European Journal of Information Systems (2006) 15, 42–53

www.palgrave-journals.com/ejis

Action-oriented group learning in the implementation of information technologies: results from three case studies

Tanya V. Bondarouk[1]

[1] *School of Business, Public Administration and Technology, University of Twente, PO Box 217, 7500 AE Enschede, The Netherlands*

Correspondence:
Tanya V Bondarouk, School of Business, Public Administration and Technology, University of Twente, PO Box 217, 7500 AE Enschede, The Netherlands.
Tel: +31 53 489 36 66;
Fax: +31 53 489 21 59;
E-mail: t.bondarouk@sms.utwente.nl

Abstract
This paper is about the influence of group *inter*-action processes known as group learning on the implementation of information technologies (IT). Aiming at a conceptualisation of the role of user interactions in IT implementation, a theoretical framework based on the experiential learning cycle is developed that includes five processes: collective acting, group reflecting, knowledge disseminating, sharing understanding and mutual adjustment. This theoretical framework is illustrated by the findings from three case studies. Analysis of 87 interviews revealed a unique function of group learning in IT implementation. It showed that group learning emerges immediately after a new IT is introduced to the targeted users and that it can take different standpoints (for or against adoption of the technology); it can also develop during the IT implementation and either progress or take a turn for the worse. The overall conclusion is that group learning is a 'hidden' mechanism that may speed up, slow down or even terminate an IT implementation project; and that therefore it is essential to appreciate its importance during IT projects and to steer it in a constructive direction.
European Journal of Information Systems (2006) **15,** 42–53.
doi:10.1057/palgrave.ejis.3000608

Keywords: IT implementation; case study; group learning; interpretive research; interviews; language-in-action; discourse analysis

Introduction

Implementation of information technologies (IT) is a very challenging topic that was first raised decades ago and has been discussed ever since. However, the practicalities are still confronted with the so-called 'go-live' problems such as user dissatisfaction with newly introduced systems, mismatches between a new technology and the existing work practices, underestimating the technological complexity for employees, and inefficient end-user support.

Many ideas have already been proposed. Work in the 1990s advanced IT studies by looking at the IT implementation process using the concept of interpretivism, that is by effectively using social construction ideas and by seeing implementation as an enacted, dynamic, changeable and situated process. These studies view people as *active* enablers of the technology implementation, and therefore, as individuals who may use the same technology differently, which can result in a range of implementation outcomes. These studies acknowledge the 'interpretive flexibility of technology', meaning that the technology evolves after the design phase

Received: 17 May 2005
Revised: 27 December 2005
Accepted: 3 January 2006

as it is traced by relevant social groups through the construction of different meanings (Orlikowski, 2000; Walsham, 2005).

Social constructivists see implementation as inscribing the interests of social groups into a technology and are primarily concerned with the dominant influence of the pre-existing social groups on technology development (Akrich, 1992; Bijker, 1992; Feenberg, 1992; Lea *et al*., 1995). This process will be based upon the users' experiences, knowledge, habits, norms, and institutional cultures. However, human actions are also seen as developing during the use of a technology (Yates and Orlikowski, 1992; Walsham, 1993, 2002; DeSanctis and Poole, 1994; Majchrzak *et al*., 2000; Heracleous and Barrett, 2001; Vaast and Walsham, 2005).

In general, the interpretive IT studies consider human actions to be the main force in IT implementation and in the interactions between human agents and technological structures or artefacts, or between actors in a global or local network. This study contributes further to the interpretive tradition in IT research by considering group-learning processes as mechanisms of implementation of information technologies. I see at least three arguments to support this view.

Firstly, almost all modern IT projects have networked, or collaborative, components, and human beings interact with one another while using IT, rather than only with the computer, even though they might well use computers to do so. These interactive actions develop within new or existing communities of users, here called groups of users. Group interactive actions reflect the reality that groups develop common understandings of the technology they are forced to (or want to) use.

Secondly, consider a situation in which employees have to work together since they have just been linked by a new software network – what is likely to happen? When employees have to perform tasks using a new technology, they will communicate, talk, discuss, praise, complain and share experiences. The new system will become a new topic in storytelling: recalling good or bad experiences with it, giving advice to each other, or telling anecdotes about mistakes. During this process, everyone in the group will develop a common understanding about working with the system.

Thirdly, employees are likely to seek a community consensus in developing their work with the technology together. In other words, an anticipated technological change will require interactions with all the networked users if their interdependence is based on the functionality of the IT. As a result, implementation may 'drift' (Ciborra, 1996) through these interactive processes away from its intended use. In other words, there can be a slight or even a significant change in the IT role and functions in real use, compared with the planned and predefined objectives. 'Drifting', notes Ciborra, 'should not be considered as a negative phenomenon *per se*: it can occur for both successful or failing applications' (Ciborra, 1996, p. 8).

What does this mean for this study? It means that groups of users are developing interpretive schemes about the technology they use through interactions among themselves, and these cumulative interpretive schemes will influence the actual use of technology by groups of users.

In this paper, I theorise a multifaceted, complex IT implementation by looking at it from the perspective of interaction processes, that is, it is conceptualised as group learning. The goals of this paper are twofold: to develop a theoretical perspective of viewing IT implementation as a group-learning process and to show empirical support for this view.

As opposed to a static, learning-as-outcome perspective, this paper focuses on the dynamic acting-interpreting learning that is 'deeply involved in human processes of communication, and which cannot be divorced from the context' (Walsham, 2005, p. 7).

I start with a definition: group learning in IT implementation is understood as all the *interaction*s through which group members develop their understanding of a newly introduced system, and which help them to adopt it. With this, I emphasise that the focus is on learning as action.

Conceptualising action-oriented group learning in IT implementation

Emerging studies that do attempt to address both organisational learning and information technology consider learning as an antidote to the organisational struggles with IT. The overview by Robey *et al*. (2000) of the literature on IT and organisational learning supports this idea; they state that 'the link between IT and learning has only begun to be explored' (p. 127).

There are at least two literature streams about learning in IT implementation. First, there is a significant body of work in the field of formal training in IT implementation. Such studies deal directly or indirectly with overcoming barriers to acquiring new knowledge in IT use (see an overview in Robey *et al*., 2000).

The second, and larger, literature stream involves research on experience-based organisational learning. The studies have shown that experience does play an important role in learning during IT implementation. There is strong evidence that an organisation's own experiences provide a knowledge base that guides future actions. Case-study literature reports several details about the role of experience in IT implementation: some studies provide evidence of the benefits of experience in achieving a successful implementation (Caron *et al*., 1994; Yetton and Johnston, 1994), while others illustrate the difficulties of learning from experience (Robey and Newman, 1996; Ang *et al*., 1997).

Thus, one may conclude from the retrospective interpretations by researchers that an organisation's experiences may affect subsequent implementation success (Robey *et al*., 2000). However, these studies do not account for instances where organisations fail to learn

from their own experience. Another limitation is that the authors do not discuss the 'competition' between the recent and earlier experiences. How can an organisation adapt an old experience to a new situation? Obviously, learning from experience is more complex than simply adjusting action based on it. So, although numerous interesting observations have been made, unfortunately there is a lack of a theoretical conceptualisation. What are the common key issues and processes in experience-based organisational learning? How can one transfer conclusions from an IT experience in one company to another, and is this necessary? Finally, when and where are the lessons applied and really learnt? These questions remain unanswered in the existing studies.

Summarising, I would stress that first, the existing research in this field is mainly focused on the 'lessons learnt' approach and presents case studies describing either triumphs or stories of war in IT projects. Second, the centre of attention in the research is the organisation level, rather than individual learning. I would argue that there is a need for a careful conceptualisation of experience-based learning as a mechanism in IT implementation at the individual and group levels.

Experiential learning

Kolb's learning theory (1984) is chosen as the starting point here since it is grounded in the concept that people have a natural capacity to learn, and experiences act as catalysts for engaging in this process (Kayes, 2002). This theory views learning as an action in which learning derives from experience and requires an individual to resolve opposing demands (Kolb, 1984, pp. 25–38).

According to Kolb (1984), learning involves the interplay between two interdependent dimensions of knowledge: acquisition and transformation. Knowledge acquisition requires the resolution of the tension between apprehension (concrete experience) and comprehension (abstract conceptualisation). Transformation also involves a tension: between intention (reflective observation) and extension (active experimentation). The learning cycle thus includes four steps: doing – reflecting – thinking – deciding. Since 1971, over 1500 studies, refereed articles, dissertations and papers have reflected the work of Kolb, and provided insights into a broad range of learning processes (Kayes, 2002).

Claimed limitations of Kolb's model are usually related to the centrality of the individual experience in learning (Holman *et al*., 1997; Vince, 1998; Reynolds, 1999; Kayes, 2002). If we understand learning as changing knowledge and behaviour through actions, then we should acknowledge the importance of social experience and context in learning (Barrett *et al*., 2004; Thompson and Walsham, 2004), and therefore also of interactions among individuals.

An adapted model of experiential learning

To further emphasise the role of *interactions*, the individual learning cycle discussed above is adapted to the group level. As a result, the 'doing-reflecting-thinking-deciding' cycle has become a collective one of 'collective actions – group reflecting – knowledge disseminating – sharing understanding – mutual adjustment' (Figure 1).

This five-step model starts with the actions that are part of individual behaviour. Individual users start to *act* with a given technology by operating with basic modules in performing everyday tasks, searching for new techniques in the system, or by replicating techniques they have learnt during training. This step resembles the one called 'starting with chaos' by Weick *et al*. (2005, p. 411), when individuals' everyday work situations are interrupted by a new technology. As a response to interruptions, users will start to *reflect* on their behaviours and that, as already noticed by Walsham (2005), will engage them in a whole range of sense-reading activities, regardless of the nature of operations with the technology. This stage shapes the basis of the individual interpretive schemes about the given technology (Orlikowski and Gash, 1994; Schipper, 2003).

The *knowledge-disseminating* step introduces the key difference between individual and group learning. It is understood as those behaviours of individual users that aim to communicate their interpretations about IT. Users might express doubts and suspicions, or trust and beliefs, concerning IT-related difficulties; or consider possible reasons for, and outcomes of, mistakes made while operating the system; or discuss errors in working with certain IT functionalities. These activities concern expressing the interpretations, labelling and categorising the experience (Weick *et al*., 2005). This communicating includes all informal occasions for talking, as well as arranged and prescribed encounters of meetings, briefings, focus groups discussions. In other words, 'a situation is talked into existence and the basis is laid for action to deal with' (Taylor and van Every, 2000, p. 58). Thus, the basis is laid for the next step, *sharing understanding*. This involves using insights to help people see their own situations better (Kim, 1993). It implies an informal mutual acceptance and respect of diverse ideas and suggestions. Nelson and Cooprider (1996) define 'sharing understanding' as the appreciation of knowledge among group members that affects their mutual

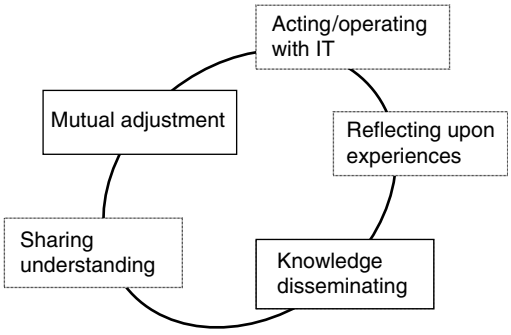

Figure 1 Experience-based group learning.

performance (p. 410). We support the idea to view 'sharing understanding' as opposite to summarizing identical standpoints (Barrett *et al*., 2004; Walsham, 2005) and as integrating various meanings about technology and the work with it. It is a sense-making activity engaging all users involved in interactions-through-languaging (Taylor and van Every, 2000, p. 35), resulting in labelling articulations about the work with the technology.

The final step in group learning is *mutual adjustment*, activities that aim to achieve agreements (explicit or implicit) on the use of the technology. In Kolb's model, this step ('deciding') is related to the extension of knowledge when learners move beyond themselves to interact with an external environment. In this stage, a group will engage in activities that lead to decisions being made together, to evaluate, reject, adopt or ignore tasks, strategies and new rules. Paraphrasing Weick *et al*. (2005), after answers to the question 'what's the story?', at this stage a group is confronted with the question 'now what'?, emerging from sense-making about technology.

I should like to stress that in sense-making, acting and interpreting are treated as cycles rather than as a linear process. The new learning cycle will build upon the existing group experience and understanding.

Research methodology

Having conceptualised IT implementation as group learning, I should justify the choice for interpretive research methods in this study. Firstly, an interpretive view corresponds fully with the theory of learning that I have applied to IT implementation. It represents the idea that learners – the users of the technology – do not accept 'the truth' about the IT as offered by the managers and project leaders, but actively construct their own views of it through their own experiences. Secondly, when talking about users' interpretations of a technology, this reflects the non-static and repeated developments in their communications towards understanding and using a system.

Three case studies were conducted in order to provide examples to support (or dispute) the theoretical discussion on the implementation of IT through group learning, and to clarify the contents of the group learning processes.

Three companies were selected from a potential shortlist: a hospital, an insurance company and a university. These are referred to as: Medinet, InsurOrg and AcademCentre (see Table 1).

Data collection

The research techniques included document analysis, interviews and participatory observations of IT project activities.

Eighty-seven interviews were conducted, each lasting from 45 min to 2 h, and totalling around 121 h. Ninety-eight employees were interviewed (see Table 2). Transcripts of all interviews were checked and corrected by the interviewees.

The interview techniques used in this study are worth special attention. In order to understand learning actions embedded in language, the interviews aimed to obtain both a consistency and a diversity in the responses. The interviewer played an active role rather than being a 'speaking questionnaire'. Questions were oriented towards encouraging diversity by active intervention, provocative statements, informal information exchange and encouraging disagreements. The interview questions were generally the same for all interviewees. During conversations with members of the project team, I asked about the project steering activities, its history, support provided to the end users, project lessons learnt, interconnection with other IT projects, and future plans. The end-users were asked about five group-learning activities: their experiences with the technology, their thoughts and reflections on their actions, the ways the users communicated with their colleagues about their thoughts and exchange of their experiences with the entire group, and finally the agreements and changes that were achieved as a result of the communications.

Another important method was participatory observation. The data gathering at Medinet took 10 months, at InsurOrg 8 months, and at AcademCentre 12 months. Such a prolonged engagement (Gardner, 1993) allowed me to gain an understanding of the on-going development of the IT projects through informal daily conversations with the employees. This built trust between the 'researcher' side and the 'subject' side. It helped with developing a common language and with understanding the culture of the companies and the sub-cultures of the various departments. Important information was obtained through participating in the meetings of the project teams, key-users, and training workshops.

Data analysis

The collected data were analysed by means of discourse analysis. Our primary concern was the social context of the use of technology and discourse that supported it. I distinguished four steps of interpretation (Van Dijk, 1997; Titscher *et al*., 2000; Phillips and Hardy, 2002).

The first step was to gain an overall impression and link it to the context that was picked up from the documents and observations. Knowledge of the context was crucial to understanding the implementation of technologies. The second step aimed at describing each of the five group-learning processes on the basis of the text units from the interview transcripts.

The third step was dedicated to the identification of the significance and linguistic presentation of every text unit. I aimed at revealing different semantic features such as vagueness of opinions, doubts, clarity, hidden meaning, but also the factual representation of the text units per component. The fourth step was about refining the conclusions.

Table 1 Organisational and IT backgrounds in case studies

Organisational context	*IT, its qualities and goals*	*Characteristics of end-user groups*	*Users' activities with the IT*	*Historical highlights in the IT project*
Medinet: A general hospital, created by the merger of three smaller local hospitals and two polyclinics. Now, one of the largest general hospitals in the Netherlands, with 1070 beds and around 3800 employees. Five medical divisions are distributed in three different locations. In total, there are 64 departments.	Beaufort: a work-flow, module-based system for personnel and salary administration. Three main goals: - increasing the efficiency of personnel administration by restructuring the HRM processes; - creating shared information files, leading to the use and exchange of personnel information among users; - combining all the various personnel information systems in Medinet.	The users were personnel managers in 64 departments; 19 of them participated in a pilot and in this research, of whom 78.9% were female. The average age was 36.2; and 65% of them were educated to high-school level. The users had never worked together before. Their main task was to advance HRM policy. The administration tasks were considered as secondary, and even as tedious, within the general field of personnel management. The software skills of the users varied; 16 of the 19 were familiar with working with IT.	Users worked with seven modules for administering documents, namely: Personnel Management, Salary Administration, Sick Leave Administration, Formation and Organisation, Time Registration, Office Link, and Report Generator. In every module users could publish, compose, structure and store personnel data, but in different ways. Each module required special numerical codification of inputs. Working with Beaufort was obligatory.	February 1998–May 2001: preparation, negotiation with an external consultancy firm, design, training, piloting, technical adaptation, etc. Some future users participated in the steering committee. June 2001: Beaufort (one of the modules) was introduced to 19 personnel managers. July–August 2001: internal evaluations and discussions; negotiations with the supplier. September 2001: a decision was taken to abandon the project.
InsurOrg: One of the largest insurance companies in the Netherlands, with 12,500 full-time employees. It unites about 30 formerly independent insurance organisations. Main strategy – to unify all the sub-companies but keep their business images. This led to a knowledge management strategy as one of the approaches to achieving unification of the sub-companies.	KennisNet, built on top of Lotus Notes, introduced as a knowledge management system. Three main goals: - providing technical support for gathering and disseminating professional information; - developing common knowledge, as compared to shared information; - supporting 'community building' through the development of common knowledge.	39 product managers in non-life section: 38% female; the average age was 36.2; 74% of the employees had been educated to university level. Users were distributed geographically across five locations. The group had 2-years experience of working together. Main tasks concerned the development and monitoring of the terms, policies, and changes in non-life insurance products. All users were highly skilled in using IT.	Users could work with the system at four different levels, ranging from passive through to active-creative: - reading, searching, getting information from the databank; - publishing or submitting new items; editing, commenting, discussing existing information; - discussing, asking, answering questions; - requesting information from colleagues. Working with KennisNet was voluntary.	April 2001: a first draft of the project plan was ready. May 2001: the project proposal was approved by the future users. June–August 2001: user discussions about the design of the system. October 2001: KennisNet was introduced to all members of the group. It took 1 week for the whole group to get familiar with the specifications of the system. November 2001 on: the employees chose not to use the system.
AcademCentre: One of the largest universities in the Netherlands, with more than 23,000 students, more than 7000 employees (academic personnel 53%, support and administrative personnel 47%), and a yearly turnover of €612 million.	SAP_HR, part of the SAP_HR/Employee Transaction Management packet. Provides the possibility to process personnel information and handle reports. In general, it can be seen as a workflow system. Two main goals: - replacing outdated technology; - matching already working SAP Financial Module.	50 personnel and salary administrators from various units: 65% female; the average age was 35.7; 72.4% were educated to high-school level. Users had never worked as a group before. Main tasks concerned processing changes in the personnel files of the AcademCentre employees. About 40 tasks were performed through	Working with the system involved three types of operations: - reading data; - making new inputs and modifying existing records; - generating and composing HR information reports. All the information fields had specific and strict numeric codes.	December 2000–September 2001: preparation, negotiations with an external consultancy firm, design, identification of requirements. October 2001: pilots in four units. November 2001: user training. January 2002: SAP_HR was introduced in 12 faculties and in all the support and administrative

Table 1 Continued

Organisational context	*IT, its qualities and goals*	*Characteristics of end-user groups*	*Users' activities with the IT*	*Historical highlights in the IT project*
There are 14 faculties and 15 support units.		SAP_HR such as new appointments (sub-tasks to appointment of a new employee or an external worker, declarant, stagiare, and those with nil-contracts); modification of basic information, payment information, working time registration and other data. Software skills were not high but adequate to run SAP_HR.	Working with SAP_HR was obligatory and rigid.	services in the AcademCentre. January–November 2002: serious difficulties experienced by the users in working with SAP_HR.

Findings from the case studies

Acting and reflecting

The interview analysis has shown that in Medinet the employees were actively making inputs on average 2–4 times a week, and not more than 40–60 min a day. All the inputs were similar and involved only basic modules of Beaufort. Respondents emphasised that while trying to work with the given technology [*acting*], they discovered that they disliked it ['*sense-reading*']. The users expressed the opinion that the technology was too difficult to use. One interviewee commented:

> *I remember, since I saw the screen of Beaufort and started to click buttons for the first time, I felt I would never be able to understand that… it was very difficult in the beginning…And it was very different from the technology we had before* (Secretary).

In InsurOrg, users acknowledged that the use of KennisNet was too low. They expressed that they were only busy with searching for information and not publishing it. Requesting information, editing documents, commenting, answering questions, submitting new items – all became rather exceptional actions. And again, as at Medinet, I observed a tight link between experimenting with the technology and reflecting on it. A typical expression I heard concerning acting with KennisNet was:

> *At the beginning I made some attempts to search for car insurance classification. For me, KennisNet was not completely logical. You have items in accordance with a product classification accepted in the organisation. But the system was confusing – I didn't know where to search for information* (Product manager).

In AcademCentre, respondents commented that when the users began to work with SAP_HR, they strived to handle the basic tasks such as inputting personnel data, sick leave administration, or time registration. The use of SAP_HR was obligatory, but the intensity differed from unit to unit. For example, based upon the interviewees' estimations, the Salary Department processed about 250 transactions per week, the HRM-1 unit about 250 transactions per month, whereas the users from HRM-2 worked no more than two hours per week with SAP_HR. The users expressed that during the first 6 months, they felt that they did not really understand how to operate SAP_HR. All interviewees from AcademCentre commented that they lacked an understanding of the SAP_HR logic. For example, a salary administrator said:

> *It was terrible that I had to correct inputs, but I did not have enough knowledge about the system and how to work with it. I remember I did not even have an image of a good input, and how a correct input should look. It was very confusing for me because one month an input 'A' was good and accepted by the SAP_HR, but the next month the same input 'A' was certified as bad and rejected by the same SAP_HR. It was not clear what was behind the screen* (Salary administrator).

Table 2 Type and number of interviews conducted

Job position	*Number of interviews*	*Main responsibilities of interviewees*
Policymakers	11	Strategic policymaking in organisations, selecting information systems.
Members of IT project teams	10	Steering the IT implementation, providing support for end-users, performing help-desk duties, maintaining functional and technical administration of the system, and sometimes analysing ongoing use of the system.
End-users	67	Working with the newly introduced technologies on a daily basis.
Technical personnel	10	Technical administration of the systems.
Total	98	

The observations suggest that after the users started operating with given technologies (whether it was obligatory or optional), they immediately reflected on it, looked implicitly inwards and scanned the sense of the technology and operations with it, assessing to which extent it supported the performance of tasks, thinking about previously acquired knowledge, absorbing, judging their own IT experience. Three types of reflecting behaviours were the most colourful ones: analysing difficulties in using the technology, acknowledging individual problems with use of the system, and comparing theirs with other software experiences.

Knowledge disseminating, or 'talking into existence'

According to the interviews, employees at Medinet did not discuss many problems during the ongoing use. They explained that there was no need to express ideas:

> *Once before Beaufort was introduced we exchanged our 'scary' expectations – many of my colleagues were afraid of it, they did not know how to encode all the information about salary payments, but after that we did not talk about it* (Personnel administrator).

The. observations showed that among the KennisNet users, most active knowledge disseminating took place during the first three to four weeks immediately following the introduction of the technology. The users discovered technical mistakes in some applications. They wrote about this to the project leader, and they discussed the usage of KennisNet in groups of two or three close colleagues. Discussions concerned the fact that the system appeared to have a different meaning to what they had expected. They talked with each other about the system and discussed the items in it (what could be added or removed). One interviewee recalled:

> *Among my closest colleagues we used to talk about KennisNet. But now we are at such a stage that we don't even want to talk about it. I think, it's useless now even to spend time for such discussions* (Product manager).

My participation in the discussions about KennisNet use among the group of the users revealed the variety of ideas proposed by the users in order to improve KennisNet. In total, I calculated 28 creative suggestions from the employees, like: publication of regular overviews of the group activities; improvement in the search for technical possibilities; publication of daily insurance news; signals about new items in the system (symbols, sounds); better classification of news items; notification of the latest questions from colleagues; attachment of the handbooks from all the sub-companies; regulations to stimulate the answering of questions.

The interviewees from AcademCentre expressed the view that initially there was no fruitful communication across the entire group of users. There were opinions that no-one wanted to admit mistakes on their own side and always blamed others, for example:

> *We try to solve many difficulties by phone with the Salary Department, but it is not always easy; our collaboration with the Salary Department could be better. Sometimes they blame us for their mistakes, sometimes the another way around. It irritates a lot, especially when you think you did your job correctly* (Personnel manager).

I noted that discussions in AcademCentre mainly took place within the units but not across the whole group of the users. Gradually, after some months of working with SAP_HR, users from different units became more open in the discussions. They expressed enthusiasm for communicating across the entire group at the later phase of SAP_HR use:

> *Also, we communicate with other HRM units to ask questions or share the same difficulties. Thus, people from the Service Centre helped us a lot at the beginning. We also liked to discuss SAP with HRM from Social Sciences faculty* (Personnel administrator).

During the interviews many respondents acknowledged the importance of knowledge disseminating:

> *I like communicating with other users. During the meetings we raise a range of questions and exchange our ideas. It is very helpful. Actually, I am not an advanced user, but I like to attend those meetings to gather all the news and to communicate with others. There I always meet the Salary Administration people and talk with them. I also visit them after each meeting – to chat face-to-face. After that, I always feel more confident to operate with SAP_HR* (Personnel administrator).

Summarising, my observations regarding the knowledge-disseminating processes support the dominance of such users' behaviours like proposing new actions in order to improve the usage of the technology and clarifying difficulties with each other. The employees at Medinet did not feel the need to talk about Beaufort,

while employees at InsurOrg and AcademCentre actively spoke out about different issues regarding KennisNet and SAP_HR use.

Sharing understanding, or 'sense-making'

After the situations were 'talked into existence' and users expressed their opinions about the technologies, the basis was laid for integrated shared understanding.

During interviews, employees at Medinet even felt awkward talking about the goals or intentions of Beaufort:

> *We use it because we have to do it, but I don't think it has any benefits for us. The managers told us that we would just have to press one button before we go home and the computer would do the rest overnight… I would like to emphasise that we think that the system is not that bad, but you must be clear for whom it is essential, and for whom not. In my situation, I don't see any need to computerise my tasks* (Secretary).

I discovered that the users had identical negative opinions. They understood how to operate with the modules of Beaufort but found them unreasonably complicated. They found that the system was not protected against incorrect inputs and that this could lead to crucial mistakes in the salary and personnel administration. They did not see strong reasons to make much effort to adopt it.

Among KennisNet users, everybody could talk about the goals of the technology, but differently. The majority of them talked about technical support for information. In addition, I heard of development of group competence and team building given as objectives of KennisNet. Respondents expressed their opinions that KennisNet did not meet their initial expectations. However, they found some applications very attractive for group work. For example, the idea of storing information was perceived as useful. And the users of KennisNet sounded optimistic about possibilities to improve the use of KennisNet:

> *I have a good feeling regarding the future of such systems, but some decisions must be taken first… I believe that based on our proposals there are many ways to improve the work with KennisNet* (Product manager).

The employees in AcademCentre all talked about the official goal of SAP_HR as replacing an antiquated technology, but none of them could express his/her own needs for a new technology. They were all very negative when they talked about SAP_HR during interviews. Criticisms concerned both technical and contextual aspects of SAP_HR. I have summarised the following points of criticism that arose during the interviews: making mistakes was 'blind' so users could not understand why an input was wrong, some mistakes were too difficult to solve, classification of the employees in the system was too complex, making historical overviews was impossible, some issues typical of a university environment were not incorporated in SAP_HR (conference leave, sabbatical leave).

In conclusion, I note that for this process it was essential to integrate understanding of the goals of the technology and needs in it, about its usefulness and ways to work with it, and attitudes regarding the future state of the technology in the organisation. I observed that the employees in two companies – InsurOrg and AcademCentre – accumulated a great variety of different opinions about their work with the technology and that their sense-making about the technology they used developed over time as an appreciation of diverse ideas and suggestions. The employees of Medinet were less open to considering diverse opinions and looked mostly for similar meanings about Beaufort. Their sense-making resembled information sharing more than articulating different labels.

Mutual adjustment, or 'now what?'

In the three companies, I observed different activities undertaken by the users as a result of their discussions together in order to change the work with the technology.

Being disappointing with the Beaufort experience, the users at Medinet organised evaluation sessions for themselves, without involving the project team. In two departments they took the initiative of writing a letter to the project team addressing all their difficulties and problems regarding the use of Beaufort. All their activities were oriented towards blocking the implementation of Beaufort.

The employees at InsurOrg developed different rules concerning the use of KennisNet. They divided the task of analysing their competitors' businesses among the sub-companies and agreed that all such news should be published in the system. They initiated such regulations as obligatory commenting on others' reports in KennisNet and attaching descriptions of methods of composing reports.

At AcademCentre, arranging activities to improve the use of the system became observable after several months of experience. In the beginning, activities – if any – were initiated by the project team and not by the users. I discovered a diversity of regulations developed by the users in different units: control over transactions was organised in different ways; each unit had its own time schedule within the faculty for making changes in personnel files; and they agreed a schedule with the Salary Department for providing them with the data that would guarantee salary payments; in January/February 2003 (a year after the system's introduction) the Salary Department introduced 'report forms' for those HRM who had questions in order to initiate discussions instead of automatically correcting the mistakes themselves.

I observed that the mutual-adjustment processes were related to such characteristics of groups as knowing each other, trust, and experience in working together. These characteristics take time and effort to establish in new groups of users. The group of SAP_HR users in

AcademCentre established these processes after 6–8 months of working together with the system.

Discussion

I began the theoretical discussion from the understanding of IT implementation as a user-centred process in which the employees together develop their interpretive schemes about a newly introduced technology. 'Developing interpretive schemes together' became crucial in the research as I focused on the group learning processes during the use of an information technology.

In this study, I base the concept of group learning on the model of experiential learning by Kolb (1984), where learning is considered as: (1) a process rather than only outcomes; (2) a problem-solving process that is always practice-oriented; and (3) a mechanism for everyday activities, occurring both consciously and unconsciously. The transformation of the individual learning circle to a group-learning circle led to a shift from the wheel of 'doing – reflecting – thinking – deciding' (Kolb, 1984) to a collective one comprising 'collective acting – group reflecting – knowledge disseminating – sharing understanding – mutual adjustment'. It is argued that group learning is more than simply the multiplication of individual learning processes: the character of group processes becomes more complex as they acquire a social context. Following the experiential learning tradition, I consider group learning to be the interplay between knowledge acquisition and knowledge transformation. Knowledge acquisition involves the tension between group 'doing' (apprehension) and group 'thinking' (comprehension) processes. Knowledge transformation is characterised as a dialectical movement between group 'reflecting' and group 'deciding'.

In the proposed perspective, I stress four issues: (a) learning is a process-based activity, (b) it rests on the interaction processes between members of a group, (c) these processes begin when a new system is introduced, and (d) these processes lead to changes in knowledge about the system and in users' behaviour (ways of operating the system).

Group learning processes specified

Observations from the case studies reveal that each of the group-learning processes in IT implementations can be specified further:

- Acting as the task-related operation with the system undertaken by members of a group. After a technology is introduced to employees, they begin to use it in order to fulfil the tasks: (a) they operate with the essential, and possibly the optional, functionalities; and (b) they search for new possibilities.
- Reflecting as communicating upon the extent to which the system supports the performance of tasks. Reflecting behaviours included: (a) discussing errors, (b) declaring individual difficulties in operating with the IT, (c) asking questions, and (d) comparing with other software experiences.
- Knowledge-disseminating as behaviours by group members that aim at the externalisation of ideas about the system in order to improve its usage. These behaviours involved (a) demonstrations of how to operate the different modules, (b) proposing new actions with IT in order to improve its usage, and (c) clarifying difficulties.
- Sharing-understanding as creating an integrated meaning of the system regarding its role and its usefulness. This includes making sense about (a) attitudes towards the usefulness of the system, (b) its intention for a company and for a user, and (c) understanding how to work with it.
- Mutual adjustment as activities that aim at collective agreements on the use of the system in a group. This step links discussions and shared understanding with action: (a) concrete rules on how to work with the system, (b) suggestions for further improvements, and (c) plans to arrange activities to improve the use of the system.

Some additional notes should be made here. First, two group-learning processes – acting and reflecting – concern individual behaviours. Observations have shown that they occur immediately after a technology is introduced to the targeted employees. Once users are 'thrown to chaos' (Weick *et al.*, 2005), they have to or want to experience it, and their next implicit step will be to judge it. The other two processes – knowledge disseminating and sharing understanding – bridge individual and group learning. These two steps concern 'talking a situation into existence' (Taylor and van Every, 2000) and articulating and integrating labels.

I observed that expressing concerns verbally developed more deeply where groups of users established such characteristics as trust, knowing each other, and openness in risk-taking conversations (known as psychological safety, Edmondson, 1999). These characteristics were seen to develop during an IT project. The largest improvement I witnessed in these group features took place among the users of SAP_HR. At the beginning, they hardly knew each other; but after a couple of months they felt safe enough to speak up.

Also, I observed that if a group of users established rich knowledge-disseminating; there was greater appreciation, acceptance and respect for a variety of expressed opinions. In other words, there were preconditions for sharing understanding as accumulating and integration of different attitudes, views and beliefs about IT.

Observations have shown that the group learning processes do not follow a linear sequence, but develop as cycles. Within a group, talks occur both before and after actions, so it was difficult to distinguish a 'point of departure' for the experiential group-learning cycle.

Group learning has the potential to speed up or slow down the IT implementation

I observed how group learning became a 'hidden' mechanism for speeding up or slowing implementation, or even for the termination of an IT project (as in the Medinet case study). As Weick *et al*. (2005) remarked, it is a micro-mechanism that can bring macro-changes.

If a group of users appreciated the technological help provided for their tasks, shared positive attitudes, helped each other and attributed growth in performance to the system, then people learnt the relevant issues concerning a technology. In so doing, the system was discovered, 'studied' and better understood; and through this the technology became more relevant for the job tasks and easier to work with. This led to a better and quicker acceptance by the users.

The opposite scenario was observed when the users only complained about the system, perceived it negatively, and convinced each other of its uselessness. Even small details that would be ignored in other situations received group attention. In such a scenario, employees learnt of issues that reinforced earlier ones. Their views became increasingly negative about the relevance of the system for their tasks, and they saw the technology as too complex to operate. Thus, the technology became 'even less relevant' for the job in the opinion of the users, and they learnt of issues that discouraged them from accepting the system.

I saw the following signs of positive developments in group learning:

- growing intensity of working with the basic services offered by the system;
- increasing activities involving searching for new possibilities with the system;
- an increasing number of proposals for improvements to the system and its implementation (such proposals could be classified into three types: technical properties of the system, organisation of information to be input, and group regulations concerning use of the system);
- improving conceptual understanding of the technology (especially understanding the why and the wherefore of the technology, and not only the how);
- discovering, recognising and acknowledging individual user needs in the technology.

Implications for management

My research suggests that IT project leaders should accept that IT implementation involves complex interactions between all the employees engaged in the adoption of the technology. Therefore, the first step for managers is to switch from seeing IT implementation as a predictable 'one click' process to trying to understand its contradictory and interactive nature. There is also a need to acknowledge that the action-based group-learning processes among the users can either speed up or kill the implementation, as was shown in the case studies.

An acceptance of this is the first precondition for supporting and keeping group-learning processes moving in the right direction. The second involves controlling and/or building conditions that encourage group learning.

The findings also suggest that the main thrust of managerial support for the implementation of information technologies should be in promoting group interaction processes in the 'right' direction. Several good practices were observed in the three case studies that did stimulate constructive group learning:

- Having a help-desk or front/back office service facility on system functionality available for the users at any time,
- Creating and distributing a list of experts on the system's functionality within the group (usually these will be the advanced users among the targeted employees whose experience can be very helpful to others),
- Introducing an e-mail address list that includes all the users (or setting up a hot-line chatroom),
- Scheduling time for informal meetings (such as coffee breaks) for the group of users,
- Agreeing how to get new employees involved in using the system (what to explain to them, who is responsible, etc.),
- Distributing special notebooks for ideas, proposals and complaints among the users,
- Collecting any proposals that come from the users and reacting to them (negotiating),
- Organising regular evaluation sessions with the users to discuss progress in the project.

This list is not exhaustive, but includes those practices I saw during my research.

Those responsible for IT implementation, in my view, have two options in terms of building user groups in advance of implementation. The first is that they can simply ignore team-building activities on the ground that it will take too much effort to convince future users of the need to become a team before they can sense it for themselves. However, they will then have to stimulate group discussions and other team-building activities once the system is active. The alternative is to begin building non-structural mechanisms such as trust, knowing and understanding each other during the preparation stages of IT projects, that is, before the system is introduced to the users. Although this last scenario was not observed in practice, I do believe that establishing strong non-structural devices within a future group of the users could enhance the group-reflecting processes when the technology becomes live.

If I were to suggest an appropriate management style for those responsible, I would recommend that managers remain constantly alert during the implementation process, and keep an eye on the group-learning processes to ensure that these develop in the right direction, and that users discuss how to improve the system usage rather than how to terminate it. If group learning develops

impulsively, the adoption of IT may result in complications and high risks for the project as a whole. A failure to steer group learning will increase the threat to implementation if this leads to an organisation reaching a critical moment when a decision has to be taken as to what should be done in order to keep the implementation on track.

Conclusions

The starting point of this research was the belief that the interactions among people in groups of users called group learning influence the success or otherwise of IT implementation. This paper has presented a perspective for looking at IT implementation through developments in acting, reflecting, knowledge-disseminating, sharing-understanding, and mutual-adjustment processes. It is not this paper's claim, however, that all problems in IT projects can be resolved through group learning, but rather that group interactions are a 'hidden' mechanism that can speed up or slow down IT implementation – or even terminate an IT project.

Having recognised the importance of group learning in IT implementation, it is argued that those who are responsible for IT projects should accept and stress its role. If managers attempt to advance group learning, then it might become a catalyst for the success of a project. If not, group learning might lead to an impulsive and unpredictable development that could harm the project.

However, to stop at this point overlooks an important aspect of organisational life. The employees studied (the users of the technologies) went to work and did what they had to do to get their usual tasks done. Further research could greatly contribute to the understanding of the origins and differences in group learning by taking into account differences in work environments. I believe that insights could be gained by exploring IT implementation in various types of work and work environments (such as process-based, product-based, logistics-based, and administrative work). Determining whether there is a link between the type of work environment or the type of organisation and group learning in IT implementation would add to the current findings.

About the author

Tanya Bondarouk is an Assistant Professor of Human Resource Management at the University of Twente, The Netherlands. She holds her Ph.D.'s in the fields of Didactics and Business Administration. Her main teaching and research interests are in the area of social aspects of implementation of information technologies and human resource management, with a special reference to the interpretive research methods. More recently, she is involved in the research into e-HRM, conducting research projects in different private and public sector organizations.

References

AKRICH M (1992) The de-scription of technical objects. In *Shaping Technology/Building society: STUDIES in Sociotechnical Change* (BIJKER WA and LAW J, Eds), pp 205–224, MIT Press, Cambridge, MA.

ANG K-T, THONG JYL and YAP C-S (1997) IT implementation through the lens of organizational learning: a case study of INSUROR. In *Proceedings of the 18th International Conference on Information Systems (ICIS'97)* (KUMAR K and DEGROSS JI, Eds), pp 331–348, Atlanta, Georgia, December 15–17.

BARRETT M, CAPPLEMAN S, SHOIB G and WALSHAM G (2004) Learning in knowledge communities: managing technology and context. *European Management Journal* **22(1),** 1–11.

BIJKER WA (1992) The social construction of fluorescent lighting, or how an artifact was invented in its diffusion stage. In *Shaping Technology/Building Society: STUDIES in Sociotechnical Change* (BIJKER WE and LAW J, Eds), pp 75–104, MIT Press, Cambridge, MA.

CARON RJ, JARVENPAA SL and STODDARD DB (1994) Business reengineering at CIGNA Corporation: experiences and lessons learnt from the first five years. *MIS Quarterly* **18(3),** 233–250.

CIBORRA CU (1996) Introduction. In *Groupware & Teamwork: Invisible Aid or Technical Hindrance?* (CIBORRA CU, Eds), Wiley, Chichester, UK.

DESANCTIS G and POOLE M (1994) Capturing the complexity in advanced technology use: adaptive structuration theory. *Organisation Science* **5(2),** 121–147.

EDMONDSON A (1999) Psychological safety and learning behaviour in work teams. *Administrative Science Quarterly* **44(2),** 350–383.

FEENBERG A (1992) From information to communication: the French experience with Videotex. In *Contexts of Computer-Mediated Communication* (LEA M, Eds), Harvester-Wheatsheaf, London, UK.

GARDNER M (1993) The great Samoan hoax. *Sceptical Inquire* **17,** 131–135.

HERACLEOUS L and BARRETT M (2001) Organisational change as discourse: Communicative actions and deep structures in the context of information technology implementation. *Academy of Management Journal* **44,** 755–778.

HOLMAN D, PAVLICA K and THORPE R (1997) Rethinking Kolb's theory of experiential learning: the contribution of social constructivism and activity theory. *Management Learning* **28,** 135–148.

KAYES DC (2002) Experiential learning and its critics: preserving the role of experience in management learning and education. *Academy of Management, Learning & Education* **1(2),** 137–150.

KIM DH (1993) The link between individual and organizational learning. *Sloan Management Review* **35(1),** 37–50.

KOLB DA (1984) *Experiential learning. Experience as the source of learning and development*. Prentice-Hall, Englewood Cliffs, NJ.

LEA M, O'SHEA T and FUNG P (1995) Constructing the networked organization: content and context in the development of electronic communications. *Organisation Science* **6(4),** 462–478.

MAJCHRZAK A, RICE RE, MALHORTA A, KING N and BA S (2000) Technology adaptation: the case of a computer-supported inter-organisational virtual team. *MIS Quarterly* **24,** 569–600.

NELSON KM and COOPRIDER JC (1996) The contribution of shared knowledge to IS group performance. *MIS Quarterly* **20(4),** 409–429.

ORLIKOWSKI W and GASH C (1994) Technological frames: making sense of information technology in organisations. *ACM Transactions on Information Systems* **12(2),** 174–207.

ORLIKOWSKI WJ (2000) Using technology and constituting structures: a practice lens for studying technology in organisations. *Organization Science* **11(4),** 404–428.

PHILLIPS N and HARDY C (2002) Discourse analysis. Investigating processes of social construction. *Quality Research Methods*, Series 50, Sage Publications, London.

REYNOLDS M (1999) Critical reflection and management education: rehabilitating less hierarchical approaches. *Journal of Management Education* **23,** 537–553.

ROBEY D, BOUDREAU M-C and ROSE GM (2000) Information technology and organisational learning: a review and assessment of research. *Accounting Management and Information Technologies* **10,** 125–155.

ROBEY D and NEWMAN M (1996) Sequential patterns in information systems development: an application of a social process model. *ACM Transactions on Information Systems* **14(1),** 30–63.

SCHIPPER M (2003) Reflexivity in teams. PhD thesis, Ridderprint offsetdrukkerij b.v., Amsterdam.

TAYLOR J and VAN EVERY J (2000) *The Emergent Organization: Communication as its Site and Surface*. Erlbaum, Mahwah, NJ.

THOMPSON MPA and WALSHAM G (2004) Placing knowledge management in context. *Journal of Management Studies* **41(5),** 724–747.

TITSCHER S, MEYER M, WODAK R and VETTER E (2000) *Methods of Text and Discourse Analysis*. Sage Publications, London.

VAAST E and WALSHAM G (2005) Representations and actions: the transformation of work practices with IT use. *Information and Organization* **15,** 65–89.

VINCE R (1998) Behind and beyond Kolb's learning cycle. *Journal of Management Education* **22,** 304–319.

VAN DIJK TA (1997) *Discourse as Structure and Process*, Volume 1 and 2. Sage, London.

WALSHAM G (1993) *Interpreting Information Systems*. John Wiley, Chichester.

WALSHAM G (2002) Cross-cultural software production and use: a structurational analysis. *MIS Quarterly* **26(4),** 359–380.

WALSHAM G (2005) Knowledge management systems: representation and communication in context. *Systems, Signs & Actions* **1(1),** 6–18.

WEICK K, SUTCLIFFE KM and OBSTFELD D (2005) Organizing and process of sensemaking. *Organization Science* **16(4),** 409–421.

YATES J and ORLIKOWSKI W (1992) Genres of organisational communication: a structurational approach to studying communication and media. *Academy of Management Review* **17(2),** 299–326.

YETTON PW and JOHNSTON KD (1994) Computer-aided architects: a case study of IT and strategic change. *Sloan Management Review* **35(4),** 57–67.