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Organizational Learning: The Role of the Physical Environment

Aneetha Rao Kasuganti[1]

Abstract This paper examines the role of the physical environment in facilitating organizational learning. Semi-structured interviews related to learning and experiences of physical environment were conducted in two organizations in India. Workspaces were studied using non-participant observation. Cognitive maps of the layouts were created and movements in the workspaces mapped. Content analysis was performed on interview responses, and space syntax analysis was used to analyse maps of the workspaces. Findings suggest that knowledge in organizations is transformed through dialogue and discussion. Relationships, supportive leadership, culture, organizational strategy, and physical environment were found to play a key role in facilitating this process. The physical environment afforded co-presence, movement, and encounter. These features were found to contribute to interaction that facilitated dialogue, and thereby transformation of knowledge. This paper highlights the importance of physical design and provides areas of concrete intervention, allowing for facilitation of learning based on the physical dimension of the learning context.

Keywords Organizational learning · Situated learning · Physical environments · Open office environments

Introduction

Learning has emerged as one of the principal processes by which organizations develop the ability to face challenges thrown up by continuous change in the business environment (Stata, 1989). This has ensured that the concept has retained the interest of practitioners and researchers alike. Cognitive and practice-based theories are two dominant perspectives that have emerged in research on organizational learning. (Marshall, 2007). Cognitive theories focus on learning by individuals, wherein individuals are seen to acquire knowledge that is disseminated across the organization to become part of organizational routines and values. According to this perspective, knowledge "exists in the heads of persons" (Gherardi, 2006: xv) and knowledge transfer occurs from the "knower" to the "seeker". Learning is a deliberate, planned activity, and physical environments in this perspective are merely the settings in which these transfers take place (Merleau-Ponty, 1962). Practice-based theory on the other hand, views learning as a dynamic, social process occurring as part of dialogue and interactions in shared activities and practices in the organization. These processes are situated in a context that includes individuals, actions, relationships, and the physical environment in which they are situated (Marshall, 2007; Nova, 2005). Since this form of learning takes place as part of actions and activities in the workplace, the role of the context or environment is an essential part of the process (Pedler, Burgoyne, & Boydell, 1997; Gherardi, 2006; Nicolini, Gherardi, & Yanow, 2003).

Prior research on organizational learning has emphasized that factors in the context such as relationships based on trust and psychological safety, as well as leadership, organizational structure, and strategy, facilitate learning (Edmondson, 2012; Garvin, Edmondson, & Gino, 2008; Law & Gunasekaran, 2009; Teare, 1997; Von Krogh, Nonaka, & Ichijo, 1997). Some studies on physical environments has established that certain layouts support interaction, collaboration, and communication, contributing to organizational outcomes such as creativity and innovation (Dul, Ceylan, & Jaspers,

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2011; Stokols, Clitheroe, & Zmuidzinas, 2002). However, despite research that highlights the impact of physical environment on behaviour in the workplace, organizations appear to view it as a mere space to house their employees instead of an asset that can positively influence behaviour of employees and impact organizational outcomes (Veitch, Charles, Farley, & Newsham, 2007). The impact of physical environment on learning remains relatively unexplored (Sailer, 2010), and literature on organizational learning reflects this gap. This paper explores situated learning and examines the influence and role of the physical environment on the process. Two case studies have been created based on an exploratory study conducted in two knowledge-intensive companies in India. The case studies are used to examine how the physical environment provides support for dialogue and interaction, thereby facilitating situated learning.

Theoretical Base

Situated Learning

Practice-based theories of situated learning view learning as a dynamic, shared, social process of mutual engagement (Elkjaer, 2005) that is rooted or situated in the organizational context. Learning according to this perspective is not a deliberate process—in fact it is a no-choice situation (Nicolini & Meznar, 1995), occurring through social practices of interaction and participation when people are brought together within a culture (Cook & Yanow, 1993; Huysman, 2000; Yanow, 2000). In this process, knowledge is generated through "speech, conversations, bodily gestures, glances, expressions and data exchanges" (Amin & Cohendet, 2004: 67). Key components of this form of learning are learning in action, knowledge sharing, and common understanding, which occur in practice and through participation in day-to-day activities in the organizational context (Handley, Clark, Fincham, & Sturdy, 2006). Practices are everyday actions, activities, behaviour, and interactions oriented towards organizational goals, and are part of the work processes and everyday life in organizations (Cook & Brown, 1999; Sandberg & Tsoukas, 2011). Individuals continuously participate in these practices, sharing and exchanging knowledge through conversations and interactions, resulting in the development of shared understanding amongst them (Nonaka, 1994; Weick, 1995). The role of joint activities as well as face-to-face interactions in the organizational context therefore becomes critical (Hillier & Penn, 1991), making the context a central and integral part of the process.

Contexts in organizations comprise of individuals, activities, relationships, and physical environments (Nova, 2005). Research has established that certain factors in the organizational context such as leadership, organizational

structure, and psychological safety facilitate learning (Edmondson, 2012; Garvin et al., 2008; Teare, 1997; Von Krogh et al., 1997). Studying the physical environment and its influence on interaction and dialogue within organizations would provide valuable insights regarding its influence on learning.

Physical Environment

Physical environments in organizations include material objects and stimuli (such as buildings, furnishing, and ambient conditions) as well as arrangement of these objects. Individuals are instrumental in the creation and arrangement of these environments, which become part of the context that influences their actions and behaviour (Elsbach & Pratt, 2007; Mehrabian & Russell, 1974). Early research on physical environment in organizations has established that proximity in the physical environment impacted behaviour such as crowding, friendship, relationships, and group behaviour (Altman, 1975; Festinger, Schater, & Back, 1950; Sommer, 1969). With the adoption of the open office in many organizations, focus of much of the research in the 1970s shifted to studying the impact of this design on individuals and their behaviour in organizations. Two opposing perspectives emerged from this research: the first claimed that improved communication and interaction in open offices positively influenced motivation and satisfaction, creating conditions for improved task performance (Allen, 1969; Oldham & Brass, 1979; Oldham & Rotchford, 1983); the second perspective, however, claimed that the lack of boundaries within this office design led to noise, distraction, and lack of privacy, which had a negative impact on task performance.

Studies specific to the open office design concentrated initially on its impact on communication and interaction (Brooks & Kaplan, 1972; Festinger, Schater, & Back, 1950; Oldham & Brass, 1979). Later research sought to consolidate these findings, and further examined the nature of physical environment in organizations, explaining the role of physical space in shaping organizational action and outcomes. These works identified ambient features, layout, and symbolic indicators as key components of physical space that influenced behaviour (Becker, 1981; Davis, 1984; Pfeffer, 1982; Steele, 1973; Sundstrom & Sundstrom, 1986). Ambient conditions, if at optimal levels, were found to lead to satisfaction with the physical environment, leading to a positive impact on productivity (Charles, Danforth, Veitch, Zwierzchowski, Johnson, & Pero, 2004). Layouts were found to impact personal space and privacy, guiding movement and interaction, thereby facilitating collaboration and exchange of knowledge (Brenner & Cornell, 1994; Chua, 2002; Sundstrom & Sundstrom, 1986). Interactions within a physical location

have been found to result in place attachment, and individuals form an attachment and identity with the physical site (Inalhan & Finch, 2004; Proshansky, Fabian, & Kaminoff, 1983). Symbolic artefacts contain symbolic meanings and associations related to roles and relationship and convey messages about structure and power in the organization (Davis, 1984; Sundstrom & Sundstrom, 1986).

More recent work has sought to examine the impact of physical environment in open offices on various organizational outcomes. Studies on creativity have established that the physical environment, along with other factors such as individual characteristics and social climate fosters creativity (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Dul et al., 2011; Sailer, 2010; Stokols et al., 2002). Improved access to other people, the possibility provided by layouts to share or absorb information, and better relationships amongst the staff were argued to foster potential for higher levels of creativity, occurring due to being exposed to the work of others in the organization (Sailer, 2010; Toker & Gray, 2008). On the other hand, there have also been studies that have established that noise and other distractions that result from the open office design have a negative impact on performance, leading to a decrease in privacy (Jahnke, Hygge, Halin, Green, & Dimberg, 2011; Keranen & Hongisto, 2013; Oldham & Brass, 1979; Zhang, Kang, & Jiao, 2012).

Despite these studies that highlight the negative impact of the open-plan office, it has been seen that the layout in such an office design increases access to other individuals, allows for observation of others and their work, and improves possibilities of communication, interaction, and dialogue, which further foster collaboration (Brenner & Cornell, 1994; Heerwagen, Kampschroer, Powell, & Loftness, 2004). Learning according to the situated learning perspective occurs by participation in practice that takes place in the context, which includes the physical environment. It is therefore possible that the physical environment may influence learning dependent on interaction and dialogue. This paper explores the possibility that open office environments would facilitate situated and practice-based learning by encouraging interaction and communication.

Method

Participants

Purposive sampling was used to shortlist knowledge-intensive organizations based on personal knowledge and research on the Web. Initial contact was made with either

Table 1 Details of participant companies in the exploratory study

	Company A	Company B
Type of work	Techno-media company	HR Consultancy
Location	Mumbai	Mumbai
Established	2002	2009
No of Employees	25	25
Area in square feet	1000 + 700	1500
No of respondents	5	6
Role of respondents	CEO, Heads of Sales, Technology and members of sales and Marketing team	Director, four team leaders and one intern

known individuals or human resource managers of the respective companies. The purpose and academic nature of the study were explained, and participation was invited. Thereafter, an initial meeting was arranged to explain the methodology proposed for the study, and companies were assured of confidentiality of data. Upon receiving confirmation of their participation, dates for interviews and observation were finalized. Details of the companies are provided in Table 1.

Convenience sampling was used to identify respondents based on their availability for the interviews. With the assistance of the HR managers, 11 participants belonging to different levels in the organization[1] were identified: 5 from Company A and 6 from Company B. Since interaction and communication patterns were being studied, respondents were chosen from a single team, with at least one other from a related but distinct team. Age of employees ranged between 21 and 52 years. Out of the 11 respondents, 5 were men, and 6 were women.

Procedure

Data for the study were gathered through employee interviews, non-participant observation, space syntax analysis, and movement maps.

Interview Process

Semi-structured interviews were used to capture perceptions and experiences of employees regarding the learning process in the organizations. Individual interviews were conducted on 5 employees in Company A, and a group interview with 6 employees in Company B. Interviews were conducted and responses recorded after receiving

Par12 Five participants from each company were targeted. In Company B, the sixth participant was an intern.

consent of the Human Resource manager and the participants. The interview guide consisted of open ended questions related to learning, aids to learning, and the physical environment in the organization. For example, perceptions regarding learning process in the organization were evoked by asking the question "How does learning happen in your organization?" Recordings ranged from half an hour to one hour in duration.

Content analysis was used to analyse data from the semistructured interviews. Transcripts were read, and coding categories associated with the content were established by analysing the first interview and developing a coding pattern. Remaining interviews were coded, and new categories, if identified, were added to list of codes. This process continued until no new categories emerged. Interview transcripts were read several times, and themes regarding the learning process and aids to learning emerged.

Research has shown that reliability of a coding system where coding is being carried out by a single researcher may be established through coding the same interview on two occasions, and further treating the two sets of codes as codes generated by distinct coders (Papworth, Milne, & Boak, 2009). Accordingly, coding was repeated for a second time after 6 months to ensure intra-rater reliability, which was found to be highly significant for both the companies ($r = 0.99$, $p < 0.01$ (two-tailed) and $r = 0.99$, $p < .01$ (two-tailed), respectively).

Study of Physical Environment

Description of the physical space was based on layout plans and observation of workspace. Cognitive maps of the layout of the organization were created and converted to AutoCad files that served as input for software used for analysis. Space syntax analysis was carried out on the layouts using UCL Depthmap, which is an open-source software. Space syntax is a technique that analyses spatial formations considering properties of space and its relationship with other spaces in the organization (Dursun, 2007; Haq & Zimring, 2003). This technique has been found to be highly predictive of movement patterns and visibility within buildings, the predictive strength lying in the fact that predictions are based on the space and its characteristics irrespective of the function of the space. Connectivity and integration were the measures used in the visibility graph analysis. Connectivity describes how connected spaces are to each other and indicate choices of movement present in spaces studied. Integration describes closeness of a space to other spaces in the system, indicative of connectedness and accessibility of one space to other. Graphs depicting the results of the space syntax analysis are discussed in the case studies along with the results of the content analysis.

A qualitative approach along with analysis of space in the form of space syntax and movement maps was chosen to get rich explanations as well as distinct sets of evidence regarding learning as well as physical environment in these organizations. Based on information collected through the various sources, case studies on individual companies were developed. Results of the content analysis, descriptions of the workspace, and the space syntax analysis are given below.

Results

Company A

Company A is a techno-media company situated on the first floor of an industrial complex in Mumbai, India. The workspace had an open design, and the dominant colours were orange, blue, and green. All employees including the team heads were seated in one big open space which was seen to be the primary work space. There was no fixed seating pattern, although employees tended to gravitate to the same places every day. There were meeting rooms, a lunch room that doubled as a massage room, and two small rooms that provided privacy for employees for phone calls, and for reflective and quiet work. These enclosed spaces were situated at the periphery of the primary workspace, and had patterned frosted glass that provided privacy while providing limited visibility.

Content Analysis

Two meta-themes emerged during content analysis: the learning process and aids to learning. Respondents described learning to be a "hands-on" process triggered by situations and problems on the job, such as problems with code, stiff goals set by bosses, or changing client requirements. Descriptions highlighted two informal processes: the first was a process beginning with reflection and culminating in informal dialogue; and the second, a process that seemed to be similar to mentorship. Table 2 displays the themes, indicators, frequency of occurrence, and some sample responses that emerged in interview responses of company A.

In the first process, employees initially reflected on work related problems on their own and attempted to arrive at solutions. The company encouraged this, as was seen in the following response by the CEO:

> People cannot post the problem in a group and think that the answer is going to come from somewhere else – that is not going to happen. [You] should be

Table 2 Sample responses in Company A

Theme/indicator/frequency	Example of an interviewee statement
Learning process	That is why we encourage people to catch somebody and have a chat. Other person may not give you an answer—just act of discussion/articulation. Could talk to one person or more than one person—one time and more than one time. Sometimes just need people to jog you in different direction
Dialogue (12)	
Reflection (8)	(Employees) should be able to live with problem for significant period—can't hand it off to somebody
Learning in action (10)	We get them up to speed—no spoon feeding, but putting him into water and telling him to swim home
	Learning is hands-on
Social environment	Then maybe after six, someone will order something, someone playing guitar, then talk—very informal basically
Informality/openness (8)	
Psychological safety (11)	We can directly go and talk and don't have to worry about offending anyone
	They have got to just make that first set of mistakes" (to learn)
Physical environment	Like the colours—coz can't feel down or bored in these colours. More offbeat colours are, people might be willing to take risks
Colour (2)	
Lack of barriers (16)	First thing that you notice is that there is no separated segregated space for the head of the organization. That immediately sets the tone for the entire organization…. it is an open organization…. The conversations will flow"
Comfort/homely (6)	
Leadership	Every person here is very passionate about that exclusive function. They have done extensive study, they keep updating themselves. They are not setting their standards against the norms. Because they are so passionate—no limit for reading or updating. Everybody is trying to better themselves all the time. But when you are surrounded by people like that, its but obvious that you want to get up to speed
Motivates by example (4)	
Passion for work (1)	
Qualities of individuals	People who do not have drive do not fit here. Need to be curious, need to want to solve the problem
Driven (4)	
Curious (3)	
Risk taking (4)	
Organizational factors	That is the reason we still do not have any strong set of rules- no strong traditional processes—it is important for people to learn—can show a set of processes—might look efficient, but truth is a person cannot really grow in a system like that
Lack of formal structure and rules (8)	
Flexibility in work and timings (5)	

Numbers in brackets indicate frequency (N = 5)

able to live with problem for significant period of time –can't hand it off to somebody (Male, 31)

During this period, individuals sought to acquire information from external sources such as the internet. If this proved unsuccessful, a discussion with friends and colleagues followed. No formal process governed this discussion: it could happen "any time" or with "anyone". According to one respondent, the company

> Encourages people to catch somebody and have a chat. [The] other person may not give you an answer – just [the] act of discussion/articulation [helps]. [One] could talk to one person or more than one person – one time and more than one time. Sometimes [you] just need people to jog you in different direction (Male, 31)

These impromptu discussions could be one-on-one, between two individuals. However, employees stated that others often joined in, and the discussion continued until a solution was found. Solutions could be problem specific

and related to a specific team, or could be related to process improvement for the company or a vertical at large. In the latter case, if the solution was implemented and found successful, then more formal programs were organized to transfer the learning to a larger number of people. These formal programs helped to make the new knowledge and methods become a part of organizational routine.

The second process that respondents described was akin to mentorship or apprenticeship programs for learning. As a part of the on-boarding process in their team, *"newbies"* (new joinees) and junior employees were sent along with senior employees on sales calls. The new comers then learnt how to make the sales calls and how to interact with clients during client meetings by first observing the seniors, and then by taking part in the process, gradually increasing participation until they finally moved to performing the tasks themselves. Learning occurred through the process of participation and performing tasks. The first informal process highlighted the unplanned and informal nature of

learning in these companies, while the second stressed on participation and doing.

Employees perceived that culture, quality of individuals, leadership, organizational factors, and physical environment aided learning (see Table 2). Informality, described as a "lack of formal rules and structures" and "lack of traditional processes", was seen to be a key facilitator, with respondents describing conversations taking place at "anytime" and "any place", as can be seen in the following response:

> …maybe after six someone will order something, someone will play the guitar and then we talk- very informal basically (Male, 30)

Respondents also emphasized that psychological safety in the form of "no judgement" and the "freedom to make mistakes" was essential for the process.

Having or hiring the "right set of people" was considered important. Curious, willing to take risk and driven, these individuals were

> The best problems solvers. They need to explain the world. Over a period of time, they come up with answers. These are strong persons. We are sometimes lucky to hire these. These are people with a burning need to know, [with whom] you must have dialogue. (Male, 31)

Leaders were considered important as they motivated employees to learn. Respondents mentioned reading habits of the leaders which encouraged them to learn. As a respondent from the sales team stated

> "When you are surrounded by people like that [who read], it's but obvious that you want to get up to speed [by reading like them]" (Male, 28)

When questioned about the physical environment, most employees commented upon the lack of boundaries, stating that the lack of segregation, and the fact that "everyone is sitting right there" sets a tone, giving rise to openness where "conversations will flow" (Female, 28). In addition to this, one respondent felt that the bright colours influenced employees and probably aided risk taking. Another respondent stated clearly that physical environment did not matter, as people adapt to any discomfort they may feel in relation to the physical environment. Examples he gave were the use of earphones to block out conversations and noise in the office, and the use of the meeting rooms as quiet spaces where they could work uninterrupted.

The learning process in Company A, therefore, occurred primarily during work practices. When faced with a problem and need to learn, individuals first reflected, attempted to find a solution, and then had informal dialogues to learn or clarify things. This process was aided by informality, psychological safety, leaders, having the right people, and lack of boundaries. The lack of boundaries was associated with openness both physical and in form of lack of barriers to communication.

Space Syntax Analysis

The visibility and integration graphs of company A are shown in Fig. 1(a) and (b).

The visibility graph clearly identifies the central corridor in the office as the most visible, and shows visibility deteriorating with movement towards the more enclosed spaces. The reception area and parts of the meeting rooms and enclosed rooms are the least visible, with maximum integration being shown in the corridor and to the extreme right of the corridor. The analysis of the physical environment therefore shows an open environment with maximum possibility of meeting and movement in the central corridor. The movement map shown in Fig. 2 supports this. The thicker lines in Fig. 2 indicate greater number of interactions per day, and different colours indicate the
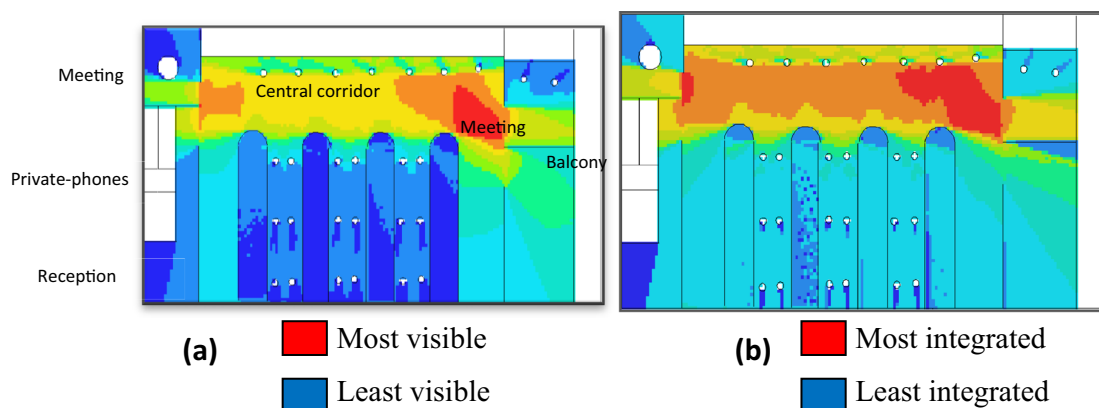

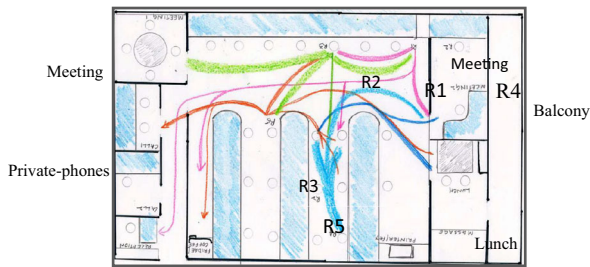**Fig. 1** Visibility and integration graphs of Company A

Fig. 2 Cognitive map of Company A showing movement patterns of respondents

different respondents. The interactions for sales teams (R1 and R2) seem to happen within a certain area—a territory almost. A similar interaction pattern is seen in the tech team (R3 and R5). These territories have no physical boundaries, but are marked by the presence of members of the same team within the area, and by the amount of contact necessitated by the work roles. Movement to and from the lunch room and the meeting room is considerable. The corridor area is the most used and most of the seating areas of the organization lie around this space, or are only one or two visual steps away. Those who are seated along it are most likely to benefit from all discussions that take place as they are within line of sight and are also within audible distance. Space syntax shows that work stations that lie in this area are the most integrated and visible. The potential for people to be aware of work in these areas, and to meet and interact with employees seated there, is high, whereas possibility of meeting or seeing employees seated deeper in the bays is lower. There are no barriers in the form of doors or separators in this workspace, therefore all employees can see each other. There are no fixed spaces allocated to employees, although they say they do tend to gravitate to the same places every day.

Perceptions of the physical environment emphasized that the lack of boundaries provided a sense of openness, which was identified as being a contributory factor to feelings of openness, freedom, psychological safety and lack of barriers in communication and dialogue. The lack of formally allotted workspace for the CEO, and the practice of having everyone sitting together in the same workspace helped add to sense of informality and foster a sense of equality. The space syntax analysis showed maximum integration and visibility in the central corridor where three of the respondents were seated. The possibility for maximum movement lay in this area, which was supported by the movement map. The employees seated in this area would be in the path of movement and encounter. Observations show that the workspace is open, and the space syntax analysis shows that there is good visibility in almost all areas. Lack of specified seating and décor indicated a level of informality (there were film posters, a

guitar, and various posters on the wall). The observations and space syntax therefore relate to perceptions of openness and informality as seen in statements such as

> It's a free culture. Everyone is sitting right there – it is easy to just talk. You can do that as barriers are not there, no specific way that you have to behave in the organizations … (Female, 28)

Responses regarding openness in communication were more frequent. The sense of equality generated by seating patterns corresponded with responses that individuals could reach out to anyone at any time. Findings in Company A therefore revealed a correlation between the physical descriptors and the interview responses.

Company B

Company B, is a HR consultancy and executive search business that has office space with two floors in Mumbai, India. Work areas were subdivided according to the verticals in which individuals worked, with each vertical having an area demarcated for it. Directors had enclosed rooms with glass walls, while individual workstations had eye-level glass separators. Team leads had larger desks, with comparatively more space for their workstations. There was a library and pantry on the ground floor, as well as a gym area and a conference room on the first floor.

Content Analysis

Like Company A, two meta-themes emerged corresponding to the questions "How does learning happen in your organization" and "What aids learning in your organizations?". Table 3 reflects themes, indicators, their frequencies, and statements from respondents.

Responses regarding learning process were varied. Learning was described to be "anything that makes things better" (Female, 25), a process that was described as occurring by reviewing the past. According to one respondent, learning by one's "self" was important, while another respondent stated that "we follow an informal process: we try to talk and discuss and solve it and sort the problem out" and the "first person whom I would go to (to discuss)" is the supervisor (Female, 24). Communication was considered important, while discussion was considered a "catalyst" (Male, 52). The process therefore had both components: self-learning and dialogue. However, from the responses, a clear step-by-step process of the learning process did not emerge. The process apparently began with the need to improve, after which people attempted to reflect and learn by themselves, after which they had informal discussions with others, which they perceived to be an important part of the learning. Whether these steps were

Table 3 Sample responses in Company B

Theme/indicator/frequency	Example of responses from interviewees
Learning process	Dialogue is informal—[we] meet and discuss in corridor
Dialogue (3)	We must learn by our selves
Learning by self (2)	We learn by reviewing the past
Reflection (1)	
Environment	We have to encourage people to come with doubts
Psychological safety (2)	We have the freedom to make mistakes
Freedom to make mistakes (3)	We have the opportunity to ask questions (means an environment in which to ask questions)
Informality (3)	There is a first name culture (people address each other by first name)
	We all eat together—there is no discrimination in sharing "dabbas" (lunch boxes)
Physical environment	There are no cubicles
No boundaries (2)	Directors rooms have glass walls so we can see what they do
Visibility of directors and co-workers (2)	We can see people easy to lift head and speak
Lack of discrimination (1)	This my chair, your chair boss "ki" chair is not there: no discrimination or feelings of hierarchy
Feeling of comfort and being at home (3)	In the pantry and library, bean bags give a homely feeling—no need of formal behaviour
Qualities of individuals	People need empathy, patience and trust, sensitivity
Sensitivity to others (1)	People should be willing to teach and willing to learn
Helping nature (2)	
Leadership	Needs to be approachable
Approachable (2)	Needs to take responsibility to create the environment to learn
Responsible for learning (1)	Words and behaviour matters of leaders matter
Sets example (2)	

Figures in brackets indicate the frequency (N = 5)

sequential or whether they occurred simultaneously was not clear.

Environment, psychological safety, leadership, qualities of individuals and physical environment emerged as key themes relating to aids to learning. The need for psychological safety was the most recurrent theme. The director felt that "people should be encouraged to come with doubts" (Male, 52), while four out of the five respondents identified the "freedom to make mistakes" as one of the important factors that aided learning. The environment of learning was perceived to be one where there was "openness to share information, and an environment in which employees should have the opportunity to ask questions" (Male, 52). "First name culture" (referring to all colleagues by first name) (Female, 28) and sharing of food were an important part of the environment that contributed to and aided learning. Words and behaviour of the leaders were important and "mattered" (Female, 25). Respondents felt that leaders "needed to be approachable". Leaders were therefore perceived to set example by their behaviour. To facilitate or aid learning, it was perceived that individuals in the organizations needed to be helpful, ready to learn, and empathetic to the problems of others.

Descriptions of the physical environment revolved around the idea of comfort. They described the physical environment as being spacious with no cubicles, not having

a "typical office look" (Female, 25). The director revealed that the company wished to create an atmosphere where people would like to come to office. This was reflected in responses from other respondents who felt that the pantry and the library gave a "homely feel". "Comfort" and a feeling of "coziness" were descriptors used to describe the physical space as well as the conference room (Female, 28). Respondents stressed on the importance of being able to see the directors through the "transparent walls" of their rooms, and the fact that there was no discrimination in use or allocation of resources such as chairs which was expressed as "there is no your chair, my chair, or bosses chair". The fact that employees were "visible" and that one could just "lift the head and speak" to others was seen to be important.

Space Syntax Analysis

Visibility and integration graphs of Company B are shown in Fig. 3(a) and (b). The visibility graph clearly identifies the area adjacent to both the directors' rooms and the area near the pantry as the most visible, as well as the most integrated. The first floor showed the area in front of the director's room and the gym area to have most visibility and accessibility. Both areas on the first floor and the ground floor were closest to the director's rooms, making
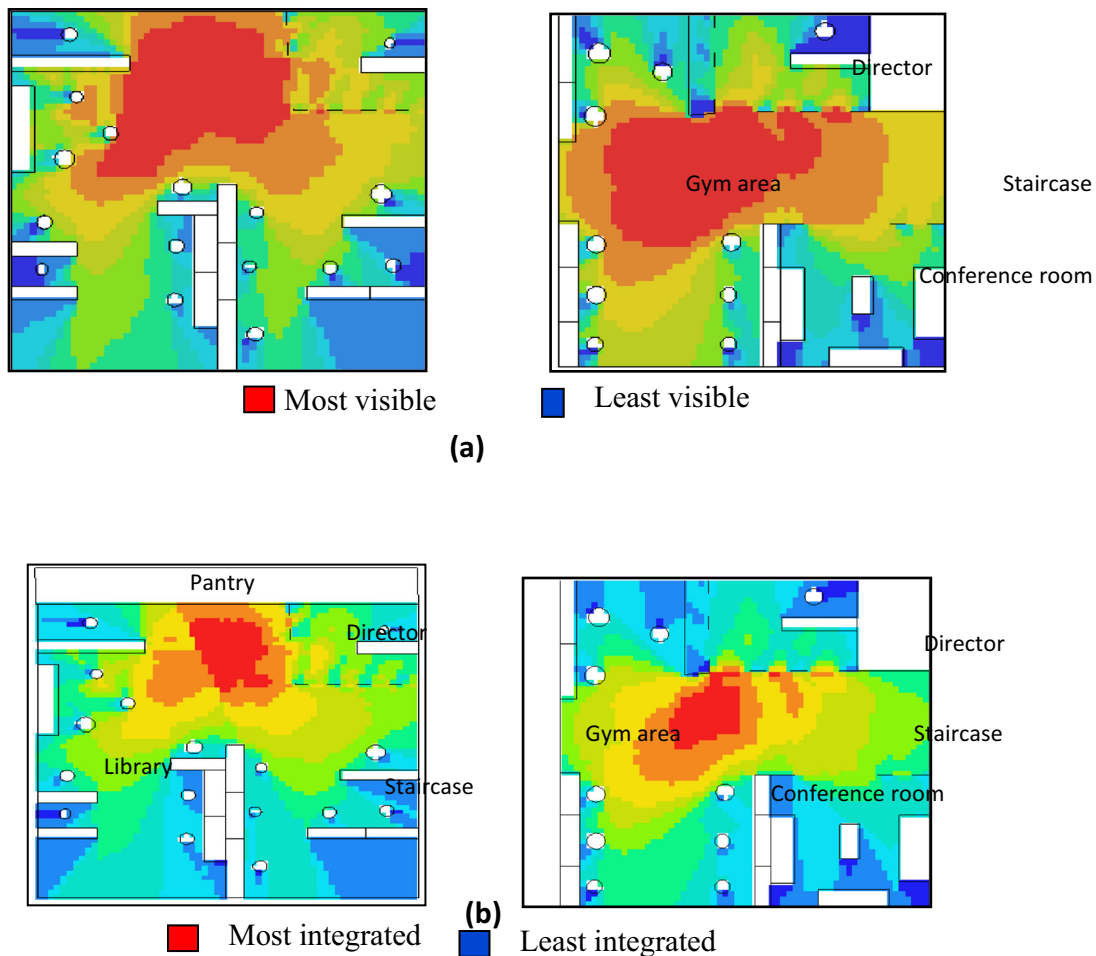
(a)

(b)

Fig. 3 Visibility and integration graphs, ground and first floor, Company B

these rooms the most visible and easily accessible. The movement map in Fig. 4 shows the movement patterns in Company B. The maximum movement is on the stairwells, the area in front of the director's cubicle on the first floor, and the pantry area on the ground floor. The space syntax analysis shows maximum visibility and connectivity in the library and gym, and integration graphs predict maximum movement and encounter in the pantry area and the area between the gym area and the director's room. The most integrated areas therefore do fall in the movement paths depicted in the cognitive map. This suggests an area in the workspace where the company could have seating to maximize informal and unplanned encounter, interaction and communication. However, not many of the workstations are in or near this area. The potential of the workspace to provide visibility and accessibility for the directors was high as opposed to the rest of the organization. Seating did not follow the spatial configuration of the workspace. For example, seating was not centred around or near the most integrated or the most visible areas of the workspace,
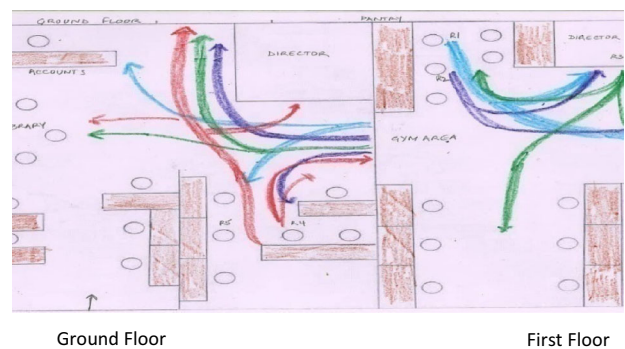

Fig. 4 Cognitive map depicting movement on both floors of Company B

which therefore does not take advantage of the natural movement and encounter zones within the workplace.

Company B's respondents stressed on the idea of comfort, and according to the director, the organization paid special attention to comfort, as they wanted the office to be "like home". These efforts on part of the company helped

heighten the sense of informality and generated a sense of belonging which was reflected in the repeated responses of "feeling at home". Enclosed spaces had glass walls, allowing visual inclusion of persons, fostering the sense of transperancy and openness, as well as the perception of accessibility and approachability of all. The glass walls which provided "transparency" in company B helped add to the sense of informality, fostering openness and encouraging communication between employees.

Discussion

This exploratory study of learning practices in knowledge-intensive companies in Mumbai sought insights regarding learning and what aided the process in these organizations. Figure 5 depicts the themes that emerged from the interviews.

Responses emphasized the informal and unplanned nature of the process. Respondents described learning to be characterized by reflection, and individuals sought solutions on their own before following up with conversations with peers and superiors. Knowledge was shared through dialogue characterized by informal exchanges. The study therefore revealed an informal form of learning occurring in the organizational context that was driven by requirements of tasks. The process described by the respondents is similar to descriptions of situated learning, and the findings therefore support existing research on learning that is situated and based on practice in everyday activities in the workplace (Brown & Duguid, 1991; Lave & Wenger, 1991; Orr, 1990).

Leadership, having the right employees, psychological safety, informality, as well as lack of protocols and rules were dominant characteristics of the work environment that were perceived as important aids for learning. Motivational leadership was seen to aid the process, as did the presence of employees who are curious, take risks, are driven to

Fig. 5 Themes that emerged in content analysis

solve problems, are empathetic, and seek to help others. Supportive learning environments described in literature identify that supportive and motivational leadership, trust, psychological safety, and the freedom to make mistakes are fundamental factors that facilitate dialogue that results in learning (Edmondson, 2012; Law & Gunasekaran, 2009; Teare, 1997; Von Krogh et al., 1997). Findings of the study support this research. Informality too was a recurrent theme. In Company A, "someone would order something", and discussions would continue, and in Company B, sharing "dabbas" (lunch boxes) was deemed important. Sharing a meal seemed to help retain a sense of informality as well as foster a sense of comfort amongst employees. The lack of formality emphasized in these responses is reflected in responses that outline the lack of formal rules for communication, and in the flat organizational structure. Research identifies that flat organizational structures and informality in organizations are facilitators of learning (Burns & Stalker, 1961; Marsick &Watkins, 2003). This sense of informality facilitated and encouraged dialogue (Alegre & Chiva, 2008; Marsick & Watkins, 2003), supporting learning in both the organizations.

The space syntax analysis as well as observations of space in both companies relate to perceptions that emerged in the content analysis, establishing a connection between the physical environment and the learning environment. Perceptions of the physical environment stressed the importance of openness, informality, flexibility, and easy access. These perceptions were supported by observation of the physical space and by the space syntax analysis. For example, where fewer boundaries were observed in Company A as compared to Company B, responses regarding openness and its importance in communication, and perception as a facilitator of learning were more frequent. The lack of formally allotted workspace for the CEO in Company A, and the practice of having everyone sitting together in the same workspace helped add to a sense of informality and foster a sense of equality, both which have been found to be integral parts of supportive learning environments (Burns & Stalker, 1961; Garvin et al., 2008). Transparency of the directors' rooms in Company B created a sense of openness, encouraging communication between employees, which has been found to be an essential element in supportive learning environments (Alegre & Chiva, 2008; Burns & Stalker, 1961; Garvin et al., 2008). Some hierarchy (in Company B) in the form of rooms for directors, and glass barriers or larger workstations for leaders corresponded with responses regarding the responsibilities of leaders to provide a learning environment and with employees going first to superiors to discuss, reflecting hierarchy in relationships as well. Employee responses regarding learning seemed to follow the pattern of physical environments and organizational
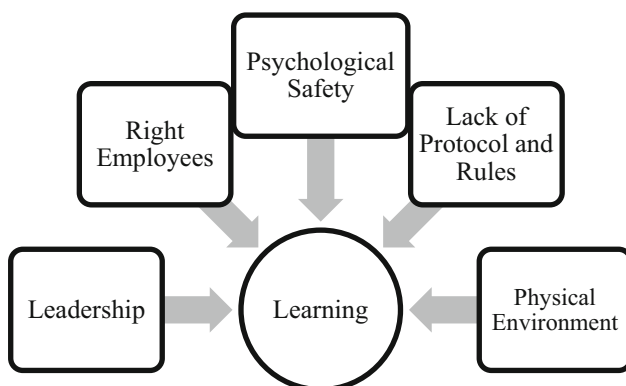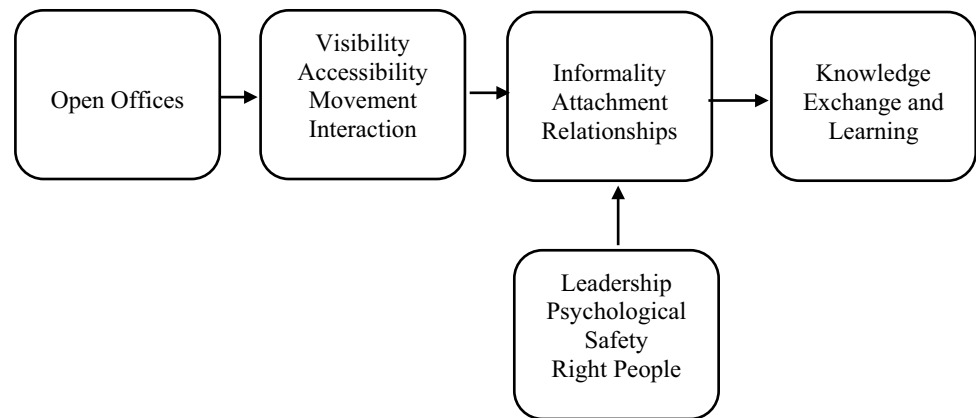
structures, where open environments and flatter structures seemed to have more informal and serendipitous learning. These responses lend support to theories that suggest a transactional relationship between the physical environment and individuals, where individuals create environments, and environments contribute then to individual behaviour such as learning, by providing opportunities to interact and share knowledge (Bell, Fisher, &Loomis, 1978; Gifford, Steg, & Reser, 2011).

Research using space syntax in organizations where creativity, learning, and innovation were key features has shown that movement and co-presence have a definite impact on interaction and collaboration, and therefore on, creativity and innovation (Peponis et al., 2007; Sailer, 2011). The findings of both the cases extend this research. The high visibility and integrated workspaces seen in both the companies encouraged accessibility and awareness, which in turn encouraged interaction and dialogue, thereby facilitating learning. Findings showed that camaraderie and interactions were the maximum in the more open workspace and were not observed in the same number and frequency in the workspace that had slightly more demarcated spaces. Hierarchies in space seem to be reflected in the hierarchy in interactions or vice versa. The open workspaces perhaps encouraged informality, which was seen to pervade interactions in the form of light-hearted banter and shared meals. These findings suggest that informality may aid in the formation of social relationships and close ties between employees, which in turn may aid knowledge sharing.

The open layouts also possibly contributed to a sense of belonging and community amongst employees that was reported by respondents. Research emphasizes that continued interactions often lead to a sense of attachment and identity with place, further leading to a sense of belonging (Buttimer, 1980; Inalhan & Finch, 2004; Proshansky, Fabian, & Kaminoff, 1983; Relph, 1976; Tuan, 1980). Feelings of belonging contribute to feelings of psychological comfort and contribute to a sense of community

(Vischer, 2008), which has been found to be crucial for learning occurring as part of everyday activities and practices (Brown & Duguid, 1991; Lave & Wenger, 1991). Physical characteristics of the workspace therefore encouraged formation of social relationships and contributed to a sense of community that aided informal transfer of knowledge as well as the transformation of individual knowledge to knowledge at the organizational level through dialogue and discussion. These findings lend support to research that highlights affordances provided by the physical environment, and lays stress on the interconnectedness of the social and the physical (Julier, 2007; Reckwitz, 2002: 249).

The cases highlight the importance of the open environment, relationships, leadership, and qualities of individuals. Figure 6 shows the relationship between the themes that emerged. A key finding is the role of the physical environment in facilitating the formation of a social environment, and its impact on learning in organizations. The open and informal physical environment that allowed for freedom of movement, co-presence, and encounter, all aid collaboration and interaction leading to relationships and attachment that are part of social environments that aid learning. The cases therefore help establish the role of the physical environment in aiding the process of learning.

Conclusion

By integrating design aspects with behaviour and interaction in the organization, this study has an innovative approach to research, providing inputs for practitioners, designers, and researchers as well. Findings of the study emphasized the social nature of learning, where employees engaged in informal and unplanned dialogue, shared knowledge, and reached common understanding. Learning was facilitated by motivating leadership, supportive relationships, organic structures and informal social

environments. These findings extend earlier research that has emphasized the impact of other aspects of the context such as trust, psychological safety, and leadership on learning.

Findings also highlight the influence that the design of a physical space has on learning in the organizational context. Lack of boundaries and openness in open offices allowed co-presence and movement which supported the informal interaction and dialogue encouraging communication and dialogue thereby enhancing learning. These findings depart from earlier studies and add to understanding of the impact of the context by identifying the effect of physical environment on learning in organizations. The physical context must therefore necessarily be considered when considering influencers of learning, and when planning design of environments to support learning.

Organizations can seek to develop social environments that would encourage easy exchange of knowledge. The findings also have special relevance to organizations in the IT domain in India and in other parts of the world. Changes in the industry are quick and continuous, and promoting rapid and informal learning is essential to remain competitive. Providing open layouts that encourage interaction and flat organizational structures with less rigid rules would help promote informality and support joint social activities, promoting interpersonal relationships that are crucial for learning. The understanding of the influence of design on behaviour would provide valuable inputs to designers, enabling them to design workplaces that support learning.

Limitations and Areas of Future Research

The current study was conducted in two organizations, and the size of the sample is therefore limited. Further studies could include more organizations of varied size to increase ability to generalize results. Researchers can further their understanding of socio ecological aspects in organizations, developing models to empirically study relationships between the physical environments, climates and learning. Cross-sectional studies of organizations with varying design features and their impact on employee behaviour and attitudes offer possibilities for future research.

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