

Social Learning and Knowledge Management in the Australian Defence Organisation

L. Warne¹, C. Pascoe², I. Ali¹, K. Agostino³ and R. Gori¹

¹ Joint Systems Branch, C3 Research Centre, Defence Science and Technology Organisation, Australia
E-mail: Leoni.Warne@dsto.defence.gov.au; Irena.Ali@dsto.defence.gov.au; Ronnie.Gori@dsto.defence.gov.au

² Division of Communication and Education, University of Canberra, Australia
E-mail: cxp@comedu.canberra.edu.au

³ Sociology Department, School of Behavioural Sciences, Macquarie University, Australia
E-mail: kagostin@ocs1.ocs.mq.edu.au

ABSTRACT:

This paper reports on research conducted by the Enterprise Social Learning Architecture team of the Defence Science and Technology Organisation. Two preliminary studies were conducted. The purpose of the first study was to determine the feasibility of observing and documenting social learning processes and trial the use of ethnographic techniques for this purpose. The study provided multi-layered findings about social learning, and validated the use of ethnography for this purpose. The second study was conducted in a Branch of the Australian Defence Headquarters, a strategic headquarters. In this study, supplementary methodologies were used which highlighted the hindrance to organisational learning when system thinking is not part of an organisation's culture

Keywords: Knowledge management, organisational learning, systems thinking

INTRODUCTION

Researchers are increasingly employing qualitative methods, specifically ethnography, to gain understanding of social, organisational and information system interactions. Understanding and enabling organisational learning in the Australian Defence Organisation (ADO) is one of the objectives of the Enterprise Social Learning Architectures (ESLA) research project being conducted by the Defence Science and Technology Organisation (DSTO).

For the purposes of the research, social learning is defined to include: the procedures by which knowledge and practice are transmitted across posting cycles, across different work situations and across time; and the procedures that facilitate generative learning - learning that enhances the enterprise's ability to adjust to dynamic and unexpected situations and to react creatively to them (Senge 1992). Since an integral part of learning is the construction of knowledge, social learning within an organisation is tightly coupled to knowledge management. Therefore, the short term objective is to understand and document the issues inherent in building learning, adaptive and sustainable organisations and the long-term objective is to facilitate the development of information systems that will enable organisational learning and facilitate knowledge management.

Two pilot studies have been conducted. The first, in a tactical headquarters, determined the feasibility of observing and documenting social learning processes and trialed the use of ethnographic techniques for this purpose. It provided multi-layered findings about social learning and validated the use of ethnography for this purpose. The second pilot study was conducted in a Branch of the Australian Defence Headquarters, a strategic headquarters. In this study, supplementary methodologies became necessary, and the findings corroborated those of the first study, highlighting the barriers to organisational learning when system thinking is not part of an organisation's culture.

This paper reports on the organisational learning findings, and their synergy with knowledge management and systems thinking. It addresses certain theoretical aspects that underpin the study, such as Wenger's communities of practice theory and Senge's five disciplines of a learning organisation. Also, the paper attempts to explain the rationale for choosing both quantitative and qualitative methods for the research study and provides background for the research setting. Study findings are discussed in terms of personal mastery, shared vision, team learning, and application of system thinking to problem solving and fulfilment of objectives.

ORGANISATIONAL LEARNING AND KNOWLEDGE MANAGEMENT

The organisational learning literature deals with learning in the social world of the work place, and it is this aspect of the pilot studies that is described in this paper. According to Courtney, Croasdel and Paradise: (1998:4)

when members of an organization share associations, cognitive systems and memories, organizational learning is taking place. Learning by organizations relies on the people and groups as agents for the transferral of knowledge.

Over time, what is learned is built into the structure, culture and memory of the organization

In this way, knowledge is assimilated into the organisation and is not lost when individuals are posted out or when situations change. This relates directly to the effectiveness of knowledge management in an organisation that, in turn, has implications for the development of systems that manage organisational knowledge effectively (Warne 1999).

A number of theories have been useful in helping the research team interpret and understand many of the observations made during the pilot studies. One of these is Wenger's communities of practice theory and another is Senge's five disciplines of a learning organisations.

Communities of Practice

Lave and Wenger (1991: 29) highlight the fact that "learners inevitably participate in communities of practitioners and that the mastery of knowledge and skill requires newcomers to move towards full participation in the socio-cultural practices of a community". The learning processes involved in newcomers efficiently acquiring the necessary knowledge to be effective in the workplace are an important part of this research, because of the ADF's two yearly posting cycle. However, learning is an on-going process as work place practice develops and changes. Wenger (1998) characterises the need for members of a community of practice to adjust and adapt to changes over time and in new situations as another manifestation of learning in a social world. Furthermore, Lave and Wenger state that learning in a social world generates questions about the construction of identities; the location and organisation of mastery in communities; problems of power, access and transparency; and the developmental cycles of communities of practice (Warne, 1999).

The theory proposes that communities of practice form an important link between the way that individuals and organisations learn. It highlights many methods by which knowledge is transmitted between community members. It blurs, from the perspective of community members doing their work, some of the boundaries between tacit and explicit knowledge, and formal and informal communication. The theory also proposes methods by which elements of practice can be propagated between communities, and the means by which different communities within an organisation remain in alignment with each other (Wenger 1998; Gori et al 1999).

The Five Disciplines of a Learning Organisation

In his seminal work on organisational learning, Senge (1992) states that in order for organisations to maintain a competitive edge, they must be capable of continuous learning. He outlines the five models, or disciplines, that will enable this: personal mastery, mental models (or assumptions); shared vision; team learning; and systems thinking. According to Senge, (1992:3) learning organisations are:

organisations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together

There are many similar definitions. Garvin (1993:81) states that learning organisations are organisations that are skilled at five primary activities: "systemic problem solving, experimentation with new approaches, learning from the experiences and best practices of others, and transferring knowledge quickly and efficiently throughout the organisation". According to Hoffman and Withers (1995), learning is an autonomous, largely uncontrollable function of being human, however, the culture in which this learning occurs is the compelling determinant of the quality of that learning. Furthermore, Hoffman and Withers believe that successful learning organisations must operate in an environment of trust and the reduction of fear; teamwork and sharing; leaders as champions of people and their ideas; and the encouragement of constant change. Trust seems to play a pivotal role as it contributes to more effective implementation of strategies, greater managerial coordination, and more effective work teams (Doney, Cannon, and Mullen, 1998). No organisation striving to become a learning organisation can foster competence, innovation, collaboration and forgiveness in the absence of trust.

The many definitions of learning organisations that followed Senge (1992) do not appear to contradict his definition. Rather, they seem to be variations on the same theme. The common theme in most of these definitions and characterisations is the belief that the key to an organisation's success and longevity is in its ability to effectively adapt to its changing environment and to efficiently nurture the growth, sharing and sustenance of the corporation's historical and dynamic knowledge (Warne 1999). This theme is central to Senge's 1992 discourse on the disciplines of learning organisations.

METHODOLOGY

Studies which consider context in research tend to support qualitative techniques where context is treated as the socially constructed reality of groups of social agents and where the key analytic task is to expose the layers of meaning in the social

process. The main body of techniques that fit this criteria fall under the domain of ethnographic approaches which involves observing the work taking place in different settings, and using directed questioning to clarify issues (Harvey & Myers 1995). Ethnographers immerse themselves in the situation to gradually see and understand the key concepts that influence the setting being studied. Given the exploratory nature of the ESLA research, the importance of the context and the need to understand the social process of learning, ethnography appeared to be the most logical and viable form of methodology to adopt.

The preferred method for conducting observations was to pair ethnographers in each setting. However, the inconsistent availability of team members meant that this was not always possible and for some of the fieldwork a single ethnographer conducted observations. Prior to the commencement of the research study the team members were thoroughly briefed on the principles and ethics of ethnographic research. Over the period the two studies have taken place, the composition of the observation teams varied. Currently, there are five researchers: one electrical engineer, one social scientist, one workplace and interpersonal communication specialist, one science and information management/seeking specialist and one researcher from an information systems/organisational studies background. A carefully defined process at research meetings ensures that all team members understand and can corroborate what the others have observed. The team rigorously discusses individual fieldnotes and conclusions are always related back to observations. The context of events is seen as being as important as the observations themselves. Rather than insisting on one interpretation of an observation, the study has benefited from the multiple stories and understandings which emerged from the multi-disciplinary team. The different perspectives, expertise and experiences of team members enrich the data and shape the kind of ethnography which takes place.

The research methods have evolved as the task has progressed. The tactical pilot study used ethnographic methods supplemented by some unstructured interviews. It was found that this approach was less suitable for the type of diffuse working environment prevalent at ADHQ. Whilst ethnography constitutes a major part of research methodology, other qualitative and quantitative methods have been used. The qualitative methods include field observations, structured and unstructured interviews and a study of various documents collected by the research team. The quantitative method involved a survey, which was designed to gather more information on issues that arose in the qualitative findings. The survey was used in the strategic ADHQ study, primarily to shift the focus of study findings from the researchers to the personnel being studied, however, the survey also served to validate the ethnographic findings.

Careful consideration was given to ensure validity of this research. Therefore, the research study is subject to triangulation by data source (different times and places); and by method (observations, interviews, and, in one of the settings, a quantitative survey).

SETTINGS FOR THE PILOT STUDIES

Two pilot studies have been conducted. The first was conducted in a RAAF tactical headquarters, and the second in a Branch of the Australian Defence Headquarters, a strategic headquarters comprising personnel from all three services as well as civilians.

Tactical Headquarters Study

The setting chosen for the first pilot study was 82Wing, a Wing Command of the Royal Australian Air Force Strike Reconnaissance Group (SRG). The primary mission of SRG is to conduct strike missions. Strike missions are conducted by aircrew flying F111 aircraft. The strike aircrew consists of pilots and navigators, since flying an F111 requires one pilot and one navigator.

Five field trips were made over a six month period: four to the Wing Headquarters at the Strike Reconnaissance Group at Amberley Air Base in Queensland, and one to Darwin. In Darwin, personnel from 82Wing were joined by members of other Wing headquarters, to form the Headquarters for "Orange Air", to take the role of "the enemy" in the Pitch Black military exercise (Warne, 1999).

Strategic Headquarters Study

Having successfully determined that it was possible to observe and enhance understanding of social learning and that ethnography was an effective methodology for doing this, the ESLA team sought to test the validity of its findings in a different ADO setting. Other goals were to refine the project methods and to determine how the task should input to the continuing reviews of ADHQ.

Consequently, the research team undertook a five-month pilot study within C3I (Command, Control, Communications and Intelligence) Development Branch of what was then Capability Division within ADHQ – a strategic headquarters. This area is responsible for producing C3I capability proposals for the ADO. Since this area had been subject to several re-organisations and consisted of personnel from all three services and civilians, this setting provided additional layers of complexity and challenge. However, the Senior Management of the area found the team's findings so useful that the C3ID pilot study was terminated prematurely, after three months, in order for the team to commence work on a fuller study of the Capability Division within

ADHQ.

FINDINGS

The complex, inter-related findings derived from the pilot studies range from observations of the detailed structured and unstructured learning processes used to propagate the communities of practice in the study settings; through the models and disciplines that facilitate organisational learning; to the broader social issues of power and discipline that impinge on the effectiveness of social learning in the organisation. The data gathered so far suggests that systems thinking is tightly coupled with effective social learning. Systems thinking, according to Senge [1992] requires a shift of mind – from seeing oneself as separate, to seeing oneself as connected to, and part of, the world (or part of any other system such as an organisation or organisational sub-unit). In the main, the research team found that this need for systems thinking was a major factor in developing a successful shared vision, goal alignment, cultural identity, morale and workplace design, and that all of these issues are integral to effective social learning.

A major conclusion derived from the SRG study was the importance of members having a shared vision, especially in terms of understanding organisational systems and objectives. It was also found that effective work groups see themselves as interdependent on others outside their team, and when it comes to problem solving, they regard themselves as part of a larger, integrated entity requiring system thinking to achieve objectives. The pilots and navigators were well aware of the importance of the maintenance engineers and other supporting staff to the success of their missions, and the engineers and other staff shared the pilots' goals of ensuring the safe execution of flying missions. The penalties for error were dire, and this was clearly understood by all involved. This finding seems to support views represented in literature that people working together on a joint enterprise for a sustained period form a community. They learn, and as they interact, over time they develop a shared practice and contribute to the intellectual assets of the organisation (Wenger, 1998). By doing so, they form effective work groups which are defined as teams where practices are transmitted from the experienced members to new members (mutual engagement and mentoring), where positions are rotated in order to gain expertise and where experience counts more than a rank or a position. These practices are well entrenched in the Wing Command studied. These teams are empowered and self directed and yet see themselves as interdependent on others. The sense of mutual engagement and mentoring in a common enterprise helps to generate a commitment to the practice and to each other and provides an effective way of conducting business and advances learning (Dilworth, 1995; Wenger, 1998).

Another finding from the SRG study is the focus on lessons learnt rather than mistakes made. At SRG strict protocols were observed at de-briefings, such as requiring participants to discuss errors or problems encountered during missions without assigning blame or shame to individuals. As well as providing access to information, this facilitated the sharing of mistakes and the sharing of responsibility for solutions. This creates an atmosphere of trust, forgiveness, positive team spirit and minimisation of fear. These factors provide a fertile ground for learning by allowing people to speak honestly, share information and offer suggestions without fear of ridicule or retribution (Hoffman & Whithers, 1995). Furthermore, a strong collaborative attitude based on strong goal alignment and the common identity that prevailed in the SRG group created team synergy as people who collaborate learn from each other. Senge (1992) advocates that effective learning at the team level becomes a microcosm for learning throughout the organisation.

The findings from the C3ID pilot study are similarly multilayered and enabled the research team to pinpoint a set of values that facilitate effective social learning, sometimes more obvious because of their absence. These values relate to the environment that facilitates social learning as well as strategies and processes used to create such an environment. The staff of C3ID Branch were shown to have many strengths, however, some problems became apparent. Issues such as the lack of induction for new staff and poor record management systems created problems. This made it much harder for newcomers to find out what part they played in the organisation, where they could find the information they would need to do their work, and to understand the links within the organisation. This hindered their ability to get a systems perspective of the organisation and consequently inhibited effective learning. The research team also identified some problems with goal alignment and cultural cohesion which, in turn, tended to fragment, rather than unite the area.

A culture of cooperation and partnership in organisations is believed to facilitate learning and the construction of new knowledge. For instance, Wenger (1998) claims that a culture characterised by the pursuit of common goals arises from a process of shared learning and subsequent development of an enterprise's knowledge (that is, its practice). Such shared, generative learning itself can only exist if there is a culture of cooperation and partnership. The survey data collected from C3ID staff indicates that a culture of cooperation and partnership does exist but is not universal across the Branch. While senior staff within C3ID Branch appear to have a shared vision built on corporate objectives, this was not apparent in lower ranks within the organisation. These staff felt excluded and irrelevant to the departmental objectives and decision-making. For instance, the survey results indicate that while 100% of staff at Director level and above personnel felt that they were invited to contribute to the C3ID reorganisation process, only 20% of other staff members felt that they had been invited to contribute their opinions. This results in perceptions of disenfranchisement, powerlessness, and exclusion from the organisational systems. This limits staffs ability to exploit opportunities and solve problems which, in turn, inhibits their learning.

In relation to Senge's disciplines, the following observations were made:

Personal Mastery

Senge acknowledges that while individual learning does not guarantee organisational learning, without it, organisational learning cannot occur. The importance of individual learning and personal mastery is well understood in the SRG environment, as the consequences of not doing a job properly can mean the difference between life and death. It appears that, in general, every member of the community knows they have a role to play and they understand the vital significance of their role, whether that role involves flying, maintenance, or providing intelligence for a flying mission. Furthermore, at SRG, it appears that both the executive staff and the aircrew were very much committed to continual clarification of what was important and the need to see current reality more clearly. They were also very much aware of the interdependencies of the systems within which the missions were being conducted. Learning was clearly an integral part of the culture of the organisation.

While the importance of individual learning and personal mastery is also understood at C3ID, the realities of budget cuts and re-organisation has meant that training is not as readily available and the time required for reflection and learning on the job is a luxury few can afford. Similarly, with a history of frequent restructuring and change within ADHQ, only a minority of staff seem to be able to keep track of the full gamut of interdependencies and links that relate to the work they do. Many staff members described learning and knowledge acquisition as "ad hoc" in C3ID, or as a process of "discovery learning", in the sense that they believed they had to make sense of a new environment on their own.

Managing Mental Models and Shared Vision

Mental models are the entrenched assumptions or "deeply internal images of how the world works, images that limit us to familiar ways of thinking and acting" (Senge 1992:174). These models, or assumptions, dictate and often constrain actions and interactions. Weintraub (1995) believes that changing mental models can be the most difficult kind of learning. The mental models of an organisation constitute its culture. When an attempt is made to change this culture and the mental models that underpin it, normal change management practices should ideally be accompanied by other interventions. Mental models will change as people come to understand and experience success with the behaviour that arises from new models and as this behaviour become more habitual and tacit.

At SRG, the research team observed some tenets of the deeply entrenched organisational culture and some of the ways in which this culture was sustained and perpetuated. It seems likely that an organisation that invests so much in nurturing its culture, must, by definition, be managing mental models. Certainly, this has not been as successful at C3ID where several service cultures dominate and there appears to be a cultural divide between several parts of the organisation. There is evidence of a predominant mental model of organisational change being 'change for change's sake', and certainly this would create a barrier to successful organisational learning. A shared vision is a vision that most people in an organisation are truly committed to because it reflects their own personal vision and it creates a sense of commonality and shared purpose. However, a shared vision is about more than purpose or objectives. A shared vision creates a common identity, purpose, understanding, image, and a set of governing values for an organisation (Senge 1992). Any military organisation is steeped in a deep, historical tradition that forms the basis of its culture. This is certainly the case of the RAAF personnel at SRG. Furthermore, in an organisation like 82Wing the sense of shared purpose and objective is very much heightened, as the ultimate price can be paid for divergence from that vision. The safety of the aircrew flying strike missions is a paramount and pervasive imperative and every person in the organisation seems to understand they have a role to play in ensuring that safety (Warne 1998).

As stated earlier, trust, the minimisation of fear, and forgiveness, are all factors that foster innovation and provide a fertile environment for learning; freeing people to speak honestly, share information and offer suggestions without fear of ridicule or retribution (Handy 1995, Hoffman & Withers 1995). "For a learning organisation to take root and grow, it must stop holding people accountable for mistake-free performance, and begin holding them accountable for learning from their mistakes" (Hoffman & Withers 1995:470). The learning organisation approach accepts not only the making of mistakes, but also encourages the sharing of them for the benefit of the whole organisation. This focus on lessons learned, rather than mistakes made, is very much part of the culture of SRG where protocols for meetings and briefings are applied specifically to avoid confrontation and fault-finding. The predominant atmosphere in briefings was inquiring and supportive and, therefore, conducive to learning (Warne 1999). The perceived cultural divisions within ADHQ work against effective organisational learning although there is clearly evidence that senior managers are working towards building a cohesive culture and shared vision.

Team Learning

Both 82Wing and C3ID operate successfully at the team level. At 82 Wing, this occurs on a number of levels: from the Wing level; through the squadron level; down to the vital inter-dependence of the pilot and navigator at the cockpit level. Beyond this, each of these team have a role as team members in other teams, through secondary duties and formations like 95Wing, thereby

inculcating the skills and practices of team learning more broadly. Furthermore, cross-peer learning is practised extensively at SRG, both informally through legitimate peripheral participation and more formally through peer review and exchange programs with other national airforces (Warne 1999). According to Dilworth (1995:254), cross-peer learning is an inherent consequence of effective team learning and “employee exchange programs allow cross-peer coaching to occur as a natural and planned result of the experience”.

At C3ID team learning operates very effectively at the small workgroup level, the Branch level, and at the Service level. However, the lack of a cohesive organisational culture and a shared organisational vision impedes effective team learning with other stakeholders. Furthermore, while an important element of generative learning is for organisational members to be able to engage in dialog which is open and is based on inquiry and reflection (Senge 1992), an additional and obvious requirement for such dialog is having the time to engage in it. At C3ID, on numerous occasions, the research team encountered comments that there is little time to reflect, learn from experiences, or generally discuss work matters. This was further exacerbated by an open plan work design with declining availability of meeting rooms or areas for quiet work or reflection.

Systems Thinking

Senge (1992:69) sees system thinking as the fifth discipline: “the conceptual cornerstone that underlies all of the five learning disciplines ... the cornerstone of how learning organisations think about their world”. Systems thinking is both the incentive and the means for integrating all the disciplines of organisational learning: “all are concerned with a shift of mind from seeing parts to seeing wholes, from seeing people as helpless reactors to seeing them as active participants in shaping their reality, from reacting to the present to creating the future” (Senge 1992:69). Systems thinking involves seeing inter-relationships, and balancing and leveraging processes through managing systemic delays and feedback, rather than by focussing on linear cause and effect.

The research team observed, and heard about, many minor instance of systems thinking at SRG, in terms of personnel seeing the whole, rather than the parts, in problem solving and conducting missions. The Wing operated at a systems level with a constant understanding of how each part integrated to produce the desired results. This understanding was encouraged and facilitated and therefore enabled and enhanced social learning which further enhanced the understanding of the links and interdependencies within the organisation. Furthermore, problems and their solutions were shared by all, whoever or however the problem may have occurred. This is a discipline that seems to be particularly re-enforced by the culture of the organisation - a nurturing culture that values common identification, and manages mental models to cement a shared vision that carries the organisation forward. However, it would be fair to say that this may be easier to do in a single service organisation with a well defined primary objective, like 82Wing, than in other organisations.

In C3ID, personnel from three services and civilians work together, and the organisation is striving to meet many different objectives. Furthermore, the outcomes of their work are heavily reliant on the prevailing economic and political climate. Consequently there are many, sometimes conflicting, cultural systems that overlay the organisation. However, the team observed several instances of system thinking within C3ID, although they were generally individual, rather than organisationally based. These individuals are able to learn effectively because they understand the interrelationships in the organisation and they know where they need to go to find information or solve problems. The research team also observed several instances where a lack of systems thinking led to a breakdown in organisational learning. Some parts of the organisation, which are not co-located with the rest of the Branch, operate as individual areas and not as part of the larger organisation. In some instances, although these areas are part of a larger section, they did not have access to the larger organisations’ electronic records or communications lines. In some of the worst instances, these staff members were sometimes not informed of staff meetings. Not surprisingly, the staff in this area felt excluded from the rest of the Branch, and knew little about what went on beyond their own area. They operated in isolation and set up their own records and communications systems which did not link into the rest of the organisation. Interestingly, in the absence of a uniform, centralised records management policy within the Branch, the predominant form of information seeking is through the establishment of personal networks (where information is sought from individuals with the required expertise rather than from documents or electronic sources). Ironically, it generally appears to be those individuals who are most aware of the interdependencies and vital links within the Branch are able to establish the most effective personal networks, and therefore, are rewarded by more effective social learning and knowledge acquisition.

CONCLUSION

While the research is continuing, and new findings may emerge, it is possible to reach some conclusions about effective organisational learning in the ADO, as identified to date. Some of the processes and strategies that have been found to engender organisational learning in the pilot study settings were found to include: legitimate peripheral participation; peer review and cross-peer learning; building a common identity; the judicious use of protocols at meetings and briefings; and effective formal information flows. Similarly, some of the factors that were found to facilitate and nurture organisational learning were based on a strong common cultural identity with a shared purpose, objective and vision. Additional enablers were the encouragement of individual expertise and mastery; the willingness to change the assumptions upon which the organisation is built; and a clear understanding of the inter-relationships and interdependencies of the systems within which individuals in the organisation operate.

Furthermore, an organisational focus on sharing lessons learned, rather than mistakes-made and fault-finding was found to be essential for effective learning. Underpinning all these enablers is an environment of trust, forgiveness and sharing.

REFERENCES

- Courtney, J.F, Croasdell, D.T, and Paradice, D.B. (1998) "Inquiring Organizations" <http://www.cba.uh.edu/~parks/fis/inqorg.htm>
(Also published in *Australian Journal of Information Systems*, 6, 1.)
- Dilworth, R (1995) "The DNA of the learning organisation" in *Learning Organisations: developing cultures for tomorrow's workplace*, Productivity Press, Portland, Oregon.
- Doney, P.M., Cannon, J.P., Mullen, M.R. (1998) "Understanding the influence of national culture on the development of trust" *Academy of Management Review*, 23, 3, 601-620.
- Garvin, D.A. (1993) "Building a Learning Organisation", *Harvard Business Review*, July-August 1993, 78-91.
- Gori, R, Agostino, K and Warne, L. (1999) "Social Learning in the Australian Defence Force: A Pilot Study" in *Proceedings of the Fifth International Command Control Research and Technology Symposium*, Newport, Rhode Island.
- Handy, C (1995) "Managing the dream" in *Learning Organisations: developing cultures for tomorrow's workplace*, Productivity Press, Portland, Oregon.
- Harvey, L. and Myers, M.D. (1995) "Scholarship and practice: the contribution of ethnographic research methods to bridging the gap", *Information Technology and People* vol 8(3):13-27.
- Hoffman, F and Whithers, B (1995) "Shared values: nutrients for learning" in *Learning Organisations: developing cultures for tomorrow's workplace*, Productivity Press, Portland, Oregon.
- Lave, J. and Wenger, E. (1991) *Situated Learning: Legitimate Peripheral Participation*, Cambridge University Press, Cambridge.
- Senge, P.M. (1992) *The fifth discipline: the art and practice of the learning organisation*, Random House, Sydney.
- Warne, L. (1999) "Understanding Organisational Learning In Military Headquarters: Findings From A Pilot Study" in *Proceedings of the 10th Australasian Conference on Information Systems*, Victoria University, Wellington, N.Z. (Reprinted in the *Australian Journal of Information Systems*, 7, 2, May 2000.)
- Weintraub, R. (1995) "Transforming Mental Models through Formal and Informal Learning: A Guide for Workplace Educators" in *Learning Organisations: Developing Cultures for Tomorrow's Workplace*, Productivity, Portland, Oregon.
- Wenger, E (1998) *Communities of practice: learning, meaning, and identity*, Cambridge University Press, Cambridge.

ACKNOWLEDGMENTS

The authors wish to acknowledge the vital contribution made to this work Dr Jennie Clothier whose vision made it possible. Thanks are also due to all the Defence personnel who participated in the studies. The authors also wish to thank the reviewers for their comments.