Vocations and Learning (2014) 7:191–214
DOI 10.1007/s12186-014-9112-1

ORIGINAL PAPER

The Relationship between Workplace Climate, Motivation and Learning Approaches for Knowledge Workers

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Received: 10 March 2013 / Accepted: 17 March 2014 /
Published online: 3 May 2014

Abstract Workplace learning is becoming a central tenet for a large proportion of today's employees. This seems especially true for so-called knowledge workers. Today, it remains unclear how differences in the quality of workplace learning are affected by differences in perception of the workplace environment and the motivation of knowledge workers to learn. Moreover, the possible role of motivation as a mediating factor between workplace climate factors and learning is underexplored. This paper therefore investigates direct and indirect links between perceptions of the workplace climate, motivation to learn and approaches to learning in the workplace. Knowledge workers (N=202) in one knowledge intensive organisation were questioned using existing and adapted questionnaires to measure learning approaches, motivation and workplace climate. Correlations and multivariate regression analyses were carried out to assess direct relationships amongst variables. Path analysis was carried out to assess the mediating role of motivation. Results show that both workplace climate factors and motivation directly influence employees' approaches to learning. Some direct relationships between workplace climate factors and motivation were also uncovered. Results regarding the mediating role of motivation showed that the effect of good supervision

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on deep learning is completely mediated by autonomous motivation. The effect of choice independence on deep learning approach is partially mediated by the same motivational drive. A-motivation was found to partially mediate the link between good supervision and a surface disorganised approach. Implications for research and practice are discussed.

Keywords Workplace learning · Learning approaches · Motivation to learn · Workplace climate · Knowledge workers

Introduction and Problem Statement

Knowledge creation and innovation are important in contemporary economies and societies. The European Union regards these factors as driving forces behind our future economic growth (European Commission 2010). More and more organisations are becoming knowledge-intensive organisations (Kessels and Poell 2004). Problem solving, learning and critically processing information are therefore crucial for both organisations and individual employees to remain competitive. This seems especially true for knowledge workers, as some scholars regard the need for continuous learning as a constituent characteristic to describe this type of employee (e.g. Drucker 1999; Brown 1999).

Knowledge workers can be defined as any employee who uses his or her (specialist) knowledge and know-how to gather, analyse, add value and/or communicate information to empower an organisation's decision making (Roy et al. 2001). Solving non-routine problems that require non-linear and creative thinking seem to be a crucial task for these workers (Reinhardt et al. 2011). From this definition it may become clear that we do not define a knowledge worker by the educational level s/he attained or the function s/he carries out, but by the knowledge related tasks s/he carries out. In line with Davenport et al. (1996) we agree that that these tasks can contain: (1) the search for existing knowledge; (2) the creation of new knowledge; (3) the processing, packaging and distribution of this knowledge; and/or (4) the application of the knowledge to the production process. Knowledge workers prefer autonomy and self-regulation while carrying out these tasks (Tampoe 1993).

Lifelong and life-wide learning is fundamental to knowledge workers. Opportunities for personal development are among the prime motivators for them to remain with an organisation (Kinnear and Sutherland 2000; Horwitz et al. 2006). This cannot be taken for granted, given that knowledge work and learning cannot be imposed through power, control or contract (Kessels 2005). Companies are thus faced with the challenge of integrating knowledge work and learning, and providing their knowledge workers with sufficient and qualitative opportunities for personal and professional development. Although formal training activities first come to mind when talking about personal or professional development, research shows that employees predominantly learn at the actual workplace (e.g. Tannenbaum 2002). They learn spontaneously as they carry out their work, by co-operating and interacting with colleagues, through working with clients, by tackling challenging new tasks and by reflecting on and evaluating one's work experiences (Tynjälä 2008). Kessels (2009) even hypothesizes that work has become a form of learning. Research, however, is still inconclusive on how knowledge workers prefer to engage in workplace learning, to what degree individual differences

in the quality of learning exist, and to what personal and contextual factors can these differences be attributed.

Gaining insight in these matters seems relevant for various reasons. It could broaden and deepen our understanding of what constitutes a 'knowledge worker' and how their learning processes can be enhanced. It may also create greater awareness on the intricacy of learning for the knowledge workers themselves (Berings 2007; Berings et al. 2005). It could also provide companies, and especially human resource (HR) professionals, with cues that can be taken into account when developing workplace policies or professional development activities for knowledge workers.

Until now, few studies have combined contextual and personal variables, and their interrelations, to investigate individual differences in the quality of (workplace) learning (e.g. Gijbels et al. 2012). In the current study we explore the relationship between *workplace climate* as a contextual factor (Kirby et al. 2003), and *motivation to participate in learning*, operationalized using self-determination theory (Deci and Ryan 2000), as a personal factor.

The concept of workplace climate consists of three variables: choice independence, workload and good supervision. Motivation to participate distinguishes between choosing to participate in workplace learning activities (autonomous motivation), feeling pressured to participate in workplace learning activities (controlled motivation) or lacking motivation to participate in workplace learning activities (a-motivation). To measure the quality of learning in this study we used the construct of *approaches to learning at the workplace* (Kirby et al. 2003).

We choose these factors as they are well known constructs in the field of work-related learning (Bernsen et al. 2009; Kyndt et al. 2012) and thus provide a solid conceptual base for our research. In addition, we picked these variables because they can be influenced and are thus relevant for practice. Finally, both factors seem relevant for exploring work-related learning with knowledge workers, as both frameworks touch upon the idea of autonomy, a concept that is crucial to knowledge workers (Drucker 1999). Therefore, we expect factors that enhance feelings of autonomy, such as choice independence or participating in learning activities through one's own choice, will foster the quality of learning, while factors that inhibit feelings of autonomy, such as a high workload or feeling pressured to participate in learning activities, may reduce the quality of learning. We also expect that contextual variables may not only directly influence the quality of learning, but may also have an indirect effect through motivation. For example, it is conceivable that employees who experience a supportive climate from their manager can themselves more readily see the relevance or value of participating in a learning activity and consequently engage with a higher-quality learning process. To account for this interplay between contextual and personal factors, we not only investigated their direct effects, but also explored the possible mediating role of motivation.

Theoretical Frameworks

Motivation to Learn

Individuals can have various reasons for participating in work related learning. Self-determination theory (SDT) is frequently used across various contexts to map

individual motives (Deci and Ryan 2000; Niemiec and Ryan 2009; Van den Broeck et al. 2009; Van den Broeck et al. 2011).

Self-determination theory provides a multidimensional theory of motivation in a sense that it distinguishes between both the quantity and quality, or nature of motivation. Regarding the latter, SDT makes a distinction between autonomous and controlled motivation. People who are autonomously motivated engage in behaviour because they willingly choose to do so. This volition can arise from a personal choice or because they fully endorse an external request or rationale (Van den Broeck et al. 2010). The latter is stimulated if they perceive the value or relevance of their behaviour. Autonomous motivation is accompanied with positive feelings of freedom. People who experience controlled motivation engage in behaviour because they feel pressured to do so. This pressure can stem from a source outside a person, such as receiving rewards, avoiding punishments or fulfilling the expectations of others, but it can also result from internal feelings such as shame, fear or guilt (Vansteenkiste et al. 2004). People who are driven by controlled motivation share feelings of pressure and stress as a common denominator (Vansteenkiste et al. 2006). They are more inclined to be autonomously motivated for behaviour that satisfies one or more of their basic human needs for autonomy or self-determination, competence or relatedness (Niemiec and Ryan 2009).

In addition, SDT also acknowledges a quantitative dimension of motivation through the concept of a-motivation. A-motivated individuals lack motives for behaviour altogether; they are apathetic and feel helpless. A-motivation can arise from feelings of incompetence towards the behaviour or perceptions of the behaviour as non-relevant (Deci and Ryan 1985).

Previous research using SDT within organisations has focused primarily on work motivation (e.g. Gagné and Deci 2005). For instance, Van den Broeck and colleagues (2010) indicate that autonomous motivation at work, as opposed to controlled motivation, is more likely to generate positive effects (e.g. greater commitment to the organisation, decreased turnover intention, enhanced well-being and improved job performance). Although motivation to engage in learning at the workplace can be seen as a component of work motivation, it has received little specific attention in previous research. As knowledge workers are regarded as being primarily autonomously motivated for their work in general (Stam 2007; Verdonschot et al. 2008), and as opportunities for professional development are important incentives for these workers (e.g. Tampoe 1993), we also expect that they have predominantly autonomous motives for learning at the workplace.

Workplace Climate

The working environment plays an important role in the learning processes of employees (Tannenbaum 2002), given that day-to-day work contains many potential learning processes (Gijbels et al. 2010). How employees perceive their working environment therefore seems of great importance as it may impact on their motivation to learn in this environment and/or the quality of their learning process. Knapper (1995) and Kirby and colleagues (2003) devised a model incorporating three aspects of the workplace climate: good supervision, choice independence and workload. *Good supervision* measures employees' perception of the managerial strategy of the supervisor. *Workload* charts employees' perceived workload, while *choice independence* assesses

employees' perceived freedom of choice and independence in performing tasks. Their research, and others, has convincingly shown that employees' perceptions of these workplace factors are related to the quality of learning in the workplace (e.g. Bernsen et al. 2009).

For their research Knapper (1995) adapted the Course Experience Questionnaire (CEQ) developed by Entwistle and Ramsden (1983) for use in the workplace. Kirby and colleagues (2003) subsequently refined the instrument, resulting in the 'Workplace Climate Questionnaire' (WCQ). The self-report questionnaire measures employees' perceptions on the above-mentioned three workplace climate factors.

Learning Approaches

In describing differences in the learning processes of individual employees the literature reflects a variety of concepts. These include learning styles (Honey and Mumford 1986; Kolb 1985), cognitive styles (Allinson and Hayes 1996; Riding and Cheema 1991), self-regulated learning (Boekaerts et al. 2000), self-directed learning (Raemdonck et al. 2014) and learning approaches (Kirby et al. 2003). In the current study, we opted for the framework of 'learning approaches'. Not only has this framework been used intensively to describe individual differences in learning in formal higher education (e.g. Entwistle et al. 2006) and at the workplace (e.g. Kirby et al. 2003; Kyndt et al. 2012), it also explicitly recognises the role of context and personal factors in determining the quality of learning (Gijbels et al. 2008; Vermunt and Vermetten 2004; Baeten et al. 2010).

A learning approach can be defined as a symbiosis and integration of the intentions individuals have when engaging in learning, and the accompanying learning strategies they adopt to reach those goals (Biggs 1987; Entwistle et al. 2003). The concept of a learning approach thus amalgamates the why and how, of how individuals learn, into a single overarching construct. The approaches to learning- framework was originally developed in the context of higher education (Gijbels et al. 2014).

Traditionally, a distinction has been made between a surface and a deep approach to learning (Biggs 1987; Entwistle et al. 2003; Vanthournout et al. 2014). Students who apply a deep approach search for the meaning of the information. They are intrinsically interested in certain topics, and are therefore committed to understanding underlying arguments by using strategies such as critically analysing information, seeking evidence and relating new knowledge to old (Entwistle et al. 2003). In contrast, learners who adopt a surface approach are motivated to meet the minimum requirements without actually searching for the meaning of the information. In general, they expend just enough effort to avoid failure and resort to rote strategies as mere unreflective reading and memorization (Entwistle et al. 2003).

Recently, several researchers have begun to investigate approaches to learning in the workplace (e.g. Bernsen et al. 2009; Delva et al. 2004; Kirby et al. 2003). In the latter context, Kirby and colleagues (2003) distinguish between three approaches: a deep approach to learning, a surface-disorganised approach, and a surface-rational approach. An employee with a deep approach has the urge to develop a thorough understanding of the problems, situations and learning opportunities they encounter in their work. These employees relate new situations and problems at work to their existing knowledge and understanding. They critically process information in light of the situation at hand, and actively search for links between their own activities and those of others. An

employee adopting a surface-disorganised approach to learning combines superficial motives with a non-academic orientation. These employees tend to be dissatisfied with their working environments, and they do not feel suited to perform their work duties (Bernsen et al. 2009). As a result, they apply superficial learning and problem solving strategies. They lack adequate self-regulatory and time management strategies. An employee assuming a surface-rational approach has a preference for trying to finish a job or solve a problem in an orderly, accurate and detailed fashion. They tackle activities using a structured and stepwise approach. Based on the theoretical conception of knowledge workers as self-regulated employees (Drucker 1999), one could hypothesise that they predominantly adopt deep approaches to learning in their work; however, empirical evidence sustaining this claim is largely lacking at the moment.

Different approaches to learning are generally found to relate to differences in performance within an academic setting (e.g. Richardson et al. 2012). However, research in an organisational context is inconclusive. Some studies report that differences in approaches to learning result in differences in career-success (Hoeksema et al. 1997), while other studies found no link with achievement during an internship (Van Lohuizen et al. 2009). Overall, too few studies have researched the link between approaches to learning at the workplace and outcome variables, to draw substantive conclusions.

Relationship Between Motivation to Learn and Approaches to Learn

Research in the context of higher education has explored the links between motivational regulations and approaches to learning. Some studies found a positive link between autonomous motivation and the use of deep approaches to learning (Baeten et al. 2009; Kyndt et al. 2011; Sobral 2004) and a negative relationship of autonomous motivation with the adoption of a surface approach (Kyndt et al. 2011; Sobral 2004). A-motivation was found to correlate negatively with a deep approach and positively with a surface approach (Sobral 2004). The empirical relationship between controlled motivation and approaches to learning among students until now remains unequivocal (Vansteenkiste et al. 2009; Vanthournout 2011). Based on these studies, we expect the following relationships in our study:

H1a: Autonomous motivation is a significant positive predictor of a deep approach to learning;
H1b: A-motivation is a significant negative predictor of a deep approach to learning;
H2: Autonomous motivation is a significant negative predictor of a surface-disorganised approach to learning;
H3: Controlled motivation is a significant positive predictor of a surface-rational approach.

Workplace Climate and Learning Approaches

Prior research has examined the effect of workplace factors on the learning approach of employees (Bernsen et al. 2009; Delva et al. 2003; Kirby et al. 2003). The results of these studies, however, are not conclusive. Research in the medical sector indicated that

a supportive learning environment and choice independence are positively associated with a deep learning approach. Moreover, a surface-disorganised learning style was found to significantly correlate with perceptions of a heavy workload (Delva et al. 2003; Kirby et al. 2003). In contrast, research into the learning processes of managers in the hotel industry demonstrated that perceptions of heavy workload are associated with a deep learning approach (Bernsen et al. 2009). We therefore tentatively provide the following hypotheses:

H4a: Good supervision is a significant positive predictor of a deep approach to learning;
H4b: Choice independence is a significant positive predictor of a deep approach to learning;

Workplace Climate and Motivation to Learn

A number of studies have been conducted on the influence of workplace climate factors on work motivation (e.g. Taris and Kompier 2005; Van den Broeck et al. 2009). According to Van den Broeck and colleagues (2009), the differences in motivation can be triggered by the environment or by employees themselves. Autonomous motivation can be fostered through job design and leadership. Taris (2010) concludes that employees are both motivated and able to learn if they receive sufficient opportunities to experiment with new ways of performing their tasks. Moreover, a heavy (but not excessive) workload can offer sufficient challenges and thus motivate employees to engage in learning. Based on self-determination theory, one would expect good supervision and choice independence to foster autonomous motivation as those workplace climate factors respectively target the need for both relatedness (Ryan and Deci 2000) and autonomy (Sierens et al. 2009). A high workload might trigger autonomous motivation if it is perceived as challenging and thus promoting competence. However, it might also fuel feelings of a-motivation if it is perceived as being overwhelming (Deci and Ryan 1985). Our study investigates the following hypotheses:

H5a: Good supervision is a significant positive predictor of autonomous motivation;
H5b: Choice independence is a significant positive predictor of autonomous motivation;

Workplace Climate Factors, Motivation and Learning Approaches

To our knowledge only one study has explored the combined influence of both motivation and workplace factors on approaches to learning (Kyndt et al. 2012). Kyndt and colleagues conducted a study with 358 employees and their analyses demonstrated that both autonomous motivation and controlled motivation were significantly and positively related to employees' deep approach to learning. In addition, choice independence and workload were found to positively predict scores on a deep approach. The results regarding a surface-disorganized approach to learning showed a negative relationship with autonomous

motivation and a positive relationship with perceived workload. The scores on a surface-rational approach were positively predicted by a single factor, namely controlled motivation.

Although the study by Kyndt and colleagues (2012) sheds light on the interplay between motivation and workplace factors in explaining employees' approaches to learning, some questions remain. First, the study did not incorporate perceptions of good supervision as a workplace climate factor, nor did it measure the motivational dimension of a-motivation. The impact of these predictors on approaches to learning therefore still remains unclear. Second, participants in the study were drawn from organisations in various branches and sectors; therefore, the study did not specifically target knowledge workers. Third, the research focused primarily on the direct relationships between variables, although interactions were also looked at.

However, it could be hypothesized that the impact of workplace climate on approaches to learning is to some degree a motivational effect, as it could be that employees' perceptions of the workplace climate trigger or inhibit their motivation to learn at the workplace (through the satisfaction of needs). This in turn might prompt them to engage differently in learning and adopt specific learning approaches. For instance, perceptions of good supervision and choice independence may result in feelings of autonomous motivation (because they satisfy the need for autonomy and relatedness), which consequently increases the likelihood of employees adopting a deep approach.

As mentioned above, the impact of workload on learning through motivation might be more complex. On the one hand, it might lead to more autonomous motivation if employees experience this workload as a challenge (and their need of competence is challenged), resulting in a deeper learning approach. On the other hand, it might lead to feelings of a-motivation (if employees feel their need for competence is thwarted), and may consequently lead to a more surface-disorganized approach. This mediating role of motivation remains, until now, unexplored. We therefore tentatively propose the following relationships:

H6a: Autonomous motivation (partially) mediates the relationship between good supervision and a deep learning approach;
H6b: Autonomous motivation (partially) mediates the relationship between choice independence and a deep learning approach;
H6c: Autonomous motivation (partially) mediates the relationship between workload and a deep learning approach;

H7: A-motivation (partially) mediates the relationship between workload and a surface-disorganized approach.

General Objective and Research Questions

The general aim of this study is to enhance our understanding of individual differences within the learning approaches of knowledge workers by exploring the impact of workplace climate factors and motivation on these approaches. We will focus both on direct effects and on the possible mediating role of motivation. The following research questions (RQ) and accompanying hypotheses (H) guide our study, visualised in Fig. 1.

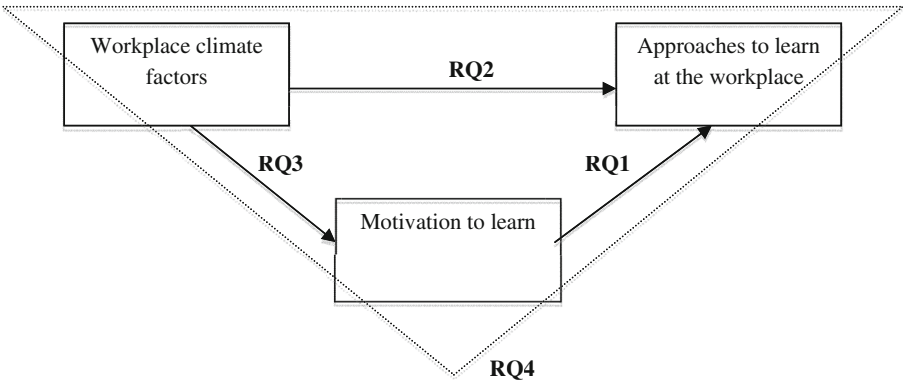

Fig. 1 Research design of the present study

RQ 1: What relationship exists between motivational regulations and learning approaches of knowledge workers?

- H1a: Autonomous motivation is a significant positive predictor of a deep approach to learning;
- H1b: A-motivation is a significant negative predictor of a deep approach to learning;
- H2: Autonomous motivation is a significant negative predictor of a surface-disorganised approach to learning;
- H3: Controlled motivation is a significant positive predictor of a surface-rational approach;

RQ 2: What relationships exist between workplace climate factors and the learning approaches of knowledge workers?

- H4a: Good supervision is a significant positive predictor of a deep approach to learning;
- H4b: Choice independence is a significant positive predictor of a deep approach to learning;

RQ 3: What relationships exist between workplace climate factors and the motivational regulations of knowledge workers?

- H5a: Good supervision is a significant positive predictor of autonomous motivation;
- H5b: Choice independence is a significant positive predictor of autonomous motivation;

RQ 4: Do motivational regulations of knowledge workers mediate the relationship between workplace climate factors and the learning approaches of knowledge workers?

- H6a: Autonomous motivation (partially) mediates the relationship between good supervision and a deep learning approach;
- H6b: Autonomous motivation (partially) mediates the relationship between choice independence and a deep learning approach;
- H6c: Autonomous motivation (partially) mediates the relationship between workload and a deep learning approach;
- H7: A-motivation (partially) mediates the relationship between workload and a surface-disorganized approach.

Method

Respondents

This study was set up with knowledge workers employed in a knowledge-intensive organisation in Flanders. This non-academic public institute carries out groundbreaking research and develops innovative technologies for socially valuable purposes. The organization realises this by conducting independent, fundamental and applied research, and by providing advice, services and products.

A total of 779 knowledge workers in the organisation received a non-compulsory request by e-mail to complete an anonymous online questionnaire. A total of 202 knowledge workers participated in this study, which translates to a response rate of 30 %. Participants who began the questionnaire were required to fill in all items before being able to move to the next page; this resulted in no missing data. Table 1 provides an overview of the gender and age distribution of these respondents. Results indicated that more male respondents completed our questionnaire (75 %), and respondents were fairly equally spread across age categories. The majority of respondents (72 %) attended some form of higher education. The respondents represented a number of functions within the organisation, ranging from general management, sales and engineering, to research and development.

Instruments

Learning approach at work was measured by using the *Approaches to learning at Work Questionnaire* (AWQ; Kirby et al. 2003). The AWQ contains 30 items, measuring three learning approaches: a deep learning approach, a surface-disorganised approach and a surface-rational approach. Items are scored on a five point Likert scale, ranging from 1 (definitely disagree) to 5 (definitely agree). Two items were removed to improve reliabilities: item 'I prefer to have a good overview rather than focus on details' (surface-disorganized approach; OOL13) and item 'In trying to understand a puzzling idea, I let my imagination wander freely to begin with, even if I don't seem to be much nearer a solution' (deep learning approach; DL15). Table 2 demonstrates that reliabilities are acceptable in our sample after deletion of these items.

Motivation to learn was explored via the scales of two self-report questionnaires. Two scales from the *Academic Self-Regulation Questionnaire (SRQ-A; Vansteenkiste et al.* 2009*)* were used to measure autonomous and controlled motivation. A scale from

Table 1 Profile of respondents

	Category	Frequency
Gender	Female	50 (25 %)
	Male	152 (75 %)
Age	18–30	36 (9 %)
	31–40	58 (29 %)
	41–50	64 (32 %)
	>50	43 (21 %)
Diploma	No diploma or primary education	1 (0.5 %)
	Secondary education	57 (28 %)
	Bachelor degree	42 (20 %)
	Master degree	70 (35 %)
	PhD	32 (16 %)
Work experience	0–10	52 (27 %)
	11–20	61 (31 %)
	21–30	50 (26 %
	>30	33 (17 %)
Work status	Blue collar worker	0
	White collar worker	91 (45 %)
	Management	111 (55 %)

Academic Motivation Scale (AMS; Vallerand et al. 1989*)* was incorporated to measure a-motivation, as this concept is not incorporated within the SRQ. The instruments are originally designed to map motivational processes in an educational context, so the items were slightly adapted to the context of the knowledge worker. For example, the item, 'I am motivated to study because that's what others (parents, friends, etc.) expect me to do', was adapted to read, 'I am motivated to learn at work because that's what others (supervisors, colleagues, customers, family, friends, etc.) expect me to do. The resulting instrument contains 20 items, measuring three motivational concepts. All items were answered along a Likert scale ranging from 1 (definitely disagree) to 5 (definitely agree). Reliabilities for these scales proved good in our sample.

The Workplace Climate Questionnaire (WCQ; Kirby et al. 2003) was used to examine employees' perceptions on 'good supervision', 'workload' and 'choice independence'. The instrument comprised 15 items and all items were answered along a Likert scale ranging from 1 (definitely disagree) to 5 (definitely agree). One item was removed to enhance the reliability of the scale, namely item WD10 'In this organisation you're expected to spend a lot of time learning things on your own', belonging to the workload-scale. Afterwards, reliabilities for the scales were acceptable in our sample.

Data-analyses

To assess the relationship between workplace climate factors, and learning approaches (RQ1) and motivation (RQ2), correlational analyses and multivariate

Table 2 Instruments, scales, items and reliabilities

Instrument and dimensions	Items	*M*	SD	Reliability	Sample item
AWQ					
Deep approach to learning	9	3.62	0.44	0.61	In trying to understand new ideas, I often try to relate them to real life situations to which they might apply.
Surface–disorganised approach to learning	9	2.36	0.61	0.73	Often I find I have to read things without having a chance to really understand them.
Surface-rational approach to learning	10	3.33	0.55	0.74	I prefer to tackle each part of a task or problem in order, working out one at a time.
Learning motivation					
Autonomous motivation	8	4.08	0.56	0.80	I am motivated to learn at work because it is personally important to me.
Controlled motivation	8	2.29	0.72	0.81	I'm motivated at work because that's what others (supervisors, colleagues, customers, family, friends, …) expect me to do.
A-motivation	4	1.57	0.69	0.83	Honestly, I don't know. I really feel that I am wasting my time when I'm learning at work.
WCQ					
Good supervision	5	3.38	0.61	0.85	Supervisors here make a real effort to understand difficulties employees may be having with their work.
Choice independence	5	3.26	0.75	0.65	There is a real opportunity in this organisation for people to choose the particular tasks they work on.
Workload	4	2.94	0.78	0.75	It sometimes seems to me that my job requires me to do too many different things.

multiple regression analyses were conducted, with climate factors as independents and motivational scales or learning approaches as dependents. Similar analyses were conducted to explore the relationship between motivation and learning approaches (RQ3). In the latter analyses motivational scales were incorporated as independent variables, while learning approaches acted as dependent variables. For all correlational analyses, we carried out Bonferroni-corrections to minimize chances of Type I-errors. By doing so, the level below which results are regarded as significant, is gradually lowered according to the number of pairwise comparisons (Abdi 2007). In each of our analyses, nine pairwise comparisons were made resulting in a cut-off alpha value of 0.006. If possible, we computed effect-sizes in addition to significance levels. Correlation coefficients of 0.10, 0.30 and 0.50

were used as cut-off points to denote small, moderate and large effect-sizes, respectively (Cohen 1988).

To investigate the possible mediating role of motivation between workplace climate factors and learning approaches (RQ4), structural equation modelling was applied. An overall model was created based on the significant direct effects that emerged from the analyses of previous research questions. Robust Maximum Likelihood was used as an estimator for the model. We chose this estimator as it is better at handling skewness in the data compared to normal Maximum Likelihood (Knight 2000). Several indicators for model-fit, such as Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residuals (SRMR), were consulted. In line with literature we considered values of higher than 0.90 on CFI and TLI as indications of sufficient quality, while a value 0.08 was taken for RMSEA and SRMR (Hu and Bentler 1999). When applicable, modification indices were used to optimize the model. Non-significant estimates in the model were deleted, and differences in chi square-tests between the total model and subsequent models, the Bayesian Information Criterion (BIC) and the Akaike Information Criterion (AIC), were consulted to identify the best fitting model. All SEM analyses were conducted in R (R Development Core Team 2012) using the lavaan-package (Rosseel 2012).

Results

Relationship Between Motivation and Learning Approaches (RQ1)

Correlation coefficients were calculated between motivational regulations and learning approaches. The results of these correlation analyses are presented in Table 3. Four of the nine correlations proved statistically significant at the 0.006 level. The results revealed a strong, significant and positive correlation between autonomous motivation and a deep learning approach (r=0.61). A small, negative correlation was observed between a-motivation and a deep approach (r=−0.26).

Moderate positive correlations were established between a surface-disorganised approach to learning on the one hand, and controlled motivation (r=0.35) or a-motivation (r=0.48) on the other hand.

The multivariate model indicated that all motivational dimensions have a significant effect on learning approaches. For autonomous motivation this effect was strong (Wilks' Lambda = 0.65, F (3, 196)=35.00, p<0.001, partial eta^2=0.35). For controlled motivation (Wilks' Lambda = 0.92, F (3, 196)=5.82, p<0.001, partial eta^2

Table 3 Pearson correlation coefficients between motivation to learn and approaches to learning (n=202)

	Deep	Surface-disorganised	Surface-rational
Autonomous motivation	0.61*	−0.19	−0.12
Controlled motivation	−0.09	0.35*	0.19
A-motivation	−0.26*	0.48*	0.14

*Correlation with significance level p<0.006 (2-tailed)

Table 4 GLM with motivation to learn as predictor and approaches to learning as dependent variables

Independent variable	B *	Sig	Partial Eta^2
Deep approach to learning			
Autonomous motivation	0.49	<0.001	0.33
Controlled motivation	−0.03	0.51	0.00
A-motivation	0.01	0.78	0.00
Surface disorganised approach to learning			
Autonomous motivation	−0.01	0.94	0.00
Controlled motivation	0.17	0.002	0.05
A-motivation	0.35	<0.001	0.13
Surface rational approach to learning			
Autonomous motivation	−0.09	0.26	0.00
Controlled motivation	0.13	0.03	0.02
A-motivation	0.03	0.62	0.00

* Unstandardized B-coefficient

=0.08) and a-motivation (Wilks' Lambda = 0.86, F (3, 196)=10.52, p <0.001, partial eta^2=0.14) a moderate effect was found. Therefore, all motivational dimensions were included in follow-up analyses and used to predict the use of specific learning approaches.

According to these analyses, scores on a deep approach were positively predicted by autonomous motivation, explaining 33 % of variance. Scores on a surface rational approach were significantly and positively predicted by scores on controlled motivation, although the effect was only small (2 %). Additionally, controlled motivation also positively predicted scores on the surface disorganised approach. Again, the effect was only small, as 5 % in the variance is explained. Lastly, a surface disorganized approach is significantly and positively predicted by both controlled motivation and a-motivation. The effect of the first was small (5 % of the variance explained), while the effect of the latter is moderate (13 % in variance explained).

Relationship Between Workplace Climate and Learning Approaches (RQ2)

In order to answer our second research question, we first conducted correlation analysis between workplace climate factors and learning approaches. The results of these correlation analyses are presented in Table 5. Four of the nine correlations were statistically significant. Results demonstrated a moderate positive correlation between choice independence and a deep approach to learning (r=0.40), and a small positive correlation between good supervision and the latter approach (r=0.23). A good supervision (r=−0.32) was moderately and negatively correlated with a surface-disorganised approach to learning, while workload was moderately and positively related to this approach (r=0.35).

The results of the multivariate general linear model indicated that all of the workplace factors had significant effects on learning approaches, although the magnitude of

Table 5 Pearson correlation coefficients between workplace climate factors and approaches to learning (n= 202)

	Deep	Surface-disorganised	Surface-rational
Choice independence	0.40*	−0.06	−0.16
Good supervision	0.23*	−0.32*	0.09
Workload	0.16	0.35*	−0.01

*Correlation with significance level $p<0.006$ (2-tailed)

the effect differed. On the one hand, choice independence (Wilks' Lambda = 0.83, F (3, 196)=13.65, $p<0.001$, partial eta^2=0.17) and workload (Wilks' Lambda = 0.85, F (3, 196)=11.51, $p<0.001$, partial eta^2=0.15) had a large and significant effect on the learning approaches of knowledge workers. On the other hand, good supervision (Wilks' Lambda=0.88, F (3, 196)=8.91, $p<0.001$, partial eta^2=0.12) had a significant moderate effect on the learning approaches of knowledge workers. We therefore took all workplace climate factors into account for the follow-up analyses predicting specific learning approaches.

These follow-up analyses, as portrayed in Table 6, revealed that a deep learning approach was significantly and positively predicted by all of the workplace factors, although the effect of good supervision and workload was only small, as respectively only 3 % and 5 % of the variance was explained. Choice independence, however, exerted a moderate effect on the use of a deep approach, explaining 13 % of variance. The workplace climate factors, good supervision and workload, had a significant moderate effect on surface disorganised learning. However, whereas workload was a positive predictor, good supervision negatively predicted scores in surface disorganised learning. Scores on the surface rational approach were positively predicted by a single factor, namely choice independence. The effect was only small, as 4 % of the variance in the dependent variable is explained.

Relationship Between Workplace Climate and Motivation (RQ3)

The results of the correlational analyses between workplace climate factors and motivational drivers are presented in Table 7. Three of the nine correlations were statistically significant. A moderate, positive association was found between choice independence (r=0.38), good supervision (r=0.36) and autonomous motivation. Good supervision was moderately and negatively correlated with a-motivation (r=−0.31).

The multivariate model indicated that both good supervision (Wilks' Lambda = 0.886, F (3, 196)=8.411, $p<0.001$, partial eta^2=0.114) and choice independence (Wilks' Lambda=0.898, F (3, 196)=7.402, $p<0.001$, partial eta^2=0.102) have a significant moderate effect on motivation to learn. The effect of workload on the motivation to learn of knowledge workers is not significant (Wilks' Lambda=0.986, F (3, 196)=0.953, p=0.416, partial eta^2=0.014). Therefore, workload was not incorporated within follow-up analyses on specific motivational drivers.

In these analyses (Table 8) it was observed that moderate good supervision and choice independence each positively predicted scores on autonomous motivation. In

Table 6 GLM with workplace climate factors as predictors and approaches to learning as dependent variables

Independent variable	B*	Sig	Partial Eta^2
Deep approach to learning			
Choice independence	0.26	0.001	0.13
Good supervision	0.09	0.02	0.03
Workload	0.12	<0.001	0.05
Surface disorganised approach to learning			
Choice independence	0.04	0.54	0.00
Good supervision	−0.23	<0.001	0.08
Workload	0.24	<0.001	0.10
Surface rational approach to learning			
Choice independence	−0.18	0.01	0.04
Good supervision	0.11	0.05	0.02
Workload	0.01	0.89	0.00

* Unstandardized B-coefficient

both cases it concerned a moderate effect, as 8 % and 10 % of variance was explained. Moreover, it was noted that good supervision negatively and moderately predicted a-motivation. In the latter case 6 % in variance was explained.

The Mediating Role of Motivation Between Workplace Climate and Learning Approaches (RQ4)

Based on the results from the previous analyses, we could identify three instances in which motivation might mediate the relationship between workplace climate factors and approaches to learning at the workplace. First, autonomous motivation might mediate the relationship between good supervision and a deep learning approach. Second, autonomous motivation might also act as a mediator between choice independence and a deep learning approach, and third, a-motivation might mediate the link between good supervision and a surface disorganized approach. We carried out path analysis to test these possibilities. To obtain sufficient degrees of freedom to estimate the model we constructed a model in which the three possible mediations were incorporated. Subsequently, non-significant parameters were removed and the change

Table 7 Pearson correlation coefficients between workplace climate factors and motivation to learn (n=202)

	Autonomous	Controlled	A-motivation
Choice independence	0.38*	0.02	−0.20
Good supervision	0.36*	−0.01	−0.31*
Workload	−0.01	0.06	0.11

* Correlation with significance level p<0.006 (2-tailed)

Table 8 GLM with workplace climate factors as predictors and motivation to learn as dependent variable

Independent variable	B*	Sig	Partial Eta^2
Autonomous motivation			
Choice independence	0.28	<0.001	0.10
Good supervision	0.21	<0.001	0.08
Workload	0.04	0.34	0.01
Controlled motivation			
Choice independence	0.03	0.73	0.00
Good supervision	−0.00	0.96	0.00
Workload	0.06	0.38	0.00
A-motivation			
Choice independence	−0.14	0.09	0.02
Good supervision	−0.25	<0.001	0.06
Workload	0.06	0.37	0.00

* Unstandardized B-coefficient

in model-fit was computed to assess whether the resulting model fitted the data better. The original model is represented in Fig. 2.

Fit indices indicated that fit of this model did not attain the cut-off criteria (CFI= 0.91; TLI=0.74; RMSEA=0.13; SRMR=0.07). Modification indices suggested that the fit of the model could be improved by allowing co-variation between the scales of autonomous motivation and a-motivation. As this is theoretically feasible, we reran the model with the added specification and this sufficiently increased the model-fit (CFI= 0.99; TLI=0.99; RMSEA=0.02; SRMR=0.03). Results indicated that all but one parameter estimates were significant. Only the direct link between good supervision and a deep learning approach proved non-significant. The effect of good supervision on

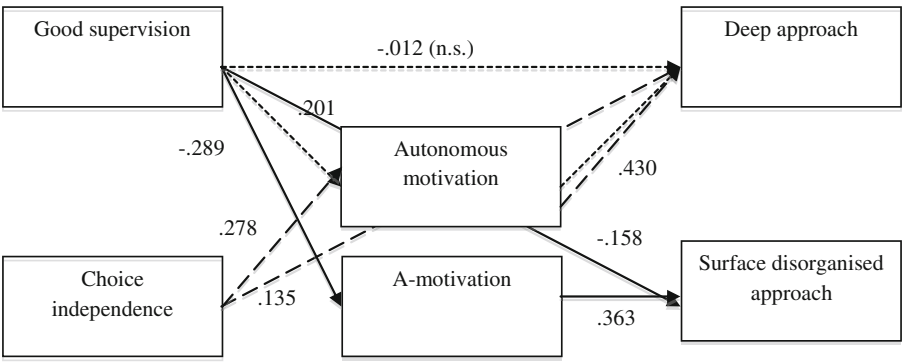

Fig. 2 Mediation analysis. The full lines represent the meditational model including good supervision, autonomous motivation and a surface disorganised approach (partial mediation). The striped line represents the meditational model including choice independence, autonomous motivation and a deep approach to learning (partial mediation). The dotted line represents the meditational model including good supervision, autonomous motivation and a deep approach to learning (full mediation)

a deep approach to learning is fully moderated by autonomous motivation. For all other relationships between workplace climate factors and approaches to learning, a partial motivation applied. Omitting the non-significant relationship from the model lowered the information criteria, but did not significantly improve the model (see Table 9). Fit indices also generally remained the same (CFI=0.99; TLI=0.99; RMSEA=0.02; SRMR=0.03).

Discussion

Our study aimed to explore individual differences in approaches to learning for knowledge workers in the workplace. It investigated whether and how motivation to participate in learning, and workplace climate factors, affected the quality of learning in the workplace.

To answer our first research question (RQ1), the direct relationship between motivation to participate in learning and approaches to learning was explored. Our analyses confirmed most of the hypotheses we put forward. The strong link between autonomous motivation and a deep learning approach (H1a) was also apparent in our data. The negative relationship between a-motivation and a deep approach to learning was confirmed in the correlational analyses (H1b). However, scores on a-motivation did not significantly predict scores on the deep approach to learning in the regression analyses. Contrary to a previous study in the context of work related learning (Kyndt et al. 2012) we did not find a significant negative relationship between autonomous motivation and a surface disorganised approach to learning (H2). Instead, we found a moderate to strong positive relationship between a-motivation and a surface disorganised approach. A-motivation was not incorporated as a predictor in previous research on work motivation. It therefore seems that when both qualitative (autonomous and controlled motivation) and quantitative dimensions (a-motivation) are incorporated into the research design, the latter is more successful at predicting problems with learning in the workplace compared to the qualitative dimensions of motivation. This link is also theoretically defendable. Vallerand and colleagues, for example, link lack of motivation to apathetic learning behaviour in a school context (Vallerand et al. 1992). Based on these findings, we therefore encourage researchers to also incorporate the dimension of a-motivation in investigating learning and motivation in the workplace. In line with our third hypothesis (H3) we found controlled motivation to be a significant positive predictor of a surface rational approach to learning, although the effect-size is small.

Table 9 Model comparison between full model(s) and mediation model

	Df	AIC	BIC	X^2	Diff X^2	Diff Df	Sign
Full model	5	2016.7	2089.5	22.019			
Full model - covariance Autonomous motivation and A-motivation	4	1995.1	2071.1	4.38	14.121	1	<0.001
Mediation model	5	1993.1	2066	4.59	0.11	1	0.73

In addition, we observed a significant relationship between controlled motivation and a surface disorganised approach.

Based on these results, we can endorse the claim made by earlier research and the theory that high quality motivation and high quality learning are moderately and positively related (e.g. Kyndt et al. 2012; Sobral 2004). There are also indications that a lack of motivation is pernicious for the quality of learning at the workplace and is related to problems with learning. When employees feel pressured to participate in learning activities, they will resort to surface strategies. In practice these results give a warning for HR-professionals. Requesting knowledge workers to partake in learning activities, in which they have no motivation, because they do not see its relevance or value, or pressuring them to participate by means of rewards or possible negative consequences, may result in a decrease in the quality of their learning process.

For our second research question (RQ2) we investigated the direct relationship between workplace climate factors and approaches to learning in the workplace. Our results largely confirmed the hypotheses we stated for this research question. Both good supervision (H4a) and choice independence (H4b) significantly and positively predicted the adoption of a deep approach to learning. However, the magnitude of the effect differed as, contrary to the moderate effect of choice independence, good supervision only exerted a small effect. So, in practice, it seems more important to provide knowledge workers with sufficient freedom of choice. Previous research proved inconclusive with respect to the relationship between workload and approaches to learning. Some studies reported a link with a deep learning approach (Bernsen et al. 2009), while others found workload to be related to a surface disorganised approach (Delva et al. 2003). In our study we found both. However, the link with a surface disorganised approach appears more substantial, as witnessed by the moderate effect size. We therefore dare to state that, for knowledge workers, a high workload has potentially more negative consequences compared its benefits. A possible explanation might be that the impact perception of a heavy workload on quality of learning is moderated by the personal feelings of the employee towards working under pressure. Employees who feel highly efficacious under a high workload may feel triggered to engage in high quality learning, no matter how high the workload. Other employees, however, may predominantly experience negative feelings of being overwhelmed, resulting in problems in the learning process. This dual mechanism has also been suggested by Bernsen and colleagues (2009). It would be interesting for future research to specifically tap into the mechanisms at work here and, for instance, include feelings of self-efficacy as a moderating variable (Pajares 1996). In addition to the hypothesized effects, we uncovered a moderate negative relationship between good supervision and a surface disorganised approach. It appears that when knowledge workers feel supported by their organisation this not only stimulates them to use a deep learning approach, it also prevents them from reverting to a surface disorganised approach.

On the basis of previous research, few hypotheses could be formulated regarding the link between workplace climate factors and motivation to learn, as conceived within the framework of self-determination theory (RQ3), although research adopting the framework of goal orientation has pointed towards this relationship (e.g. Button et al. 1996). Based on self-determination theory we expected a positive relationship between good supervision (H5a), choice independence (H5b) and autonomous motivation, as both workplace factors might aid in fulfilling the need of competence, relatedness and

autonomy, respectively (Ryan and Deci 2000). These relationships were confirmed empirically. In a similar vein, lack of attention for these workplace climate factors was found to relate to problems with a motivation to learn. All of these findings are coherent with self-determination theory, and provide evidence for the suitability and applicability of this framework in analysing the motivation to learn of knowledge workers. Surprisingly, a high workload did not have a positive or a detrimental effect on the motivation of knowledge workers. This is in contrast to the relationships with learning approaches found when answering our second research question. This difference in effect might have to do with the temporal aspect (lack of time) enclosed in the construct of a surface disorganised approach. It might be the case that knowledge workers are willing to learn at the workplace but, if under pressure through a high amount of work, they may think they are unable to engage in learning in a qualitative way; however, this hypothesis warrants further research.

The findings of the previous questions raised the issue as to whether or not the effect of good supervision or choice independence is predominantly on motivational dimensions, with an impact on learning approaches as a consequence of motivation, rather than as a direct result of workplace climate factors. As previous research only looked at the direct effects of workplace climate factors, the possible mediating role of motivation remained underexposed (RQ4). Three hypotheses regarding the mediating role of autonomous motivation were proposed: between good supervision (H6a), choice independence (H6b) and workload (H6c) on the one hand, and a deep approach to learning on the other hand. In addition, a mediating role for a-motivation between workload and a surface disorganized approach was proposed (H7).

For the first two instances (H6a + H6b) this relationship was confirmed by the data, although differences in the nature of mediation exist. In the case of good supervision, this mediation was found to be a full mediation. The mediating role of autonomous motivation between choice independence and a deep approach was found to be partial. The latter two hypotheses (H6c + H7) failed to materialize in the data. In addition, a non-hypothesized mediation effect was uncovered: a-motivation partially mediated the link between good supervision and a surface disorganised approach. A model containing the three mediation models proved to be of sufficient quality after allowing covariation between autonomous motivation and a-motivation.

It seems that the direct link between good supervision and approaches to learning in fact hid a dual relationship: one between good supervision and autonomous motivation, and one between autonomous motivation and a deep approach. These findings stress the complexity of the learning process in work related learning. Moreover, they point towards the necessity of incorporating both cognitive, metacognitive and motivational factors if one wants to understand the full extent of work related learning. For practice, our findings reaffirm the importance of providing autonomy and support to knowledge workers, as these factors not only impact on motivation but, subsequently, also on the way they engage in learning.

We want to end this article by pointing out some limitations to our study. First, motivation to learn, learning approaches and workplace climate factors were all measured at the same time in the current study, using a single measurement instrument. This has several consequences. First, it is impossible to make conclusive statements on the direction of the relationships, despite applying directional techniques such as regression analysis. Our aim was to explore how motivation and workplace factors

affect quality of learning with knowledge workers. The data provided us with the indications herein. However, to draw more conclusive data longitudinal research is necessary. A second caveat involves the sole use of self-report questionnaires. By doing so we heightened the possibility of common method bias (Conway and Lance 2010). Subsequent studies could take this into account by triangulating data with data from other types of measurement. Finally, individual knowledge workers evaluated learning motivation and workplace climate factors in a subjective manner. This poses a risk that respondents will provide socially desirable answers. Moreover, survey research is limited to generating general statements about the learning processes of knowledge workers. Future research can build on these findings by supplementing it with qualitative data obtained through observation in the workplace, interviews with knowledge workers and managers, or through other methods.

To conclude, our research in general confirms findings from previous research. However, by incorporating multiple variables, by exploring direct and indirect relationships and by assessing overall quality, we have attempted to strengthen and further refine our insights in the complexity of work related learning. For practice it is relevant to realise the value of providing knowledge workers with sufficient autonomy, while at the same time investing in a supportive climate, as these factors not only affect the quality of motivation, but also (subsequently) the quality of learning. It is also important to note that a high workload is possibly a double-edged sword. Although no effect on motivation to learn was observed, there was an impact on the approaches to learning, although this effect in itself was not unambiguous. It can challenge knowledge workers to engage in deep learning, but the likelihood is, it has a substantial detrimental effect on the quality of learning. Our hypothesis is that knowledge workers not only need motivation to learn, they also require sufficient time to engage in a deep learning process.

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