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Abstract

Despite the explosion of interest in informal learning in the workplace, few attempts have been made to synthesize the current literature. This article provides an integrative and analytical review of prior empirical studies, particularly focusing on what factors have been identified as antecedents of informal learning in organizations and how informal learning has been conceptualized and measured. It then suggests future avenues for theory building, research, and practice. The authors propose a conceptual framework for understanding informal learning activities using three dimensions: learning competence, intentionality, and developmental relatedness. Implications for human resource development research and practice are also discussed.

Keywords: informal learning; antecedents; measures; conceptual framework

Introduction

Interest in informal learning has grown in the field of human resource development (HRD) over the last three decades as scholars have recognized that informal learning is a driving force of corporate sustainability and competitiveness (Ellinger, 2005; Schulz & Roßnagel, 2010). In the preface of his book, *Informal Learning*, Cross (2007) states that “the workhorse of knowledge economy has been, and continues to be, informal learning (p. xiii).” He goes on to suggest that informal learning likely accounts for 70 to 80 percent of workplace learning as it is highly integrated into everyday work activities.

Numerous studies have reported a positive influence of informal learning in the workplace, including enhanced productivity and cost savings at the organizational level, and enhanced knowledge and skills of individual employees (Dale & Bell, 1999; Ellinger & Cseh, 2007; Leslie, Aring, & Brand, 1998). Engaging in informal learning activities such as collaboration with colleagues can also result in changes in individuals’ beliefs or points of view (Meirink, Meijer, Verloop, & Bergen, 2009). Employees are more likely to gain new, practical knowledge from informal learning activities (Berg & Chyung, 2008; Jeon & Kim, 2012).

With increased interest in and demand for informal learning, pressure on HR practitioners to develop and support informal learning has also grown (Schürmann & Beausaert, 2016). Responding to these calls, numerous researchers have conducted conceptual and empirical studies on how to better facilitate informal learning (Choi & Jacob, 2011; Ellinger, 2005; Marsick, 2009; Skule, 2004). Searching *Business Source Complete* and *Academic Search Complete* using the keywords *informal learning*, we found 2,225 full-text, scholarly, peer-reviewed journal articles: 145 published between 1991 and 2000; 838 articles between 2001 and 2010; and 1,242 articles between 2011 and 2017.

Despite this explosion of research on informal learning, few studies have synthesized the core concepts, particularly identifying what drives informal learning in organizations, and most of them have drawn their conclusions from conceptual work. Thus, a comprehensive literature review of empirical studies on informal learning is urgently needed.

By definition, informal learning involves non-institutionalized and unstructured learning, and occurs deliberately or spontaneously, encompassing broad learning behaviors, activities, and theories (Marsick, 2009). Cunningham and Hillier (2013) described informal learning in the workplace as "...any learning activity related to the pursuit of understanding, knowledge, or skills...almost everything that a person does can be thought of as informal learning" (p.38). In line with these open and broad views, one of the challenges in informal learning research has been the difficulty of observing and measuring learning (Skule, 2004; Schürmann & Beausaert, 2016). It is critical to see which conceptual frameworks and measurements of informal learning have been utilized in the literature (Cerasoli et al., 2017). In doing so, examining the types of informal learning and related antecedents is important before a study measures informal learning outcomes.

The purpose of this study is to synthesize the current body of literature on informal learning, focusing on empirical studies that have investigated the antecedents of informal learning, and to identify an agenda for future theory building, research, and practice. The current study will help HRD scholars and practitioners understand the scope and drivers of informal learning based on empirical evidence. This study seeks to answer the following research questions using Torracco's (2005) and Callahan's (2010, 2014) guide to conducting integrative literature review:

- 1) How has informal learning been conceptualized and measured in prior research?
- 2) What factors influencing informal learning in the workplace have been empirically identified?
- 3) What remains under-studied for future research?

Definitions, Behaviors, and Theories of Informal Learning

Several scholars have defined informal learning, often in contrast with formal learning, but no consensual definition has emerged (Clarke, 2004). Whereas formal learning is characterized as highly structured, institutionally-sponsored, and classroom-based learning with an educator or trainer, informal learning is characterized as "predominantly unstructured, experiential, and non-institutionalized" as individuals make sense of their everyday working experiences (Marsick & Volpe, 1999, p. 4). Informal learning is initiated by the learners, either individually or with others, in pursuit of knowledge and skill acquisition to serve the individual's as well as the organization's objectives.

Informal learning activities are largely "self-directed, intentional, and field-based" (Cerasoli et al., 2017, p. 2). Integrated with the concept of incidental learning, informal learning is often discussed as an accidental by-product of work activities that is spontaneous and tacit (Watkins & Marsick, 2001). Similarly, Eraut (2004) described informal learning as "implicit, unintended, opportunistic and unstructured learning and the absence of a teacher" (p. 250).

Schugurensky (2000) identified three forms of informal learning depending on the degree of consciousness and intentionality exercised by the learner: 1) self-directed learning is both conscious and intentional; 2) incidental learning is conscious but not intentional (e.g., learning as a by-product of working); and 3) tacit learning, also known as socialization, is neither conscious nor intentional. More recently, Bennett (2012) suggested adding a fourth form of informal learning: integrative learning. This type of informal learning is nonconscious but intentional as it involves implicit processing of tacit knowledge and sudden insights generated from intuition (e.g., "aha" moments). Taken together, informal learning is an individual learning process that is highly integrated with daily work activities and can be deliberate, conscious, planned, and intended, or spontaneous, unconscious, unplanned, and unintended, resulting in the enhancement of knowledge and skills.

Scholars have also identified the major types of informal learning activities and practices. For example, Crouse, Doyle, and Young (2011) and Clarke (2004) identified doing new tasks, working with others, observing others, trial and error, reading/researching, surfing the web, reflecting on action, mentoring, job rotation, job shadowing, and networking. Lohman (2000, 2006) included asking questions, sharing materials and resources with others, searching the internet, scanning professional magazines and journals, sharing and reflecting on other's practices and experiences, and trying out new ideas and techniques. Chan and Auster (2003) additionally discussed on-the-job training, conference attendance, and self-directed projects.

Van Woerkom, Nijhof, and Nieuwenhuis (2002) and De Groot et al. (2012) emphasized critical reflective behaviors at work for effective informal learning, and highlighted learning from mistakes, challenging group think, asking for feedback, and evaluating findings from scientific research. These exemplary practices indicate that informal learning occurs in a number of different ways, involving the individual cognitive processes and actions as well as socio-cognitive interactions (Clark, 2004).

Scholars have also attempted to advance a theoretical framework. For example, drawing on Kolb's (1984) experiential learning theory, Marsick, Nicolaidis, and Watkins (2014) claimed that reflective strategies are essential for productive informal learning since the learning process starts with recognizing problems between what is expected and what actually happens in everyday life. In this sense, informal learning recognizes personal experiences related to daily routine work with a dialectical process of action and reflection.

Based on Argyris and Schon's (1978) double loop learning theory, intentionality, conscious thought and planning, and proactivity were suggested as facilitators of informal learning (Marsick, 2009) since they deepen an individual's critical reflection that confronts underlying beliefs and assumptions. In comparison, drawing from Wenger's (1998) community of practice, Poell, Chivers, Van der Krogt, and Wildermeersch's (2000) proposed learner-network theory states that informal learning occurs in relationships and interactions with various social contexts (e.g., people, job tasks, and organizational culture), and different kinds of informal learning needs and patterns can emerge depending on the different types of learning networks. Taken together, the informal learning process is not linear, nor does it indicate personal meaning-making in a vacuum; rather, it is highly contextual and emerges from self-perceived cognitive gaps and task-dependent social interactions.

In an effort to provide a unifying framework for informal learning, Marsick (2009) suggested Kurt Lewin's (1947) field theory as a key to understanding informal learning in that his psychological equation of ($B = f(P, E)$) well-captures the influences of individual, group, and organizational variables. Human behavior (B) is the function of both the person (P) and his or her surrounding environment (E); thus, drawing on field theory, both personal and contextual characteristics play a role in shaping informal learning experiences. For example, organizational culture and structure (e.g., time, materials, systems, and incentives) should influence individuals' informal learning, and individual characteristics such as their beliefs, values, and histories should mediate their actions. Marsick (2009) also noted that leadership is often considered a critical factor that shapes organizational culture and individual behavior in allocating human, financial, and physical resources.

Method

An integrative literature review is a form of research that reviews and synthesizes literature on a specific topic using an integrative method through a systematic process of searching, selecting, and synthesizing the literature (Torraco, 2005). In the following section, we describe the literature search and selection process considering the six W's suggested by Callahan (2010, 2014).

For a thorough search of the literature, we used multiple online databases including ERIC, Academic Search Complete, Business Source Complete, Education Full Text, and Human Resources Abstracts using the following combinations of search terms that appeared in abstracts and titles of articles: ((AB informal w1 learn*) or (TI informal w1 learn*)) AND AB (workplace* or employ* or organiza*). The truncated versions of "employee" and "organization" were used to capture all ending variants. We limited our search to articles published in peer-reviewed journals with full-text versions available. This search was conducted twice in March 2015 and April 2017. After removing redundant articles, 465 articles remained.

We initially screened the article abstracts to determine which studies explored antecedents of informal learning in workplace settings. For example, studies that focused on students' informal learning were excluded. If the article was deemed relevant to our research purpose, the full text was screened and included if it met all of the following criteria: (a) empirical study (qualitative, quantitative, or mixed method), (b) published in English, (c) published from 1998-2017, and (d) focused on informal learning. Some studies used the term "workplace learning" in their abstracts, but our review of those studies found that the concepts of formal training and informal learning were combined; thus, they were excluded. Additionally, a snowball method was utilized as we tracked any relevant articles identified in the reference lists (Greenhalph & Peacock, 2005). As a result, we identified 55 articles for the final review (see Table 1).

(Insert Table 1 about here)

We used Microsoft Excel to generate a review matrix to organize the data set. Table 2 provides a snapshot of the matrix, which consists of the author(s)' name(s), research title, journal title, publication year, research methodology, sample, instrument, and findings. Each antecedent of informal learning identified in the final set of articles was categorized using the framework of the individual, group, and organizational levels based on Lewin's (1947) field theory. Articles were distributed to the present authors for the initial analysis followed by a group discussion and consensus

(Insert Table 2 about here)

Findings

In this section, we first report how informal learning was conceptualized and measured within the selected studies. This step was necessary to clarify the nature, type, and scope of informal learning. Second, the antecedents of informal learning were captured and analyzed according to the individual, group, and organizational levels.

Conceptualization and Measurement of Informal Learning in Empirical Studies

Many studies have conceptualized informal learning along the lines of incidental learning rather than distinguishing them; thus, informal learning is described as either intentional or serendipitous. For example, De Groot et al. (2012) indicated that informal learning occurs "more or less as an accidental by-product of work activities or more deliberately by means of reflection on incidents" (p. 49). Skule (2004) also stated that informal learning may be "intentional, but is in most cases non-intentional" (p. 9). In contrast, Watkins and Marsick (2001) introduced incidental learning as a subset of informal learning and reported that informal learning can be planned and intentional, but incidental learning is never planned. In our review, only a few empirical studies (e.g., Rowden, 2002; Rowden & Ahmad, 2000) investigated these two different concepts separately. Only one study (i.e., Schulz & Roßnagel, 2010) solely focused on intentional informal learning in the workplace in which learners initiate and structure their learning.

Not surprisingly, the scope and types of informal learning practices varied across studies as well. Choi and Jacobs (2011) conceptualized learning with others, self-experimentation, and external scanning as three subtypes of informal learning, whereas Cunningham and Hillier (2013) used mentoring, peer relationships, and temporary job restructuring as the general framework of informal learning. Doornbos, Simons, and Denessen (2008) presented a framework which identified 12 types of work-related learning categorized by developmental relatedness (i.e., individual, together, and others) and learning intentionality (i.e., deliberate or spontaneous).

In educational contexts, Bednall, Sanders, and Runhaar (2014) identified reflection on daily activities, knowledge sharing with colleagues, and innovative behaviors as three representative informal learning activities to enhance knowledge and expertise acquisition. Hoekstra, Korthagen, Brekelmans, Beijaard and Imants (2009) divided informal learning into four major categories: learning by experimenting, learning by getting ideas from others, learning by doing, and learning by reflective practices. Kwakman (2003) reported reading, experimenting, reflecting, and collaborating as major types of informal learning when teachers participate in professional development. Other studies reported self-directed learning (e.g., Schulz & Roßnagel, 2010), critical reflection (e.g., De Groot et al., 2012), or interpersonal interactions (e.g., Van Der Heiden, Boon, Van Der Klink, & Meijs, 2009) as the primary modes of informal learning.

Since the definitions and scopes of informal learning varied widely among studies, it is not surprising to see little coherence in the measurement of informal learning. Among the 27 quantitative studies, four most frequently used scales were identified. Noe et al. (2013) developed a 3-factor 9-item instrument with each factor representing learning from oneself, learning from others, and learning from non-interpersonal sources. Rowden and Ahmad's (2000) Small Business Workplace Learning survey was based on Rowden's (1995) previous qualitative study with eight items related to informal learning and six items related to incidental learning behaviors. Van Woerkoms' (2003) instrument operationalized critical reflection at work using seven dimensions: reflection, experimentation, learning from mistakes, career awareness, critical opinion sharing, asking for feedback, and challenging groupthink. Finally, Lohman (2005) developed and validated an instrument consisting of eight informal learning activities.

Other studies (e.g., Jeon & Kim, 2012) utilized secondary data from national, large-scale surveys such as the Human Capital Corporate Panel survey in South Korea, the Changing Nature of Work and Lifelong Learning survey in Canada, and the Adult Education Participation Survey in Taiwan. Some of these studies simply asked about the

number of hours spent participating in informal learning activities or used a binary scale indicating participation or non-participation in informal learning during a certain time period. Other measures asked about the extent of the informal learning contribution relative to formal learning to obtain certain skills and knowledge. For example, Enos, Kehrhahn, and Bell (2003) listed 20 core skills associated with successful completion of managerial duties and asked participants to identify how much they learned from informal learning versus formal learning for each skill.

Another observation that caught our attention was the variety of samples representing various nations and occupations. Of the 55 studies, 17 were conducted in northwestern European countries such as the Netherlands, Sweden, Norway, and Germany, followed by 14 studies in the U.S and five studies in Canada. This reflects an increased interest in informal learning within highly developed countries (Smith, n.d.). The national backgrounds of other studies included South Korea, Malaysia, Russia, Indonesia, and Australia. Regarding the industrial type or occupation, the most frequently studied occupational group was teacher/faculty across 11 studies, followed by the healthcare profession across seven studies. Other studies included HRD professionals, government employees, information technology professionals, police officers, professional chefs, engineers, and scientists. Four studies focused on managerial-level employees, and three studies focused on small- and medium-sized enterprises (SMEs).

Antecedents of Informal Learning in the Workplace

In this section, we provide a review of factors affecting informal learning based on the extant literature. Guided by Lewin's field theory, which identified the importance of interactions between individuals and environments, elicited factors are categorized into three groups: individual, group, and organizational levels (see Table 3).

The Antecedents of Informal Learning at the Individual Level

The individual level focuses on individual behaviors and characteristics. We found that the determinants of informal learning at the individual level had the following three characteristics: socio-demographic, personal, and job characteristics.

Socio-Demographic Characteristics. Studies investigating the relationship between age or generation and informal learning reported mixed results. Some scholars noted that younger generations tended to be more open-minded, eager to learn, and adaptive to technology (Sibaran, Tjakraatmadja, Putro, & Munir, 2015), while others revealed a positive relationship between informal learning and age (e.g., Nilsson & Rubenson, 2014).

Participation in informal learning differed between genders in terms of learning method preferences (de Grip & Smits, 2012; Kwakman, 2003), learning conditions such as feedback, new learning approaches, and communication tools (Kyndt, Dochy, & Nijs, 2009), and reasons for engaging in informal learning (Nilsson & Rubenson, 2014). Furthermore, the educational level was significantly and positively associated with the degree of informal learning efforts (e.g., Kyndt et al., 2009).

Personal Characteristics. Personal characteristics included cognitive ability, self-efficacy, personality, and interest. Individuals perceived the necessary conditions for learning at work differently depending on the level of cognitive or metacognitive ability (Enos et al., 2003; Hoekstra et al., 2009). Self-efficacy predicted individuals' participation in informal learning (e.g. Choi & Jacobs, 2011). Furthermore, particular personality types (e.g., nurturing and outgoing) promoted engagement in learning that involved interactions with others (Lohman, 2005, 2006).

Individuals' interests involve multiple aspects: motivation, perception, and attitude or belief in informal learning. Motivation was reported in the form of love of learning (Lohman, 2005, 2006), interest in learning (e.g., Noe et al., 2013), perceived need for lifelong learning (e.g., Lans, Wesselink, Biemans, & Mulder, 2004), learning value (Van der Heijden et al, 2009), learning goal (Choi & Jacobs, 2011) or goal orientation, and personal or situational interest (Schulz & Roßnagel, 2010). Attitude toward or belief in informal learning also mediated the effects of learning competences (Doornbos et al., 2008; Schulz & Roßnagel, 2010).

Career motivation and interest stimulate individuals' career development intentions. Three career-motivating factors contributing to informal learning were interest in the profession (Lohman, 2005, 2006), professional development commitment (Lohman, 2006), and value toward career progress (e.g., Cormier-MacBurnie, Doyle, Mombourquette, & Young, 2015; Van Rijn, Yang, & Sanders, 2013).

Job Characteristics. Employees who differed in seniority, function, department tenure, part-time versus full-time, and skill level (Doornbo et al., 2008; Kyndt et al., 2009; Nilsson & Rubenson, 2014; Van der Heijden et al., 2009) engaged in informal learning activities differently.

Greater job satisfaction positively influenced the effectiveness of informal learning through learning by doing (Jeon & Kim, 2012) including a supportive environment, benefit or compensation, recognition, climate, and contentment (e.g., Rowden & Conine, 2005). In addition, the utility of knowledge was significantly higher when employees perceived that their knowledge from a current task was useful (Jeon & Kim, 2012; Sutherland Olsen, 2016).

Challenging work or task complexity requires informal learning, particularly on-the-job learning (Schürmann & Beusaert, 2016). A challenge that encouraged job completion increased the learning commitment (Eraut, 2004). In addition, task autonomy and labor intensity were highly associated with informal learning (e.g., Doornbos et al., 2008; Schürmann & Beusaert, 2016). Employees who reported that their job required a great deal of analysis were more likely to participate in informal learning (Nilsson & Rubenson, 2014).

The Antecedents of Informal Learning at the Group Level

Informal learning at the group level relates to interpersonal dynamics and socio-emotional processes within and between groups in the workplace (Brown, 1988; Marquardt, 2011). The factors representing interpersonal relationships and group interaction (e.g., leader-member exchange and utilizing a peer group) fell into this level. We categorized the group-level determinants into four categories: leadership, feedback, networking, and interpersonal relationship.

Leadership Support. Managerial support is a critical component facilitating informal learning (e.g., Ouweneel, Taris, Van Zolingen, & Schreurs, 2009; Pifer, Baker, & Lunsford, 2015). According to Sambrook and Stewart (2000), managerial characteristics such as senior managers' commitment, managerial skills, and leadership styles influenced employees' participation in informal learning. Ellinger (2005) found that learning-committed leaders play several roles: (a) create informal learning opportunities; (b) serve as developers (coaches or mentors); (c) visibly make space for learning; (d) encourage risk taking; (e) instill the importance of sharing knowledge and developing others; (f) give positive feedback and recognition; and (g) serve as role models. Jeon and Kim (2012) also found that top management leadership positively affected the informal learning process.

Feedback. Feedback is an essential activity and resource for learning (e.g., Holley, Santos, Cook, & Kerr, 2016; Nisbet, Dunn, & Lincoln, 2015). Hoekstra et al. (2009) found that feedback and reflective dialogue fostered teachers' learning. Doornbos et al.'s (2008) study of Dutch police also revealed that collegial feedback was positively associated with more frequent learning activities. In addition, feedback from leaders led to informal learning (Eraut, 2004), and in particular, open communication was a key for supportive leadership (Eraut, 2004; Jeon & Kim, 2012).

Networking. Participation in a network positively stimulates learning with peers and from outsiders (e.g., Doornbos et al., 2008; Schürmann & Beusaert, 2016). Holley et al. (2016) found that strong ties to a more capable peer promoted informal learning. Van der Heijden et al. (2009) also revealed that participation in internal and external networks was a significant predictor of employability and encompassed a mix of formal and informal learning opportunities.

Interpersonal Relationships. Interpersonal relationships have been found to be a remarkable vehicle for workplace learning processes and outcomes (e.g., Cuyvers, Donche, & Van den Bossche, 2016; Lai, Wu, and Li, 2011). Relationship dynamics include positive relationships, seeking help, consulting, clear communication, trust, respect, and developing positive connections among participants during collaboration (Cunningham & Hillier, 2013; Cuyvers et al., 2016). Employees preferred to communicate interpersonally and shared information freely, so professional relationships facilitated informal learning (e.g., Lai et al., 2011). These activities could lead to team empowerment

(Kukenberger, Mathieu, & Ruddy, 2015), which was highly associated with informal learning (Nisbet et al., 2015; Schürmann & Beusaert, 2016). Specifically, support from colleagues or collegiality was an important group level factor for informal learning (e.g., Ouweneel et al., 2009; Pifer et al., 2015). For example, Boud, Rooney, and Solomon (2009) presented interventions like morning tea and toolbox talks, which promoted informal learning through employees' social interaction. Professional meetings among colleagues also helped them learn and exchange knowledge (Neher, Ståhl, & Nilsen, 2015; Yanchar & Hawkey, 2015).

The Antecedents of Informal Learning at the Organizational Level

The organizational level is not the summation of a group's behavior, but it relies on an organization's mechanism (Robbins & Judge, 2013). The constructs of the organizational level are the cultural, institutionalized, and systemic influences on the learning of members. Elicited factors are divided into four categories: organizational characteristics, organizational interventions, organizational culture, and work tools and resources.

Organizational Characteristics. Twelve studies reported that characteristics of an organization such as size, architectural structure, industry, and composition of constituents affect informal learning (e.g., Clark, 2004; Nisbet et al., 2015). The impact of the organizational size was distinctive, with large organizations providing greater resources and established mechanisms of learning (Nilsson & Rubenson, 2014). Frequent face-to-face contact also promoted communication among members, but the lack of proximity among colleagues in far-off offices interfered with creating a learning culture (Lohman, 2006). In addition, the participation rate of informal learning varied depending on the type and industry of the organization (Kyndt et al., 2009; Nilsson & Rubenson, 2014). For example, employees working in public sectors and education, health, and social service industries participated more actively in informal learning. The structure of constituents also affected informal learning (Schei & Nerbø, 2015). In particular, hierarchical order in rank hindered informal learning and interfered with active communication (Holley et al., 2016).

Organizational Interventions. Formal training and rewards were two examples of organizational interventions influencing informal learning. First, participating in formal training promoted informal learning by enabling individuals to share knowledge or skills (Schürmann & Beusaert, 2016). The process of planning informal learning, such as matching employees to an assignment, significantly influenced informal learning facilitation (Cunningham & Hillier, 2013). Second, rewarding proficiency (e.g., salary or career opportunities) encouraged participation in informal learning (Skule, 2004). In contrast, a lack of meaningful rewards could discourage employees' informal learning because they felt they were not appreciated by the organization, so they hesitated to participate in learning activities (Lohman, 2000).

Organizational Culture and Environment. Jurasaitė-Harbison and Rex (2010) reported that the mission and tradition of an organization affects informal learning. Because mission and tradition are closely related to a country's cultural and historical context, mission and culture influenced how members thought and behaved. For example, teachers in a Russian school had to prepare a school festival related to their mission and values, which became an opportunity for learning (Jurasaitė-Harbison & Rex, 2010).

A supportive learning culture facilitates employees' participation in learning activities (Cormier-MacBurnie et al., 2015; Kwakman, 2003; Skule, 2004). Especially for newcomers, mentoring, as a way of continuing professional education, was a major vehicle for self-development (Neher et al., 2015; Pifer et al., 2015; Williams, 2003). In addition, a positive and psychologically safe environment was a prominent aspect of learning culture (Schei & Nerbø, 2015; Schürmann & Beusaert, 2016). In many cases, informal learning occurred through trial and error. To do so, having no fear of making mistakes, asking questions or providing different perspectives were essential prerequisites to informal learning (Schürmann & Beusaert, 2016).

In contrast, an unsupportive organization culture such as high work pressure, bureaucracy, or short-termism, had a negative influence on informal learning (e.g., Lohman, 2009; Sambrook & Stewart, 2000). A perceived lack of support occurred when managers did not understand their role as trainers (Cormier-MacBurnie et al., 2015). A silo mentality, which refers to a competitive relationship among teams or departments, was also a psychological barrier to interaction with others (Ellinger, 2005; Ellinger & Cseh, 2007).

It is worthwhile to note, however, that some scholars reported a counter-intuitive relationship between organizational culture and informal learning. That is, when employees perceived a lack of support from their organizations, they used more informal learning strategies to fill the gap (Chan & Auster, 2003; Enos et al., 2003). Skule (2004) suggested that

even if employees were exposed to many changes and demands, when the amount was perceived as appropriate, it stimulated employees' learning. However, Berg and Chyung (2008) argued that there was no significant relationship between how employees perceived the organization's learning culture and the degree of informal learning engagement. Employees sometimes regarded interventions from the organization as both "interference" and "support" at the same time (Hoekstra et al., 2009).

Work Tools and Resources. One of the most frequently reported factors contributing to employees' informal learning was using information and communication tools such as the internet and internal documents (e.g., Cuyvers et al., 2016; Smith & Barrett, 2014). Sharing knowledge and interacting with each other using communication media (e.g., Wiki) is a good example (Milovanović, Minović, Štavljanin, Savković, & Starčević, 2012). Likewise, the lack of a knowledge management system reduced the efficiency of informal learning activities (Ellinger, 2005). Employees also acquired knowledge from internal and external experts (Kyndt et al., 2009) by interacting with them in a project workgroup. Through these interactions, employees formed learning networks as an organizational asset. Support from human resource systems was another facilitator of informal learning (Bednall et al., 2014; Sambrook & Stewart, 2000). When employees perceived that the performance appraisal quality (e.g., clarity, regularity, and openness) was high, their willingness to participate in informal learning improved (Bednall et al., 2014). In addition, employees' perceptions of the organization's investment in employee learning and development as a strategic goal and mission enhanced employees' learning (Sambrook & Stewart, 2000).

Limited time and financial constraints were frequently mentioned as obstacles. Lack of time due to a heavy workload was one of the most frequently reported inhibitors of informal learning (e.g., Cormier-MacBurnie et al., 2015; Lohman, 2009). Insufficient funds to purchase learning materials or hiring substitute employees were other factors inhibiting employees' participation in informal learning (Lohman, 2005; Schei, & Nerbø, 2015).

(Insert Table 3 about here)

Discussion

Our review of the empirical research on informal learning revealed that the measures of informal learning used in the precedent empirical studies were mostly ad-hoc and tentative. Despite the general consensus that informal learning is broad in scope and application, most instruments seem to lack in capturing the broad scope (e.g., thought processing and interacting with self, within a group, with resources and members of the organization or outside the organization) and common practices of informal learning within the scale. Some studies that used a generic, single question such as asking about the number of hours or mere participation (i.e., whether participated or did not participate in informal learning) did not adequately assess the extent, type, or quality of informal learning in the workplace.

Studies that developed a scale based on the precedent qualitative studies can be illuminating, but they have limited generalizability. Those qualitative studies usually employed a small number of participants representing a specific occupation or organization, when our review of the literature indicates a strong influence of organizational characteristics; thus, the findings are short of generalized conceptualizations, not readily applicable to other populations (Skule, 2004). Very importantly, we found that only a few studies (e.g., Doornbos et al., 2008; Kwakman, 2003) reported their instrument development processes and validity analysis results.

From a conceptual and theoretical point of view, the multi-dimensional nature of informal learning should be considered in developing a scale, using multiple sub-factors or constructs. Scholars have noted that the nature of informal learning is complex and multi-faceted, involving cognitive, metacognitive, and motivational dimensions embedded in a socio-cultural context (Schulz & Roßnagel, 2010). Informal learning occurs through a dialectic process of action and reflection; thus, it consists of both action components and mental components evolving from multiple activities such as individual learning, interpersonal learning, and collaborative learning (Marsick 2009; Meirink et al., 2009). However, most current instruments have treated informal learning as unidimensional, merely listing a series of informal learning activities and using a composite score to quantify informal learning.

The current literature also makes it difficult to determine what types of informal learning are associated with or facilitated by which specific individual, group, or organizational factors. If important and frequent informal learning activities in line with personal or organizational characteristics are missing, the findings could be partial or inconclusive. For example, Bednall et al. (2014) conceptualized informal learning as three major activities (i.e., reflection on daily activities, knowledge sharing with colleagues, and innovative behavior) and found that employees'

innovative behavior is facilitated by performance appraisal quality, but is negatively associated with HRM system strength. Kwakman (2003) conceptualized individual, collaborative, and instructive activities as a framework of teacher workplace informal learning and reported that job variety is associated only with collaborative learning activities. Although useful, these examples show that without a holistic account of informal learning activities and entities of interaction together, study results are difficult to compare.

Taken together, we feel that a very pressing need in informal learning research is developing and improving a scale, particularly through conceptual and theoretical advancement. Akrofi, Clarke, and Vernon's (2011) study is a good example in that they attempted to clarify the concept and measurement of workplace learning, but they only focused on both formal and informal learning at the executive level (i.e., senior managers). Although several studies have identified the lack of available questionnaires to measure informal learning, little progress has been made (Wang & Spitzer, 2005).

Based on our findings, informal learning in organizations is an individual learning process that (1) can be deliberate, conscious, planned, and intended, or spontaneous, unconscious, unplanned, and unintended, (2) can take place in a group or with goal-sharing others, and (3) must be highly integrated with daily working activities for the improvement of knowledge and skills. Thus, we propose a conceptual framework with three dimensions: intentionality, developmental relatedness, and learning competence (see figure 1).

(Insert figure 1 about here)

Drawing on Marsick and Watkins's (2001) model of informal and incidental learning and on Eraut's (2000) research, the dimension of intentionality indicates that informal learning in the workplace occurs either spontaneously or deliberately. Whereas spontaneous learning takes place with or without one's conscious awareness as a result of unplanned and unexpected events or actions, deliberative learning stems from clear learning needs and intentions to acquire new knowledge and solve problems.

Second, Doornbos et al. (2008) introduced the idea of developmental relatedness and defined it as "how interaction between the learning worker and his or her interaction partner(s) contributes to learning solely on the part of the worker or for the interaction partner(s) as well" (p. 131). They distinguished three aspects of developmental relatedness: individual learning, learning together, and learning from others. For example, whereas individual learning refers to learning by oneself without social interaction, learning from others or together indicates a one-way or two-way developmental relation. Interaction partners can include people either inside or outside of the working organization. Since this dimension involves individual learning and learning from or with others, it is particularly relevant to the social constructivism approach (e.g., community of practice, social-cognitive theory) and self-directed learning.

As for the third dimension of learning competence, workplace informal learning can be conceived as two different yet iterative cycles—action and mental components (Hoekstra et al., 2009)—with a dialectical process of action and reflection (Marsick & Watkins, 2001). For example, while the action component encompasses experimenting with new ideas, setting learning goals, and interacting with colleagues, the mental component can include assessing specific learning needs, monitoring learning progress, and engaging in critical reflection. Since these activities involve various cognitive and metacognitive skills and knowledge as well as past, present, and future actions required for learning, we name this dimension "learning competence," which is deeply embedded in Kolb's (1984) theories and concepts of experiential learning and reflection.

Our proposed framework is descriptive in nature; thus, it would be premature to consider it as an emerging theory of workplace informal learning. Nevertheless, the proposed framework can help future researchers develop a more comprehensive, holistic instrument to measure informal learning in the workplace and to identify a clear set of relevant antecedents. Twelve combinations of informal learning activities can be derived from the framework, as presented in Table 4. For instance, the action/deliberate/internal-others cube can identify informal learning activities that involve action-oriented components interacting with people inside of the organization with a clear learning intention such as asking team members for advice to solve a problem. Exemplary activities can be added, but to do so, the extent of requiring deliberation, target learner(s), and the concentration or interaction of action and reflection must be justified. We believe that these three dimensions can also facilitate further integration of related concepts and theories of learning (e.g., experiential learning, community of practice, social-cognitive theory, and self-directed learning) in balancing various forms of informal learning behaviors.

(Insert Table 4 about here)

Although some definitions indicate that informal learning is initiated and implemented by an individual employee (or learner), the antecedents of informal learning identified from this study (i.e., the situated contexts such as leadership, interaction with colleagues, and the organizational system) play a critical role in facilitating the learning process. Based on Lewin's (1947) field theory, Marsick (2009) emphasized that individual informal learning should be understood within the social context. The sub-factors of the group and organizational levels in our review provide a holistic picture of the environmental facilitators (e.g., people, resources, tools, tasks, and interventions) that have been empirically examined.

In this sense, we agree with Cunningham and Hillier's (2013) viewpoint that the study of informal learning must be multi-level in nature. Scholars (e.g., Ellinger, 2005; Marsick, 2009) have also argued that the relationships between factors and informal learning engagement are interdependent and complex and should not be understood in a one-way direction, giving support to interactions among individuals and environment. The crux of these arguments is that there might be joint effects or cross-level interactions among antecedents influencing an individual's informal learning engagement. However, our review revealed that current studies focusing on these interactions are scarce. We found only three studies (e.g., Bednall et al., 2014; Tews, Noe, Scheurer, & Michel, 2016; Van Rijn et al., 2013) that investigated such interactions.

Implications for HRD Research and Practice

As illustrated in Figure 1 and Table 4, this study highlights how essential informal learning behaviors and activities must be identified and how researchers must continue to develop a theoretically and psychometrically sound informal learning scale. Research endeavors must not stop there.

Based on the premise of the field theory which shows the importance of the fit between the person and the environment, we suggest that researchers further expand their attempts to investigate the joint contributions of persons and situations. Many HRD researchers have over-emphasized either person-level antecedents or contextual-level antecedents and have largely ignored the person-context interaction effects (Chatman, 1989; Garavan, McGuire, & O'donnell, 2004). People are not merely passive recipients influenced by their external environments, but they are active agents who interpret and reproduce the environment recursively. In other words, the influence of individual-level antecedents on informal learning may vary as a function of the group- or organizational-level (contextual) variables, or vice versa. A multi-level interactionist approach with both conceptualization and statistical analysis would contribute useful insights to this unexplored area (Lau & Nie, 2008).

Future research should focus on investigating other factors within the larger social context, or at the community-societal level

It is also important to note that the current literature has largely focused on informal learning in organizational and workplace contexts, yet other social contexts such as family, community, or national culture can influence informal learning in the workplace. Based on our review, we found one study (Tews et al., 2016) that demonstrated a negative influence of work-family conflict on managers' informal learning and its negative moderation effect on the relationship between core self-evaluations and informal learning.

It may be worthwhile to examine the impact of national culture on informal learning empirically. Kim and McLean (2014) described the influence of national culture on how informal learning works with relevant antecedents using Hofstede's (Hofstede, Hofstede, & Minkov, 2010) five cultural dimensions. Marsick (2009) pointed out that the impact of national culture on informal learning is still unknown and called for future research. Similarly, Bednall et al. (2014) also recommended, that researchers investigate the potential moderating effects of national culture on the association between performance appraisal and informal learning. They suggested that employees' perceptions of performance appraisal may be different according to their national culture such as a high or low power distance culture or an individualistic or collectivistic culture.

Finally, it would be interesting to examine what types of informal learning activities different work groups engage in using the three dimensions suggested by our proposed framework. For example, Lohman (2005) found that teachers engage more in interactive informal learning activities (i.e., "internal others" or "external others" in the developmental relatedness dimension) while HRD professionals rely to a greater extent on independent learning activities (i.e., "self"

in the developmental relatedness dimension). Marsick (2009) also suggested that there may be differences in learning activities between “knowledge workers—who frequently use judgment in complex, ambiguous circumstances—[and] employees asked to execute according to a script or exact rule set, often developed by others in the hierarchy” (p. 272). Additionally, a different set of antecedents could influence different types of informal learning; hence, it is worthwhile to investigate the various types.

Our findings indicate that supervisors, team leaders, and organizational leaders have access to many effective tools and resources to leverage informal learning. Several HRD interventions can be designed and implemented, strategically interconnected and integrated with HRM systems such as compensation and performance appraisal in the context of the organizational mission and vision (Yoon & Lim, 2005). For example, organizations can offer formal managerial training programs on how to facilitate a team environment that is conducive to learning and provide motivational resources such as formal/informal mentoring groups, learning communities, and knowledge management systems for exchanging, sharing, and creating ideas (Rosenberg, 2009; Yoon & Lim, 2009).

The results of this review also offer HRD professionals a diagnostic basis to support a learning environment that invites employees to learn. Rather than leaving the decision to the employees to learn at will, organizations can take a more proactive role in promoting individual employees’ informal learning participation. More importantly, our conceptual framework can be a guide or can be used as a diagnostic tool for organizations to identify what types of informal learning activities take place the most or least frequently in their workplaces. They can then design informal learning opportunities tailored to the unique context of their corporations. For example, SMEs, where the infrastructure, labor, and resources for learning are limited, could promote certain types of informal learning that are in line with experiential and self-directed learning. In contrast, large-sized enterprises might focus on delivering deliberate/internal others/action-oriented informal learning activities using their rich resources and finances, encouraging collaborative learning and community of practice.

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Table 1. Descriptive information of the included studies

Year	Before 2000	2001-2005	2006-2010	2011-2017
	2	10	17	26
Methodology	quantitative	qualitative	mixed-method	
	27	23	5	

Table 2. An example matrix created for this review

#	Methodology	Authors (year)	Title	Title of Journal	Studied subjects	Instrument (Analysis)	Findings		
							Individual	Group	Organizational
31	Quan	Lohman (2006)	Factors influencing teachers' engagement in informal learning activities	Journal of Workplace Learning	166 teachers in the US.	Self-developed survey based on Lohman (2000) (Frequency, mean, SD, and t-test)	- Initiative - Self-efficacy - Love of learning - Profession Interest - Commitment to professional development - Nurturing personality - Outgoing personality - Lack of time	N/A	- lack of proximity to colleagues' work areas - Insufficient funds.
32	Qual	Boud, Rooney, & Solomon (2009)	Talking up learning at work: Cautionary tales in co-opting everyday learning	International Journal of Lifelong Education	Over 40 people in a Australian local government council	Interview questions (Phenomenology)	N/A	- Social interaction	- Organization intervention (i.e., toolbox talks and morning teas)
33	Qual	Ellinger (2005)	Contextual factors influencing informal learning in a workplace setting: The case of "reinventing itself company"	Human Resource Development Quarterly	13 participants in a consumer-focused manufacturer located in the eastern region of the U.S.	Case study (Critical incident technique)	- Lack of time	- Learning committed leadership and management - People who form webs of relationships for learning	- Internal culture committed to learning - Work tools and resources - Too much change too fast (negative) - Lack of knowledge management system
34	Quan	Noe, Te ws, & Marand (2013)	Individual differences and informal learning in the workplace	Journal of Vocational Behavior	180 managers from 100 restaurants in the U.S.	Hierarchical regression	- Zest	N/A	N/A
35	Mixed	Sibaran, Tjakraatmaja, Putro, & Munir, (2015)	The influence of multigenerational workforce in effective informal team learning.	Journal of Economics and Business Research	21 interviews and 184 survey respondents in the Indonesian business environment	Interview & Path Analysis	- Generation (Baby boomers, Generation X, and Generation Y)	N/A	N/A

Table 3. Classification of informal learning factors by level

Individual level			Group level				Organizational (org) level			
Socio-demographic	Personal characteristics	Job characteristics	Leadership	Feedback	Networking	Interpersonal relationship	Org characteristics	Org interventions	Org culture & environment	Work tool and resources
- Age - Generation - Gender - Education - Life role	- Cognitive ability - Self-efficacy - Personality (e.g., nurturing, outgoing, initiative) - Motivation to learn - Perception of learning - Attitude or epistemic belief	- Job position - Seniority - Function - Department - Skill level - Occupation class - Job contract - Tenure - Career motivation - Interest in profession - Commitment to professional development - Value of work - Job satisfaction - Work challenging - Task autonomy - Labor intensity - Job demand-control - Utility of knowledge into a job	- Managerial /supervisor support - Managerial characteristics (e.g., commitment, management styles and skills) - Managerial responsibility and motivation	- Reflective dialogue - Positive encouragement - Open communication - Support among group members	- Communication with outsiders - Mixed with internal and external networks - Asking questions and observing other colleagues	- Interpersonal communication - Open sharing - Trust and respect - Positive social interactions	- Type & size of organization - Industrial type - Heterogeneous milieu - Relations of power and hierarchy	- Meeting - Personal development plans - Coaching - Planning process - (Lack of) Reward	- Mission & tradition - (Un)Supportive learning culture - employees' resistance to change - Degree of change & demands - Mentoring & learning committed culture - Psychological safety	- Information/communication tools - Experts within or outside of organization - Physical and architectural structure - (Lack of) Time and funds - Work pressure and high expectation - Support from HR system.

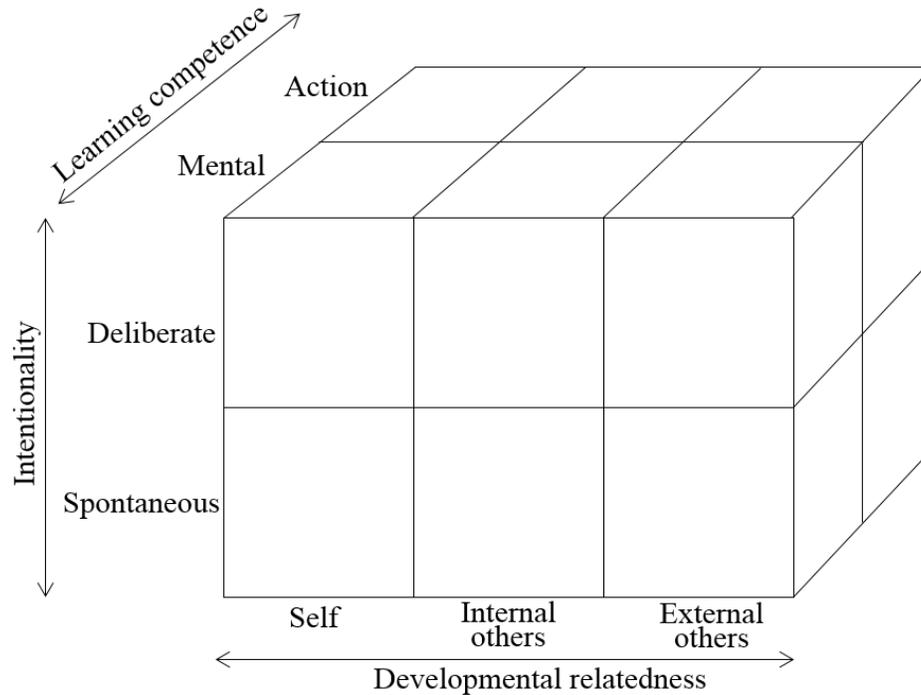


Figure 1. Proposed conceptual framework of workplace informal learning

Table 4. Examples of 12 types of informal learning activities in the workplace

Type (Cube)	Illustrative Example
Deliberate/Self/Mental	I reflect on work situations to make sense of what has happened and what I can learn from it.
Deliberate/Self/Action	I experiment with new working methods on my own.
Deliberate/Internal others/Mental	I contemplate suggestions made by my supervisor to improve performance.
Deliberate/Internal others/Action	I ask my team members for advice to solve a work-related problem.
Deliberate/External others/Mental	I ponder the customer feedback to improve my work procedures.
Deliberate/External others/Action	I consult with experts outside of the organization who might have insights and information on a work-related problem.
Spontaneous/Self/Mental	I find that exploring solutions for a problem sometimes provides unintended insights to solve another problem.
Spontaneous/Self/Action	What I learn about my job happens as a natural consequence of doing my job.
Spontaneous/Internal others/Mental	I sometimes obtain unexpected insights from a discussion with my team.
Spontaneous/Internal others/Action	When I make a mistake, my boss or a coworker helps me identify what to do to avoid making the mistake again.
Spontaneous/External others/Mental	Interacting with others outside of the organization sometimes adds unintended, critical questions on my working process.
Spontaneous/External others/Action	I sometimes receive unrequested feedback on my services or products from a client.