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# **The ‘How’ of Multilevel Learning Dynamics: A Systematic Literature Review Exploring How Mechanisms Bridge Learning between Individuals, Teams/Projects and the Organization**

Wiewiora A., Smidt M. and Chang A.

The organizational learning literature recognizes that learning is a multilevel phenomenon that occurs between the individual, team and organizational levels. Existing literature has begun to identify linking mechanisms between these levels, but the research explaining how these mechanisms operate remains scarce. There is a limited understanding of the learning paths and connections between the individual, team and organizational levels. Using a systematic literature review, this paper synthesizes the research on multilevel learning to: (1) classify primary and less researched mechanisms enabling multilevel learning, and (2) explain how and in what direction these mechanisms operate to link the levels. We then propose a framework to summarize our findings. We investigate this phenomenon in both organizational and project-based contexts due to the unique temporal and structural learning challenges of the latter. Future research directions are proposed for scholars who wish to further contribute to this important and growing field.

**Keywords:** Multilevel learning; project organization; bridging mechanisms

## **Introduction**

The notion of organizational learning has gained increasing attention in the literature (e.g. March and Simon, 1958; Argyris and Schön, 1978; Levitt and March, 1988; Senge, 1990; Huber, 1991; Crossan *et al.*, 2011; Brusoni and Rosenkranz, 2014). Early discussions about organizational learning were mostly abstract and did not provide concrete prescriptions regarding what organizations can do to engage in learning (Garvin *et al.* 2008). Since the influential work of Crossan *et al.* (1999), research has begun to acknowledge organizational learning as a multilevel phenomenon, providing a more complete picture of how learning occurs and flows within organizations (e.g. Brusoni and Rosenkranz, 2014; Campbell and Armstrong, 2013; Engestrøm *et al.*, 2007; Lawrence *et al.*, 2005). From a review of the general management and project-based learning literature we understand that: (1) learning is a dynamic and multilevel process (Crossan *et al.*, 2011); (2) learning flows between individual, team/project and organizational levels in feed-forward and feedback directions, but not always in a linear fashion (Berends and Lammers, 2010); (3) there is still limited research on multilevel project-based learning, with research to date primarily concentrating on explaining project-to-organization linkages (Grabher, 2004); and (4) the broader management literature has begun to identify linking mechanisms between the levels (e.g. Hannah and Lester, 2009; Vera and Crossan, 2004).

In spite of the progress on this topic, studies investigating learning dynamics and interactions between different organizational levels remain scarce (Anderson and Lewis, 2014; Brusoni and Rosenkranz, 2014). Subsequently, a vital gap exists with regard to explaining ‘how’ these mechanisms operate to influence multilevel learning. Consequently, there is limited understanding of the learning paths and interactions between the individual, team/project and organizational levels (Crossan *et al.*, 2011; Swart and Harcup, 2012). Extending this line of inquiry is of value because it will help solve the puzzle of ‘how’

learning moves between levels. This in turn will enable theory development, and will ultimately benefit organizations and projects in their quest to advance learning and thereby improve overall performance.

Aiming to further knowledge on how learning moves between levels, this paper consolidates the current management and project management literature, providing an integrated overview of the mechanisms connecting learning across levels. As a result, we address the following research questions:

- 1. What are the bridging mechanisms that facilitate learning between levels in: (a) general management and (b) project-based contexts?*
- 2. How do the bridging mechanisms connect various levels in the learning process?*
- 3. What are the future research directions that could further expand this field of enquiry?*

This systematic literature review consolidates existing understanding of multilevel learning and provides the foundation for three sets of contributions. First, this study distils 11 bridging mechanisms and explains how these mechanisms trigger multilevel learning flows in general and unique to the project-based context. Second, the study builds on the multilevel learning theory by explaining ‘how’, ‘where’ and ‘in which direction’ each identified mechanism functions to facilitate learning flows. For example we found that some mechanisms—culture, leaders, organizational structure and politics—are active across all three levels, while others connect only two levels. We also found that all of the mechanisms facilitate feed-forward learning flows, but only three – leaders, shared mental models and organizational initiatives – trigger the feedback learning. Third, using structuration theory and systems approach this study demonstrates how bridging mechanisms work in conjunction and reinforce one another to facilitate multilevel learning. Lastly, the paper offers numerous avenues for future research.

The following theory section examines learning as a multilevel learning phenomenon and provides an argument for the view we adopt. We also investigate multilevel learning in the project-based context and explain our reason for separating this from the general management literature. Next, we provide an account of the methodology used in this paper, followed by an overview of the review findings. We then examine the identified mechanisms in order of their prevalence in the literature in the ‘bridging mechanisms for multilevel learning’ section. Finally, we conclude this paper and suggest future research avenues.

## **Theory**

### *Learning as a multilevel phenomenon*

There is growing consensus in the literature that the theory of organizational learning should consider individual, team and organizational levels (Fiol and Lyles, 1985; Crossan *et al.*, 1999; Edmondson, 2002). Learning originates within an individual’s development of new insights and innovative ideas. Individual learning points to individuals’ behavior (Argyris and Schon, 1978) and involves developing interpretations and new understanding based on new and existing information (Fiol and Lyles, 1985). A person learns through developing and refining different interpretations of new or existing information (Crossan *et al.*, 1999). At the other end of the spectrum, organizational learning is the process of improving organizational actions. It begins when individual ideas are shared and common meanings – developed by individuals and groups – are institutionalized as organizational artifacts. Organizational learning therefore involves developing common understanding and beliefs that are often institutionalized and legitimated (Fiol and Lyles, 1985). Connecting micro-level individual learning and macro-level organizational learning is meso-level learning – also known as team learning, which has been defined as a process in which a team takes action, obtains and reflects upon feedback, and makes changes to adapt or improve (Edmondson, 1999; Argote *et*

*al.*, 2001). Team learning emerged in the literature following an argument that teams carry out significant work in organizations (Senge, 1990) and are important for sharing individual-level cognition and behavior (Hackman, 1992).

Most research argues that learning begins with an individual and is then embedded at the collective level (Argyris, 1992; D. Kim, 1993; Yew-Jin and Wolff-Michael, 2007). There is some debate regarding where group learning ends and organizational learning begins. Some consider the collective knowledge of top management teams as the manifestation of organizational learning (Campbell and Armstrong, 2013). Others, like Edmondson (2002), support the view that learning flows to groups or teams through the interactions between individuals situated within smaller units, and that only at these meso-level, independent learning outcomes jointly impact organizational learning. We adopt a view of organizational learning as a multilevel process of change in the cognition and actions of individuals and teams, embedded in and affected by the organization's institutions (Berends and Lammers, 2010; Crossan *et al.*, 1999).

It is argued that most management problems involve multilevel processes, yet most management research uses a single level of analysis (Hitt *et al.*, 2007). This is also the case for the research on learning, where only a few studies have attempted to investigate organizational learning using a multilevel perspective (Berends and Lammers, 2010; Di Milia and Birdi, 2010; Vera and Crossan, 2004). One of the most prominent contributions in this area is Crossan *et al.*'s (1999) *Academy of Management Review* 2009 decade award paper. This paper identifies four learning sub-processes that occur at the individual, group and organizational levels respectively: intuiting, interpreting, integrating and institutionalizing. *Intuiting* is the process of recognizing familiar patterns from past events and situations, and can occur only at the individual level. *Interpreting* is a conscious element of the learning process of sense-making and reshaping new knowledge through individual and collective

efforts with the use of metaphors, images and language. *Integrating* is the process of developing shared understanding at the team level, achieved through collective actions, dialogue, shared practices and mutual adjustment. *Institutionalizing* refers to individual and collective learning being embedded in the organization's systems, structures, strategies, routines and practices. These four learning processes are connected in feed-forward and feedback directions. *Feed-forward* learning direction relates to the exploration of new knowledge by individuals and teams that eventually becomes institutionalized on the organizational level. *Feedback* learning direction relates to exploiting existing and institutionalized knowledge, and making this knowledge available for teams and individuals. Crossan *et al.*'s (1999) seminal paper spiked a number of scholarly works that have added to the original work; however, a decade later the authors noted that studies focusing on organizational initiatives and drivers connecting the levels in multilevel learning still remained limited and lacked anticipated insights from the role of power, politics, emotions and leadership (Crossan *et al.*, 2011). One of the noteworthy empirical applications of Crossan *et al.*'s (1999) framework found that the learning process does not unfold in a sequence, but forms complex learning paths with learning discontinuities affecting connections between levels in the learning process (Berends and Lammers, 2010). These discontinuities are associated with fragmented or abandoned learning flows, and limit opportunities for institutionalizing learning beyond a local context, thus suggesting the existence of bridging or hindering elements impacting the flow of multilevel learning. Crossan *et al.*'s (1999) seminal work created the foundation for theorizing and empirically studying learning as a multilevel phenomenon and provides the framing for our analysis in this review.

### *Multilevel learning in project-based organizations*

Due to their temporal and structural learning challenges we investigate project-based

organizations (PBOs) and the general management literature separately. PBOs represent traditional forms of organizing across many industries, such as film-making (DeFillippi and Arthur, 1998), construction (Brady and Davies, 2010) and biomedical (Newell *et al.*, 2008), and many more industries are now increasingly adopting this way of operating. Following Lindkvist (2004), we define PBOs as organizations that conduct a significant part of their business through projects. Characterized by autonomous individuals and temporary units, projects operating with constant time pressure are a particularly challenging setting for long-term organizational learning (Swan *et al.*, 2010). As more and more organizations are becoming project-based there is an emergent need to understand how these organizations can overcome the challenges of disruptive learning-cycles that projects give rise to (Berends and Lammers, 2010; Engestrom *et al.*, 2007) and improve organizational learning processes.

In the PBO context, multilevel learning occurs when project teams are able to capitalize on knowledge that is acquired during the execution of one project, and share this knowledge with other projects or parts of the organization for future application and use (Swan *et al.*, 2010; Williams, 2007). Project-based learning thereby happens within projects, between projects and from projects to the wider organization (DeFillippi, 2001; Grabher, 2004). Nevertheless, it is acknowledged that studies investigating project-based learning tend to focus on a single level of analysis, and only a few empirical studies explain the interrelations and dynamics between organizational, project and individual levels and their impact on building organizational learning capabilities (Sydow *et al.*, 2004; Bakker *et al.*, 2011).

Prencipe and Tell (2001) developed three distinct inter-project learning landscapes capturing PBOs' learning abilities at the individual and organizational levels. Brady and Davies (2004) presented a model of two interacting levels of learning: project-led and business-led learning. Söderlund (2008) went a step further, identifying three learning processes (shifting, adjusting and leveraging) for building project capabilities, achieved



through integrating strategies at different organizational levels. However, most of the existing research assumes that individuals have the ability to efficiently use the PBO's knowledge capacities, directing their focus primarily on organizational or project conditions as influencing learning processes. Furthermore, although recent findings suggest that the process of learning is impacted by organizational and individual factors (Shepherd *et al.*, 2011), there is a lack of empirical studies that capture the multilevel dynamics and interactions of project-based learning processes.

To evaluate the current literature and the extent to which these aspects have been addressed we adopted a systematic literature review approach to select and analyze relevant literature. This is discussed below.

## **Methodology**

In order to understand interactions between the levels in the learning process we focused on papers that recognize learning as a multilevel phenomenon. A systematic, process-based approach was used to select, analyze and synthesize the literature (Douriau *et al.*, 2007; Pawson *et al.*, 2005). Selected papers served as a data set for our analysis. The search commenced by selecting a number of terms commonly used to describe multilevel learning and the project-based context. The search terms were divided into three categories: (1) multilevel, (2) learning and (3) project-based context. We then selected synonyms commonly used to describe these three categories. Table 1 outlines the search terms used. The key terms were then used in various combinations. In step 1 of the search we combined the multilevel category with the learning category to identify the general management literature on multilevel learning; in step 2 we combined the results of step 1 with the project-based context keywords to identify a subset of literature situated in the project management field.

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Insert Table 1 about here.

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These search terms were then inserted into two search engines – ABI/Inform and EBSCO Host – that offer access to the widest range of journals in the relevant research area. Following a similar approach to Bakker (2010), we narrowed the search to abstract, title and subject area to select literature with an explicit focus on multilevel learning. Further restricting the search to scholarly peer-reviewed journal articles we identified a total of 2,789 papers. Although it is not uncommon to have a large number of hits in the first round of a search (Bakker, 2010) the textual analysis was not feasible given the volume of papers. Therefore, this number was systematically brought down following the process captured in Figure 1. We excluded papers from the education sector, deselecting specific subject terms, such as universities and colleges, education, higher education and activity programs in education, which we found were not relevant to our investigation. We did that due to the fundamental differences between corporate learning and learning in the education sector; the latter of which primarily concerns individual and, to a limited extent, group learning. This process brought down the number of papers to 1,586. The next stage of the selection process was to read the titles and abstracts. During this stage we considered papers investigating at least two levels of learning. This process brought our search down to 90 papers.

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Insert Figure 1 about here.  
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In addition to the two selected databases, Google Scholar was used to search for more recent papers in order to account for the time restrictions of some journal availabilities in the selected databases. We also reviewed papers that cited Crossan *et al.*'s (1999) seminal work on multilevel learning, some of which offered important contributions to the field but were missing from the initial search, most likely because their main focus was not on multilevel learning. Through these additional searches we obtained a further 23 results. It is important to

note that Crossan *et al.*'s (1999) paper was not included in our final data set. This seminal paper, although it indicates connections between the levels in the learning process, does not specifically explore the bridging mechanisms through which multilevel learning occurs, hence it was excluded from the data set. The process described above brought us to 113 papers. Next, we thoroughly read the full text and excluded 75 papers that we found were irrelevant to our objective. Although these excluded papers acknowledged learning as a multilevel phenomenon there was no mention of bridging mechanisms that connect different levels. This process of literature selection resulted in a final 38 papers that identify and/or explain mechanisms connecting the levels in the multilevel learning process. Despite the likelihood that some potentially relevant literature was missed during this process, we believe that the final list of papers is largely representative of work in our area of interest.

In the second step, we again reviewed the full text of selected papers. Specifically, we focused on coverage of the following: (1) *the bridging mechanisms facilitating learning across levels in general and for the project-based context specifically*, (2) *how these bridging mechanisms connect various levels in the learning process*, and (3) *future research directions to further expand this field of enquiry*.

In the third step, we concentrated on developing categories, more specifically focusing on the bridging mechanisms that influence learning across levels. This step involved distilling the key categories emerging in the literature. To make this process effective, and to start our discussion, we first selected key papers from our list that were highly relevant to our study. These papers were chosen based on the extent to which they explicitly investigated how mechanisms act to enable or hinder learning between at least two levels. For example, we chose Campbell and Armstrong's (2013) paper, as it specifically addresses how shared mental models influence learning between the individual, team and organizational levels. Additionally, the main topics covered in the selected key papers helped us to develop initial

categories. We then populated these categories with evidence from the remaining publications. As we continued the review, new categories emerged, such as feedback, temporality, employees and major events. In the fourth step, we synthesized the evidence and drew conclusions. In this step, we also focused on explanations of how these bridging mechanisms connect various levels in the learning process, and future research directions.

### **Overview of the findings**

We thoroughly reviewed 113 papers that had a central focus on multilevel learning. Among these papers we found 38 that explicitly discussed links between the individual, team/project and organizational levels, of which 11 papers investigated the phenomena in the project-based context. Figure 2 depicts the growth of literature on multilevel learning compared with the literature specifically discussing linkages between the levels.

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Insert Figure 2 about here.  
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From a systematic search of papers that address the transfer of learning from and between individual, team/project and organizational levels ( $N=38$ ) it was clear that, although coverage of this topic was generally limited, the number of papers published each year has increased over time, albeit marginally. The earliest paper that focused on connecting the levels was published in 1993 by Daniel Kim (1993). This paper aimed to develop a model linking individual and organizational learning through shared mental models (D. Kim, 1993). In 1999 there was an uptake of research in this area, following the seminal work of Crossan *et al.* (1999). Since then the interest in the phenomenon of multilevel learning, and more specifically linkages between the levels, has increased, with much research remaining conceptual or exploratory. From a project-based perspective the topic of multilevel learning

and elements that connect various levels has received limited but consistent attention from scholars.

Table 2 lists all the papers from our data set in chronological order. Papers from the project management literature are lightly shaded to distinguish between the project and general management literature. Table 2 also illustrates our coding of the bridging mechanisms and specifies which papers simply identify the mechanisms and which provide more insightful explanations of ‘how’ specific mechanisms facilitate multilevel learning. Eleven mechanisms were uncovered linking individual–team/project–organizational learning and are discussed in the subsequent section. From Table 2 it is evident that earlier conceptual papers primarily focus on shared mental models and culture as mechanisms to facilitate learning across levels. This reflects the roots of learning research as a discipline focused on cognitions and environments to foster shared knowledge. From the year 2000 onwards other organizational bridging mechanisms started to emerge from both conceptual and empirical work.

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Insert Table 2 about here.

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Figure 3 reports the summary of the 11 bridging mechanisms. Culture ( $N=16$ ) and leaders ( $N=16$ ), followed by organizational learning initiatives ( $N=12$ ) and structure ( $N=9$ ), are the most frequently discussed elements influencing multilevel learning. Note that while many papers refer to the learning mechanisms, few devote enough space to explain ‘how’ bridging mechanisms connect the learning between levels. Figure 3 illustrates the number of papers that explain ‘how’, and papers in which the mechanisms are simply identified but not explained. Interestingly, only one paper (Madsen, 2009) discusses the occurrence of major events as triggering multilevel learning. Madsen (2009) found that lessons from major mining disasters prompted managers to adjust mental models (individual-level learning) and to

develop new routines and processes (institutionalizing learning at the organizational level). Occurrences of major disasters are specific to high-risk industries, such as mining, construction, manufacturing and agriculture, where individuals' lives can be at risk. This could explain the limited uptake of this element in the broader multilevel learning literature.

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Insert Figure 3 about here.  
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The majority of the papers that discuss bridging elements of multilevel learning cover all three levels of learning: individual, team/project and organization ( $N=22$ ). The remaining papers focus on learning between two levels: individual and organizational ( $N=11$ ), individual and team/project ( $N=3$ ), and team/project and organizational levels ( $N=2$ ). Papers in the project-based setting predominantly concentrate on explaining bridging elements that influence multilevel learning between the project and organization, with a central focus on project learning. Evidently, there has been very limited interest in the learning linkages between individuals and the organization ( $N=1$ ) in the project management literature (see Table 2). This result might be expected, as project management literature predominantly focuses on projects and consequently investigates learning flows with projects as a central focus. However, a reasonable argument can be made that, by omitting the link between the organization and the individual, valuable information might be overlooked which could help add to a more integrated understanding of the project learning.

Most of the 38 papers were published in *The Learning Organization* (5), *Academy of Management Review* (3), *International Journal of Project Management* (3), *Management Learning* (3), *Organization Science* (3), and *Organization Studies* (2). Of these papers, the majority are conceptual or qualitative enquiries. Fifteen are based on qualitative studies, which predominantly employed case study methodologies, while 15 are conceptual in nature, reviewing previous work and recommending future research directions. Only six papers are

based on quantitative studies, all of which employed survey methodologies. Finally, one paper is based on a mixed-methods study and one paper on experimental research. The large percentage of qualitative studies suggests that this field of research remains in the nascent stage (Edmondson and McManus, 2007). Although research into organizational learning dates back to the 1950s, it is only since the work of Fiol and Lyles (1985) that research has started to debate and explicitly consider learning as a multilevel phenomenon. Crossan *et al.*'s (1999) work marks the beginning of theoretical development to understand this phenomenon. The work to date has been exploratory in nature partially due to the lack of established theory in the field. The lack of quantitative studies to date could also be due to methodological challenges; team/project level data can be especially challenging to obtain using quantitative methods.

The following sections discuss the bridging mechanisms identified in order of their prevalence in the literature. For each bridging mechanism we first discuss its role in facilitating learning across different levels more broadly, and subsequently turn to the project-based literature before providing suggestions for future research directions.

### **Bridging mechanisms for multilevel learning**

Table 3 summarizes the bridging mechanisms influencing multilevel learning. A separate column reports on activities and triggers unique to the project-based context. The following discussion covers what we have labelled *primary mechanisms*, which include culture, leaders, structure, politics and shared mental models. These five primary mechanisms were chosen because: (a) they are identified by more than five papers, and (b) at least two papers provide rich explanations of 'how' these mechanisms facilitate multilevel learning (as depicted in Table 3). The *less researched mechanisms* (organizational initiatives, networks, feedback, temporality, employees and major events) are covered in less detail, as they

received limited attention in the literature, especially regarding ‘how’ they impact multilevel learning. As such, although the mechanism ‘organizational initiatives’ was the third most frequently identified mechanism (Table 3), it is classified as a less researched mechanism and not reported in detail because few papers provide an in-depth discussion and explanation of the role it plays; thus, providing little knowledge about ‘how’ it facilitates learning across levels.

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Insert Table 3 about here.

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### *Culture*

One of the most frequently researched mechanisms connecting individual, team and organizational levels in the learning process is culture (N=16). Three papers in particular (Edmondson, 2002; Turner *et al.*, 2006; Yew-Jin and Wolff-Michael, 2007) explain in more detail ‘how’ culture and cultural values influence the multilevel flow of learning.

Organizational culture consists of practices, symbols, values and assumptions that the organization’s members share in regard to appropriate behavior (Schein, 1990). Organizational culture influences the way organizational members learn by shaping patterns and qualities of social interactions (De Long and Fahey, 2000) and by influencing their behaviors (Zheng *et al.*, 2010). Existing research typically conceptualizes organizational culture in terms of values (e.g. De Long and Fahey, 2000; Cameron and Quinn, 2005; Zheng *et al.*, 2010). This is because values are more easily studied than invisible, basic underlying assumptions, and provide a context for social interaction through which people act and communicate (Schein, 1990).

Our review revealed that different dominant cultural values trigger different multilevel learning behaviors. Cultural values that foster flexibility, experimentation and risk-taking have been found to enable multilevel learning, whereas the values specific to bureaucratic



cultures (being focused on control, well-established standards and top-down decision-making) have been found to discourage individuals from taking risks and challenging managerial decisions (Bhatt, 2000; Schilling and Kluge, 2009). These self-protective behaviors result in missed opportunities for sharing alternative ideas with the group (Lin *et al.*, 2013; Turner *et al.*, 2006). Similarly, Edmondson (2002) found that the group's subculture of blame prevented individuals from speaking up and expressing their opinion in a group situation, affecting learning flows from the individual to group level. A related conclusion was drawn by Augustsson *et al.* (2013), who found that, despite conscious efforts and investment of organizational time and resources into learning programs, the absence of a learning culture was a key reason for inadequate group-to-organizational learning. From these findings it appears that organizational culture plays an important role in triggering feed-forward learning flows. First, individuals make sense of their group and/or organization, its prevalent cultural values, norms and goals. This understanding is later used to make implicit decisions about what the group and/or organization should do, and what can be said or not said in their local work group. If the cultural values are oriented towards learning, individuals are more likely to share their ideas with others, and the organization is more likely to consider these ideas and use them to influence future directions.

In the project management literature there are limited and implicit indications of cultural values influencing multilevel learning (e.g. Carrillo *et al.*, 2013). This research is largely aligned with the general management literature. However, there is one particular aspect of time orientation, related to cultural values specific to project-based organizing, which has been found to influence the learning process. This was noted in three manuscripts (Anbari *et al.*, 2008; Carrillo *et al.*, 2013; Sense, 2004). Time pressures and short-term orientation are integral characteristics of project-based organizing (Bakker *et al.*, 2011). Driven by tight schedules and milestones, project members and teams tend to focus on immediate project

goals. In addition to this, contract arrangements often embed penalties for project delays (Grimsey and Lewis, 2002). It is therefore logical that the nature of project-based organizing endorses a short-term orientation, focusing on immediate delivery of project objectives. This short-term focus prevents projects and the organization from engaging in long-term learning. This was specifically evident in action research investigating elements of the learning architecture within a project team operating in the heavy engineering/manufacturing sector (Sense, 2004). The project culture is about 'doing' as opposed to 'reflecting', with no time allocated for reflection activities. These cultural 'frames' had a clear influence on learning practices, which often showed missed project-to-organization learning opportunities. Similarly, Carrillo *et al.* (2013) indicate that the lack of time for reflection is caused by an ingrained culture of not looking back to, and learning from, completed projects, but instead looking ahead to new projects. From this, it appears that the prevalent cultural values of project-based organizing – focusing on doing, short-termism and concentrating on immediate project goals – provide no space for individuals to reflect on project learnings. This subsequently compromises project-to-organizational learning flows. Although the role of culture in multilevel learning specific to project-based contexts has been rather scarce and implicit, these examples tend to support the claim that culture affects the flow of learning between the levels. Based on the review of the papers we can draw two observations: (1) cultural values oriented towards learning will have a positive impact on feed-forward learning on the individual, team and organizational levels; and (2) in project-based organizations, cultural frames of short-termism will have a negative effect on feed-forward learning, preventing individuals from engaging in learning activities and from sharing learning at the team/project level, hence restricting opportunities for organizational learning.

## *Leaders*

Leaders are described as individuals who hold high levels of power and influence to facilitate or inhibit learning in feed-forward and feedback directions (Vera and Crossan, 2004). Out of 16 papers that discuss the roles leaders play in enabling multilevel learning processes, six in particular provide the richest explanations furthering our understanding of this phenomenon (Berends and Lammers, 2010; Edmondson, 2002; Hannah and Lester, 2009; Mazutis and Slawinski, 2008; Turner *et al.*, 2006; Vera and Crossan, 2004). The majority of these papers do not use leadership theories as a departure for their study, as often the role of leaders in multilevel learning emerged from their empirical investigation (i.e. Berends and Lammers, 2010; Edmondson, 2002). However, there are some exceptions: Hannah and Lester (2009), Mazutis and Slawinski (2008), and Vera and Crossan (2004). Mazutis and Slawinski (2008) and Vera and Crossan (2004) used a strategic leadership anchor stemming from the upper echelons theory, which focuses on senior executives responsible for strategic enactment (Hambrick and Mason, 1984), to explain the role of top-level leaders in triggering multilevel learning flows. Hannah and Lester (2009) refer to leadership as ‘the collective capacity of organizational members to engage effectively in formal and informal leadership roles’ (Hannah and Lester, 2009, p. 35), where leaders are social architects and orchestrators of learning processes. Commonly these papers focus on leaders’ interventions at multiple levels to set the conditions for learning. In our review we tried to synthesize findings from these various sources in an attempt to find a common theme.

A key theme was the role of leaders in facilitating or inhibiting feed-forward learning processes, with a greater focus on leaders influencing linkages between individual and team levels ( $N=6$ ), as well as their role in influencing the institutionalization of learning ( $N=6$ ). For example, both Vera and Crossan (2004) and Hannah and Lester (2009) explain specific actions that leaders take to influence multilevel learning at the micro level by promoting

openness to diverse opinions, through performance feedback and increased task challenges. At the meso-level, actions include influencing structure and functioning of social networks, and at the macro-level actions include introducing policies and procedures that help foster learning through knowledge creation and diffusion.

Synthesizing our review papers we identified partial answers to two important questions: how leaders' specific characteristics and styles influence multilevel learning ( $N=5$ ), and how the role of power and authority held by leaders influences the institutionalization of learning ( $N=5$ ). Mazutis and Slawinski (2008) concentrated their research more specifically on the role of authentic leadership to support the feed-forward flow of learning by allowing for open and transparent communication between the individual, group and organization. Vera and Crossan (2004) propose that transformational and transactional leadership styles influence both feedback and feed-forward learning flows. In short, the authors suggest that transactional leaders positively impact feedback learning through their focus on efficiency, and reliance on established routines and memory (Vera and Crossan, 2004). Contrarily, transformational leadership is proposed to positively influence feed-forward learning as a result of such leaders' push for radical change, renewal and capture of group learning (Vera and Crossan, 2004). Consistent with this, other scholars demonstrate that leaders who purposefully obliterate power differences and encourage input and debate in turn promote an environment conducive to openness and sharing, hence facilitating individual-to-team learning linkages (Edmondson, 2002). Meanwhile, research has found that leaders who choose to retain their status and power tend to tighten control at the expense of learning. These managers often show behaviors characterized by defensiveness, conflict-avoidance and self-protection, which in turn prevent individuals from experimenting and sharing ideas with others (Edmondson, 2002). These leaders' actions reinforce an environment where individuals are passive actors

who execute orders and instructions, limiting opportunities for collective learning and shared understanding (Turner *et al.*, 2006).

The project management literature also notes that leadership plays an important role in embedding learning from individuals and projects to the organization (Berends and Lammers, 2010; Poell *et al.*, 2008; Sense, 2004) ( $N=3$ ). Most of this limited literature is concerned with the role of project managers and their power to create dependence and constrain team members' readiness to explore and learn. For example, Sense (2004) demonstrates that by providing seemingly vague directions and lack of role clarity project managers create hierarchy dependence, which in turn limits employees' confidence to explore new ideas, increasing their dependence on the project manager. Similarly, Berends and Lammers (2010) show how project leaders use their hierarchical position to influence learning trajectories. These behaviors restrict collective learning and lead to the selection of sub-optimal solutions during the project in order to 'speed things up'. Summarizing these findings, we offer the following observations: (1) leaders who limit power differences and actively promote a learning environment (e.g. encourage diverse opinions, increase task challenges and influence formation of social networks) will have a positive impact on feed-forward learning at the individual, team and organizational levels; and (2) leaders who actively enforce established routines and focus on efficiency will positively impact feedback learning from the organization to the group and the individual.

### *Structure*

Organizational structure defines the roles and responsibilities of the organizational members and teams, and determines how an organization allocates resources and interacts with the environment (Child, 1972). Our research indicates that organizational structure influences multilevel learning dynamics by shaping the patterns of information flow and communication

between organizational units. Our review papers ( $N=9$ ) provide limited explanation of ‘how’ the organizational structure creates these cross-level learning linkages ( $N=2$ ).

Organizational structure is linked to organizational theories and is determined by technology, size and the external environment within which an organization operates (Child, 1972). Research has long found that organizational structure plays an important role in triggering learning processes (Fiol and Lyles, 1985; Simon, 1991). Distinction between centralized and decentralized structures has been of particular interest when it comes to learning (D. Kim, 1993; Benner and Tushman, 2003; Siggelkow and Levinthal, 2003). A more mechanistic and centralized structure tends to reinforce past behaviors, is more efficient, but less adaptive. An organic, more decentralized structure tends to allow for more diverse beliefs and actions (Fiol and Lyles, 1985). It is the less mechanistic structures that encourage reflection and learning.

Papers from our review provide some answers regarding the role of organizational structure and multilevel learning outcomes. Fang *et al.* (2010) found that modest amounts of cross-group linkages are associated with higher learning performance and that team isolation enables the exploration of new ideas and solutions. These weak connections between teams enable novel solutions to be exploited throughout the organization (Fang *et al.*, 2010). Another aspect that emerged relates to the tension between exploitation and exploration. Research has found that structure can be used to manage the balance between exploration and exploitation. Decentralized structures promote rapid diffusion of ideas and encourage the exploration of a more diverse range of solutions (Benner and Tushman, 2003; Siggelkow and Levinthal, 2003). By integrating reasoning from network research (Granovetter, 1973; Reagans and McEvily, 2003) with organizational learning, some authors indicate that the ideal structure is one that is loosely coupled, providing some degree of team separation, while ensuring weak connections between teams and the organization (Fang *et al.*, 2010).

According to D. Kim (1993) and Schilling and Kluge (2009) a high level of decentralization inhibits the implementation of new ideas. Yet some level of team separation protects the team from becoming overly exposed to existing organizational routines and norms (Benner and Tushman, 2003). This in turn encourages exploration of a more diverse range of solutions and new alternatives. More recently, in their empirical study, Y. Kim *et al.* (2014) confirm that decentralized organizational structures encourage feed-forward learning to a greater extent than centralized structures. In decentralized structures top management delegates a significant amount of decision-making authority to lower-level managers. Operational practices and initiatives of the middle and frontline managers are therefore more likely to be institutionalized in decentralized structures because decision-making authority is distributed across organizational layers. Taken together, these findings suggest that a decentralized structure promotes learning flows between individuals, teams and the organization, and increases the opportunity for individual learning to reach the organizational level.

Four papers demonstrate the role of structure in shaping learning dynamics in PBOs; however, most of these studies provide only implicit evidence and their observations are not framed from a multilevel learning perspective. In PBOs the greatest amount of interaction and knowledge integration takes place at the project level (Lam, 2000). Nevertheless, this learning often remains within the project, leading to underutilized and missed inter-project learning opportunities. Project management research and practice have found that creating internal units, such as project management offices, is an effective way to bridge project and organizational learning. The main function of these internal units is to standardize project processes and design scaffolding that enables exploitation of what has been learned from previous projects to inform organizational practices (Pemsel and Wiewiora, 2013). Specific to the project-based setting, these units are created to support the growing volume of similar

types of projects and help institutionalize knowledge gained from these projects to the organizational memory (Brady and Davies, 2004).

In summary, our review reveals that it is mostly the decentralized structures, composed of loosely coupled, isolated teams, that enable the exploration of new ideas and solutions; hence triggering feed-forward learning flows.

### *Politics*

Political dynamics that occur within organizational boundaries have been found to influence organizational learning processes (Crossan *et al.*, 2011; Lawrence *et al.*, 2005). Theory of organizational politics and power has not yet been well-developed, with often two views on politics: ‘wide’, which describes politics as an exercise of power to influence behaviors or processes (Lawrence *et al.*, 2001); and ‘narrow’, which sees politics as a dysfunctional behavior that is strategically designed to maximize short-term or long-term self-interest (Cropanzano *et al.*, 1997). Even lesser theory development has been conducted to systematically link organizational politics and organizational learning (Coopey, 1995; Coopey and Burgoyne, 2000; Huzzard, 2004).

We found six papers ( $N=6$ ) that explicitly discuss politics as a driver of multilevel learning, and this research remains mostly conceptual and exploratory. The most contributing piece of research was produced by Lawrence *et al.* (2005), who refer to a broader definition of politics as the dynamics of power in organizations. Lawrence *et al.* (2005) used Crossan *et al.*'s (1999) multilevel learning framework to describe how politics and power move learning across the levels. Lawrence *et al.* (2005) theorize that episodic forms of power, characterized by discrete, political acts initiated by self-interested actors, facilitate interpretation and integration of new ideas (individual-to-team learning). Systemic elements of power, such as physical layout or information systems, provide individuals with predetermined decision



paths that influence institutionalizing and intuiting of learning (linking organizational and individual learning) (Lawrence *et al.*, 2005).

In the project-based literature, consistent with Lawrence *et al.*'s (2005) theorizing, Sense and Antoni (2003) found that only ideas from individuals holding a high level of bureaucratic or technical authority are considered, and that some individuals, aware of their position, purposefully minimize these authority barriers to promote project learning. Furthermore, Berends and Lammers (2010) demonstrate that tensions concerning the timing and pace of project activities trigger political interventions, which result in far-reaching implications for project learning outcomes. In other words, those in power purposefully interrupt the learning trajectory in an attempt to speed things up. Overall, these papers demonstrate that individuals who hold a position of power can use political interventions to influence (positively or negatively) feed-forward learning at the individual, team and organizational levels.

### *Shared mental models*

Our search identified six papers (N=6) with references to shared mental models; however, only two of these papers look at 'how' shared mental models can be utilized as a bridging mechanism for multilevel learning. Senge (1992) describes mental models as deeply held internal images of how the world works; those images often limit us to familiar ways of thinking and acting. D. Kim's (1993) seminal work positions the 'shared mental model' as the only mechanism supporting the transfer of learning between individuals and the organization: 'the mental models in individuals' heads are where a vast majority of an organization's knowledge (both know how and know why) lies' (D. Kim 1993, p. 44). Organizational learning, according to D. Kim (1993), can only take place with the exchange of individuals' shared mental models. D. Kim (1993) further argues that individual learning can be accelerated by surfacing and making explicit individuals' mental models (i.e. their views of the world, including the implicit and explicit assumptions): 'As mental models are made

explicit and actively shared, the base of shared meaning in an organization expands, and the organization's capacity for effective coordinated action increases' (D. Kim, 1993, p. 48).

Recognizing the limitation of a pure cognitive approach, Bogenrieder (2002) emphasizes the importance of the socio-cognitive context (Doise and Mugny, 1984) for learning, presenting three different types of 'social architecture for learning'. Bogenrieder (2002) argues that for the learning process to be successful individuals need to be able to: (1) recognize cognitive differences between their own and the other party's mental model, and (2) have an urge to solve the problem and find a common solution. Actual learning in this socio-cognitive context takes place when the cognitive conflict is solved. Bogenrieder (2002) argues cognitive diversity and the creation of social networks to be the building blocks of the 'social architecture for learning'.

Together, D. Kim's (1993) and Bogenrieder's (2002) work explains the cognitive and social mechanisms to bridge the gap between individual and organizational learning. This process involves: (a) making explicit an individual's mental model, and (b) providing the social architecture to identify conflicting mental models and resolve these conflicts to create shared mental models. However, both papers are theoretical, and the cognitive and social structures depicted in the papers are difficult to measure empirically. Methodological insight was offered by Campbell and Armstrong (2013), who studied shared mental models empirically using cognitive mapping methods (Laukkanen, 1994), comparing similarities and differences between the mental models of top management teams and individual lower-level managers. Convergence or divergence of mental maps from the senior managers was examined as an indication of the strengths of the shared mental models.

The process of using shared mental models to connect various levels in the learning process can be presented as follows. Individuals' mental models are shared with others through the use of examples, dialog, negotiation, observations and imitations of others

(Campbell and Armstrong, 2013). Practicing together, joint problem-solving and discussion can then help create shared understanding that contributes to collective knowledge. This shared understanding increases employees' shared knowledge about the task at hand and produces a common language that is argued to increase a group's effectiveness (D. Kim, 1993). As a group comes together, only some aspects of individual mental models will overlap, while other aspects will not. It is the overlapping parts, rather than the sum of individual mental models, that make up the shared collective learning. Organizational learning is created once individual mental models have become sufficiently spread throughout the organization (Hayes and Allinson, 1998; D. Kim, 1993; Senge, 1990).

Only one paper (Senge, 2004) is from the project management literature and its focus on shared mental models is merely peripheral. Senge (2004) points out the common tension between a project's focus on task delivery and learning, and argues for the importance of recognizing projects as the ideal 'social environment' for learning to occur. While the project management literature has not specifically examined the role of shared mental models in multilevel learning, recent work on temporal boundary objects in large-scale projects demonstrates the practice of constructing shared mental models using integrated scheduling systems, which is critical to the temporal nature of PBOs (Chang *et al.*, 2013). From the above, we can conclude that actively shared mental models will impact both feed-forward and feedback learning at the individual and team levels.

#### *Less researched mechanisms*

The less researched bridging mechanisms include organizational initiatives, networks, feedback, temporality, employees and major events. Although in most cases there were only implicit references to these six bridging mechanisms they may nevertheless play an important role in linking the levels of the multilevel learning process.

While organizational learning initiatives is a frequently identified mechanism ( $N=12$ ) only one paper provides rich explanation of its role in facilitating multilevel learning (see Figure 3). Thus, it provides little insight into ‘how’ organizational initiatives facilitate multilevel learning. Most of the studies focus on learning activities that bridge the individual and team level ( $N=6$ ), such as project reviews or study circles. Only a few studies focus on linkages between the team and the organization. Moreover, our review demonstrates that the types of learning initiatives differ based on the context and the field in which they feature. The broader management literature ( $N=4$ ) recognizes organizational initiatives as triggering feed-forward learning, focusing specifically on informal and less-structured initiatives, such as study circles (Augustsson *et al.*, 2013), explorative learning activities (Coradi *et al.*, 2015), opportunities for informal discussions and interactions (Sense, 2004), and conferences (Yew-Jin and Wolff-Michael, 2007). It can be argued that the outcomes of these activities are less tangible, encompassing tacit knowledge and new acquaintances. Only two studies ( $N=2$ ) focus on the role of specific conditions and identify physical space and allocation of time for learning activities as particularly influential in terms of learning transfer. More specifically, the organization can assist in creating individual–team connections by considering the design of zones and common spaces that encourage interaction, participation and knowledge sharing between individuals, such as tea rooms and rooms specifically designed for interactive gatherings (Coradi *et al.*, 2015; Sense, 2004). Additionally, time allocation is also identified as an important factor and Sense (2004) stresses the need to allow time for employees to attend and participate in learning activities, including meetings, forums and discussions. Allocating time for such activities grants permission to engage in learning and promotes sharing of knowledge and ideas, hence motivating employees to build a collective learning base. Noteworthy is the dominant focus on feed-forward learning in the general management research, which impacts linkages between the individual and team levels.

A number of papers ( $N=5$ ) in the project management literature identify certain organizational initiatives specific to the project-based context that are conducive to the transfer of learning between levels. These include post-project reviews (Anbari *et al.*, 2008), project team learning reviews (Barker and Neailey, 1999), risk registers (McCann *et al.*, 2012), formal meetings (Sense, 2004) and using realization cards as a learning activity (Fuller *et al.*, 2011). Project reviews are a consistent theme in the project literature when it comes to organizational initiatives promoting multilevel learning. This is most likely a consequence of the temporal nature of projects which, due to their defined boundaries and clear transition points (start, middle, end), provide the ideal setting for reflection and formal review to occur. The organizational initiatives identified in the project literature tend to produce tangible outcomes, such as records, reports and registers that capture knowledge and assist in the feedback learning linkages. Although these structured activities are designed to encourage more formal interactions that promote feedback learning, the literature consistently reports that these forms of learning do not produce desired outcomes (Anbari *et al.*, 2008; Scarbrough *et al.*, 2004).

A number of papers ( $N=6$ ) note networks as an element that enables learning between the individual and team/project levels. In particular, informal and formal networks are identified as opportunities where individuals can share ideas and learn from each other (McCann *et al.*, 2012; Yew-Jin and Wolff-Michael, 2007). Study circles and workshops are described as providing networking forums to get to know colleagues and learn from others (Augustsson *et al.*, 2013). Moreover, communities of practice are reported as more focused networks, where learning and development occurs through discussion of common interests (Edmondson, 2002; Song and Chermack, 2008). Bogenrieder (2002) outlines specific characteristics affecting learning in networks, such as relational strength (the frequency of communication, the duration of contact over time, intimacy or degree of agreement), legitimacy (a person's

position, e.g. status, authority) and trust. Networks are likely to have some influence on multilevel learning, especially in contexts where communication flow may be restricted due to the size or structure of the organizational units. Formal or informal networks of individuals operating in different parts of the organization, who otherwise would not be able to interact, can provide an effective avenue for multilevel learning and generating novel ideas.

Another element found to affect multilevel learning is the role of feedback ( $N=4$ ). Given the nature of feedback, which often takes place between individuals or within groups of individuals, it is perhaps unsurprising that most papers discuss feedback as linking the individual and team levels, rather than the organizational level (e.g. Turner *et al.*, 2006; Parboteeah *et al.*, 2015). One study by Turner *et al.* (2006) highlights how a lack of feedback can hinder the creation of individual and shared mental models, and thereby obstruct learning between the individual and team levels. Moreover, a distinction is made between positive and negative feedback, with the authors proposing that the latter could result in an outcome worse than ‘not learning’ (Turner *et al.*, 2006, p. 404). In the project-based context, only one paper vaguely mentions the role of feedback in providing opportunities for reflection and assisting in individual and team learning outcomes through seeking feedback and discussing ways to improve project team performance (Parboteeah *et al.*, 2015).

Although there has been limited uptake of research focusing on the role of time and temporality in affecting multilevel learning, all the papers discussing this phenomenon are from the project-based context ( $N=4$ ). Temporality and handling of time is one of the most evident differences between permanent and temporary organizations (Lundin and Söderholm, 1995). It is typical for those responsible for delivering of a project to think of the project in terms of consecutive phases. Temporality and short-term focus on project deliverables are deeply embedded in project-based organizing and project-based cultures. The time orientation also provides a rationale for arranging social relations (Lundin and Söderholm, 1995) and

shaping individual and team behavior, consequently having an inevitable impact on the learning flow. Learning unfolds over time, therefore time can be seen as a resource for learning, for example a time schedule dictates when to finish a task rather than continue experimenting (Berends and Lammers, 2010).

The role of employees in triggering multilevel learning appears to be largely under-researched; of the reviewed papers, only three provide limited discussion on this phenomenon. Yew-Jin and Wolff-Michael (2007) acknowledge that individuals at low and high levels of the corporate hierarchy have the potential to facilitate or impede organizational learning. Schilling and Kluge (2009) outline micro-level conditions, such as employees' perceptions of status, trustworthiness, liking or disliking their peers, level of stress, collective identity as well as their relations with the group, as influencing the flow of learning between individual and team levels. Crossan *et al.* (2011) further argue that individuals can influence at least some of the learning processes, regardless of the position they hold in an organization. Individuals on the lower level of the corporate hierarchy are directly exposed to everyday work challenges; they either work directly with clients or are directly involved in the design and production of a product or service. As such, these individuals hold important knowledge that can be used to inform organizational routines and practices.

The major events mechanism features in only one paper (Madsen, 2009). Major events, according to Madsen (2009), act as a source of feed-forward learning. Significant consequences from such events force immediate transmission of learning from the individual to the organizational level in order to avoid and prevent future similar major events from occurring.

## **Theoretical insights and contributions**

The goal of this literature review was to synthesize research on bridging mechanisms that connect learning across levels to create an integrated framework. More specifically, our three research questions were designed to find out what bridging mechanisms have been found in the general management and project management literature, and how these mechanisms function to connect the various levels in the learning process. Table 3 captures our three main findings: the bridging mechanisms that are studied in the existing literature, the levels these mechanisms connect, and the direction of learning that these mechanisms facilitate. We also contrasted the mechanisms as they relate to the project management context (see Table 3). Figure 4 captures a summary of our findings and illustrates the direction of learning (feed-forward or feedback) that each of the identified mechanisms influence. As outlined below, by addressing our research questions we contribute to the multilevel learning literature in at least two ways.

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Insert Figure 4 about here.  
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### *Multilevel learning: a systems approach*

First, our research contributes to and builds on the multilevel learning theory (Fiol and Lyles, 1985; Crossan *et al.* 1999) and research (Vera and Crossan, 2004) by integrating management and project management literature to connect the micro-, meso- and macro-levels. Through our systematic review we found that research on bridging mechanisms has been largely scattered. Some scholars use multilevel learning frameworks to explain the role of only one of the mechanisms, for example politics (Lawrence *et al.*, 2005) or leadership (Hannah and Lester, 2009) in facilitating or inhibiting learning flows. Others offer only implicit evidence of how learning travels between the levels, and are not explicitly framed using the multilevel



learning perspective (Sense, 2004). As such, we synthesized the existing research to consolidate our understanding of multilevel learning flows, captured in Figure 4. The framework proposed in Figure 4 can be viewed as a system of learning where one or more mechanisms reinforce one another or work in conjunction to facilitate learning flows. Structuration theory (Giddens, 1984), introduced below, can help us explain this systems approach.

Our second contribution is improved understanding of the mechanisms connecting levels. By using the multilevel learning framework (Crossan *et al.*, 1999), we can map the bridging mechanisms to better understand ‘how’, ‘where’ and ‘in which direction’ each identified mechanism functions to facilitate learning flows. In doing so, we uncovered that some mechanisms are active across all three levels, while others connect only two. We also found that all of the mechanisms facilitate feed-forward learning flows, but only three – leaders, shared mental models and organizational initiatives – trigger feedback learning.

#### *Mechanisms bridging three levels*

Culture, leaders, organizational structure and politics were found to facilitate learning across all three learning levels. This set of factors constitutes both the actors and the structures embedded within a social system and can be explained using structuration theory (Giddens, 1984). Structuration theory views social systems as sets of interactions concerned with the concrete practices of individuals operating within a set of institutionalized rules and resources, referred to as structure (Giddens, 1984). This structure is then reinforced or legitimized by regular interactions between actors within the existing structural elements. Building on Schilling and Kluge (2009) and Fang *et al.* (2010), our findings suggest that a flexible culture which supports experimentation and risk-taking, together with a loosely coupled, decentralized organizational structure, create the optimal structure to enable learning across levels. Leaders are unique key actors within the system and are able to significantly

influence the current structure to either support or inhibit learning. For instance, self-protected leaders can further endorse cultural values focused on control and top-down decision-making, by discouraging individuals from taking risks and sharing their novel ideas, thereby restricting collective learning. At the same time, leaders, through their leadership styles and actions, can deliberately limit power differences, provide regular feedback and connect networks to enable a more learning friendly structure. Together, culture and leaders have the power to promote or restrict an environment of risk-taking and sharing, and thereby influence multilevel learning flows.

#### *Mechanisms bridging two levels*

Shared mental models, feedback and networks were mostly active in linking the individual and team levels, but only two mechanisms – shared mental models and organizational initiatives – were reported to trigger multilevel learning in both the feed-forward and feedback direction. These less frequently researched mechanisms – shared mental models, networks and feedback – contribute to the understanding of feed-forward learning (from individuals to teams) and, to a limited extent, to the understanding of feedback learning (from teams to individuals).

While the management literature tends to focus more on individual-to-team linkages, the project management literature offers research that explains connections between the project and organizational levels. Table 3 clarifies the activities and triggers that are unique to the project management literature. One of the most significant themes unique to the project-based context is the influence of organizational initiatives and a time-sensitive culture. Both of these factors negatively affect learning flows. Being unique to the project-based context, post-project reviews, project management offices and political interventions were the three bridging mechanisms impacting learning flows from the project to the organizational level.

Overall, the summary illustrated in Table 3 helps encapsulate the mechanisms specific to the project-based context.

### **Implications for multilevel learning research and future research opportunities**

This section discusses the major gaps identified during our review, which provide fruitful avenues for future research. This section also concentrates on the multiple directions for future research concerning specific primary and less researched bridging mechanisms as outlined below.

A first priority is the need for a richer understanding of how learning flows in the feedback direction – from the organization down to teams/projects and individuals – as this remains a significant gap. As such, there is still a need for further research that investigates the role of bridging mechanisms and ‘how’ these can act to successfully influence feedback learning. When examining feedback learning, related literature such as training and professional development, as well as performance management, may prove useful to help inform future research. It is likely that these two disciplines focus more specifically on explaining the process by which learning travels from the organizational to the individual level, as this is traditionally how learning has been viewed. Additionally, the literature on governance and compliance may have examined feedback linkages and organizational-level factors impacting learning at the team/project level. Project processes, systems and behaviors are shaped by the governance structure and compliance standards (Pemsel and Müller, 2012); as a result, these organizational-level mechanisms may trigger top-down learning from the organization to teams/projects. It is likely that relevant articles from these fields were not captured in our review, either as a result of the keywords or the exclusion of individual subject categories.

The second priority is to advance research in project management and investigate the utility and efficiency of feed-forward learning from individuals to projects, and informal sharing of knowledge between individuals and projects. Our review of literature demonstrates that the link between individual and organizational learning is an area the project management field is yet to explore. Additionally, future research should consider the organization's temporal boundaries and how this affects learning cycles. In fact, the very temporal nature of projects implicitly encourages feed-forward learning through the recruitment of personnel who often bring tacit knowledge and experience with them from prior projects. It would be interesting to investigate the role of individuals, as knowledge or project champions, in triggering multilevel learning in PBOs.

*Advancing understanding of organizational culture in multilevel learning*

Our findings reveal that learning flow is optimized by certain cultural values. Values of flexibility, experimentation and risk-taking enable learning flows, while short-term orientation and emphasis on control inhibits learning. No paper in our review systematically examined how these specific cultural values influence individual-, team/project- and organizational-level learning. Furthermore, papers with a major focus on culture mostly used case studies and concentrated primarily on the individual and organizational learning linkages, with one exception centered around the group level (Edmondson, 2002). The complexity and context-dependency of organizational culture and organizational learning research using case study methodologies restricts the development of a generalizable theoretical framework illustrating the relationships between culture and multilevel learning. In spite of this, we believe that there is an opportunity to further advance such knowledge, striving towards a more complete model to expose the specific cultural values, including how and why they influence multilevel learning relationships. A large, cross-sectional and quantitative study could advance our understanding of culture as a bridging mechanism.

Furthermore, the project management literature identifies short-termism – an emphasis on ‘doing’ and meeting immediate deadlines – as a barrier to learning, unique to this particular context. Project management literature also reveals that organizational culture determines how project mistakes are perceived and if they are hidden or revealed (Carrillo *et al.*, 2013). Project mistakes provide valuable learnings to future projects and the organization. Lessons from those mistakes can save money, time and other resources in the long term. Building on these findings, future research can further investigate how to manage these tensions between short- versus long-term goals to better manage learning discontinuities. More specifically, showing how the culture of short-termism can be shaped to encourage learning from mistakes would be of immense value. Existing research has not attempted to investigate this problem. Lastly, in the context of project-based organizing, the differences between project subcultures and the dominant organizational culture are evident. Building on Ajmal and Koskinen (2008), who began to distinguish these cultural differences and their significance for knowledge sharing, future research can explore which cultural values – project or organizational – have a greater influence on multilevel learning flows, and which are more dominant in shaping individual and team learning behaviors.

#### *Advancing understanding of leadership in multilevel learning*

Our review found evidence that leaders play a significant role in facilitating feed-forward learning. Most research focuses on the role of leaders to ignite the feed-forward learning flow (from individuals to team/project to the organization), whereas little has been mentioned about the role leaders play in facilitating feedback learning (organization-to-individual learning), with the exception of Vera and Crossan (2004). Vera and Crossan (2004) hypothesize the important role of transformational and transactional leaders in triggering both feedback and feed-forward learning, depending on the firm’s stage of maturity. Further research is needed to empirically test Vera and Crossan’s (2004) and Hannah and Lester’s

(2009) propositions and explore negative and positive effects of other types of leaders on learning flows in both directions: feedback and feed-forward. Future research can also focus on investigating how specific leadership styles shape multilevel learning processes and the mechanisms leaders use to motivate individuals to share knowledge and trigger the flow of learning. In the project-based context, project managers have been described as CEOs of their projects and knowledge gate keepers located at the center of a project network (Blackburn, 2002), playing an important role as boundary spanners between projects and the organization (Eskerod and Skriver, 2007; Loo, 2002). Project managers have been found to be autocratic and pragmatic, focused on short-term project outcomes and give lower priority to everything that does not directly contribute to their project (Pensel and Wiewiora, 2013). These specific leadership characteristics imply the relevance of strategic leadership theory to examine how these distinct features of project managers affect multilevel learning flows and investigate how to unlock those learning discontinuities caused by outcome-oriented project leaders. Finally, Crossan *et al.* (2011) warn that a theory of multilevel learning needs to carefully consider the meaning of leadership. It would be unfortunate if it were viewed solely from an upper-echelon perspective, or even from a simple hierarchical perspective, as it is evident that individuals can also influence learning processes in spite of their hierarchical position. Future research linking leadership and multilevel learning could borrow from other strategic leadership theories, such as contingency or complexity theory, or theories where leadership is understood as the product of complex social relationships, to further explore this phenomenon.

#### *Advancing understanding of structure in multilevel learning*

Our findings on the role of structure in triggering multilevel learning also make a contribution to the project management context. Building on Fang *et al.* (2010) and Y. Kim *et al.* (2014), future research could focus on examining which type of structure configuration best triggers

project-to-organization learning. It would also be of interest to the general management field to examine multilevel learning capabilities of organizations operating in complex environments with adaptive structures.

*Advancing understanding of politics in multilevel learning*

We found that politics affect the flow of learning between individuals, the team/project and the organization, and that different types of political interventions (i.e. episodic versus systemic) affect different levels of learning (Lawrence *et al.*, 2005). Research demonstrates that politics and political interventions primarily affect feed-forward learning. The current understanding of this phenomenon is that political interventions shape individuals' involvement in the learning process. This occurs by including and/or excluding particular organizational actors and influencing decisions regarding who, when and how they are involved in the learning process. These political interventions in turn either interrupt or trigger learning flows. Shadowing Crossan *et al.* (2011), we consider politics to be an important aspect of organizational learning and suggest that more empirical research is needed to better understand the interplay between politics and power in the multilevel learning process. More specifically, existing research assigns power as a primary attribute of leaders or individuals with hierarchical or technical authority. It is less understood how lower-level employees use politics to engage in the learning process. In the project management setting it may be worthwhile to further examine the role of power and politics in the learning process, including the tensions stemming from prioritization of project versus organizational goals. Building on Lawrence *et al.*'s (2005) work, future research could empirically examine episodic and systemic power and multilevel learning processes. In addition, in some organizations knowledge can be perceived as a source of power (Premsel and Wiewiora, 2013), therefore some individuals may purposefully disturb the learning process to remain in

a position of power. Future research can investigate this phenomenon and determine how it affects multilevel learning.

*Advancing understanding of shared mental models in multilevel learning*

Current research on shared mental models explains how an individual's learning is transferred to group and organizational levels through shared understanding and negotiation of mental models (D. Kim, 1993; Bogenrieder, 2002). There is limited attention to this cognitive mechanism in the project management space. The use of a scheduling system as representing shared mental models creates opportunities for future research to examine the iteration and learning processes in project organizations (Chang *et al.*, 2013). Chang *et al.* (2013) observed the use of the integrated master schedule as a 'temporal boundary object' which enables communication and negotiation of project realities. Boundary projects are defined as objects in systems that can be reshaped to adapt to the local needs and constraints of the several parties employing them, yet are robust enough to maintain a common identity. They have different meanings in different social worlds, but their structure is common enough to more than one world to make them recognizable as a means of translation. The creation and management of boundary objects is key in developing and maintaining coherence across intersecting social worlds (Star and Griesemer, 1989). Campbell and Armstrong's (2013) paper highlights the utilities of cognitive mapping methods to study shared mental models. This technique echoes the utility of a boundary object in facilitating visualization and negotiation of shared meanings. Future research is recommended to consolidate the current knowledge of boundary objects to enhance our understanding on how shared mental models are created to facilitate cross-level learning.



### *Advancing understanding of the less researched mechanisms in multilevel learning*

Opportunities also exist to advance knowledge of the less researched mechanisms, where limited understanding exists about ‘how’ they act to facilitate learning flows. In particular, future studies may focus on how specific organizational initiatives facilitate learning in feed-forward and feedback directions, how networks act to trigger individual-to-team/project learning and specifically what network configurations are best for different learning outcomes. Future research could further explore types of feedback and their consequent impact on multilevel learning. Moreover, attention might also be given to how and if feedback affects learning at the organizational level, as this appears to be a missing aspect in the articles featured in this review. Further research into time and temporality is required to understand how learning unfolds over time and how it impacts learning discontinuities between the levels. Finally, more empirical research is needed on the role of lower-level employees in facilitating or impeding team and organizational learning outcomes. How individuals break through the levels of learning to inform organizational practices is still not well understood. We suggest that future empirical studies investigating these less research elements attempt to apply theory in their research.

### **Conclusion**

Research in multilevel learning has gained increased attention, with well-established argumentation that organizations learn from individuals and teams, and that learning needs to ‘travel’ between the levels. Existing research on mechanisms that connect levels in feedback and feed-forward directions still remains exploratory and scattered. This paper provides a critical assessment of the multilevel learning literature by: identifying bridging mechanisms for multilevel learning, evaluating differences across two disciplines, highlighting weaknesses and gaps, and proposing areas worthy of further investigation.

Our most notable contribution to the field is the view of multilevel learning as a system where bridging mechanisms work together to enable feedback and feed-forward learning. Some of these mechanisms, such as culture, leaders, organizational structure and politics, connect three levels in the learning process. Other mechanisms, such as shared mental models, feedback and networks, appear more active in connecting only two levels – the micro- and meso-levels.

We also offer future research opportunities, focusing on those that are, in our view, the most important research priorities for advancing knowledge in multilevel learning. We hope that the findings from this paper and the suggested research agenda trigger future research investigations into multilevel learning. In particular, focusing on investigating multilevel learning from the perspective of the holistic learning system approach or providing a more in-depth examination of those less researched mechanisms.

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## Tables and Figures

**Table 1** Search terms

<b>Step 1</b>		<b>Step 2</b>		
<b>Multilevel category</b>	AND	<b>Learning category</b>	AND	<b>Project-based category</b>
<ul style="list-style-type: none"> <li>• Multilevel/multi-level</li> <li>• Micro and macro</li> <li>• Individual and project</li> <li>• Individual and organization/organization(al)</li> <li>• Learning process(es)</li> </ul>		<ul style="list-style-type: none"> <li>• Learning</li> </ul>		<ul style="list-style-type: none"> <li>• Project</li> <li>• Project-based</li> <li>• Project management</li> <li>• Project organizing</li> <li>• Project organization</li> <li>• P-form corporation</li> <li>• Inter-project</li> </ul>

**Table 2** Overview of the data set

Author	Year	Journal	Level of Learning			Primary Mechanisms					Less Researched Mechanisms						
			Individual level	Team/project level	Org. level	Culture	Leaders	Structure	Politics	Shared mental models	Org. Initiatives	Networks	Feedback	Temporality	Employees	Major events	
D. Kim	1993	<i>Sloan Mgt Review</i>	✓		✓						M						
Ahmed <i>et al.</i>	1999	<i>Total Quality Mgt</i>	✓	✓	✓	L											
Barker & Neailey	1999	<i>Journal of Workplace Learning</i>	✓	✓							M						
Bhatt	2000	<i>The Learning Organization</i>	✓		✓	L					L						
Lam	2000	<i>Organization Studies</i>	✓	✓	✓				L								
Bogenrieder	2002	<i>Mgt Learning</i>	✓	✓	✓						L		M				
Edmondson	2002	<i>Organization Science</i>	✓	✓	✓	M	M				L	L					
Sense	2003	<i>Int. Journal of Project Mgt</i>		✓	✓			L	M								
Sense	2004	<i>Journal of Workplace Learning</i>	✓	✓	✓	L	L	L	L	L	L				L		
Vera & Crossan	2004	<i>Academy of Mgt Review</i>	✓	✓	✓			M									
Lawrence <i>et al.</i>	2005	<i>Academy of Mgt Review</i>	✓	✓	✓					M							
Turner <i>et al.</i>	2006	<i>The Learning Organization</i>	✓		✓	M	M							M			
Yew-Jin & Wolff-Michael	2007	<i>The Learning Organization</i>	✓		✓	M	L				L	L				M	
Sense	2007	<i>Int. Journal of Project Mgt</i>	✓	✓	✓	L											
Anbari <i>et al.</i>	2008	<i>Technovation</i>	✓	✓	✓	L	L				L				L		
Mazutis & Slawinski	2008	<i>Mgt Learning</i>	✓	✓	✓			M									
Poell <i>et al.</i>	2008	<i>Academy of Man. Annual Meeting Proc</i>	✓		✓	L	L	L									
Song & Chermack	2008	<i>Human Resource Development Review</i>	✓		✓						L		L				
Hannah & Lester	2009	<i>Leadership Quarterly</i>	✓	✓	✓			M									
Schilling & Kluge	2009	<i>Int. Journal of Mgt Reviews</i>	✓	✓	✓	L	L	L	L		L					L	
Madsen	2009	<i>Organization Science</i>	✓		✓			L									M
Berends & Lammers	2010	<i>Organization Studies</i>	✓	✓	✓			M	L	M					L		
Fang <i>et al.</i>	2010	<i>Organization Science</i>	✓	✓	✓				M								
Bell <i>et al.</i>	2010	<i>Journal of Academy of Marketing Science</i>	✓	✓	✓	L					L		L				
Crossan <i>et al.</i>	2011	<i>Academy of Mgt Review</i>	✓	✓	✓			L		L						L	
Fuller <i>et al.</i>	2011	<i>Intern. J of Managing Projects in Business</i>		✓	✓						L						
Song <i>et al.</i>	2011	<i>The Learning Organization</i>	✓	✓	✓	L	L	L			L						

McCann <i>et al.</i>	2012	<i>Journal of Risk and Governance</i>	✓	✓	✓								L	L				
Swart & Harcup	2012	<i>Mgt Learning</i>	✓	✓											L			
Augustsson <i>et al.</i>	2013	<i>Journal of Health Org. and Mgt.</i>	✓	✓	✓	L	L						L	L				
Carrillo <i>et al.</i>	2013	<i>Int. Journal of Project Mgt</i>	✓	✓	✓	L										L		
Campbell & Armstrong	2013	<i>The Learning Organization</i>	✓	✓	✓					M								
Lin <i>et al.</i>	2013	<i>Journal of Product Innovation Mgt.</i>	✓		✓	L												
Brusoni & Rosenkranz	2014	<i>European Mgt Journal</i>	✓		✓		L											
Y. Kim <i>et al.</i>	2014	<i>Journal of Operations Mgt</i>	✓		✓			M										
Dayaram & Fung	2014	<i>Asia Pacific Journal of Human Resources,</i>	✓	✓	✓	L												
Coradi <i>et al.</i>	2015	<i>Creativity and Innovation Mgt.</i>	✓		✓								L					
Parboteeah <i>et al.</i>	2015	<i>European Mgt Journal</i>	✓	✓											L			

**Legend:**

L – Limited focus (explains the ‘what’)

M – Major focus (explains ‘how’ bridging mechanisms connect the levels)

\* Lightly shaded are the papers from the project management literature.



**Table 3** Bridging mechanisms for multilevel learning in organizational and project-based contexts

<b>Bridging mechanisms</b>	<b>Activities and triggers</b>	<b>Project-based specific activities and triggers</b>	<b>Levels of learning</b>	<b>Learning direction</b>
<b>Culture</b>	Specific cultural and sub-cultural values, norms and artifacts impacting learning flows	Cultural frames focused on time pressures and short-term orientation	Individual→team/project Individual→organization	Feed-forward learning
<b>Leaders</b>	Influence access to diverse opinions and knowledge Influence formation of social networks Use power and hierarchical position to influence learning flows Translate values and provide formal systems and training	Create interdependence	Individual→team/project Individual→organization Team/project→organization  Organization→individual Organization→team	Feed-forward learning   Feedback learning
<b>Structure</b>	Centralized versus decentralized structures Degree of team separation	Project Management Offices	Individual→organization Project→organization	Feed-forward learning
<b>Politics</b>	Political interventions: episodic and systemic power Interventions to include/exclude actors in the learning process	Political interventions triggered by timing and pace of project activities	Individual→team/project Team→organization Individual→organization	Feed-forward learning
<b>Shared mental models</b>	Resolving tensions, shared understanding through dialog and negotiation, sense-making, cognitive differences		Individual→team  Team→individuals	Feed-forward learning  Feedback learning
<b>Organizational initiatives</b>	Study circles, explorative learning activities, conferences, physical spaces, time for learning, rules and regulations, policies and procedures	Project reviews, risk registers, lessons learned	Individual→team/project Project→organization  Organization→individual Team→individual	Feed-forward learning  Feedback learning
<b>Networks</b>	Informal and formal interactions: workshops, communities of practice		Individual→team	Feed-forward learning
<b>Feedback</b>	Positive versus negative		Individual→team	Feed-forward learning
<b>Temporality</b>		Short-term focus on project deliverables, temporal structures	Individual→project	Feed-forward learning
<b>Employees</b>	Employees' actions triggered by their perception of status, stress level, identity, relationships with group		Individual→team	Feed-forward learning
<b>Major events</b>	Adjust mental models, develop new routines and processes		Individual→organization	Feed-forward learning

\* Lightly shaded rows are less researched mechanisms, meaning those with little coverage of *how* they link learning between levels.

## **Figure captions**

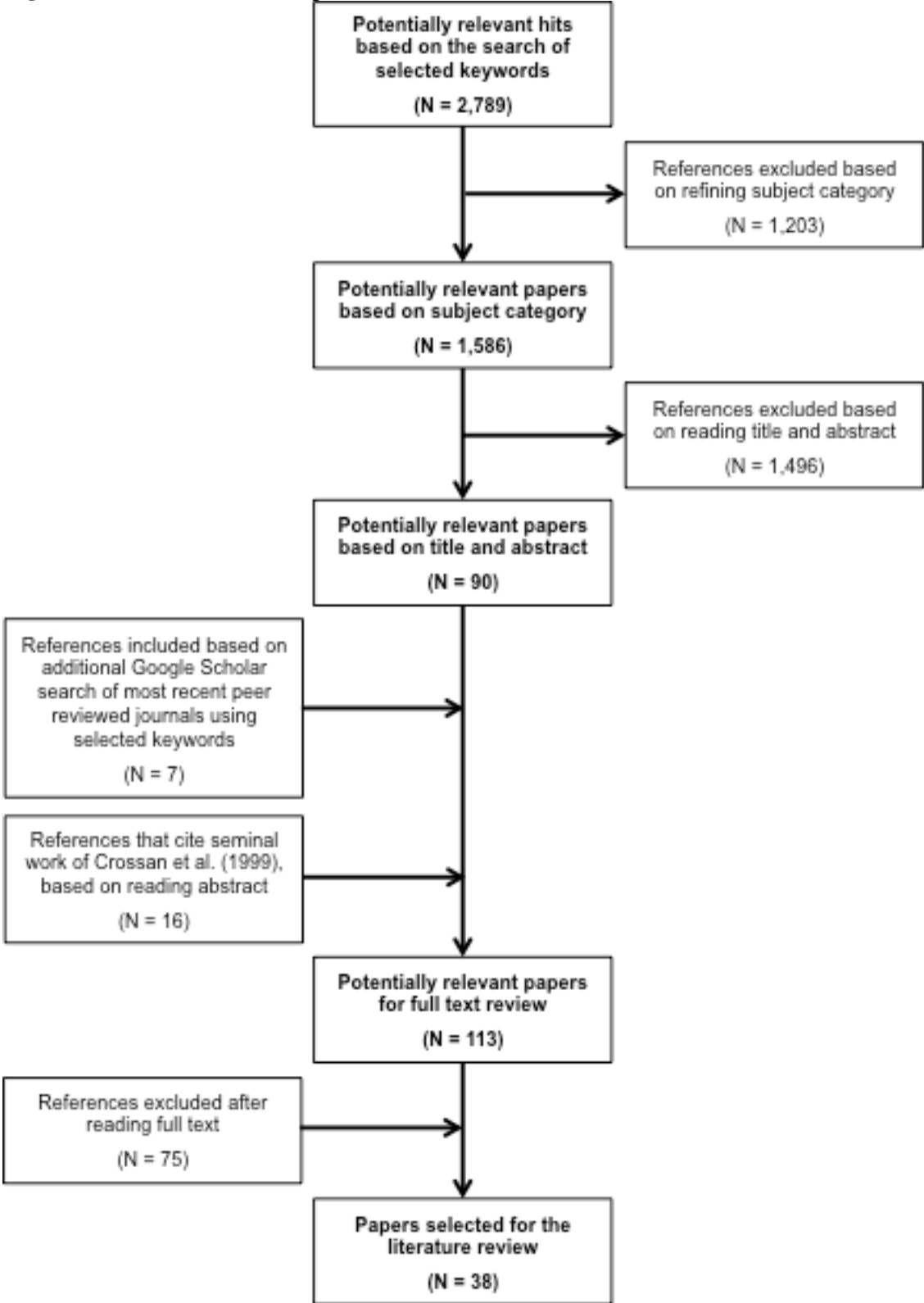
**Figure 1** Literature selection process

**Figure 2** Growth of the literature on multilevel learning

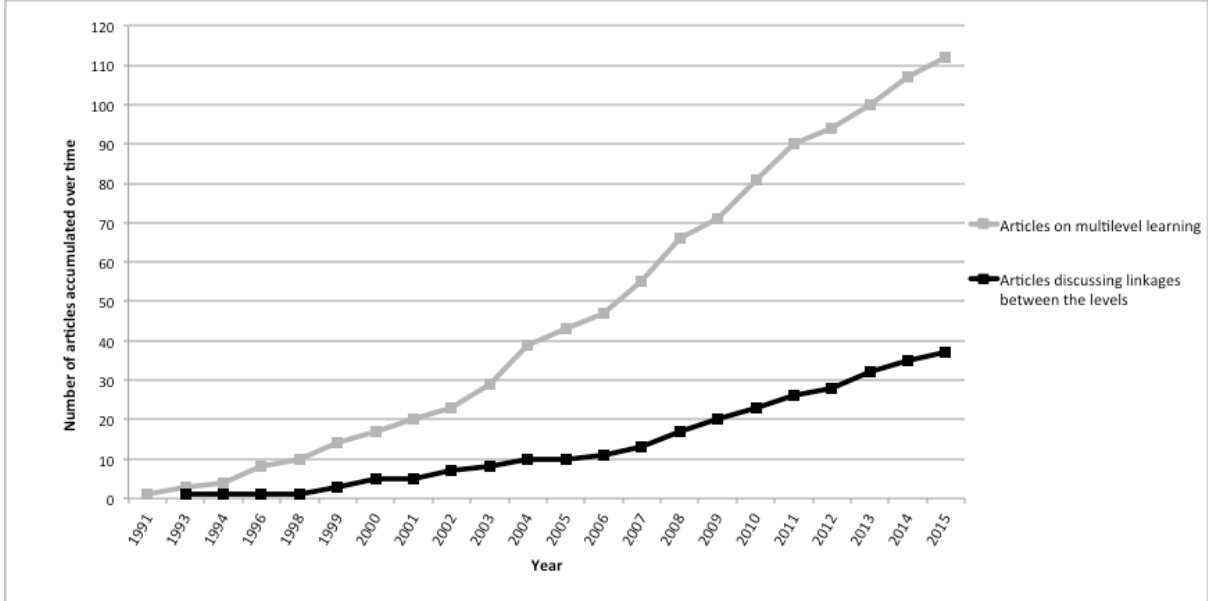
**Figure 3** Bridging mechanisms facilitating learning between the levels

**Figure 4** Summary of findings

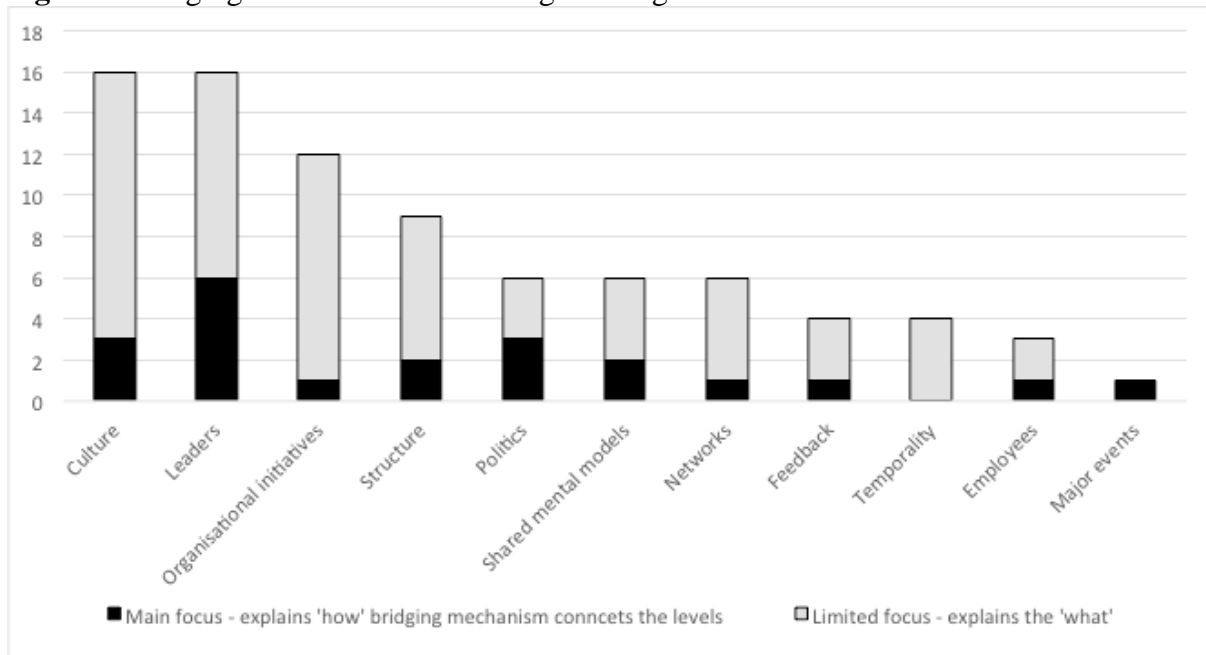
**Figure 1** Literature selection process



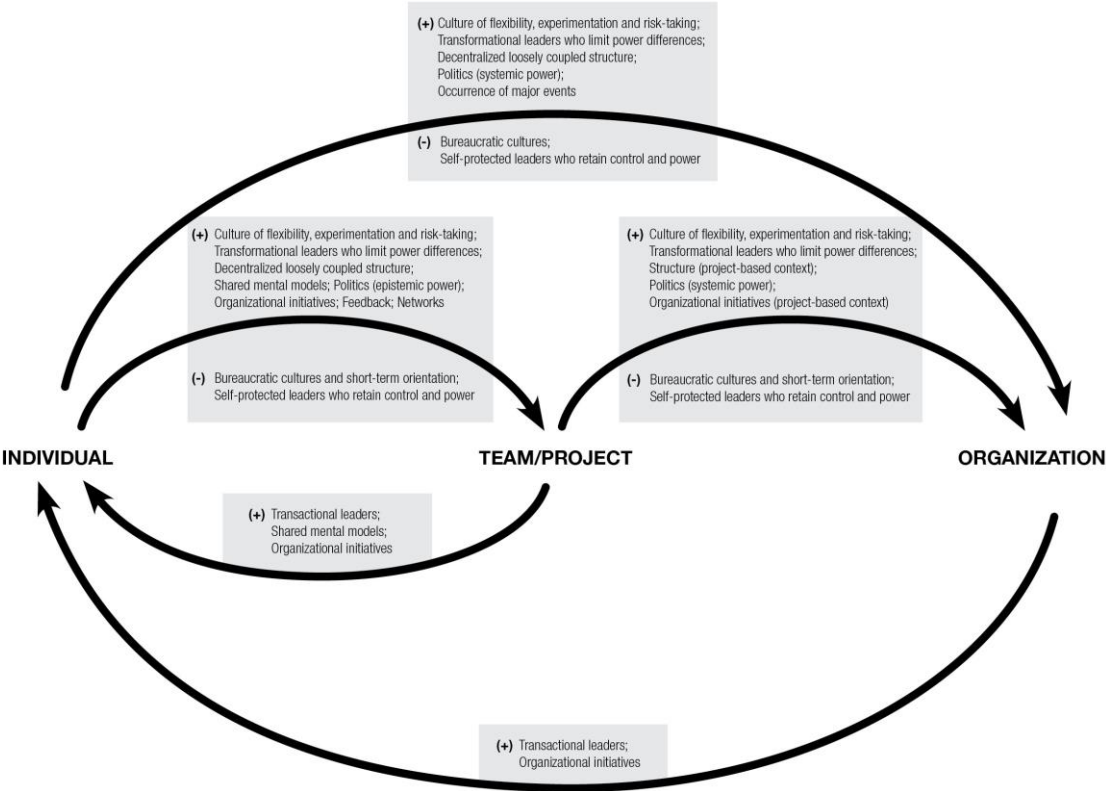
**Figure 2** Growth of the literature on multilevel learning



**Figure 3** Bridging mechanisms facilitating learning between the levels



**Figure 4** Summary of findings



**Legend:**

- (+) Positively impacts and assists the learning flow between the levels
- (-) Negatively impacts and discourages the learning flow between the levels