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The effects of organizational learning environment factors on e-learning acceptance

Bo Cheng [a], Minhong Wang [a,*], Jürgen Moormann [b], Bolanle A. Olaniran [c], Nian-Shing Chen [d]

[a] Faculty of Education, The University of Hong Kong, Pokfulam Road, Hong Kong
[b] ProcessLab, Frankfurt School of Finance & Management, Germany
[c] Department of Communication Studies, Texas Tech University, United States
[d] Department of Information Management, National Sun Yat-Sen University, Taiwan, ROC

ABSTRACT

Workplace learning is an important means of employees' continuous learning and professional development. E-learning is being recognized as an important supportive practice for learning at work. Current research on the success factors of e-learning in the workplace has emphasized on employees' characteristics, technological attributes, and training design elements, with little attention to workplace contextual effects. The study aims to investigate the impacts of organizational learning environment factors, including managerial support, job support, and organizational support, on employees' motivation to use a workplace e-learning system. A model was proposed based on the expectancy theory of training motivation and the social influences and facilitating conditions in technology acceptance models. The model was tested on sample data collected from mainland China using Structural Equation Modeling and Moderated Structural Equation Modeling. The results suggested that employees' perceived managerial support and job support had a significant impact on their perceived usefulness of the e-learning system for individual learning, and that perceived organizational support had a significant influence on the perceived usefulness of the e-learning system for social learning. Perceived usefulness for individual learning was found to completely mediate the environmental influences on individuals' motivation to use the system, while perceived usefulness for social learning made partial mediation in the effects of the environmental factors on intention to use. In addition, perceived job support was found to have moderating effects on the relationship between employees' perceived usefulness of the e-learning system and their intention to use the system. Consistent with previous findings, employees' perceptions about the usefulness of the e-learning system have significant effects on their intention to use the system in the work setting.

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1. Introduction

The importance of workplace learning as an effective way for employees to acquire knowledge and skills for individual competence development as well as for organizational effectiveness has been widely recognized (Doornbos, Simons, & Denessen, 2008). Workplace learning can be summarized as the means, processes, and activities in the workplace by which employees learn from basic skills to high technology and management practice that are immediately applicable to their jobs, duties, and roles. It includes both formal and informal learning. Formal learning refers to activities that are formally planned and structured and institutionally sponsored, while informal learning is described as processes that are predominantly unstructured, experiential, and non-institutional (Ellinger, 2005). E-learning refers to a wide set of applications and processes such as web-based learning, computer-based learning, virtual classrooms, and digital collaboration. With its beneficial features, such as cost-effectiveness, delivery-efficiency, self-management of learning, on-demand training, and anytime/anywhere availability, e-learning is increasingly recognized as an important supportive structure for both formal and informal learning at work (Rosenberg, 2006). Accordingly, it is playing important roles in work organizations, e.g., as a tool supporting Just-in-Time information

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access, knowledge management, peer collaboration, staff training, and for online performance support (Brandenburg & Ellinger, 2003). According to recent industrial surveys, e-learning has accounted for a significant proportion of corporate investment (Little, 2010; SkillSoft, 2010). On the other hand, the literature reports that a key barrier to the success of e-learning initiatives in practices is a lack of adequate consideration on enhancing employees' engagement in workplace e-learning (Admiraal & Lockhorst, 2009).

Employees' engagement and participation in developmental activities is a critical issue in the workplace learning literature. A number of studies have been carried out to examine the antecedent factors such as work environment, training design, and trainee characteristics for trainees' motivation to learn (e.g., Doornbos et al., 2008). In e-learning settings, existing research on trainees' motivation to learn mainly focuses on examining the predictive effects of technological attributes, trainees' individual differences (Roca & Gagne, 2008), or instructional design factors (DeRouin, Fritzsche, & Salas, 2005), while the role of work environment is left insufficiently understood. Due to the nature of workplace learning such as being integrated with work and daily routines, the importance of contextual and situational factors in e-learning implementation has recently attracted attention in discussions. For example, the learning organization theorists viewed e-learning as a form of organizational learning and the potential of e-learning as a tool for workplace learning can only be exploited within an appropriate work and learning culture and environment (Tynjälä & Häkkinen, 2005). The significance of work environment factors also has been taken into account in e-learning design, e.g., the use of a performance-based learning approach to align employees' personal learning with the organizational and social contexts (Wang, 2011), and the design of social learning for coworkers (Collis & Margaryan, 2004). However, the impacts of the work environment factors on employees' motivation to use e-learning systems have not yet been theoretically modeled and empirically tested. To fill the gap in literature, this study proposed and tested a model of the impacts of organizational learning environment factors on employees' perception on, and intention of, using e-learning from the perspective of expectancy theory of motivation.

2. Research model and hypotheses

2.1. Theoretical backgrounds

2.1.1. Expectancy theory of adult learning motivation in the workplace

Expectancy theory (Vroom, 1964) is a particularly meaningful and relevant theoretical approach to trainee's motivation to participate in workplace learning (Dubin, 1990; Farr & Middlebrooks, 1990; Mathieu & Martineau, 1997; Mathieu, Tannenbaum, & Salas, 1992; Noe, 1986). It is mainly advantageous in relating the internal perception and belief components of individual's motivation to the situational influences in the work environment of trainees. According to the expectancy-theoretical model, there are three components of motivation, expectancy (E), instrumentality (I), and valence (V) (Mathieu & Martineau, 1997; Tharenou, 2001). Expectancy refers to one's personal belief regarding the likelihood that participating in training and development activities would lead to knowledge, skills and ability (KSAs). Instrumentality concerns the perception of likelihood that those KSAs gained from participating in training and development would lead to specific outcomes (e.g., peer respect, salary increase, and better job performance). Valence is the relative desirability or importance of those outcomes for each individual.

Based on the Valence-Instrumentality- Expectancy (VIE) approach, a number of work environment factors have been linked as antecedents to employees' motivation to participate in workplace learning and developmental activities. For example, Kozlowski and Farr (1988) assessed the impacts of job characteristics perception and psychological climate for updating on engineers' responses to technical competence updating (e.g., updating orientation, technical performance). The identified perceptual factors in job and updating climate included a collection of five dimensions: updating climate (e.g., organizational policies), work characteristics (e.g., autonomy), feedback, social interaction, and work technologies. Similarly, Tharenou (2001) evaluated the relations of a set of work environment factors, which included job challenge, supervisor support, employer support, and situational constraints, to trainees' motivation through the composite of expectancy, instrumentality, and valence. Tracey, Hinkin, Tannenbaum, and Mathieu (2001) also empirically tested the impacts of a set of work environment elements, including managerial support, job support, and organizational support, on trainees' pre-training motivation. Besides, using the expectancy-theoretical approach, Mathieu and Martineau (1997) particularly constructed a conceptual model of situational influences, which included situational constraints in the workplace, social-psychological influences (i.e. interpersonal relationship), and the maintenance system (i.e., the skill-based pay system), on training motivation. In extant literature, a number of other research studies made similar endeavors to investigate the work environment influences on individual's motivation to participate in learning and developmental activities (e.g., Chiaburu & Tekleab, 2005; Facteau, Dobbins, Russell, Ladd, & Kudisch, 1995; Mathieu et al., 1992). Although a variety of work environment factors have been evaluated, there still lacks a consistent taxonomic view of these factors as antecedents of trainee motivation.

The prior work on assessing the work environment impacts on trainees' motivation to participate in training and development activities using the expectancy theory approach contributed to the basic understanding in the area. Due to its superiority in decomposing the perception and belief components of trainee's motivation and mediating the situational influences in the work environment, the expectancy theory was adopted as the theoretical foundation of the present study. Specifically, three of the important work environment factors, i.e., managerial support, job support, and organizational support, were selected to be included in this study. The reason is that these factors have been commonly investigated in prior research (e.g., Kozlowski & Farr, 1988; Mathieu & Martineau, 1997; Tharenou, 2001; Tracey et al., 2001). Besides, from the multilevel point of view of organizational systems for training design (Kozlowski & Salas, 1997), these three factors indicate support from the different levels of an organizational system (interpersonal relationship, job performance requirements, and organizational goals and objectives) which are key drivers of employees' developmental needs, and thus are expected to be highly relevant organizational learning environment factors in the present study. On the other hand, these factors have not been examined in the technology-enabled learning environment.

2.1.2. Social influences and facilitating conditions in technology acceptance

Since the focus question of the present study was on trainee's motivation to use and participate in workplace e-learning, the technology acceptance and usage models were included as a highly relevant theoretical framework. Based on the leading technology acceptance models such as the "Theory of Reasoned Action (TRA)" (Fishbein & Ajzen, 1975), the "Theory of Planned Behavior (TPB)" (Ajzen, 1991), and the

"Unified Theory of Acceptance and Usage of Technology (UTAUT)" (Venkatesh, Morris, Davis, & Davis, 2003), two predominant external contextual factors, i.e., social influences and facilitating conditions, were identified to have impacts on perceived usefulness of using information technologies.

Social influence refers to the degree to which individuals perceive social pressure or expectations to engage in some behavior and feel motivated to comply with that pressure (Davis, Bagozzi, & Warshaw, 1989; Fishbein & Ajzen, 1975). In technology acceptance models, social influences is represented by subjective norm, which is defined as "a person's perception that most people who are important to him/her think he/she should or should not use the system" (Venkatesh et al., 2003). The underlying logic for the impact of social influence on an individual's intention is that a user's belief in the usefulness of a technology tends to be consistent with the beliefs of important referents such as the top management, supervisors, or coworkers in a relevant social network to reassure oneself about legitimacy (Lewis, Agarwal, & Sambamurthy, 2003; Venkatesh & Davis, 2000). According to these definitions, top management and supervisors are one of the important, perhaps the most important one, reference groups of belief regarding the importance of using technologies within an organizational context, and thus would impose a direct influence on individual's perception and belief about the usefulness of using a system.

Facilitating condition is defined as "objective factors in the environment that several judges or observers can agree make an act easy to do" (Thompson, Higgins, & Howell, 1991). It is modeled as a core component of perceived behavior control, which is described as the perception of presence or absence of requisite resources and opportunities in the job procedures and organizational policies needed to perform behavior. The perceived resource can be measured by formative indicators such as access to hardware/software, knowledge, time, financial resources, someone's help, documentation, and data (Mathieson & Chin, 2001). According to the definitions, facilitation conditions in job characteristics and in organizational policies would impact on people's beliefs about the usefulness of adopting, and actual utilization of, technologies, and the empirical evidences have been found in the technology acceptance literature (Mathieson & Chin, 2001; Thompson et al., 1991).

2.2. Conceptual model

Based on the two theoretical frameworks, i.e., the expectancy-theoretical model of training motivation and the social influences and facilitation conditions in technology acceptance, a conceptual model was built as shown in Fig. 1. As seen in the diagram, in quadrant I was trainees' perception of the three organizational learning environment factors, i.e., managerial support, job support, and organizational support, which have been widely examined in prior studies (e.g., Kozlowski & Farr, 1988; Mathieu & Martineau, 1997; Tharenou, 2001; Tracey et al., 2001). The three environmental factors in quadrant I were posited as antecedents of trainees' perception and belief regarding the usefulness (i.e., the composite of valence, instrumentality, and expectancy in quadrant II) of using e-learning systems. This relationship was derived from the two theoretical frameworks. The diagram also posited trainees' perceived usefulness (i.e., the composite in quadrant II) of e-learning usage as the motivational determinant of trainees' intention to use e-learning technologies (i.e., quadrant III). This path was based on the widely tested Perceived Usefulness → Intention relationship in technology acceptance models, which was theoretically grounded by the expectancy theory of motivation.
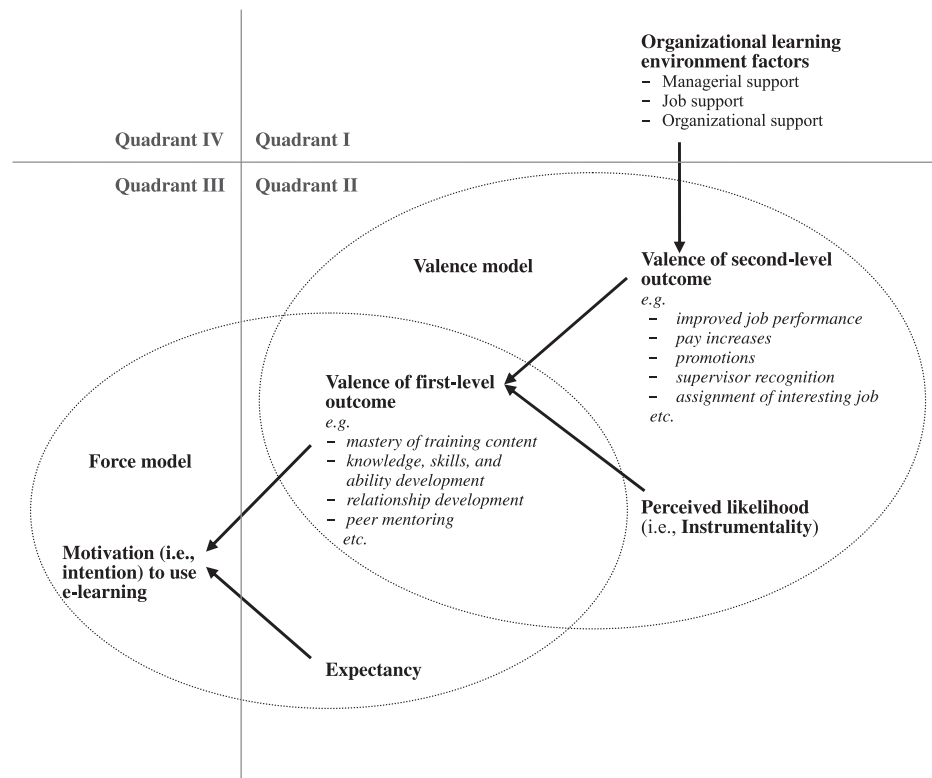

Fig. 1. Conceptual model for theoretical frameworks. Diagram of perceived usefulness (i.e., the composite of valence, instrumentality, and expectancy in quadrant II) as the mediator of the work environment influences (i.e., quadrant I) on motivation to use e-learning (i.e., quadrant III) (redrawn based on Snead and Harrell (1994)).

In the present study perceived usefulness was decomposed into perceived usefulness for individual learning and perceived usefulness for social learning. This was because in prior work on design of e-learning at work, two important pedagogical principles for the design were to support individual cognitive learning processes (e.g., self-directed reasoning, learner control of content, etc.) and to support social construction of knowledge (Tynjälä & Häkkinen, 2005). The theoretical basis for the design of individual learning support is related to andragogy and self-directed learning theory, which inform that learners will be motivated once learning objectives have been rationally set that meet their needs, and learning programs should be designed to give emphasis to self-directed learning so as to help learners select and carry out their own learning goals, objectives, methods and means (Merriam, 2001). The theoretical ground for the design of social learning support is based on the phenomenon that learning is situated in a culture and social context and the multiplediscsiplinary perspectives of learning such as the Communities of Practices framework (Brown & Duguid, 1991) and the Knowledge Management (KM) model (Nonaka & Takeuchi, 1995; Rosenberg, 2006). Based on these design principles and learning theories, the expected outcomes of using an e-learning system would include the individual and the social dimensions. Besides, in technology acceptance literature, the construct perceived usefulness was acknowledged not to be unidimensional and could include multiple components (Thompson et al., 1991).

The relations among the variables in the conceptual model were drawn and represented in Fig. 2. The following sections were justifications of the hypotheses in the model.

2.2.1. Environmental influences on perceived usefulness of e-learning usage

2.2.1.1. Managerial support. In literature, managerial support is concerned with trainees' perception and belief of the extent to which supervisors or managers give them opportunities and reinforcement for acquiring new KSAs through participating in continuous learning and developmental activities (Facteau et al., 1995). According to the expectancy-theoretical model of training motivation, perceived managerial support may enhance trainees' perception and belief of the valence of the outcomes (i.e., supervisor recognition) gained through participation in learning. Empirical evidences for this relation can be found in prior studies (e.g., Chiaburu & Tekleab, 2005; Tharenou, 2001). From the technology acceptance perspective, managerial support has been widely examined in technology acceptance models as an antecedent of potential users' perceived usefulness of a technological system (e.g., Lewis et al., 2003). Thus, we hypothesize:

> H1a: Perceived managerial support will have a positive effect on perceived usefulness of the workplace e-learning system in supporting individual learning.
> H1b: Perceived managerial support will have a positive effect on perceived usefulness of the workplace e-learning system in supporting social learning.

2.2.1.2. Job support. Job support refers to the degree to which trainees perceive that work characteristics such as autonomy and task assignments are designed to facilitate the attainment of KSAs through learning and developmental activities (Kozlowski & Farr, 1988; Mathieu et al., 1992; Tharenou, 2001). From the expectancy-theoretical perspective, a high level of perceived job support for learning may motivate trainees' participation by cuing that mastery of new knowledge and skills will be instrumental in achieving valued extrinsic outcomes (e.g., better job performance). The link between job support and perceived usefulness of learning has been empirically evidenced in previous research (Mathieu et al., 1992; Noe & Wilk, 1993). In the technology acceptance literature, facilitating conditions in job procedures (e.g., time availability, job-related information, hardware/software access) have been found to have a direct effect on potential users' perceived usefulness of using technologies (e.g., Mathieson & Chin, 2001). Thus, we hypothesize:

> H2a: Perceived job support will have a positive effect on perceived usefulness of the workplace e-learning system in supporting individual learning.
> H2b: Perceived job support will have a positive effect on perceived usefulness of the workplace e-learning system in supporting social learning.
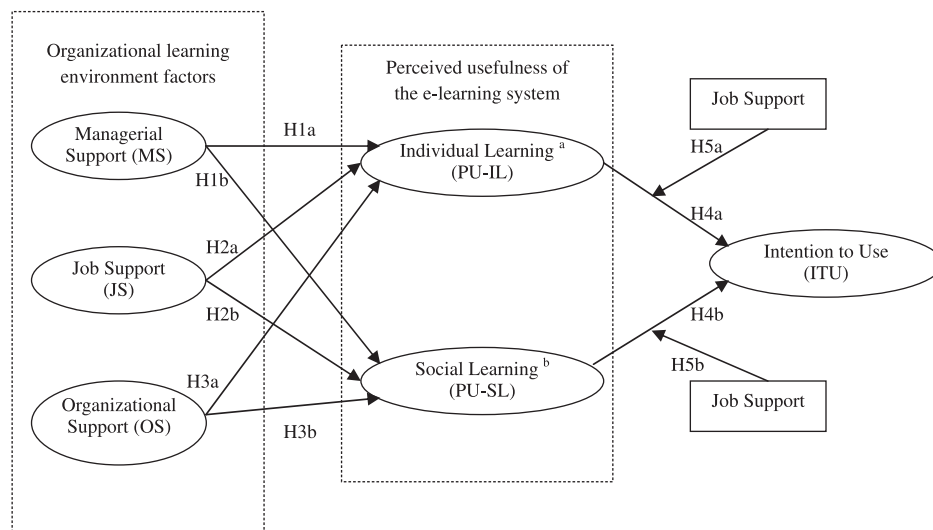
a Perceived usefulness of the e-learning system in supporting individual learning

b Perceived usefulness of the e-learning system in supporting social learning

Fig. 2. Conceptual model for variables.

2.2.1.3. Organizational support. Organizational support represents the degree to which employees perceive that their employers support individuals' participation in development activities and value their learning through supportive organizational policies such as skill-based pay systems and visible rewards (Kozlowski & Farr, 1988; Tharenou, 2001; Tracey & Tews, 2005). Based on the expectancy-theoretical model, supportive organizational policies for learning may advance employees' belief about the valence and benefits of the outcomes gained from participation in learning. The positive link between organizational support and perceived usefulness of learning is empirically evidenced in literature (Maurer & Tarulli, 1994; Tracey et al., 2001). From the technology acceptance perspective, facilitating conditions at the organizational level (e.g., internal training program, perceived financial resources) have been found to have a direct effect on perceived usefulness of using a technology (e.g., Igbaria, Zinatelli, Cragg, & Cavaye, 1997; Wang, Lin, & Luarn, 2006). Thus, we hypothesize:

> H3a: Perceived organizational support will have a positive effect on perceived usefulness of the workplace e-learning system in supporting individual learning.
> H3b: Perceived organizational support will have a positive effect on perceived usefulness of the workplace e-learning system in supporting social learning.

2.2.2. Perceived usefulness as the motivational determinant of e-learning usage

The impact of perceived usefulness in explaining individual's behavioral intention to use technologies is theoretically grounded in the Vroom's (1964) expectancy theory (Davis, 1989; Davis et al., 1989). According to the expectancy-theoretical model (e.g., Snead & Harrell, 1994), an individual's motivation (i.e., intention) to use e-learning is explained by the valence (i.e., attractiveness or usefulness) of the outcomes of using e-learning (i.e., first-level outcome, e.g., acquisition of new KSAs) and the expectancy (i.e., perception or belief of likelihood) that his/her behavioral effort in usage will lead to the specific outcomes. The valence of the outcomes of using e-learning is further determined by the valence of the extrinsic rewards (i.e., second-level outcome, e.g., improved job performance, pay increases, or promotions) that result from the outcomes of usage and the perceived likelihood (i.e., instrumentality) that the outcomes will lead to the rewards. In such a way, perceived usefulness is represented by outcome expectancy in the expectancy-theoretical model.[1] The diagram in Fig. 1 (i.e., the path of quadrant II → quadrant III) explains the way of perceived usefulness as the motivational determinant of using e-learning. The expectancy theory provides one of the theoretical bases for TAM and has been empirically applied in explaining information system usage behavior (e.g., Burton, Chen, Grover, & Stewart, 1993; Snead & Harrell, 1994; Watson & Hewitt, 2006).

Previous research studies on acceptance of e-learning in the workplace environment suggest that perceived usefulness of e-learning in improving individual learning effectiveness has a significant effect on employees' attitude, satisfaction, and intention to use e-learning (Roca & Gagne, 2008). Studies in distance learning and e-learning for HRD suggest that learners' communication and collaboration in distance learning environments may address their social needs and therefore promote learners' satisfaction with, and motivation to use online learning (DeRouin et al., 2005). Therefore, the following hypotheses are proposed:

> H4a: Perceived usefulness of the workplace e-learning system in supporting individual learning will have a positive effect on employees' intention to use the system.
> H4b: Perceived usefulness of the workplace e-learning system in supporting social learning will have a positive effect on employees' intention to use the system.

2.2.3. Moderator

Beyond the indirect influences mediated by perceived usefulness, perceived job support is alternatively hypothesized to moderate the relations between trainees' perception of usefulness, and their intention, of using e-learning. This means that the effect of trainees' perceptual beliefs about the usefulness of using the e-learning system on their intention to use the system is dependent on the perceived job conditions. The assumption is that, if trainees perceive that they cannot translate the perceived outcome (i.e., mastery of KSAs) of using e-learning into an improved job performance because of the poor job support, e.g., no opportunities to apply the KSAs due to no autonomy in work scheduling or fixed task assignments, then the trainees will be frustrated and not motivated to use e-learning. This moderating effect has been stated and tested in prior studies (Mathieu & Martineau, 1997; Mathieu et al., 1992; Tharenou, 2001). From the technology acceptance perspective, the theoretical rationale for the moderating role of job support between perceived usefulness and intention to use can be found in the Elaboration Likelihood Model (ELM), which is a theory from social psychology literature explaining human attitudinal and behavior change. The ELM model has recently been introduced into the IT acceptance area to construct alternative models of influences and to specify moderating factors. It posits that individuals' attitude change is driven by external information, and the information recipients' motivation and ability to elaborate the informational messages will moderate the influence processes (Bhattacherjee & Sanford, 2006). In IT acceptance literature, the perceived job relevance of a target technology is defined to operationalize the potential user's motivation dimension of elaboration and is modeled as a moderator between perceived usefulness and behavioral intention (Kim & Garrison, 2009). In the present study, perceived job support is regarded to provide a stimulus for the trainees' extrinsic motivation to elaborate information about e-learning and thus is expected to moderate the influence of perceived usefulness of e-learning on usage intention. It is assumed that if the potential users of a workplace e-learning system perceive that their job tasks are flexible to ensure them to pursue learning and innovation, they will be motivated to elaborate information about the e-learning system to make informed decisions about the perceived usefulness of the system and their behavioral intention to use. Based on these arguments, we hypothesize:

> H5a: Perceived job support will have a moderating effect on the relationship between perceived usefulness of the workplace e-learning system in supporting individual learning and employees' intention to use the system, such that the effect will be stronger in a condition that job support is more flexible.

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[1] In the expectancy-theoretical mode, the outcome (both of the two levels) could be further distinguished into extrinsic outcome and intrinsic outcome. In this study only the extrinsic outcome is referred to delineate perceived usefulness as a form of extrinsic motivation (e.g., Davis, Bagozzi, & Warshaw, 1992).

H5b: Perceived job support will have a moderating effect on the relationship between perceived usefulness of the workplace e-learning system in supporting social learning and employees' intention to use the system, such that the effect will be stronger in a condition that job support is more flexible.

3. Research design

3.1. Instrumentation and pilot validation

To test the conceptual model, the six constructs in the model were operationally defined and instrumented. In this study, Tracey and Tews' (2005) General Training Climate Scale (GTCS) was adopted to measure the three organizational learning environment factors: managerial support, job support, and organizational support. *Managerial support* is defined as "the extent to which supervisors and managers encourage on-the job learning, innovation, and skill acquisition and provide recognition to employees in support of these activities"; *job support* refers to "the degree to which jobs are designed to promote continuous learning and provide flexibility for acquiring new knowledge and skills"; and *organizational support* represents "policies, procedures, and practices that demonstrate the importance of training and development efforts, such as reward systems and resources to acquire and apply learned skills" (Tracey & Tews, 2005). The conceptual foundation of the three-factor definition of the training climate is associated with the three-facet taxonomy of organizational climate and the diagnostic theories of organizations, which both characterize organizational work environments in terms of three systems: social, job-related/technical, and organizational (Ostroff, 1993). The three factors also are accordant to the multilevel point of view of organizational systems for training design (Kozlowski & Salas, 1997). The measure of training climate is made up of 15 items, with 5 items measuring each of the three sub-constructs. In a validation study, the three sub-constructs of the training climate scale were tested to have satisfactory psychometric properties (i.e., internal consistency, convergent and discriminant validity, and criterion-related validity) (Tracey & Tews, 2005). *Perceived usefulness for individual learning* refers to the extent to which the workplace e-learning system is perceived to be useful for employees to assess their job competencies, identify personal learning needs, and support the process of independent on-the-job learning. Measures of perceived support for individual learning included 8 items adopted from Arbaugh (2000), Davis et al. (1989), Kirkpatrick and Kirkpatrick (2006), and Thurmond, Wambach, and Connors (2002). *Perceived usefulness for social learning* is the extent to which the workplace e-learning system is perceived to be useful for a group of workers to develop the interpersonal relationship of cooperation and collaboration in learning and developmental activities. 3 items derived from Kankanhalli, Tan, and Wei (2005) and Noe, Wilk, Mullen, and Wanek (1997) were used for measurement. The construct *intention to use* was operationalized by 3 items from Kirkpatrick and Kirkpatrick (2006) and Venkatesh and Davis's (2000).

Following Kankanhalli et al. (2005), the raw collection of items were conceptually validated. For this purpose, the 29 items, with a random order, were administered to 12 subjects of an educational level of postgraduate or above. The definitions of the six constructs were introduced with the items. The subjects were asked to link each item to the most proper construct according to their understanding of the items and constructs. After the responses had been collected, the inter-judge agreement statistics for each item were calculated, and only items that were placed to the intended constructs with a high inter-judge agreement were preserved as the indicators of the constructs. After the pilot revision, 5 items were deleted and 24 items were preserved. Results of the conceptual validation are given in Table 1.

3.2. Procedures

To test the hypothesized relationships in the conceptual model, a survey was conducted to collect and analyze perceptions and reactions from workplace learners toward an online learning system. The workplace e-learning system demonstrated in this study is a web-based

Table 1
Conceptual validation.

Intended construct	Actual construct					Inter-judge agreement ($N = 12$)	Intended construct	Actual construct					Inter-judge agreement ($N = 12$)
	MS	JS	OS	Other	Total			PU-IL	PU-SL	ITU	Other	Total	
MS							PU-IL						
Q1[a]	11	1			12	0.92	Q1[a]	12				12	1.00
Q2[a]	12				12	1.00	Q2[a]	10		2		12	0.83
Q3[a]	11		1		12	0.92	Q3[a,b]	10				10	0.83
Q4[a]	10	2			12	0.83	Q4[a]	10		2		12	0.83
Q5[a]	10	1	1		12	0.83	Q5	2		9	1	12	0.17
JS							Q6[a]	10	1		1	12	0.83
Q1[a]		10	2		12	0.83	Q7[a,b]	10			1	11	0.83
Q2	2	5	5		12	0.42	Q8	9		3		12	0.75
Q3	1	0	11		12	0.00	PU-SL						
Q4[a]	1	8	3		12	0.67	Q1[a]		11		1	12	0.92
Q5[a]	3	4	5		12	0.33	Q2[a,b]		9			9	0.75
OS							Q3[a,b]		11			11	0.92
Q1[a]		1	11		12	0.92	ITU						
Q2	3	2	7		12	0.58	Q1[a]	1		11		12	0.92
Q3[a]	1	1	10		12	0.83	Q2[a,b]	1	1	7	2	11	0.58
Q4[a]	1	2	9		12	0.75	Q3[a]			12		12	1.00
Q5[a]	1	2	9		12	0.75							

MS: Managerial Support; JS: Job Support; OS: Organizational Support; PU-IL: Perceived Usefulness for Individual Learning; PU-SL: Perceived Usefulness for Social Learning; ITU: Intention To Use.

[a] Items preserved as indicators.

[b] Some subjects did not make judgments on these items.

performance-oriented e-learning system (Wang et al., 2011). The main instructional intervention provided in the system was a performance-oriented learning model, which specified performance indicators, required competencies or skills, and associated knowledge for job positions according to job requirements and professional standards. The system was designed to facilitate performance-oriented, self-directed, and socially constructed online learning activities in the workplace. The effectiveness of the system has been examined with positive results. To conduct the survey in this study, a demo and PDF-documented introduction of the workplace e-learning system was presented on a website to allow easy access to the information. A survey questionnaire was created and posted to a website for free online surveys, with a link to the website of the system information. The items in the questionnaire were rated on a 7-point Likert scale worded from "strongly disagree" to "strongly agree."

3.3. Sample

The sampling methods used in this survey were convenience sampling and snowball sampling. The demo and questionnaire were disseminated to a convenient sample of respondents through e-mail and online instant messaging tools. Besides, a management training and consulting company in mainland China assisted to collect data. The HR department of the company helped to invite a reachable sample of clients to participate in a paper-and-pencil questionnaire survey accompanied with printed materials about the system information. The respondents were chosen from different organizations of various size and sectors such as commercial enterprises, schools/colleges, and public sectors, all of whom coming from mainland China. There were a total number of 222 usable responses. The descriptive statistics of the responses are given in Table 2.

4. Data analysis

Since the hypothesized model involved multistage causal relationships, the structural equation modeling (SEM) technique was adopted to test the model in this study. SEM is advantageous in simultaneously evaluating the measurement model and estimating the structural coefficients. LISREL 8.7 was used as the statistical tool to implement the modeling program. The two-stage strategy recommended by McDonald and Ho (2002) was followed such that the confirmatory factor analysis (CFA) was carried out first to evaluate the measurement model, and the full model was then tested to generate the path coefficients. The hypothesized moderating effects in the model were tested via Mathieu, Tannenbaum, and Salas's (1992) method which involves latent product terms to evaluate latent variables interaction effects.

4.1. Measurement model

To examine the measurement properties of the preliminary survey instrument, a confirmatory factor analysis (CFA) was implemented. Table 3 shows the fit indexes values of the initial measurement model that consists of 24 items loading on the six constructs (see Table 1). According to the recommended cut-off criteria of the recommended fit indexes, the initial model did not fit the sample data very well (e.g., values of χ^2/df, RMSEA, and GFI were out of the recommended bounds). Based on the modification index values output by LISREL 8.7, the initial model was revised by dropping items one by one. The revised model, which was derived from the initial model by dropping two items loading on managerial support, two items loading on organizational support, and one item loading on PU-IL, showed satisfactory fit to the sample data contrasted to the recommended fit values.

Table 2
Descriptive statistics of the sample.

	Frequency	Percentage
Gender		
Male	120	54.05%
Female	102	45.95%
Age		
18–25	58	26.13%
26–35	111	50.00%
36–45	37	16.67%
46–55	15	6.76%
Over 55 years old	1	0.45%
Education[a]		
High school	12	5.41%
College/Associate degree	36	16.22%
University/Bachelor degree	113	50.90%
Graduate school/Master degree	60	27.03%
Work experience		
1–3 years	67	30.18%
3–6 years	60	27.03%
6–9 years	19	8.56%
9–12 years	28	12.61%
Over 12 years	48	21.62%
Prior experience using online training systems		
Yes	139	62.61%
No	83	37.39%

[a] One case responded with missing data on educational background.

Table 3
Measurement model fit statistics.

Model	WLS χ^2	df	χ^2/df	P	RMSEA	90% CI	NNFI	CFI	GFI	SRMR
Recommended value			<2.0		<0.10		>0.90	>0.90	>0.80	<0.05
Initial	758.04	237	3.20	0.00	0.10	0.09; 0.11	0.96	0.96	0.78	0.06
Revised	267.73	137	1.95	0.00	0.07	0.05; 0.08	0.98	0.98	0.89	0.04

WLS χ^2: Normal Theory Weighted Least Squares Chi-Square; RMSEA: Root Mean Square Error of Approximation; 90% CI: 90 Percent Confidence Interval for RMSEA; NNFI: Non-Normed Fit Index; CFI: Comparative Fit Index; GFI: Goodness of Fit; SRMR: Standardized Root Mean Square Residual.

To examine the psychometric properties of the revised measurement model, Cronbach's α, convergent validity, and discriminant validity were assessed for the remaining 19 indicators. Cronbach's α reflects the internal consistency reliability among indicators of a construct. As seen in Table 4, all the Cronbach's αs exceed 0.7, showing satisfactory reliability for all the six scales.

Following Fornell and Larcker (1981) and Chiu, Hsu, and Wang (2006), convergent validity was ensured via three criteria: a) all indicator loadings should be significant and exceed 0.7; b) construct reliabilities should exceed 0.8; c) average variance extracted (AVE) should exceed 0.5. As seen in Table 5, the factor loadings of the 19 items varied from 0.72 to 0.91, and all loadings were significant at $p < 0.01$, all of the six composite reliability (CR) values were higher than 0.8, and all AVE values exceeded 0.5. These results suggested satisfactory convergent validity of the revised measurement model.

For discriminant validity, Fornell and Larcker (1981) suggested that the square root of the AVE from the construct should be larger than the correlation shared between the construct and other constructs in the model. Based on Fornell and Larcker's (1981) principle, Chiou and Lin (2009) suggested that the average AVE values of any pair of constructs should be larger than the squared correlation between that pair of constructs. Following this suggestion, results given in Table 6 indicated that the six constructs have acceptable discriminant validity.

Multicollinearity among the exogenous constructs (managerial support, job support, and organizational support) was checked and the results indicated that it was not a serious problem, i.e., the Tolerance values were much larger than 0 (i.e., 0.50, 0.38, and 0.51 respectively), none of the VIF exceeded 10 (i.e., 1.99, 2.61, and 1.98 respectively), and none of the Eigenvalues was much greater than others. Besides, whether common method bias is a concern was assessed in the present study. A single-factor confirmatory factor analysis (CFA), which is a variant of the Harman's one-factor test (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), was implemented. The one-factor model didn't fit the data well (χ^2/df = 11.09, RMSEA = 0.21, GFI = 0.55, CFI = 0.87), suggesting that the method factor (i.e., self-reported data from a single-source survey) was not an account for the co-variation in the data.

4.2. Structural model

To test the hypothesized causal effects, the path coefficients in the structural model were estimated via maximum likelihood by LISREL 8.7. Fig. 3 presents the structural analysis results. The fit values of indexes such as the RMSEA, NNFI, CFI, and GFI show that the full model fit the sample data acceptably. The path coefficients suggest that managerial support (MS) had a significant impact on perceived usefulness for individual learning (PU-IL) ($\gamma_{11} = 0.39$, t-value = 3.19, $p < 0.01$), but had no significant effect on perceived usefulness for social learning (PU-SL) ($\gamma_{21} = 0.18$, t-value = 1.39, not significant at $p < 0.05$). Thus, the hypothesis H1a was supported but H1b was not supported. The structural coefficients also demonstrate that job support (JS) had a significant effect on perceived usefulness for individual learning (PU-IL) ($\gamma_{12} = 0.53$, t-value = 3.41, $p < 0.001$), but had no significant effect on perceived usefulness for social learning (PU-SL) ($\gamma_{22} = 0.18$, t-value = 1.12, not significant at $p < 0.05$). Therefore, hypothesis H2a was evidenced, but H2b was rejected. The effect of organizational support (OS) on perceived usefulness for individual learning (PU-IL) ($\gamma_{13} = -0.28$, t-value = -2.82, $p < 0.01$) was negative and significant, and the path from OS to perceived usefulness for social learning (PU-SL) was significant ($\gamma_{23} = 0.27$, t-value = 2.51, $p < 0.05$). Hence, hypothesis H3a was rejected but H3b was supported. As seen in Fig. 3, the two paths to intention from employees' perceptions are both significant ($\beta_{11} = 0.75$, $p < 0.001$; $\beta_{12} = 0.34$, $p < 0.001$). Therefore, H4a and H4b are supported.

According to the structural equation modeling results, 50% of the variance of perceived usefulness for individual learning (PU-IL) could be explained by the three exogenous variables ($R^2 = 0.50$, $\zeta = 0.50$), 31% of the variance of perceived usefulness for social learning (PU-SL) could be explained by organizational support ($R^2 = 0.31$, $\zeta = 0.69$), and 84% of the variance of intention to use could be explained by the two perception dimensions of usefulness ($R^2 = 0.84$, $\zeta = 0.16$).

To interpret the nature of the indirect paths in the structural model, the mediating roles of perceived usefulness for individual learning and perceived usefulness for social learning between the three exogenous variables (i.e., MS, JS, OS) and the dependent variable, intention to use, were examined. Following Baron and Kenny's (1986) causal step approach, the four conditions for mediation were tested in two models. Firstly the direct relationship between the independent variable and the dependent variable was tested in a direct path model (model 1). Secondly the significance of the path coefficients in a mediating model which includes the mediator was tested (model 2). Besides, according to Wood, Goodman, Cook, and Beckman's (2008) recommendation, the Sobel's (1986) Z was calculated to test the significance of change in

Table 4
Descriptive statistics and measurement reliability.

	Mean	Std.	Cronbach's α
Managerial Support (MS)	5.68	0.98	0.90
Job Support (JS)	5.11	1.06	0.87
Organizational Support (OS)	5.60	1.07	0.89
Perceived Usefulness for Individual Learning (PU-IL)	5.54	1.05	0.81
Perceived Usefulness for Social Learning (PU-SL)	4.95	1.23	0.87
Intention To Use (ITU)	4.57	1.54	0.89

Table 5
Convergent validity.

	λi	t-value	δ	t-value	CR	AVE
Managerial Support (MS)					0.82	0.61
MS1	0.76	12.53	0.42	8.24		
MS2	0.86	14.80	0.27	5.98		
MS3	0.72	11.74	0.48	8.70		
Job Support (JS)					0.87	0.69
JS1	0.80	13.94	0.36	8.40		
JS2	0.87	15.75	0.24	6.82		
JS3	0.81	14.06	0.35	8.32		
Organizational Support (OS)					0.89	0.81
OS1	0.89	15.85	0.22	5.38		
OS2	0.91	16.48	0.17	4.35		
Perceived Usefulness for Individual Learning (PU-IL)					0.90	0.63
PU-IL1	0.77	13.26	0.41	9.32		
PU-IL2	0.76	12.96	0.43	9.41		
PU-IL3	0.81	14.44	0.34	8.88		
PU-IL4	0.82	14.61	0.33	8.80		
PU-IL5	0.81	14.39	0.34	8.90		
Perceived Usefulness for Social Learning (PU-SL)					0.87	0.69
PU-SL1	0.85	15.01	0.28	7.18		
PU-SL2	0.86	15.46	0.25	6.68		
PU-SL3	0.78	13.22	0.40	8.56		
Intention To Use (ITU)					0.89	0.74
ITU1	0.87	15.94	0.25	7.91		
ITU2	0.85	15.30	0.29	8.39		
ITU3	0.86	15.83	0.25	8.00		

the direct effect between the independent and dependent variables. According to these authors, full mediation occurs when the direct effect of independent variable on dependent variable changes from being significant to no longer significant after inclusion of the mediator, while partial mediation can be inferred when the direct effect between independent and dependent variables decreases but remains significant, both plus that the Sobel Z is significant. The mediation testing results were given in Table 7. The results indicate that perceived usefulness for individual learning completely mediate the effects of the three exogenous constructs on the dependent variable, and perceived usefulness for social learning contributes partial mediation in the effects from the three exogenous variables to intention to use.

4.3. Moderating effect

In this study, the latent product approach (Mathieu et al., 1992) was adopted to test the hypothesized moderating effects of job support. The moderation effects were tested through two stages of implementation. Firstly, whether there exist significant moderating effects in the model was diagnosed using Mathieu et al.'s (1992) significance test of $\Delta\chi^2$, and further checked through Carte and Russell's (2003) F-statistic and Cohen's (1988) formula for effect size (f^2). Secondly, on the basis that the moderating effects were verified, the plots of interaction between the moderator and the predictor were depicted to interpret the nature of the interaction effects following Ping's (2002) and Cohen, Cohen, West and Aiken's (2003) approach.

For the testing of moderator role of job support on PU-IL → ITU, firstly Table 8 gives results of the $\Delta\chi^2$ test through the Mathieu et al. (1992) procedure. Fit indexes values in Table 8 suggest that the two models fit the data acceptably, except that the RMSEA values are higher than the recommended cut-off. The poor RMSEA fit may reflect an overestimation due to the relatively small sample size (Bentler & Yuan, 1999; Hu & Bentler, 1999). The $\Delta\chi^2$ between the model with the path from the latent product term to the dependent variable (i.e., the multiplicative model) and the model without that path (i.e., the additive model) is significant at $p < 0.01$ ($\Delta\chi^2_{(df=1)} = 13.38$), showing that the multiplicative model fits the data significantly better.

Table 6
Discriminant validity.

		MS	JS	OS	PU-IL	PU-SL
JS	avgAVE	0.65				
	r(r²)	0.66 (0.43)				
OS	avgAVE	0.71	0.75			
	r(r²)	0.47 (0.22)	0.64 (0.41)			
PU-IL	avgAVE	0.62	0.66	0.72		
	r(r²)	0.57 (0.32)	0.56 (0.31)	0.29 (0.08)		
PU-SL	avgAVE	0.65	0.69	0.75	0.66	
	r(r²)	0.38 (0.14)	0.43 (0.18)	0.46 (0.22)	0.55 (0.30)	
ITU	avgAVE	0.67	0.71	0.77	0.68	0.71
	r(r²)	0.45 (0.20)	0.49 (0.24)	0.26 (0.07)	0.81 (0.66)	0.66 (0.43)

avgAVE: average AVE values of the specified pair of constructs. r(r²): correlation and squared correlation between the specified pair of constructs.
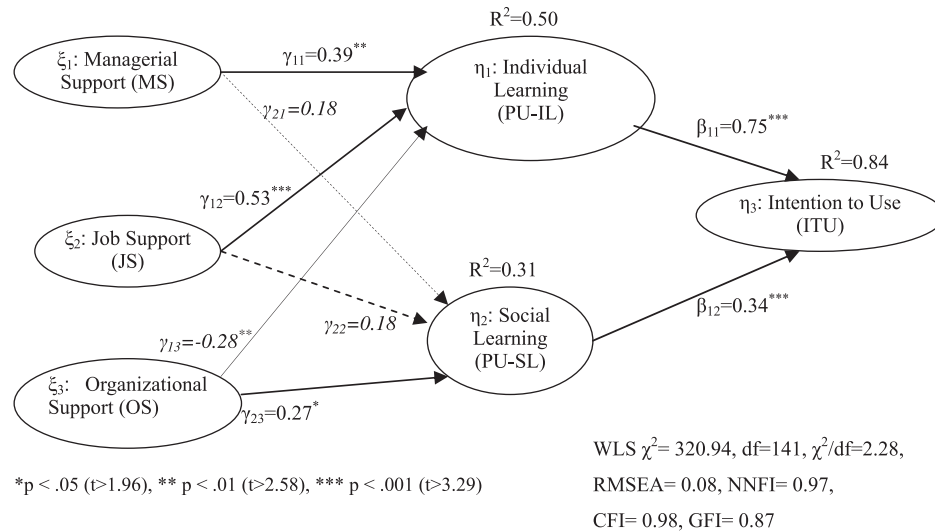
Fig. 3. Structural model. Note: All path coefficients were based on the completely standardized solution generated by LISREL 8.7.

The moderation effect was further assessed via Carte and Russell's (2003) F-statistic, which is defined to test the significance of ΔR^2 explained by the interaction term in the model beyond the main effects, as the following formula:

$$F\left(df_{multiplicative} - df_{additive}, N - df_{multiplicative} - 1\right) = \frac{\Delta R^2 / \left(df_{multiplicative} - df_{additive}\right)}{\left(1 - R^2_{multiplicative}\right) / \left(N - df_{multiplicative} - 1\right)}$$

The F value is significant at $\alpha = 0.01$ ($F_{(1,199)}=149.25$, $p < 0.01$).

The significant $\Delta\chi^2$ and F-statistic suggest that the significant moderating effect of job support on perceived usefulness for individual learning (PU-IL) to intention to use (ITU) relationship is supported. Further, The Cohen's f^2 is calculated as below to decide the effect size:

$$Cohen's \, f^2 = \frac{R^2_{multiplicative} - R^2_{additive}}{1 - R^2_{multiplicative}}$$

According to this formula, the effect size of moderation for job support on PU-IL → ITU is 0.75, which is a large effect.

Table 7
Mediation effect of PU-IL and PU-SL.

Condition	Mediator								
	M: PU-IL				M: PU-SL				
	β (s.e.)	t	R^2	Sobel Z [a]		β (s.e.)	t	R^2	Sobel Z
Predictor x: Managerial Support									
Model 1									
Direct path (x → y)	$\beta_{yx} = 0.51$ (0.07)	7.03^{***}	$R^2_{y, x} = 0.27$			$\beta_{yx} = 0.51$ (0.07)	7.03^{***}	$R^2_{y, x} = 0.27$	
Model 2									
Path a (x → m)	$\beta_{mx, y} = 0.65$ (0.08)	8.46^{***}				$\beta_{mx, y} = 0.42$ (0.08)	5.56^{***}		
Path b (m → y)	$\beta_{ym, x} = 0.98$ (0.09)	10.9^{***}				$\beta_{ym, x} = 0.63$ (0.07)	8.84^{***}		
Path c (x → y)	$\beta_{yx, m} = -0.11$ (0.07)	-1.68^{ns}	$R^2_{y, xm} = 0.83$	10.89^{***}		$\beta_{yx, m} = 0.25$ (0.06)	3.91^{***}	$R^2_{y, xm} = 0.59$	9.00^{***}
Predictor x: Job Support									
Model 1									
Direct path (x → y)	$\beta_{yx} = 0.54$ (0.07)	7.44^{***}	$R^2_{y, x} = 0.29$			$\beta_{yx} = 0.54$ (0.07)	7.44^{***}	$R^2_{y, x} = 0.29$	
Model 2									
Path a (x → m)	$\beta_{mx, y} = 0.64$ (0.08)	8.34^{***}				$\beta_{mx, y} = 0.49$ (0.07)	6.54^{***}		
Path b (m → y)	$\beta_{ym, x} = 0.94$ (0.09)	10.79^{***}				$\beta_{ym, x} = 0.62$ (0.07)	8.31^{***}		
Path c (x → y)	$\beta_{yx, m} = -0.05$ (0.06)	-0.84^{ns}	$R^2_{y, xm} = 0.82$	10.44^{***}		$\beta_{yx, m} = 0.24$ (0.07)	3.63^{***}	$R^2_{y, xm} = 0.59$	8.86^{***}
Predictor x: Organizational Support									
Model 1									
Direct path (x → y)	$\beta_{yx} = 0.27$ (0.07)	3.69^{***}	$R^2_{y, x} = 0.08$			$\beta_{yx} = 0.27$ (0.07)	3.69^{***}	$R^2_{y, x} = 0.08$	
Model 2									
Path a (x → m)	$\beta_{mx, y} = 0.32$ (0.08)	4.26^{***}				$\beta_{mx, y} = 0.53$ (0.07)	7.17^{***}		
Path b (m → y)	$\beta_{ym x} = 0.91$ (0.07)	12.24^{***}				$\beta_{ym, x} = 0.81$ (0.08)	9.63^{***}		
Path c (x → y)	$\beta_{yx, m} = -0.02$ (0.05)	-0.46^{ns}	$R^2_{y, xm} = 0.82$	13.00^{***}		$\beta_{yx, m} = -0.15$ (0.07)	-2.12^{*}	$R^2_{y, xm} = 0.56$	10.12^{***}

The italics indicate the path coefficients for the effects of the predictors on the dependent variable before (i.e., model 1) and after (i.e., model 2) the inclusion of the mediator for the decision of whether the mediation is a full mediation or a partial mediation.
Dependent variable y: Intention to use.
*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$. ns: not significant.
[a] Sobel $Z = a*b/\sqrt{a^2 * s.e._b^2 + b^2 * s.e._a^2 + s.e._a^2 * s.e._b^2}$, a denotes the coefficient of path a, i.e., $\beta_{mx, y}$, while b denotes the coefficient of path b, i.e., $\beta_{ym, x.}$

Table 8
χ^2 test of the difference in fit between the model with and without interaction.

Model	WLS chi-Square	df	χ^2/df	RMSEA	90% CI	NNFI	CFI	GFI	Multiple R^2	ζ
Additive model (main effect model)	82.84 ($P = 0.00$)	23	3.60	0.11	0.08; 0.13	0.95	0.97	0.92	0.86	0.14
Multiplicative model (interaction model)	69.45 ($P = 0.00$)	22	3.16	0.10	0.07; 0.13	0.96	0.98	0.94	0.92	0.08
$\Delta\chi^2$	13.38	1							$\Delta R^2 = 0.06$	

With reference to LISREL 8.7 estimates, the interaction term PU-IL × JS has a significant negative impact on the criteria variable ($\gamma = -0.26$, t-value $= -4.46$), suggesting that perceived job support weakens the relationship between perceived usefulness for individual learning (PU-IL) and intention to use (ITU). Thus, the positive moderation hypothesis in H5a is rejected with an opposite direction. To interpret the nature of the moderation effect, the interaction between job support and perceived usefulness for individual learning on intention to use was plotted following the standard procedures (Fig. 4) (Aiken & West, 1991). Using Ping's (2002) and Cohen, Cohen, West, and Aiken (2003) approach, the significance of the simple slopes were tested. Results show that all three simple slopes are significant at $p < 0.05$ (i.e., for low job support, t-value$_{(slope)} = 12.15$, standard error $= 0.0003$; for mean job support, t-value$_{(slope)} = 11.34$, standard error $= 0.0002$; for high job support, t-value$_{(slope)} = 8.18$, standard error $= 0.0003$).

For the moderator role of job support on the relation between PU-SL and ITU, firstly Table 9 gives the fit statistics. The $\Delta\chi^2$ between the interaction model and the main effect model is significant ($p < 0.01$, $\Delta\chi^2_{(df=1)} = 16.59$), suggesting that the hypothesized significant moderation of job support on PU-SL → ITU is verified. Again, the F-statistic further confirms the effect ($F_{(1,183)=}114.38$, $p < 0.01$). The effect size of the moderation for job support on PU-SL → ITU is a large effect (Cohen's $f^2 = 0.63$).

The LISREL estimate produces a significant negative path from the latent product term PU-SL × JS to the criteria variable ($\gamma = -0.25$, t-value $= -3.88$), indicating that perceived job support attenuates the relation between perceived usefulness for social learning (PU-SL) and intention to use (ITU). Thus the positive moderation hypothesis in H5b is not supported. Fig. 5 plots the interaction between job support and PU-SL on intention to use. Following the same procedures, the three simple slopes are tested to be significant at $p < 0.05$ (i.e., for low job support, t-value$_{(slope)} = 6.44$, s.e. $= 0.0007$; for mean job support, t-value$_{(slope)} = 5.22$, s.e. $= 0.0005$; for high job support, t-value$_{(slope)} = 2.96$, s.e. $= 0.0007$).

5. Discussion

The purpose of this study was to examine the role of work environment factors in explaining employees' motivation to use an e-learning system in the workplace. Managerial support, job support, and organizational support were identified as the key factors of organizational learning environments. The research model of the study proposed that the three factors would enhance employees' intention to use the e-learning system through improving their perception and belief about the usefulness of using the system. The model was tested on sample data collected from mainland China, using the structural equation modeling (SEM) and moderated structural equation modeling (MSEM). The results suggested that: (1) perceived managerial support and perceived job support had a significant positive impact on perceived usefulness of the workplace e-learning system in supporting individual learning such as identification of knowledge gap and acquirement of work-related competency, and (2) perceived organizational support had a significant positive effect on perceived usefulness of the work-place e-learning system in supporting social learning, such as peering mentoring and coaching and teamwork climate. The two dimensions of employees' perceptions of the usefulness of using the e-learning system both had a significant positive influence on their intention to use the system. Perceived usefulness for individual learning was found to completely mediate the paths from the three exogenous variables, MS, JS, and OS, to intention to use e-learning, while perceived usefulness for social learning contributed partial mediations in the effects of the three work environment factors on trainees' intention to use e-learning. Contrary to the hypotheses, the MSEM results suggested that perceived job support had significant mitigating moderation effect on the relationships from the two perceived usefulness dimensions to employees' intention to use e-learning.
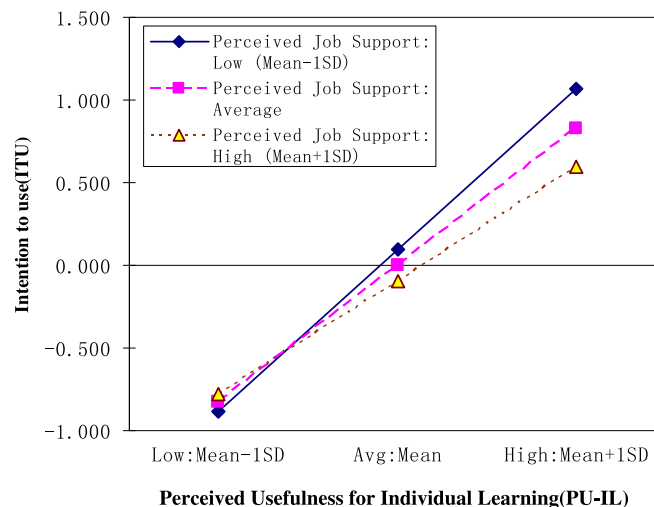

Fig. 4. Plot of the interaction between PU-IL and job support on intention to use.

Table 9
χ^2 test of the difference in fit between the model with and without interaction.

Model	WLS chi-Square	df	χ2/df	RMSEA	90% CI	NNFI	CFI	GFI	Multiple R^2	ζ
Additive model (main effect model)	119.66 ($P = 0.000$)	39	3.07	0.10	0.08; 0.12	0.97	0.98	0.91	0.87	0.13
Multiplicative model (interaction model)	103.07 ($P = 0.000$)	38	2.71	0.09	0.07; 0.11	0.97	0.98	0.92	0.92	0.08
$\Delta\chi^2$	16.59	1							$\Delta R^2 = 0.05$	

The positive effect of perceived managerial support on perceived usefulness of the workplace e-learning system in supporting individual learning was consistent with the expectancy-theoretical explanation of the social context impacts on trainees' motivation to participate in learning. The significant path means that influences from interpersonal relationships such as supervisor and manager reinforcement will act as a motivator for trainees' expectation of gaining beneficial outcomes from using e-learning and their subsequent intention to accept the system. The result is also accordant with the positive link between social influences and workers' perceived usefulness of using a workplace technology (Lewis et al., 2003; Venkatesh & Davis, 2000). In corporate e-learning literature, while senior management support and top leadership commitment was stated to be an important factor in e-learning effectiveness (Rosenberg, 2006), the results of this study provided quantitative support for these claims.

Job support was also found to have a significant direct relationship with perceived usefulness of the e-learning system for individual learning. From the expectancy-theoretical point of view, the result suggests that a high degree of job support, i.e., many opportunities for workers to learn and transfer new knowledge and skills in their job, will increase employees' expectancy that the learned knowledge and skills from participation in e-learning will be useful in leading to improved job performance, and consequently motivate them to use and participate in e-learning activities. The finding is also consistent with the relation between perceived resources (e.g., sufficient knowledge and data resources) and perceived usefulness of work technologies found in technology acceptance literature (Mathieson & Chin, 2001). In the context of this research, the e-learning mode itself permits workers to learn through alternative ways and to access new knowledge with more flexibility.

Organizational support was found to have a significant impact on perceived usefulness of the workplace e-learning system in supporting social learning. This result is accordant with the expectancy-theoretical explanation, that is, organizational supportive policies (e.g., budgetary support, monetary rewards, promotion, etc.) for e-learning is an effective factor for increasing employees' expected benefits of learning, and thus will motivate them to use and participate in e-learning. In the technology acceptance area, from an institutional theory point of view, organizational norms, values, culture, and history all have a significant influence on the thoughts and actions of individuals within an organization (Lewis et al., 2003). This justification was empirically evidenced in the case of workplace e-learning usage in the result of this study. The result implies that organizational policies and procedures is a critical dimension of a facilitative work environment for learning, and thus, elements that constitute organizational policy infrastructures such as business strategies, incentives systems, financial and budgetary support in HRD, and organizational decision structure will be essential conditions for e-learning success.

Contrary to the hypotheses, perceived job support was found to have mitigating moderating effects on the relationships between the two dimensions of employees' perceived usefulness and their intention to use the e-learning system. One of the possible reasons may relate to the phenomenon of resistance to changes. Prior research findings pointed out that implementation of new workplace technologies often involves learning new technologies, changes in work practices, and an additional workload. These may lead to a fear of adverse consequences or reduced behavior control and resistance to changes, and employees' resistance to change may reduce the effective use of the new technologies (Karsh, 2004; Umarji & Seaman, 2005). In terms of e-learning technology, the implementation of a new online learning system and accompanying policies in an organization may lead to additional learning effort and workload for workers, as well as to employees' feelings of uncertainty and reduced behavioral control in the new environment. Another possible reason may be associated with employees'
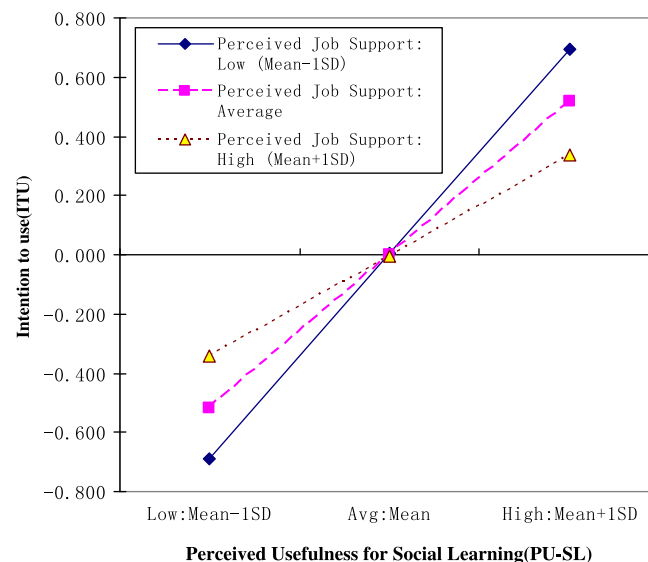
Fig. 5. Plot of interaction between PU-SL and job support on intention to use.

individual characteristics such as computer self-efficacy and learning goal orientation, which have been found to have an impact on learners' motivation and intention to use learning technologies (Klein, Noe, & Wang, 2006).

It was unexpected to find that perceived organizational support has a significant negative effect on perceived usefulness of the e-learning system for individual learning. This result is not consistent with the theoretical assumption. However, in prior literature similar results were reported, e.g., Tharenou (2001) found employer support was negatively linked to trainees' motivation through expectation, and in Kozlowski and Farr (1988) updating climate was found to have no significant relation with trainees' technical updating responses. These mixed results may imply that further investigations are needed.

6. Implications

To address the issue of enhancing employees' participation in workplace e-learning, this study built and tested a model of work environment influences on employees' motivation to use an e-learning system mediated by their valence, instrumentality, and expectancy belief. The findings provide implications to both practice and research.

In the practical side, the results indicated that the three work environment factors, i.e., managerial support, job support and organizational support, were significant motivators for employees' acceptance of the e-learning system. This finding implies that, for the management in organizations who are in charge of e-learning initiatives, it would be a first step to check and redesign work environment elements, e.g., social atmosphere, work flow design, and skill-based reward system. It could be wise to identify and overcome the potential situational constraints in the organizational systems that may be detrimental and misguiding for workers' expectancy beliefs toward using e-learning prior to making the financial inputs in the design and development efforts. It could be expected that if it is initiated in an appropriate work environment, the potential of e-learning as a tool for employee formal and informal learning could be exploited. At the macro level, organizations in the process of strategic change via e-learning should consider and put adequate attention to leadership commitment, job system design, and organizational HRD policies and strategies; each of these aspects constitutes an essential dimension of a facilitative organizational environment for e-learning implementation. Besides, the results of the present study indicate that both perceived usefulness for individual learning and perceived usefulness for social learning play a mediating role in the work environment influences on individuals' motivation to learn. This finding suggests that the two pedagogical design principles for e-learning, i.e., design to support individual cognitive learning and to support social construction of knowledge, should be considered in instructional design practices of workplace e-learning applications.

From the theoretical standpoint, the findings of this research extend the literature on e-learning acceptance by including and validating the effects of work environment factors. The expectancy theory of training motivation as well as the social influences and facilitating conditions in technology acceptance models provide sound theoretical foundations for integrating work environment influences in e-learning acceptance models. Education or training is a kind of complex system. There are many interacting components in an educational or training system, including learners, instructors, professional communities, administrators, support staff, technologies, facilities, infrastructure, funding and support, reporting, and etc. It is crucial to have a holistic view or system perspective, and a comprehensive planning for effective application of learning technologies in school, institutional and organizational environment (Wang, 2011; Klett, 2010). Future research on effectiveness of e-learning at work could make more endeavors to build and test integrative models involving organizational, technological, instructional design, and individual differences factors for e-learning motivation, achievements, and transfer.

7. Conclusion

Based on the theoretical frameworks of expectancy theory of training motivation and the external contextual variables in technology acceptance models, a conceptual model was proposed in this study to examine the impacts of organizational learning environment factors on employees' motivation to use workplace e-learning. Results of structural equation modeling technique performed on a sample data supported some of the research hypotheses. Findings of this research added to the current understandings on workplace e-learning success factors by validating the environmental influences on trainees' motivation to use e-learning through changing their valence, instrumentality, and expectancy beliefs.

Limitations of this research should be noted. Firstly, the convenience and snowball sampling method was not rigorously random and may limit the generalizability of the results. Compared to the rigorous requirements of the advanced statistical procedures applied in this study, the sample size was limited and may have led to biased results. Secondly, the self-reported and cross-sectional quantitative data may have led to the omission of information about some of the factual, dynamic, and detailed patterns that represent workplace scenarios and that depict relations among the organizational environment factors and employees' thoughts and actions regarding usage of workplace online learning systems. Even though rigorous procedures were applied to ensure the reliability and validity of the research instrument and data analysis results, the validity of the findings requires further evidence. Future research may consider building the design on triangulated data sources, multiple data analysis methods, and cross-validation of results.

Acknowledgement

Appendix. Survey instrument

Perceived managerial Support (MS) (Tracey & Tews, 2005)
  1. Supervisors give recognition and credit to those who apply new knowledge and skills to their work.
  2. Top management expects continuing technical excellence and competence.

3. Top management expects high levels of performance at all times.

Perceived Job Support (JS) (Tracey & Tews, 2005)
  1. Job assignments are designed to promote personal development.
  2. Gaining new information about ways to perform work more effectively is important in this organization.
  3. Work assignments include opportunities to learn new techniques and procedures for improving performance.

Perceived Organizational Support (OS) (Tracey & Tews, 2005)
  1. There is a performance appraisal system that ties financial rewards to use of newly acquired knowledge and skills.
  2. There are rewards and incentives for acquiring and using new knowledge and skills in one's job.

Perceived Usefulness for Individual Learning (PS-IL)
  1. The e-learning system would be helpful for me to construct knowledge in my work context. (Kirkpatrick & Kirkpatrick, 2006)
  2. Using this e-learning system would allow me to arrange my learning more effectively. (Arbaugh, 2000)
  3. Using this e-learning system would enhance effectiveness in my work-related learning. (Davis et al., 1989)
  4. This e-learning system would be helpful for me to identify my knowledge gaps or learning needs. (Kirkpatrick & Kirkpatrick, 2006)
  5. Using this e-learning system in my job would enable me to acquire job-related competency more quickly. (Davis et al., 1989)

Perceived Usefulness for Social Learning (PS-SL)
  1. This e-learning system would be helpful for formation of a workplace climate of cooperation in work-related learning. (Kankanhalli et al., 2005)
  2. This e-learning system would be helpful for formation of a workplace climate of peer mentoring and coaching. (Self-developed based on Noe et al., 1997)
  3. This e-learning system would be helpful for formation of a workplace climate of teamwork in learning. (Kankanhalli et al., 2005)

Intention To Use (ITU)
  1. Given that I had access to this e-learning system, I predict that I would use it. (Venkatesh & Davis, 2000)
  2. If possible, I would recommend this e-learning system to other teammates. (Kirkpatrick & Kirkpatrick, 2006)
  3. Assuming I have access to the e-learning system, I intend to use it. (Venkatesh & Davis, 2000)

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