I promote and defend my innovative ideas to others				0.69	0.70
I try to reach agreement about new ways to realise tasks				0.70	0.69
When I get the opportunity, I show creativity in my work				0.68	0.67
In my education practice I try out new ways of instruction				0.67	0.71
Composite reliability:	0.87	0.83	0.79	0.82	0.83
Average variance extracted:	0.69	0.54	0.49	0.47	0.50

Note: All factor loadings are significant ($p < 0.001$).

Tests of hypotheses

The hypothesised relations between the factors were tested in a structural model. To assess change between the two waves of data collection, we used innovative behaviour at wave 1 as a predictor of innovative behaviour at wave 2. This model provided close fit to the data, χ^2 (df = 230) = 421.340, CFI = 0.940, RMSEA = 0.035 and SRMR = 0.050.

The hypothesised model and results are presented in Figure 1. In partially support of hypothesis 1, task interdependence was positively related to innovative behaviour at wave 1, but not at wave 2.

Hypothesis 2a, which predicted a positive effect of task interdependence on learning goal orientation, was confirmed. Also hypothesis 2b was confirmed: learning goal orientation was positively related to innovative behaviour at wave 1 and wave 2. Hypothesis 2c proposed that the effect of task interdependence on innovative behaviour would be mediated by learning goal orientation. In order to test this hypothesis, we calculated bias-corrected bootstrap confidence intervals around the indirect effects of task interdependence via learning goal orientation (Preacher and Hayes 2008). For innovative behaviour at both waves, the indirect paths via learning goal orientation were significant different from zero, 95% CIs: [0.07, 0.26] and [0.05, 0.19], respectively.

In support of hypothesis 3a, task interdependence was positively related to occupational self-efficacy. Regarding hypothesis 3b, the results showed that occupational self-efficacy was positively related to innovative behaviour at wave 1, but that it was negatively related to innovative behaviour in wave 2, indicating that the positive effects of occupational self-efficacy were negated over time. Hypothesis 3c proposed that the effect of task interdependence on innovative behaviour would be mediated by occupational self-efficacy. For innovative behaviour at wave 1, the indirect path occupational self-efficacy was significant

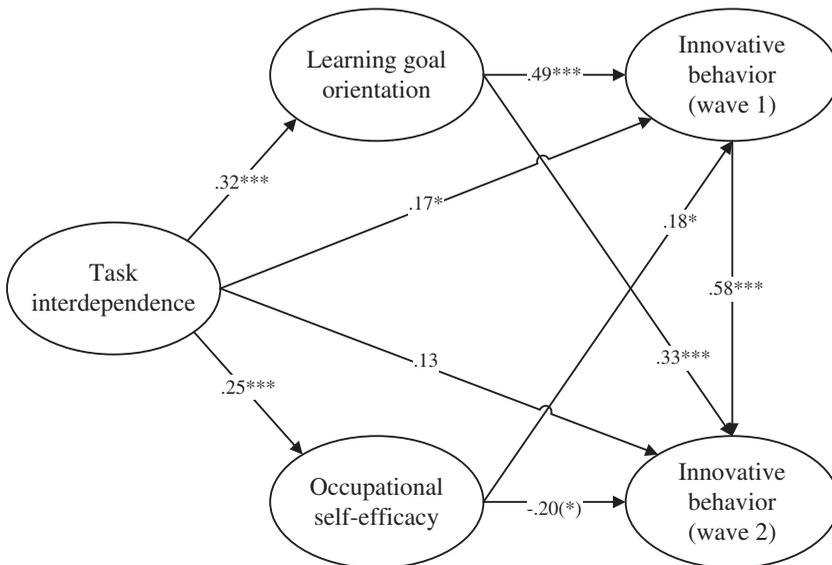


Figure 1. Hypothesised model depicting the effects of task interdependence, learning goal orientation and occupational self-efficacy on innovative behaviour. Notes: (*) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

different from zero, 95% CI: [0.01, 0.10]. For wave 2, this was not the case, 95% CI: [-0.13, 0.00]. In partial support for hypothesis 3c, the findings suggest that occupational self-efficacy mediates the relationship between task interdependence on the short run and not on the long run.

Regarding control variables, results indicated that longer serving teachers reported a significantly lower learning goal orientation, $\beta = -0.06$, $p = 0.013$ and that males reported significantly lower occupational self-efficacy than females, $\beta = -0.11$, $p = 0.045$. The effects of all other control variables were small, unsystematic and non-significant.

Discussion

Changing employer demands, new technological and pedagogical insights are examples of developments which urge VET institutes to continually renew their educational programmes. This imperative for change requires teachers to be innovative. While innovative behaviour is a recurrent topic in organisation studies, less is known about how *teachers'* innovative behaviour can be promoted. In an effort to fill this gap, our study focused on the effect of task interdependence on innovative behaviour and the mediating roles of teachers' occupational self-efficacy and learning goal orientation in this relationship. The survey study took place in Dutch VET institutes. The two-wave study design enabled us to draw causal relationships among study variables and to determine whether effects hold over time.

The finding that task interdependence positively affects innovative behaviour at wave 1 is in line with previous studies (Hülshager, Anderson, and Salgado 2009). It suggests that increased levels of interdependence facilitate constructive interaction among teachers, a prerequisite for innovative behaviour. In contrast to previous studies, the direct effect of task interdependence on innovative behaviour appears short-lived. Our explanation to this finding is that task interdependence may act as an activating force for teachers to engage in innovative behaviour, but may not function as a sustaining force to keep teachers to engage in innovative behaviour over time. To keep teachers to continue innovative behaviour, other factors, like learning goal orientation as we will describe below, and other team characteristics, like psychological safety (Hülshager, Anderson, and Salgado 2009), may be required.

We expected and found that task interdependence positively affected learning goal orientation, which in turn positively affected innovative behaviour at both waves. Based on demands-resources theory, we expected and found that teachers' learning goal orientation served as a personal resource, which 'transferred' the effect of task interdependence (as a situational resource) into innovative behaviour (as a job demand). Learning goal orientation mediated the relationship between task interdependence and innovative behaviour, and this indirect effect was sustained over time.

Similarly, we expected and found positive effects of task interdependence on occupational self-efficacy, which in turn was positively related to innovative behaviour. However, a mediating effect was only found at wave one. These findings may have to do with the particular growth patterns of self-efficacy. In line with what Bandura (1995) suggested, self-efficacy beliefs of teachers remain relatively stable once a task is mastered (Woolfolk Hoy and Spero 2005). Once occupational self-efficacy beliefs are established, their effects on innovative behaviour may diminish as well. Moreover, according to the resource-matching theory (e.g. Peracchio and Meyers-Levy 1997), performance on tasks (like innovative behaviour) suffers when available resources (e.g. occupational self-efficacy) are insufficient to meet task

demands. This theory implies that when occupational self-efficacy exceeds the required level, it ceases to become a driver of innovative behaviour. Other variables, like learning goal orientation, may play a more important role in sustaining innovative behaviour. Future research is needed to give more insight into its effects over time.

We can conclude that in comparison, learning goal orientation is a stronger predictor of innovative behaviour than occupational self-efficacy. It is interesting to see that the mediators we chose function differently with regard to innovative behaviour. The reason may lie in their different nature and, thus, different relationships with innovative behaviour. While occupational self-efficacy can be seen as a kind of self-assessment which helps teachers to 'dare' and take the risks associated with innovative behaviour, learning goal orientation can be seen as a kind of intrinsic motivation which leads to teachers' feeling of 'willing' to take the risks accompanying innovative behaviour. If occupational self-efficacy, in line with our reasoning, is only needed in order for people to *start* to engage in innovation, learning goal orientation may be needed to *stay* engaged in it.

While the study took place in VET institutes, we argue that the findings regarding the relationships among study variables can be generalised to other educational institutions and to other sectors, for these share the same organisational and job characteristics. Because the findings regarding the main effects of interdependence on innovative behaviour have been found in completely different contexts (Van der Vegt and Janssen 2003) and because the relationships regarding the mediators were theoretically well underpinned, we argue that the findings may even be generalised to sectors outside education. Of course, further research is needed to confirm these expectancies.

Limitations and suggestions for further research

Despite the interesting findings, there are also some limitations inherent to our research design. First, our assumption was that interdependence stimulates teachers' learning goal orientation and occupational self-efficacy. Learning goal orientation and occupational self-efficacy may also have a self-selected effect in the sense that those high on these individual characteristics tend to develop interdependence regarding team work. Then a dynamic process might be going on. Future research needs to take this point into account in designing a study that examines reciprocal relationships between variables over time.

Second, our data are based on self-report that could lead to spurious relationships due to common method bias. Moreover, social desirability regarding innovative behaviour may have played a role too. Although people are generally able to accurately perceive themselves and their environment (e.g. Alper, Tjosvold, and Law 2000), the validity of our results would be stronger if other sources of information had been used. More specifically, a suggestion for future research would be to examine the relationships among our study variables using a quasi-experimental design.

Third, and related to the former, we have explored the mediating roles of occupational self-efficacy and learning goal orientation without taking their possible interrelationship into account. Research, however, points out that both concepts are related (Runhaar, Sanders and Yang 2010). There are studies that suggest that people with a high learning goal orientation, who are confronted with setbacks while executing a specific complex task, will not experience a decrease in self-efficacy because they view setbacks as opportunities to improve mastery. There are, however, also studies that suggest that goal orientations are based on

implicit theories about one's abilities, such as intelligence and skills. According to this view, learning goal orientation is associated with the belief that abilities are not fixed and can be developed with effort. Causal relationships between learning goal orientation and self-efficacy are hard to detect using a survey approach, underscoring the need for further research using mixed methods.

Finally, we have explored relationships between variables without taking the concrete context wherein teachers have been operating into account. For instance, we could have paid attention to the organisation structure, strategy and culture, which could have moderated the found relationships. Moreover, based on Dutch policy documents and former research done in this setting, we *assumed* that implementation of CBE was taking place in the institutes the teachers worked for. Moreover, we assumed that within these institutes, a holistic approach to CBE would be present, since this approach dominates the Dutch discourse on CBE (Biemans et al. 2009). We, thus, do not know, for instance, how interdependence exactly takes form in different institutes, how teachers' innovative behaviour exactly appears in practice or whether innovative behaviour actually contributes to the implementation of CBE. It would be very informative for practice when future research, again by means of mixed methods, would incorporate these characteristics of the work environment and the innovation at hand into account.

Practical implications

Given the positive influence of task interdependence on innovative behaviour, VET institutes may develop policies to encourage teachers to work together on collaborative projects. For example, a policy within a school might state that teachers are expected to develop and execute a number of multidisciplinary lessons or assignments. Specifically, by collaborating with colleagues who are subject-matter experts in different fields, more exchanges of ideas and methods occur than when collaboration is limited to colleagues of their own department. Moreover, recent research among VET teachers showed positive relationships between aspects of transformational leadership and task interdependence (Beverborg, Sleegers, and van Veen 2015). Specifically, the more transformational leaders show individual consideration, the more teachers tend to exchange information and resources with their colleagues to complete their tasks successfully (i.e. enhanced task interdependence) (Beverborg, Sleegers, and van Veen 2015).

Next to creating interdependent conditions within teams explained above, one can also find other means by which to increase the occupational self-efficacy and learning goal orientation of teachers. To start with the first, Bandura (1995) states that employees' self-efficacy is partly based on the positive feedback received from others and opportunities to learn from others that perform well. For VET institutes, it is thus important to create a culture where successes are recognised, and where teachers can learn from their colleagues. Moreover, we suggest incorporating greater opportunities to learn from colleagues into professional development programmes. This could be done, for example, by implementing collegial consultation or mentoring programmes. Regarding learning goal orientation, this might be enhanced by giving teachers the opportunity to opt for challenging projects or providing them with a leading role in innovations. Finally, HR and line managers should help teachers by guiding their appraisal process. For example, managers may frame complex team work, such as innovations, as an opportunity for learning rather than as a 'threat'. By adopting this

approach, the redesigned team environments with high task interdependency may further stimulate teachers' innovative behaviour.

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