PROJECT WORK AS A LOCUS OF LEARNING: THE JOURNEY THROUGH PRACTICE

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INTRODUCTION

This chapter speaks to the theme of 'bridging cognitive distance' by focussing on the role which projects play as a source of learning within organizations, and their links with other sources of learning. The need for such learning is often given as the major reason for deploying projects as a way of organizing work tasks (DeFillippi and Arthur 1998; Sole and Edmondson 2002). This approach to organizing work is seen as particularly useful in contexts typified by rapid changes in markets and technologies (Gerwin and Ferris 2004). Following this logic, organizations in both service and technology-based sectors are increasingly structuring work around projects and project teams (Zenger 2002; Huber 1999). The rich potential of projects as a source of learning needs to be set alongside a growing body of evidence that this potential is often neglected. Thus, while many organizations make conscious efforts to 'capture' the learning from projects (for example, via post-project reviews), much of the available evidence suggests that these efforts experience only limited success (Hobday 2000; Keegan and Turner 2001). This inability to exploit the learning from

projects has worrying implications for the growing popularity of the project form as a way of organizing work.

In this chapter, therefore, we are keen to explore the ways in which such learning becomes woven into the ongoing patterns of knowledge acquisition that occur within organizations. Equally, we seek to understand why many organizations continue to 're-invent the wheel' by failing to capture and spread what has been learned from particular projects. This failure may have something to tell us about the possible limits on organizing for recombinance. Constraints on our ability to capture and exploit the learning from projects may be an indicator of possible trade-offs that exist between different organizational forms, on one hand, and the ability to accumulate and exploit knowledge on the other.

In exploring these features of project work, the chapter proceeds as follows. We begin with a brief review of existing perspectives on project-based learning. This contrasts practice-based and cognitive approaches to the topic. In the subsequent section, we outline a practice-based approach to project work. The advantage of this approach is that it allows us to relate project-based learning to other sources of learning in organizations, particularly communities of practice. Its implications are then further analysed by focussing on the characteristics of project work and how they relate to mainstream organizational practices. The theoretical framework produced by this analysis is explored through brief case-study descriptions of three projects which produced very different outcomes in terms of the generation, capture and spread of learning. This allows us to derive some conclusions as to the factors influencing the

role of projects as a source of learning within organizations, and the implications for attempts

to exploit such learning as an organizational resource.

PERSPECTIVES ON PROJECT-BASED LEARNING

Projects can be initially defined as the activities clustered around specified work tasks where

there has been an allocation of resources and roles (e.g. a project manager) by a sponsoring

organization to that task (De Fillippi 2001). Whereas the traditional view of projects saw them

as rarely-to-be-repeated, time-bound, goal driven activities, more recent research has

recognised the importance of projects as sites for learning. In particular, it has underlined the

need to distinguish conceptually between the learning *within* project teams (e.g. Arthur,

DeFillipe and Jones 2001; Huber 1999; Marks and Lockyer 2004; Sense 2003), and learning

from projects to the wider organization (Courtright 2004; Schindler and Eppler 2003;

Williams 2003).

The dominant approach in many of these studies is based on a cognitive view of learning.

This approach highlights changes in individual cognition, including perceptions, attitudes and

behaviour, as the characteristic form of learning within organizations. In this approach,

project-based learning occurs through the operation of multiple mechanisms which impact on

and reflect cognition. These include; the eliciting of existing knowledge though team member

expertise and their social networks (Ancona and Caldwell 1992); transforming such

knowledge through a range of activities including the integration of disparate forms of expertise (Okhuysen and Eisenhardt 2002), reflection on and articulation of experience (Zollo and Winter 2002; Ayas and Zeniuk 2001), and the conversion of tacit into explicit knowledge (Nonaka and Takeuchi 1995); and, finally, the diffusion of the knowledge created, 'embrained' in the heads of project team members (Blackler 1995; Huber 1999) as they move on to new roles or projects within the organization, or to be made available as 'lessons learned' or 'after-project reviews' stored on company intranets or databases (Kotnour 1999).

Although studies adopting this cognitive approach are generally optimistic about the possibilities of project-based learning being shared with the wider organization, the existing empirical evidence is much more mixed. For example, the available evidence suggests that post-project review activities are not very successful in spreading knowledge to other groups (Von Zedtwitz 2002; Keegan and Turner 2001). This lack of success questions the assumption in cognitively-oriented studies that exploiting project-based learning is largely a matter of having mechanisms in place to capture, store and diffuse the knowledge. Rather, it suggests that a better understanding of the fate of project-based learning involves moving away from a focus on projects as isolated and self-contained activities (Engwall 2002). The alternative, as stressed in several recent studies (for example, Sydow and Staber (2002)), hinges on locating projects within their organizational context.

Emphasizing the organizational context for project work has a number of advantages. For one, it enables us to relate the learning which takes place within projects to other sources of

learning in organizations. These include the individual learning of project participants, the group learning of the project team, the learning of wider communities of practice, and ultimately the organizational learning through which new practices and routines become part of the mainstream operations of the firm. In addition, locating projects within their organizational context also highlights the variety of roles which projects may play depending on the strategy and structure of the organization.

This last point opens up a number of issues, but for the purposes of this paper we will simply note that the character of project work varies across a continuum of organizational forms. At one extreme, we have settings where projects are organized infrequently to deal with specific needs and challenges – for example, change programs. At the other extreme, we have what writers have labelled the 'project-based organization' – one which delivers its primary products and services through project working. Whilst there is a growing amount of work on this kind of organization, there is also considerable debate about whether 'pure' forms of such organization exist and, if they do, whether they are sustainable. Both Zenger (2002) and Foss (2003), for example, argue that hybrid organizations are inherently unstable and tend to drift towards more internally coherent bureaucratic or market based forms. Organizations using cross-functional teams, for example, often continue to use hierarchically-based incentive systems and, so, drift towards more bureaucratic forms of control (Zenger 2002; Barker 1993). Regardless of whether ideal or 'pure' types of project-based form exist, however, it is evident that many organizations that routinely deploy projects to complete tasks are not 'pure'

project-based organizations. More typically, they will display some kind of internal 'hybrid' or matrix management structure which combines project work with work organized around functional or divisional specialization, thus mixing elements of both market and hierarchical governance (Zenger 2002). Within these matrix forms, some organizations (i.e. project-based) will privilege the project dimension whilst others will privilege the functional/divisional dimension (Lindkvist 2005; Knight 1977; Bresnen 1990).

A PRACTICE-BASED VIEW OF PROJECT WORK

There are many possible approaches to exploring the relationship between project-based learning and these other aspects of the organizational context. For the purposes of this chapter, however, we have adopted the lens of what has been termed the 'practice-based view' of knowledge (Orlikowski 2002; Gherardi 2001; Carlile 2002). Studies adopting this view take knowledge to be closely intertwined with the social practices which different groups and communities develop and participate in. Such studies can be contrasted epistemologically with the cognitive perspective on these issues in that it takes learning to be '…an inseparable and integral part of all organizational practices' (Gherardi 1999: 113). They thus take knowledge out of the heads of individuals and place it within their practices and their accompanying social relations and identities.

Applying a practice-based view to project work is not unproblematic, as we outline below.

However, the advantage of applying this lens is that it brings into sharp relief important features of the organizational context which the cognitive approach tends to leave in the background. Thus, previous work on learning within social practices has highlighted the role of shared practices in enabling the acquisition and spread of knowledge. Equally, it has also highlighted the way in which organization structure (e.g. functional specialisations) creates divisions of practice. The latter are seen as creating boundaries to the acquisition and sharing of knowledge. As Brown and Duguid (2001: 203) note; ' . . . it is at divisions of practice where knowledge sticks'. By focussing on the mainstream practices, and divisions in practice of the organization, therefore, we are able to develop a better understanding of the way in which project-based learning is assimilated into wider processes of knowledge organization in organizations.

Within the existing literature, most of the work on learning and social practices has focussed on the development of 'communities of practice' (CoPs). The latter involve 'a set of relations among persons, activity and world, over time and in relation with other tangential and overlapping communities of practice' (Lave and Wenger 1991: 41), and are seen as emerging over time through the recursive practices and social interactions of established social groups (Lave and Wenger 1991). Lave and Wenger (1991: 51), for instance, describe learning in terms of 'legitimate peripheral participation'. Learning is seen as involving a change in the individual and is related to their socialization and identity formation within a particular community. As they put it, 'one way to think of learning is as the historical production,

transformation, and change of persons'(p. 51). The contribution of such communities to organizational learning was also highlighted by Brown and Duguid (1991) who identified the role of story-telling in the sharing of non-canonical practice amongst a particular work community.

If we consider communities of practice simply as distinct social entities, there seems to be little overlap between such communities and the learning which takes place in projects. In a stylised sense, projects are markedly different entities in that they are generally seen as involving highly time-bounded social interaction, discrete forms of non-repeatable activity, formal objectives and one-off tasks (Wenger and Snyder 2000). They thus typically lack the community-building effects (e.g. through strong ties, continued participation, common identities) found in localized, ongoing and more routine work activities (Gherardi, Nicolini and Odella 1998). Again, 'legitimate peripheral participation' is not generally associated with projects, where the more usual image is one of disparate groups of individuals being assembled and dis-assembled in relation to specific tasks. These perceived differences between project work and communities of practice as highlighted by the existing literature are briefly outlined in Table 6.1 below.

[Table 6.1 near here]

However, although this contrast points to differences in the way in which people learn within CoPs and projects respectively, it is too simplistic to say that project work and communities of practice are wholly distinct activities. After all projects emerge out of and feed back into

the embedded social practices of mainstream work organizations. It follows that it may be more useful to see the distinction between these sources of learning as fuzzy and relational rather than absolute, allowing that project activities draw on, are constrained by, and even influence the shared social practices sustained by CoPs. Thus, for the purposes of this paper we see the concept of community of practice as denoting not a discrete social grouping but rather historically specific expressions of the self-reinforcing relationships between learning, identity, group formation and social practices. This definition not only admits of the wide variety of CoPs found empirically, but allows us to see communities of practice as an emergent phenomenon, overlapping with and not displacing existing sociological categories such as work-group, occupation and profession. Thus, in empirical terms for example, we might identify CoP elements within a range of professional groups – these are described as 'networks of practice' by Brown and Duguid. By the same token, CoPs are equally amenable to the kinds of analysis applied to these other groupings, including the role of power relations in constituting and sustaining them (Contu and Willmott 2000).

Project work is also highly diverse in the forms it takes empirically. Again, specifying project work in terms of a given social group – i.e. the project team - is problematic as project work may be undertaken by a variety of groups and individuals, inside and outside the focal organization, not all of whom are members of an identified team (the latter being in some sectors a highly fluid formation). Although many previous studies have emphasized the importance of team-based learning in projects, the characteristics of projects are not

necessarily the same as the characteristics of teams. Psychological definitions of a 'team'

emphasise characteristics of shared identity and continued psychological commitment to team

membership where behaviour within the team is shaped by mutual interests and group-level

norms. In contrast to these team-centred definitions, project work in some arenas may be

temporary, fluid, interrupted and distributed. Whilst projects typically entail formal role

responsibilities, goals and deliverables - they usually have a project manager and deadlines,

for example - the boundaries of membership and role identities (i.e. who belongs to 'the

team') are often not that clearly defined and/or not all that apparent to members of the project.

For example, projects in construction typically involve site managers and construction

engineers working alongside an extended range of other engineers, tendering experts,

planners, and external subcontractors and architects. Different individuals (and organizations)

enter and leave the project at different points in time, depending on particular issues that arise,

and project members are often working on several projects at once. As such, the individuals

involved may, or may not, see themselves as part of a (psychological) team and group goals

and mutual interests may or may not develop. A suitably inclusive definition of project work,

therefore, involves recognizing the shifting relationships between organizational tasks, group

coordination and resource allocation. Importantly, this definition suggests that projects may

be differentiated from CoPs politically, inasmuch as their formal representation in the

management structure and the resource dependencies which they command may make them

significant political actors within the organization – some writers highlight the power of

'heavyweight' project managers, for example. In contrast, CoPs are less likely to mobilize as political actors but do operate as sites of resistance to such actors.

Adopting this relational definition suggests that project work may interact with CoPs in many different ways. Some of these interactions have been well described in the existing literature. Thus, in some sectors – for example, magazine publishing, advertising, and the movie industry - projects are assembled out of the competencies and networks sustained by wider sectoral and occupational communities (Grabher 2002; DeFillippi and Arthur 1998). In industries such as this the project form in effect creates the interface between the organization and these wider communities, providing a vehicle for the organization to exploit skills and competencies which it is not able to produce itself. The project enables the highly specialized practices of the wider industrial community to be applied, reproduced and improved through their application to specific organizationally-mandated tasks. It seems significant, however, that the role of the wider industrial communities in the sectors described above is centred on the creation and sharing of aesthetic forms of knowledge and sensibility – forms of knowledge which enable community learning outside the workplace through sociability and widely available artefacts. Indeed, this community learning may be much more important than organizational learning in certain sectors (Grabher 2002).

In other sectors, where critical forms of knowledge are more task or firm-specific, the most important sources of learning are situated within organizational boundaries and CoPs are more rooted within particular organizational contexts. Here organizations typically encompass

multiple communities of practice, being a 'community of communities' as Brown and Duguid (1991) put it. Again, this suggests a number of possible interactions between such CoPs and projects. One possible interaction, for instance, is where project work is contained within and reproduces the practices of a particular CoP – for example, a sub-unit of the organization which delivers its offerings through project work. This kind of interaction is documented in a recent paper by Thompson who describes the development of a CoP within the 'E-Futures' sub-unit of a large multinational (Thompson 2005).

Where projects span sub-unit boundaries, however, and involve members of multiple CoPs, the possible interactions become more complex. Here, the CoP impact on projects may have as much to do with the divisions of practice which they reinforce as in the forms of learning which they sustain within the organization. Viewing the effect of CoPs in these terms suggests that they may have ambivalent effects on projects as sites for learning. On the one hand, these divisions of practice create significant opportunities for new *learning within* projects as members work to overcome practice boundaries in the accomplishment of tasks. For example, Carlile's (2002) study of cross-functional product design teams observed the significant opportunities for learning and innovation entailed by team members overcoming the boundaries created by specialised practice. On the other hand, the same divisions in practice may constrain the *learning from* projects insofar as they make it difficult to assimilate such learning within the embedded social practices of the organization.

PROJECT FEATURES AND LEARNING PROCESSES

We have described above the ways in which project work may interact with other sources of learning within the firm and beyond. As discussed, the nature of these interactions and their learning outcomes depends generally on the way projects are positioned within the organizational context. To understand specific cases, however, we also need to address the way in which such positioning is worked out in terms of features of the project itself. Here, previous work highlights the importance of key features - task novelty, project autonomy and project team membership - in shaping learning processes.

To review these briefly, task novelty is a classic explanation of the greater need for learning in projects. Situations involving new tasks and high levels of uncertainty have long been seen as a stimulus of learning (Burns and Stalker 1961; Mintzberg 1979). In turn, the related feature of project autonomy is seen as important for success by a number of writers. Studies in the biotechnology sector, for example, show how the innovative potential of projects is directly related to their relative detachment from mainstream organisational structures and processes (Oliver and Liebeskind 1998; Powell, Koputand and Smith-Doerr 1996). Such findings suggest that the relative autonomy which projects enjoy, and hence their ability to generate learning, is important in allowing a set of practices to develop (for example, highly pressurised and time-bounded (Lindkvist, Soderlund and Tell 1998; Schultze 2000)) which are distinctively different to mainstream organizational practices. Similarly, project team membership is also highlighted in the literature as an influence on learning (e.g. Senge 1993;

Edmondson 1996; Argote and Ingram 2000). In particular, diversity of team member backgrounds is seen as particularly conducive to learning when it produces tensions between the different cultures or worldviews. Such tensions, which can be related to the 'cognitive distance' described in previous chapters are said to 'ignite processes of deeper mutual (self) understanding and reflection.' (Grabher 2002: 253).

What do these existing studies have to tell us about the relationship between project activities and learning within the wider organization? As noted above, task novelty is seen as requiring higher levels of learning and this is associated with greater project autonomy. It may be that such autonomy is important for learning precisely because it enables greater decoupling from existing organizational practices, thus allowing new practices to emerge which are distinctively different to the mainstream. One important ingredient in such decoupling may be the differences in time horizons which many writers see as a quintessential feature of project work, as compared to more routine organizational tasks (Bryman *et al*. 1987). Whereas organizational tasks are relatively open-ended and continuous, project work is both time-pressured and time-paced (Lindkvist, Soderlund and Tell 1998). Even where projects are relatively long in duration (as, for example, with automotive design projects), they typically comprise multiple phased subprojects or 'gateways', each with their own time-driven goals, milestones and deadlines. This has significant implications for learning. The emphasis on milestones and deadlines triggers constant dialogue and compromise among project members between what is sufficient − or 'good enough' − and what is optimal to achieve performance.

For example, 'corner cutting', ongoing problem solving, and improvisation is a 'normal' feature of project work. Deadlines, therefore, may induce project members, faced with non-negotiable goals, to abandon established organizational practices in favour of new, performative practices (Lindkvist, Soderlund and Tell 1998; Gersick 1989).

Similarly, once we acknowledge that projects and teams are not coterminous, the value of a focus on practice rather than team dynamics or diversity becomes obvious. For example, where project membership is determined by established routines of project management, it seems more likely that existing practices will be applied to project work, and less likely that new practices will be developed. Diversity of membership in such settings may simply entail the application of a wide range of existing practices - as in complex, but routine projects, involving the programmatic deployment of different specialist skills. Conversely, where project membership is more stable or evolves according to the particular needs of the project itself, the diversity of membership may be an important ingredient in encouraging the development of new practices. It may operate in this way, partly because such diversity creates new challenges for knowledge integration (Okhuysen and Eisenhardt 2002) which cannot be addressed by existing practices, and partly due to the time-boundedness of projects which ' . . . prevents any single perspective from becoming corrupted by a hegemonic view . . . deadlines provide antidotes against lock-ins into particular cognitive or aesthetic patterns.' (Grabher 2002: 249)

To summarise the points above, the implications of task novelty, project autonomy and

project membership can be viewed to a large extent in terms of their effects on the relationship between project activities, existing communities of practice, and divisions between practices. Thus, whether project activities involve the application of existing practices or the development of new practices has important implications for learning within projects, and this is likely to be linked to novelty, autonomy and diversity of membership. In addition, even where projects see very little change in existing practices, they may have a learning effect through the development of new ways of integrating existing practices.

As noted earlier, the implications which these factors have for project-based learning as a locus of learning can usefully be considered in terms of both learning within, and learning from projects. In the former case, we have already noted that where the project is subsumed with a particular CoP, learning within the project equates with learning by the community of practice. However, even where projects span multiple CoPs, those communities may continue to influence the learning within the project by the importation of CoP artifacts and stories. Sense (2003), for example, suggests that project teams can become a 'dumping ground' for CoP artifacts. This particularly applies where project working is focussed on low novelty tasks. In some project-based organizations, for example, specialist occupational practices may be applied across a variety of projects through the application of organizational routines for the coordination of project work. Where the organization possesses specialist project management capabilities, the interactions between project members may be tightly regulated according to predetermined routines. There may be little or no need to create new forms of

coordination when work is programmed and coordinated according to well-established norms and roles. Grant (1996: 379), for example, describes the 'closely coordinated working arrangements' of work teams where ' . . . each team member applies his or her specialist knowledge but where the patterns of interaction appear automatic .'

On the other hand, where task novelty or project membership diversity create discontinuities, project settings may provide opportunities for the development of new practices through the process of interaction amongst project members. This may include a new repertoire of routines, words, tools, ways of doing things, stories, gestures, symbols, actions which have become part of its practice (Wenger, 1998). Brown and Duguid for example, in describing one such group note how; ' . . . in getting the job done, the people involved ignored divisions of rank and role to forge a single group around their shared task, with overlapping knowledge, relatively blurred boundaries, and a common working identity.' (Brown and Duguid 2000: 127). Clearly, this kind of project may provide an arena – more limited in learning scope and time than a CoP admittedly – in which individual learning is supplemented by the emergence of a group affiliation and social motivation (Sense 2003).

New project practices may also emerge where projects provide a boundary space which enables new forms of coordination and collaboration across existing practices. Such boundary spaces may involve the development of networking and brokering practices. Gherardi and Nicolini (2002: 419), for example, describe practices 'that traverse the boundaries of several communities . . . which . . . create a network of relations within a constellation of practices

tied together by interconnected practices.'

Turning to the implications of project features for the organization's overall ability to learn from projects, a practice-based view of knowledge suggests that such learning make take a variety of forms, including the creation of artifacts and stories, with its spread across the organization being indicated both by the development of new practices and changes in the existing divisions of practice. By the same token, however, this view also suggests that the spread of learning from projects is likely to be mediated by existing practices and the communities which sustain them Carlile (2002).

CASES OF PROJECT-BASED LEARNING

The previous sections have identified a theoretical framework to apply to project-based learning based on major strands in the existing literature. In subsequent sections, we will explore this framework by drawing on empirical case-studies of projects and learning. These cases are drawn from a wider study, the initial findings of which have been presented previously (Scarbrough *et al*. 2004). The three cases[i] have been selected for their theoretical contribution more than empirical typicality, since they are deployed to highlight the effects of gross variation in contexts and outcomes (Pettigrew, Woodman and Cameron 2001). Thus, the first case shows how sometimes there may be little learning within a project. The second case, in contrast, outlines a project where there were high levels of learning within the project,

but little learning from the project. The third case completes the trio by providing an example where there was both learning within and learning from the project. Our aim in outlining these cases is simply to illustrate and explore the issues outlined above, and to derive some tentative findings for the wider appreciation of this topic.

Case A: The Thurrock Project at BuildCo

This case focuses on a particular building project - the construction of a logistics warehouse - carried out by the Midland regional division of BuildCo, which is one of largest building contractors in the UK. Logistics warehouses are considered routine in BuildCo. The Thurrock project started in February 2002 and was completed in July 2002. Importantly, the warehouse was to be built on a contaminated brown site, as opposed to a green site where most such projects are done. This created significant contingencies, including the need to deal with the risk of contamination and with a large concrete slab, which remained after the demolition of previous buildings. As such, an important part of this project involved the development on site of a 'ground solution' that would address both problems.

The design and delivery of the Thurrock project depended, in practice, on two different teams - a tender team and a site team. The tender team was concerned with winning the work and agreeing the project specification and price (the tender) with the client. The site team was responsible for the construction of the building to agreed specifications. This way of

organizing project practices (i.e. around sub teams dealing with different project phases) was seen as typical of the way projects were approached in BuildCo, so the practices and forms of collaboration described below can be seen as reflecting institutionalized arrangements within the organization.

The tender team comprised staff who were all based at the regional headquarters. These staff were drawn from a variety of specialisms (including planning, architecture, commercial and design) but each specialist also worked on several other projects at the same time. The tender team developed tenders on the basis of their understanding of the building process. Their work practices drew heavily on personal experience rather than any systematic review of previous projects. Tendering was viewed almost as a craft activity. The site team was similarly made up of a grouping of technical specialists, including a design and build coordinator, quantity surveyor, engineer, general supervisor and a secretary. This group was led by the site agent, who was effectively the project manager and who, in contrast to the tender team, deployed a number of standardised project management tools and methods used in previous projects.

As was the norm in BuildCo, there was little overlap in activities and little interaction between the tender team and the site team in the development of the Thurrock programme. Moreover, the strict division in practices was not mitigated by any common membership or sense of shared identity – each team operated to its own sets of work parameters, objectives and targets. The demarcation between tender and site project team thus sustained two

different views of the practices surrounding construction. As the site agent noted (referring to the tender team): *'They hand over their strategy on how they see things, but the actual job, once that is handed over it has obviously got a different team looking at it. We are the guys that actually are going to build it . . . '*

At a superficial level, the Thurrock project was actually successful on two counts. First, it was completed four weeks short of deadline - the tender team had planned for a 26-week project but the building was actually delivered in 22 weeks. Second, the site team were successful in developing a ground solution that was more effective than the one originally proposed by the tender team. However, this 'success' was not based on learning across the two teams involved in the overall project. The reduction in timescale was effectively the result of a revision to the original tender by the site team, and this was made at the outset of site work. As the site agent put it: '*We were lucky to get a 26 week programme, so we knew we could shave off at least two or three weeks anyway.*' Thus the programme of work was revised according to the site team's knowledge from prior projects of proven methods and work practices in construction - knowledge which was not available to the tender team who devised the original programme. Similarly, the site team came to the view that the tender team's proposed solution to issues of ground contamination lacked an appreciation of the potential implications for the delivery of the project, and so they simply implemented a different solution.

The apparent success of the Thurrock project thus reflects a real failure to translate learning between tender team and site team. This lack of learning at a project level should not be

confused, however, with the complete absence of learning. Certainly, individuals learned in that they adapted their own practices to the contingencies of the project. It was this individual learning which characterised project work, and which ensured that some of the experience of projects like Thurrock was re-cycled for future application.

The lack of project-based learning was thus linked to the 'craft' orientation, which individuals developed towards their work practices. A site engineer highlighted the importance of individual expertise as follows: *'If it is a minor problem I tend to fix it on the spot and that will be done and it will be locked away in my head. If it is anything a little bit major you would stay on the site team but probably go to the consultants and things like that and get information back from them. Anything else you tend to do it yourself.'* This view could be related to the extent to which projects were seen as competitive environments in which individual performance was judged for career progression. This reinforced personal ownership of the learning acquired from projects, as reflected in the following comment by the Site Agent: *'The thing for me is obviously the more experience I gain obviously the better innovations that I can come up with . . . .It tends to be that the person who will benefit most out of it is me.'*

The problems of lack of learning at project level were endemic within the company, as evidenced by the managerial initiatives which had been launched to exploit project-based learning more systematically. These included the creation of a new role of 'Regional Engineering Manager' where the explicit remit was to 'spread learning' across projects. They

also included provision for formal 'post-project reviews' and 'quality alerts'. Such initiatives were largely ineffective, however, in stimulating project teams to identify, codify and share the learning from their work. Post project reviews occurred only rarely and quality alerts were a token gesture towards managerial requirements.

Relating the case to our previous discussion, the scope of learning within and between project teams in the Thurrock case was highly influenced by the project's position within a wider portfolio of projects undertaken by BuildCo. This seems to have been important in two ways. First, individuals came to the Thurrock project teams with experience of a number of previous, and similarly designed, projects behind them. Second, as part of a stream of 'repeat' projects, the overall Thurrock project was subject to a pervasive focus on efficiency through the application of standard methods. This reinforces findings from previous work which has emphasized the constraints on learning in the construction sector. Keegan and Turner, (2001: 90) for example, note that in this sector 'the focus is clearly on capturing 'deviations.' Similarly, in the Thurrock case, where learning did occur, it was usually associated with errors or mistakes. As the Planning Manager on the tender team commented, *'We say bad news travels fast and good news never.'*

Case B: Cataract treatment re-engineering project at Midlands hospital

Midlands Hospital is one of a large number of trusts that together make up the National

Health Service of the UK. This case focusses on the re-engineering of the cataract diagnosis and treatment procedure at the hospital. This project was initiated by a dedicated 'transformation team' who had been charged with reengineering hospital processes. Other projects initiated by this team included an initiative on lead-time reduction, a project on diabetes, and a project on hip replacement surgery. The project to reengineer cataract diagnosis and treatment commenced with the formation of a project team comprised of eye experts from both the hospital and the wider community to review possible ways in which to cut surgery lead times and improve patient satisfaction. Members of the cataract team included the head nurse in the eye unit, a hospital administrator, general practitioners, a set of optometrists from the local community, and a surgical consultant who was instrumental in championing the need for change and in leading the change process. Team meetings were held in the evening to facilitate attendance, and were led by a member of the transformation team who produced all minutes, flow charts and other necessary documentation for the process, and distributed them to all team members after each meeting. In total, five project-team meetings and many more informal discussions were held over a six-month period.

The efforts of the project team were seen as justified by the need to address the inadequacies of the current process. Cataracts represent 96% of the ophthalmology workload, but the surgery itself is only a 20-minute procedure. However, the existing process for diagnosis and treatment involved a patient in a number of visits to various specialists. Typically, patients began at the optometrist (the high street optician) because they believed that deteriorating

eye-sight required new glasses/contact lenses. However, the optometrist would quickly diagnose that the problem was actually cataracts, and would then refer the patient to his or her general practitioner (GP). After a visit to the local GP who, not being an eye specialist generally relies on the diagnosis of the optometrist, the patient would be forwarded to the hospital consultant for further examination. The patient then went on a waiting list and would eventually be called for a brief meeting with the consultant. This almost invariably confirmed the optometrist's diagnosis. Then, in a separate appointment, the patient would meet with the hospital nurse for a physical examination. Only when all of these visits were completed would the patient get in the queue for obtaining a date for the cataract surgery. Post-surgery, another visit to the consultant would be scheduled to check on the patient, and then the patient would be referred back to the optometrist for a new pair of glasses. Therefore, it took patients at least six visits and often well over a year to have a routine, 20-minute, outpatient, surgical procedure.

Work on the project brought together individuals from a diverse range of professional groups and backgrounds. One by-product of their working together was an increased understanding of the skills and capabilities of the members of other professional groups. This was particularly beneficial for the optometrists who traditionally had not been given the latitude to use their extensive training in eye care treatment. The consultants and optometrists involved in the project gained new respect for each other, breaking down many preconceived prejudices. As one project member commented; *We had never really got together before and*

that built great bridges.' However, team diversity was not without its costs. The project

threatened existing work practices and professional demarcations, for example, and this led to

resistance from certain groups (an issue which was also highlighted in Bart Nooteboom's

analysis in chapter 5). Professional barriers remained an issue for those consultants who had

not been directly involved in the cataract project team. For example, certain consultants in

Midlands Hospital still assumed that optometrists could not properly diagnose cataracts and

were therefore unhappy about not making the diagnosis themselves. As one project member

put it: *'There are a lot of other departments where people express reservations about the*

skills of optometrists who will be referring patients to them and they are not prepared to go

down that route (i.e., the new cataract process) because of that'. The project team were able

to overcome this resistance in large part due to the influence exerted by the team's

opthalmology consultant. By meeting formally and informally with his fellow consultants to

discuss issues surrounding the change process, this individual was able to alleviate their

concerns sufficiently to ensure acceptance of the project.

Once the project team had reviewed the existing process, they sought to develop a more

streamlined approach which would deliver a significant reduction in the lead-time for

patients. A number of substantive changes to the existing process were made. Non-essential

visits to the general practitioner, the consultant and the nurse were eliminated. Instead,

optometrists were empowered to decide if a patient needed cataract surgery. In doing so, they

were required to fill out a detailed form that provided the consultant with specific information

about the nature and severity of the cataract, and to call the hospital and book a time for the patient's surgery. For their additional responsibility, the optometrists were given some extra training and received a small amount of compensation from the trust. The preliminary pre-operation physical was replaced with a self-diagnostic questionnaire that each patient was required to fill out and return to the hospital before surgery. Nurses would then telephone each patient before surgery to check the patient's details and answer any questions. Post-operation consultant appointments were also replaced with follow-up telephone calls.

The new cataract procedure resulted in dramatic efficiency gains. Lead times were radically reduced from over 12 months down to six to eight weeks. In addition, theatre utilization rates improved due to the addition of an administrator whose sole responsibility lay in scheduling theatres. Finally, and most importantly, follow-up phone conversations with cataract patients indicated a dramatic improvement in patient satisfaction. The new reengineering cataract process can, therefore, clearly be seen as transforming the Midlands Hospital's ability to deliver this service.

Despite the success in changing practices and the division of practice within the Midlands Hospital itself, attempts to *learn from* this project to the wider NHS organization were much less successful. Even in the face of significant efforts by project members and managers to champion the new procedure within the NHS more widely, staff in other hospitals remained sceptical of its relevance when it was presented to them as 'best practice'. This resistance was not greatly reduced even when the new team responsible for the new process were presented

with an award by the Prime Minister for their efforts. Several factors can be adduced to account for this inability to spread the learning more widely. For one, the conditions at Midlands Hospital were especially conducive to the creation and implementation of the new process. The hospital's deployment of a transformation team was highly unusual within the NHS context, and this provided resources and expertise to facilitate the project. Also, the various professional groups involved in the design of the new procedure were willing and able to learn from each other and realign their roles and responsibilities accordingly. In contrast, these conditions were rarely found in other hospitals. Moreover, the learning which the cataract project generated was especially difficult to assimilate elsewhere: not only did it require a change in practices on the part of entrenched professionals, it also involved a change in the divisions in practice between groups which was even more difficult to orchestrate at other sites.

Case C: The Lowlands projects at WaterCo

WaterCo is one of the UK's leading water and sewage companies. It has a turnover of approximately £900 million. The company is organized on a functional basis, comprising the four main functions of asset procurement and investment, engineering, customer relations and technology and development. The case focuses on a 30-month, £60 million programme undertaken by WaterCo to redevelop and extend a sewage and water treatment works in a region of the UK. This site at Lowlands posed high profile environmental problems and the

works required a significant amount of asset renewal. The machinery was at the end of its working life and thus its reconstruction had significant planning and environmental aspects.

The programme was unique for WaterCo in many respects, bring the largest capital scheme in the firm's development programme – such programmes were usually budgeted around £500,000 to £2 million in size. At the same time, the timescale was very demanding and the feasibility work, planning applications, assessment and site investigations had all to be done at the same time rather than sequentially to meet an ambitious deadline. Finally, the programme was also unusual in its combination of civil engineering works with the complex mechanical and electronic tasks supporting an improved water treatment process. Project activities were thus diverse, ranging from building a bridge over a river through to land remediation, additional infrastructures and sophisticated software control systems.

A scheme of this size and technical complexity demanded the coordinated effort of a range of groups inside and outside WaterCo, including half a dozen UK leading engineering and architectural consultancies. The primary external contractor, however, was ConstructCo, a major UK-based construction and building design firm. Ultimately, despite the technical and organizational challenges confronting the programme, it was deemed a great success by WaterCo management. Not only were the treatment works successfully developed on time, but this was achieved to new specifications and a much tighter standard. Members of the programme believed that this success was closely related to important changes in the management of the programme over the course of three linked projects. As outlined below,

these changes were significant in allowing the development of new patterns of project-based learning across these projects.

The management of the programme centred on the design of the organizational arrangements for the three sequentially-linked projects (termed here projects A, B and C) which made it up. Project A was developed on the basis of standard project management practices. This involved WaterCo management assembling a core team for the project which was made up of WaterCo and ConstructCo staff, each supported by their own regional head offices and their network of contractors and suppliers. WaterCo team members were all hand-picked and experienced specialists working full-time on the programme. The core team was carefully selected because WaterCo management felt that the timescale did not allow the project to be used as a learning environment for less experienced staff. WaterCo's team on site was led by the Site Reconstruction Manager, who possessed extensive experience of both sewerage treatment works within WaterCo and the site itself. Other WaterCo team members, however, were not based on-site and worked on the project from their offices in the company headquarters. The tendering arrangements with sub-contractors followed the conventional norm in WaterCo. Most of the design work was performed at the start of the project, and sub-contractors tendered to produce pre-defined elements of the design. Design solutions were thus 'frozen' at the tender stage.

The learning which took place in project A was essentially technical in nature and driven by the need to redevelop the facilities to meet new environmental expectations The core team

sought to benefit from the experience of recently completed schemes and a significant amount of effort was devoted to benchmarking activities in technical areas, including, for example, chemical dosing systems, tank water tightness, water pump management, and so on. Such benchmarking initially focussed on previous proprietary schemes and included visits to three water treatment works in the Midlands.

For projects B and C, however, there was a significant change in WaterCo's approach which had major repercussions for the dynamics of project-based learning. This began with a spatial shift, as the Site Reconstruction Manager decided to reorganise all members of the core project team (design, construction and contract administration staff and a site supervision group) to locate them together on site with the external contractors. This, together with the shared responsibility over the final detailed design, gave the core team a certain degree of autonomy and independence from the main office.

In addition to the physical re-distribution of team members, these subsequent projects were also subject to different contracting arrangements. Projects B and C were both procured with ConstructCo and related contractors on the basis of a single, one-off target price and an outline rather than a detailed design specification. Although each project was distinct in the sense of addressing a discrete set of tasks, the decision to link them contractually reflected a perceived complementarity between the tasks and skills involved – many of the tasks were the same or similar. This arrangement had important implications for the conduct of the project work. Although the projects continued to depend upon a form of inter-organizational

collaboration, the linkage between them secured continuity of personnel across projects. At the same time, this arrangement incorporated a 'shared pain – shared gain' incentive arrangement between WaterCo and ConstructCo. The partners were to absorb whatever difference, either positive or negative, arose between the actual cost and the target price of the programme. Client and contractors were thus able to develop the detailed design together to optimise both the technical solution and the cost. This created new possibilities for collaborative design, shared ownership and cross-fertilisation between the partners.

The effects of these changes in management approach were to create a greater sense of shared goals and collaboration between WaterCo and its contractors. As ConstructCo's Project Manager put it;

 'Any problem that comes up, then there's that common goal of "let's make the decision quickly to solve it and let's make it with the least cost in mind" . . . That means that people have the same objective rather than the opposite. In the old way of working we would try to maximise value and they would try to minimise it across the project, so you're working against each other.'

Importantly, with this new arrangement, the project partners stood to benefit not only from any learning which they could take away from the project themselves (as we noted of the individual learning in the Thurrock case), but also from the learning applied to a future project. Any such learning across projects B and C would improve overall project performance and hence create gains for all. This arrangement, together with the continuity of

tasks and practices across projects, created a high level of motivation on the part of project members to ensure that anything learned in project B was re-applied in project C. Here, unlike the Thurrock case, project-based learning was viewed positively as a source of improvement and not as the 'bad news' associated with rectifying mistakes.

ANALYSIS AND DISCUSSION

Our analysis of project-based learning within these cases begins with the simple observation that all our cases highlight the important role of existing CoPs, and existing divisions in practice, in mediating the generation and spread of such learning. In the Thurrock case, for example, learning was bounded by a separation between the ground-level learning of site contingencies which was the responsibility of site teams, and the tender teams' concern for the more abstract forms of knowledge accumulation applicable across local contexts. At one level, one might argue that this reflects the 'nested' nature of learning in organizations (Levinthal and March 1993). Thus, the one-off nature of many projects, solving specific or unique problems, was traded-off against the repeatability and specialization through which organizational learning was achieved. Moreover, this highlighted the influence of accumulated knowledge as reflected in the functional boundaries of the organization. The development of BuildCo had produced an accumulation of knowledge about project work within the firm, allowing the development of more standardized approaches to construction, the development of functionally specialized roles for individuals and a broad division of

labour between head office and site-based activities. This institutionalized separation between the two teams enabled the acquisition of abstract and professional knowledge regarding design and value engineering within the tendering process. Such knowledge could be applied across a variety of spatial environments and was developed at head office by a community of professional specialists rather than through exposure to the narrow contingencies of site work.

The separation of site activities from tendering and design also had the effect of promoting significantly different perspectives and practices amongst project participants. Tendering activities reflected the stories circulating about previous tenders as discussed between colleagues co-located at the regional head office. Building activities reflected experience on previous construction projects, although in this sphere communication between sites was limited. The strict demarcation between the activities of site teams and tender teams ensured that these bodies of specialized expertise were not confronted by experience which might be challenging or equivocal. This separation of practice, rather than any learning effect, seems to explain the difference between planned and actual outcomes in the Thurrock case. Given the differences in practice and the lack of interaction, the site team simply possessed greater knowledge about the site-level contingencies of building work than the tender team.

This tension between local variation and the standardizing pressures of organizational learning has been previously observed by a number of authors (e.g. Weick and Westley 1996). However, as Brown and Duguid (2001) note, the danger for organizations is that this trade-off actually reflects historic institutional demarcations (in the Thurrock case, between

'head' and 'hands') and is increasingly inappropriate when the local solutions produced by different communities are often critically important for innovation. In the Thurrock case, certainly, the emphasis on the standardization of methods meant that the rich experience of work on site was normatively evaluated as either conforming to or deviating from existing standards. Learning at the project level was associated with errors or mistakes.

In the NHS Trust case we see an example of a project which generates a significant amount of *learning within* the project. Through their interactions, project members are able to both bring about some change in their own practices – accepting new approaches to diagnosis and treatment – and, more importantly, in the division of practices between them. New protocols are established for the transfer of patients between the different professional groups involved and new inter-professional norms established for the way in which patients are treated.

Despite the significant benefits which this learning brought for the Midland Hospital itself, the failure to spread this learning more widely amongst other NHS hospitals highlights the difficulty of translating new practices across an organization. While new practices created within a project are likely to be localized, it is possible to envisage more widespread learning where such practices can be legitimised and translated through the insitutions and norms of a functional or professional community (Greenwood, Suddaby and Hinings 2002). Changes in divisions in practice, however, may be more difficult to spread, in that they are more deeply embedded in the practices and norms of multiple groupings (Scarbrough 2003). Moreover, such changes would require organizational mechanisms for institutionalizing new divisions in

practice which are either not available or are widely contested within the professionally-dominated NHS.

Conversely, the Lowlands case highlights the extent to which new practices can be spread, at least from one project to another. Significantly, however, these changes in practice were only achieved when the project was able to achieve greater autonomy from its host organization. This enabled greater decoupling from mainstream organizational practices, and at the same time, the creation of conditions under which new, shared practices could be developed. That these changes in practice were then retained for a subsequent project seems to have been the result, first, of organizational and technical continuity between one project and the next – the same tasks could be addressed through the same practices and division of practice. And second, it seems to have reflected the project members' willingness to invest in these new practices in return for the gains which they could achieve together.

Taking our cases together effectively underlines the impact which existing communities and divisions in practice exert upon the organization's ability to exploit project-based learning. In each case, the opportunities and limitations for such learning were different. This seems to have reflected the importance, as noted previously, of the organizational contexts in which projects were positioned. These contexts involved an institutionalized ordering of different communities of practice, and the relations of power and legitimacy between them (Contu and Willmott 2003), which facilitated certain kinds of learning but precluded others. Thus, in the Thurrock case, the BuildCo organization affirmed a traditional manual-mental division of

labour between tender teams and site teams. The communities which evolved around these distinct practices thus promoted divergent forms of learning – centring for the tender teams on the discipline-based collation of technical data, and for the site teams on the individual learning of craft practices.

This can be contrasted with the Midlands Hospital case, where the conscious pursuit of innovative project goals achieved local success through diversity of team membership and high levels of learning within the project. However, the learning from this project was associated with artifacts and stories focussed on an organizational innovation. These could not be readily assimilated within specialized practices which were reinforced and legitimised by formal professional bodies.

Significantly, the one case where we found both *learning within*, and *learning from* the project was the Lowlands case. Here, we identified a high level of project autonomy, but also the importance of the continuity from one project to another. Such continuity, when added to autonomy, meant that in some sense, the project became its own organizational sub-unit. One consequence of this was that the new practices created within the initial project did not have to be re-digested through an existing division of practice, but could be dynamically carried forward to the emerging activities of the follow-up project. The iteration of project work in this case also had political consequences, as the new contract arrangements effectively applied resource power to the project's innovative practices. This encouraged individuals to invest in these practices – in effect, creating an embryonic community of practice – and, at the

same time, forging a tighter partnership with contractors.

Consideration of the Lowlands case, however, also suggests a need to extend future research beyond locating the project in its organizational context to the positioning of the organization itself in wider institutional, technological and market environments. This would complement the work described previously on project ecologies and regional effects, but focussing less on the movement of individuals across projects, and more on the organization's shifting powers and positions within wider labour-market and regulatory environments. Thus, developments in practice at Lowlands were made possible in part by a change in the relationship between BuildCo and its partner organization. This mandated the resources and business opportunity through which new practices could be sustained. In contrast, the Thurrock case shows an organization locked into the craft-based institutional logic of the UK construction sector, with important consequences (as with many other construction firms) for its ability to innovate. Finally, the Midlands Hospital case highlights the important influence of the wider professional, and explicitly political environment on the NHS' ability to bring about change from the level of practice – bottom-up change as it were – in its organizational processes (Child and Loveridge 1990).

CONCLUSIONS

In this paper, we have attempted to develop a practice-based view of project-based learning.

We noted that this view seemed to offer some advantages over alternative perspectives on such learning. Thus, cognitive-oriented views seemed to overstate the fluidity of project-based learning, neglecting the problems of embeddedness within organizational contexts. This may have helped to account for the limited effectiveness of cognitively-based attempts to capture and transfer project-based learning. On the other hand, the existing literature on learning within teams has limited applicability to the dynamics of project work. Whatever autonomy projects enjoy, they are also interpenetrated by existing organizational routines (e.g. project management routines) and practices. Learning within projects thus reflects not so much the localized development of the team as the way in which project members interpret and enact the interplay between project activities and existing organizational practices.

In the remainder of the paper, we sought to explore a practice-based view of project work by focussing on its implications for, and indebtedness, to existing communities of practice and divisions in practice. The comparison between our three cases suggests that these carriers of practice do indeed significantly influence the process and outcomes of project-based learning – certainly to a greater extent than is currently appreciated in much of the existing literature, which tends to isolate projects from the social practices which underpin their execution. We found that the scope and extent of *learning within* projects is influenced by the practices of established communities. Where projects were routine in nature, as in our construction example, the importation of existing practices was relatively straightforward, securing organizational efficiencies, but militating against the generation of learning within the project

itself. In contrast, where the project was highly novel and project membership spanned a range of existing communities, a high level of learning was generated. However, the resulting organizational innovation encountered stiff resistance due to its challenge to existing practices within the wider organization.

The variation in these findings suggested that the influence of communities of practice on project-based learning, and vice versa, needs to be related to their organizational contexts. Such contexts not only help to define the ordering and constitution of different communities of practice – as, for example, between the craft-based and professionally-based forms we found in BuildCo and Midlands Hospital respectively – but also the relative influence of existing divisions in practice on the learning potential of projects. As we noted previously, it is simplistic to see projects and CoPs as distinct entities. Rather, these different sources of learning with organizations overlap, reinforce and sometimes conflict depending on the relationship between project work and existing social practices. Thus, where projects map neatly onto established CoPs, one would anticipate an incremental pattern of learning, linked to existing practices and mediated by individual career paths and the development of the CoP. Conversely, where a project becomes a focal point for the development of new practices within an organization, or where it provides an interface to wider networks of practitioners outside the organization, the project may itself become an important, if likely short-lived, catalyst for the development of a new CoP. On the other hand, where project work cuts across existing CoPs, as in the Midlands Hospital case, there is potential for more radical

breakthroughs in thinking and practice – 'learning within' as we have termed it. But this also increases the risk that the spread of any such breakthroughs will be blocked by the embeddedness of existing practices. Thus, by constraining change, existing CoPs may preserve one source of learning, but at the cost of 'reinventing the wheel' in successive projects.

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Table 6. 1. Comparison of the characteristics of CoPs and projects

Community of practice	Project work
No formally specified tasks	Predefined task
Open-ended work cycle	Time bounded
Emergent community participation	Conscripted participation
Primary identities forged within the community	Primary identities forged externally
Social motivation	Intrinsic and extrinsic motivation

(Based on Wenger 1998: Sense 2003.)

NOTES

[i] The names of these organizations have been changed to protect the confidentiality of

respondents.