Action Research: Lessons Learned From a Multi-Iteration Study of Computer-Mediated Communication in Groups

Abstract*—*Action research has been presented as a promising approach for academic inquiry because of its focus on real world problems and its ability to provide researchers with a rich body of field data for knowledge building. Published examples of action research, however, are hard to find in business communication literature. What are the reasons for this? In this paper, I try to provide a basis for answering this question as well as helping other business communication researchers—particularly those interested in computer-mediated communication issues—to decide whether and when to employ action research. I offer a first-person, confessional tale-like account of an action research study of computer-mediated communication in groups. In order to focus on the lessons learned, my focus in this paper is on the process of conducting action research and not on empirical results. Some of the situations and related lessons discussed here are somewhat surprising and illustrate the complex nature of action research. The doctoral research, conducted over four years in Brazil and New Zealand, highlights the challenges associated with action research's dual goal of serving practitioners and the research community.

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Index Terms*—*Action research (AR), business process improvement, computer-mediated communications, email, grounded theory, information systems.

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Notwithstanding some controversy about its origins, action research (AR) seems to have been independently pioneered in the U.S. and Great Britain in the early 1940s. Kurt Lewin is generally regarded as one of its pioneers [1], [2] through his work on group dynamics in the US. Lewin was a German-born social psychologist with a strong experimental orientation. He migrated to the U.S. in 1933, after having served in the German army during World War I. Lewin initially settled at the State University of Iowa's Child Welfare Research Station (from 1935 until about 1945), later moving to the Massachusetts Institute of Technology where he founded and directed, until his death in 1947, the Research Center for Group Dynamics. Lewin is widely known for his contributions to the understanding of complex societal issues, such as gang behavior and discrimination against minorities, as well as for his application of GESTALT psychology to the understanding of group dynamics [3], [4]. He is also believed to have been the first person to use the term "action research" [5]. Lewin [6] defined ACTION RESEARCH as a specific research approach in which the researcher generates new knowledge about a social system, while at the same time attempting to change it in a quasi-experimental fashion and

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with the goal of improving the social system. Lewin's approach to AR later became known as "classic" AR [7] and is, in a general sense, the approach on which my own AR practice is more deeply rooted.

A distinctive thrust of AR also developed after World War II in Great Britain at the Tavistock Institute of Human Relations in London. There, AR was used as an innovative method to deal with sociological and psychological disorders arising from prison camps and war battlefields [8]–[10]. While having an impact on individuals, society, and organizations that was comparable to Lewin's, the researchers from the Tavistock school of AR were less concerned with conducting AR in a quasi-experimental manner than with the solution of societal and organizational problems through change-oriented research. This school of AR has primarily addressed intra-organizational and worklife problems. One of the major topics, for example, is the issue of job satisfaction and its dependence upon several aspects of work situations [8], [9], [11]. The Tavistock school of AR has been very influential within the social and organizational research communities, and has led to several other forms of AR inquiry that can be seen as variants of that school, such as participatory and critical AR (see, e.g., [7] and [12]).

The use of AR as an approach for business inquiry with a focus on technology issues has been important to the field of information systems [12]–[21]. However, surveys of research approaches spanning more than two decades suggest that the number of published examples of AR has always been very small in comparison with case, experimental, and survey research [12], [22], [23]. Is this because AR is still new to business research, or, rather, because there are inherent and unique challenges in conducting AR? My experience suggests that AR presents inherent and unique challenges to researchers, which I try to make explicit by offering a candid discussion of my doctoral AR on the effects of computer mediation on business process improvement groups in three organizations. The results of that study have been published in [24] and [25]. In this paper, I present a set of lessons learned in the format of a "confessional tale" [26]–[28]. Although this paper does not aim to be an exemplar of that reporting method. Usually, CONFESSIONAL TALES are written in the first person and reveal enough information about the researcher and the research study so readers can understand the subtleties of the social context in which the research was conducted. Confessional tales are also characterized by a level of candor not usually found in other forms of the research reporting methods. These characteristics of confessional tales are incorporated into this paper.

The main goal of this paper is to describe the subtleties associated with conducting AR for business communication inquiry as well as some unexpected experience-based conclusions, summarized as lessons learned. Given the many forms of AR that emerged from the two original schools of AR pioneered by Lewin and the Tavistock group [7], [17], it would be inappropriate to present the lessons learned discussed here as being applicable to all forms of AR. In fact, I believe that there is no such a thing as a "typical" AR study; each has its particular problems and peculiarities. Rather, my main expectation is that my story will illustrate the possible difficulties of AR and potential solutions. In particular, I believe that this paper will be especially useful to students using AR in their doctoral research investigation. I hope that the lessons learned will capture the essence of the narrative and serve as points of reference, rather than universal rules for conducting AR.

Two main themes underlie the narrative presented here. The first theme is the personal appeal of AR, an exciting research approach that places the researcher in the middle of the action. As such, AR also allows the researcher access to "rich" context-specific data that would be difficult to collect through other, more traditional, research approaches. The second theme is the researcher's struggle to reliably generate valid findings from the analysis of a sea of data, which is often unstructured and laden with emotional attachments.

GENESIS OF THE RESEARCH PROJECT

Most research projects begin with the identification of a research topic that appeals to both the researcher and, ideally, the larger research community, often by means of a survey of published research and the gaps therein [29], [30]. In my case, my work as a consultant involved helping companies set up quality management systems with the goal of obtaining ISO9000 certification [31]–[33]. I found this topic very interesting, and after exchanging several emails throughout 1992 with my future advisor, whom I got to know almost by chance on the internet, I finally resigned from my job in Brazil and formally enrolled in 1993 in the doctoral program in information systems of the School of Management Studies at the University of Waikato, New Zealand.

While inspecting the literature, I noticed that most of the empirical computer-mediated communication research published in refereed journals focused on group decision support systems and was experimental in nature [34]–[37]. Group decision support systems have been designed and traditionally used to improve the efficiency of face-to-face business decision meetings through system features that automate the process of anonymously contributing,

ranking, and voting on ideas. Past research suggests that those systems, if properly used, usually lead to business meeting productivity gains [38], [39]. My previous work experience largely centered on facilitating these business process improvement (BPI) groups in Brazilian companies and helping them use information systems to implement new business processes. A BUSINESS PROCESS is a set of interrelated activities, usually jointly carried out by people with different types of expertise. Examples of business processes are filling an order for a batch of exhaust pipes or preparing a budget for the construction of a three-story building. The people involved in carrying out a process are often referred to as members of a PROCESS TEAM [40].

My work as a consultant had fueled my interest in a specific problem facing the organizations I had worked with. Most BPI groups I had facilitated involved people from different departments who discussed and tried to solve problems related to a business process whose component activities they had to routinely perform as part of their job. The problem was that participation in BPI groups was very disruptive for group members, particularly if group discussions had to be conducted entirely face-to-face. While some of the attempts to conduct computer-mediated BPI groups using email conferencing systems in which I had been involved had been relatively successful, others failed miserably. More importantly, it was not clear what made some of those computer-mediated BPI groups succeed and others fail.

One of the difficulties I noted was that group decision support systems traditionally require "synchronous" interaction, that is, users must interact at the "same time," and usually also in the same room. Thus, these systems could not entirely solve the problem that participation in BPI groups could still be disruptive for group members. One of the main obstacles to setting up BPI groups is that people in different departments have different work schedules and are often reluctant to work around those schedules to take part in face-to-face BPI group discussions.

Also, a few influential theories of computer-mediated communication suggested outcomes of the use of asynchronous computer mediation in BPI groups that were obviously contradictory. Among the most influential theories were social presence theory and media richness theory [41], [42]. Those theories essentially argued that for group tasks as complex (or "equivocal" in media richness theory terminology) as BPI, asynchronous computer mediation would lead to less desirable outcomes than those achieved by BPI groups interacting face-to-face. On the other hand, the social influence model argued that social influences could strongly shape individual behavior toward technology, independent of technology traits [43], [44]. My interpretation of the social influence model in the context of BPI suggested that certain social influences (e.g., perceived group mandate, peer expectations of individual behavior) could lead BPI members to adapt their use of technology in ways that were inconsistent with predictions based on the social presence and media richness theories.

So, it seemed to my advisor and me that I had been able to identify a gap in the empirical research literature and a theoretical dilemma that were both worth investigating and would hopefully get me a doctoral degree. I concluded that the topic of my research should be the effects of asynchronous groupware support on business process improvement groups. What I needed next was a good plan for my research project.

PLANNING THE RESEARCH: ITERATIONS OF THE AR CYCLE

My research plan was guided by two main project specifications. One of them was that the research should answer a broad question: What are the effects of asynchronous groupware support on business process improvement groups? Given that I spoke Portuguese and had access to Brazilian organizations, the other specification was that data collection should take place partly in Brazil and partly in New Zealand. In this way, I hoped to identify and isolate the influence of cultural idiosyncrasies on the research findings and increase the external validity of the research [45]–[47].

My review of research approaches and methodologies suggested that three main research approaches had been successfully used in business research addressing technology issues: experimental, survey, and case research [23], [48], [49]. At about the same time, I got hold of a set of slides from a recent presentation by Julie Travis (from the Curtin Institute of Technology, Australia). The presentation was about an intriguing research approach called "action research." Up until then, I had never heard about AR, which, at first glance, struck me as incorporating several elements of what I thought to be good consulting. My subsequent library and internet research left me with the impression that there was disagreement among AR practitioners about its precise definition [7], [50], [51]. However, I also found some clear distinctions between AR and three common research approaches (see Table I).

In my mind, conducting AR in a business context involved helping one or more organizations become "better" (e.g., by improving their productivity, the quality of their products and/or services, working conditions, etc.) and, at the same time, doing research (i.e., collecting and analyzing research

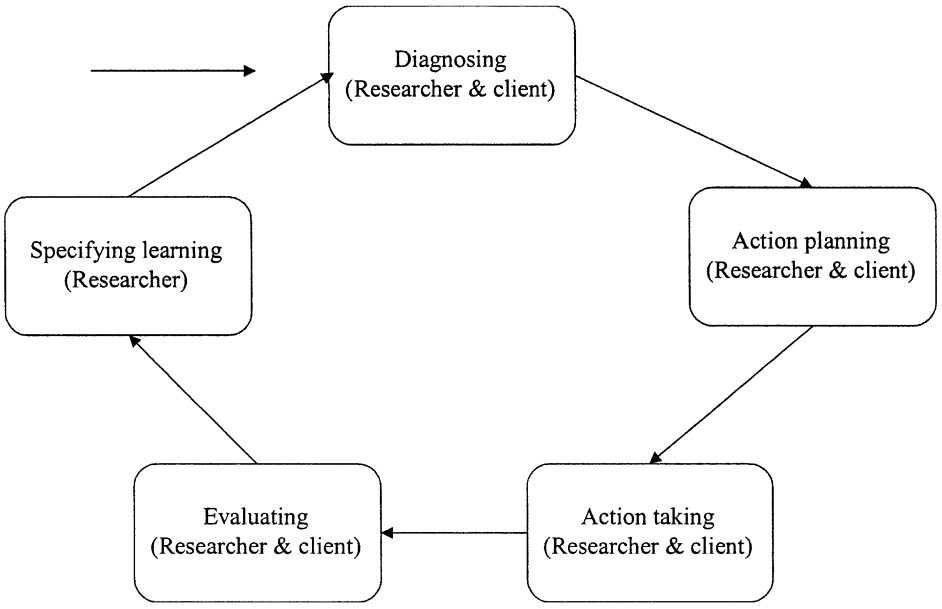
data). This combination of "action" and "research" [62], [63] was, and still is, one of the most appealing aspects of the method. Having decided to employ AR, I planned my research as a set of a few iterations of Susman and Evered's [64] AR cycle (see Fig. 1); one to be conducted in Brazil, and the others in New Zealand. The focus of my investigation would be BPI groups supported by internet-based email conferencing systems (one "mini-listserv" would be set up to mediate interaction between the members of each BPI group).

Susman and Evered's AR cycle comprises five stages: diagnosing, action planning, action taking, evaluating, and specifying learning [64]. (1) The DIAGNOSING stage, where the cycle begins, involves the identification of an improvement opportunity or a general problem to be solved at the client organization. (2) ACTION PLANNING involves the consideration of alternative courses of action to attain the improvement or solve

TABLE I
CONTRASTING AR WITH OTHER MAJOR RESEARCH APPROACHES
(ADAPTED FROM [60], [61])

Approach	Description	Typical instances
Experimental research	Is rooted in the scientific practice of biologists and physicians (as well as other groups devoted to the "natural" sciences), where variables are manipulated over time, associated numeric data is collected, and causal or correlation models are tested through standardized statistical analysis procedures.	Chidambaram and Jones' [52] study of the impact of communication medium and computer support on teams in dispersed and face-to-face meetings; and Gallupe et al.'s [53] comparative study where production blocking was manipulated in three experiments.
Survey research	Is rooted in the work of economists and sociologists. The researchers typically have a considerable sample to be analyzed, which suggests the use of questionnaires with close-ended questions that are easy to be answered and that permit quantitative evaluation "a posteriori. "	The survey involving 49 organizations in Southern California performed by Winter [54]; and Brynjolfsson and Hitt's [55] survey based on firm-level data from 1987 to 1991 about 380 large firms.
Case research	Is rooted in general business studies, particularly those using what is referred to as the "Harvard Method" [56]. The researchers typically study a small sample of organizations in depth. Cases are analyzed either to build or validate models or theories, typically through collection of textual data in interviews.	The on-site case research performed at a large corporation by Alavi [57]; and the interview-based research performed by Trauth and O'Connor [58] to analyze the influences and impacts of several factors on the establishment and evolution of technology firms Ireland.
Action research	Is rooted in studies of social and work-related issues. The researchers typically study a small sample of organizations in depth, using participant observation and interviews as key data collection approaches. Is often uniquely identified by its dual goal of both improving the situation being studied, and at the same time generating relevant knowledge.	The research on the participatory development and introduction of an expert system in a welding plant conducted by Candlin and Wright [59]; and Kock's [24] study of computer-supported business process improvement groups, where the researcher provided technology support and group facilitation.

Fig. 1. Susman and Evered's AR cycle [64].



the problem identified. (3) The ACTION TAKING stage involves the selection and implementation of one of the courses of action considered in the previous stage. (4) The EVALUATING stage involves the study of the outcomes of the selected course of action. (5) Finally, the SPECIFYING LEARNING stage involves reviewing the outcomes of the evaluating stage and, based on this, knowledge building in the form of a model describing the situation under study. In studies that involve several iterations of the AR cycle, the specifying learning stage is followed by the diagnosing stage of a subsequent cycle, which can take place in the same context or in a different one (e.g., a different department or company).

Selecting Client Organizations Research topic and client organization selection are closely interdependent tasks in AR. Given AR's dual goal, topic selection is driven in part by organizational needs [7], [11]. The extent to which client organizations influence topic selection in AR varies. Some AR practitioners have argued that topic selection should be defined based primarily on the needs of a potential client organization [65], [66]. Others seem to believe that topic selection should result from the identification of a research gap based on a survey of the related literature [62]. The existence of such divergent opinions underlies what Rapoport refers to as AR's "initiative dilemma," characterized by the researcher having to choose between either defining a research topic beforehand and then searching for suitable client organizations, or approaching potential client organizations and defining a research topic based on specific needs of those organizations [10].

The resolution of this dilemma in AR is likely to be a test of the researcher's ability to identify topics that are relevant from both a research and an organizational perspective [67]. It can reasonably be expected that if a predefined AR topic is not particularly relevant to organizations, then finding interested client organizations may be very difficult. On the other hand, letting a potential client organization pick a research topic may have a negative impact on research relevance. For example, most organizations need new computer-based databases from time to time, yet standard database development would hardly be an acceptable topic for an academic study, much less a doctoral AR project focusing on technology-related issues. An advisable approach is to define, in general terms, an expected research contribution, and, subsequently, criteria for selecting client organizations that are closely tied to the expected research contribution of the AR project [67].

In my research, the criteria for selecting client organizations included commitment to BPI and initial absence of computer support for BPI activities. The first criterion, commitment to BPI, could be demonstrated by the existence of at least one formal organization-wide BPI program, such as a total quality management [68]–[72] or ISO9000 certification program [31]–[33]. The second criterion was aimed at allowing me to observe the impact of the use of computer systems to support BPI groups the first time computers were used for that purpose in the organization.

Brazilian Phase of the Study: Initial Iteration of the AR Cycle

I approached several organizations over a three-month period with a plan to facilitate BPI groups with the support of an asynchronous groupware system, which I proposed to develop as an email conferencing system based on commercial, off-the-shelf email packages. Initially, I focused my efforts on the city in which I lived, as I expected to spend a great deal of time in the field, collecting research data and performing activities related to the action component of my research. The city was an industrial center in Southern Brazil and had a population of about 1.5 million. One organization (EventsInc, a pseudonym) whose revenues came chiefly from the organization of large professional and trade events (e.g., exhibitions and conferences), agreed to participate in the AR project.

In order to provide the reader with an illustration of how each stage of the AR cycle relates to the other stages, this section is organized around the five main AR cycle stages described above. Later, when I describe the New Zealand phase of the study, a less structured narrative approach will be used to highlight specific idiosyncrasies of AR.

Diagnosing: The Prospect of "Killing Two Birds With One Stone" EventsInc was facing two nagging problems that its management believed could be solved through the AR project. One of the problems was that its local area network of computers was not working properly, and was preventing the full deployment of an email package they had purchased a while ago. The other problem was that their existing approach to BPI was ineffective. EventsInc's approach to BPI involved employees being routinely called to participate in strategic decisions (i.e., whether to sign a large contract with the government or purchase the rights to a yearly professional conference) independently of their position, formal responsibilities, and hierarchical level in the organization. The approach was inspired on a participatory management method advocated by Semler that became wildly popular in Brazil in the early 1990s [73]–[76]. Eventually, EventsInc's management found out that Semler's recommendations led to two undesirable consequences. The first was that employees often

spent long hours making decisions outside their sphere of competence and that had little to do with the business processes they were immediately responsible for. The second was that, even though it was clear to employees that they were not prepared to make certain strategic decisions they were often offended when their suggestions were not implemented.

EventsInc's management viewed my proposed AR intervention as likely to solve both problems. They also saw the AR project as an opportunity to "get on the right track" with the BPI program and improve some of the core processes of the organization, particularly those related to the planning and scheduling of events. My work at EventsInc began in August 1993 and lasted approximately one year.

Action Planning: Setting Up an Organizational Structure for BPI BPI groups were expected to tackle a number of problems whose scope varied from local departments to the whole business. From the outset, it became clear that my temporary status at EventsInc would be equivalent to that of a "director," answering directly to the chief executive officer. I was going to be paid an hourly fee for my participation in the project and was introduced to employees by the chief executive officer as an organizational consultant and, "by the way," also as a researcher.

The iteration of the AR cycle was expected to last approximately one year. It was agreed that the iteration would begin with a number of training sessions in which I provided all employees with formal hands-on training on BPI techniques. Each BPI group was expected to have a self-appointed leader, who could be anyone in the organization and who should select and invite other employees to participate in the BPI group.

Our plan specified that whenever the implementation of a BPI proposal required the involvement of people outside the group (e.g., the purchase of expensive equipment or changes in processes outside the sphere of authority of the group), the proposal would be handed to a BPI committee to be evaluated. This committee included members of the board of directors and me. Should the proposals be considered attainable and likely to generate a return on investment, the BPI group leader would be given formal authorization to coordinate, on behalf of the chief executive officer, the implementation of the proposals with the appropriate departments (e.g., equipment purchase with the purchasing department, equipment set up with the information systems department, etc.).

Action Taking: Facilitating BPI Groups Seven training sessions were held over a three-week period. These sessions, which lasted one full day each, gave me the opportunity to get to know managers and employees on a more personal basis and establish an initial rapport with them.

Much to my relief, the computer network problems were relatively easy to fix, and the email conferencing system was installed without any major problems. The system allowed BPI groups to post electronic messages onto mailboxes created for each group discussion. Reading and posting rights could be granted to all employees or a small set of users (e.g., the group members). Twenty-six BPI groups were conducted, of which 11 interacted only face-to-face because the email conferencing system was not yet available. Most of these groups lasted no more than 40 days.

Evaluating: Good News and Bad News (Or the "Shocking Truth") In an attempt to ensure data triangulation, four main types of data were collected during the action taking stage: interview notes, participating observation notes, archival data (e.g., internal memos, forms, technical manuals, and internal publications), and electronic postings by BPI group members [77], [78].

I set out to analyze the qualitative data collected using the three-step coding process proposed by grounded theory methodology [79]–[82]. The first step, OPEN CODING, involves the identification of emerging categories (i.e., variables) in the textual data. The second step, AXIAL CODING, involves the identification of relationships between the variables identified by open coding. The third step, SELECTIVE CODING, involves the grouping of interrelated variables into models (e.g., causal models). However, the closest I was able to get to a blueprint to perform these three steps in a "reliable way" (i.e., in a way that could be replicated by other researchers) was an earlier version of the excellent, encyclopedic book of qualitative analysis techniques by Miles and Huberman [83]. At that time, advice from more experienced qualitative researchers was not to worry about coding reliability, as qualitative research was by its own nature "subjective." Eventually, I developed my own approach to data analysis—an adaptation of grounded theory described in more detail below.

Nevertheless, while an in-depth analysis was needed for the "specifying learning" stage, there was a sense of urgency to analyze the data for an initial report to the company. This led me to conduct perception frequency analyzes of interviews and to triangulate the results with participant observation notes, electronic postings, and other documents, as discussed by Miles and Huberman [83] and Yin [84]–[86]. In general terms, the results of this analysis suggested that the project had been very successful. Significant efficiency gains in local processes due to the decentralization of access to information, a major simplification of the organization's

departmental structure, and a 7% increase in revenues were the main bottom-line results of the major changes brought about by BPI groups addressing "core" business processes (i.e., processes that cut across several departments or the entire company). The BPI groups addressing "local" processes (i.e., those restricted to one or two departments only), on the other hand, made a number of incremental improvements in the quality and productivity of local (mostly departmental) processes, and a general improvement in internal morale and in the quality of the relationship between management and line staff. These results were met with enthusiasm by both management and employees.

Given their enthusiasm about the results, I expected EventsInc's management to want competitors to be as far away as possible from the company's premises so they would not be able to copy EventsInc's new approach to BPI. Nevertheless, on several occasions, the chief executive officer invited the owners of a competing company to see the intermediate results of the project. The visitors, who were introduced to me as "some friends" by the chief executive officer, usually asked me (repeatedly) questions about the impact of BPI groups on EventsInc's bottom line (e.g., sustained increases in sales, profitability, etc.).

Approximately nine months into the project, I heard from one irate executive that EventsInc was undergoing the first stages of an amicable acquisition process by a competitor—exactly the one whose representatives had been visiting EventsInc and asking me questions. My AR project was discontinued. I was asked by EventsInc's chief executive officer to conduct an analysis of the project and summarize it in a business report to be considered by the acquiring company's board of directors in the assessment of EventsInc's market value. This incident taught me an important lesson about AR, summarized as Lesson 1 below.

Lesson 1: Intervention does not equate control in AR. While in AR the researcher applies intervention in the environment being studied, he or she has very little control over what actually happens.

Lesson 1 highlights the fact that although applying intervention on the environment being studied may give the researcher the false impression he or she is "in control" (somewhat like in a laboratory experiment), the researcher has in fact very little control over what actually happens and how. A plausible conclusion based on this lack of control approach is that AR is a risky research approach that should be avoided, particularly by doctoral students (who need to complete their research within a set period of time). However, there are ways in which this lack of control can be dealt with. Perhaps the most obvious is to plan the AR project in such a way so that more than one organization is involved, so that the researcher is not completely dependent on one single group of people to complete the research. This approach was adopted here, as will become clear as the narrative progresses.

As soon as the news about the acquisition became public, key employees left the company in disgust. Conversations with management and employees suggested that the general feeling was that the BPI project had been used to add market value to the company and benefit the major shareholders in a potential sellout. I was seen as an "evil consultant" by some of the key employees who left the company. Others saw me as a "not very perceptive consultant" (actually, "idiot fool" was the term used by one manager) who had been manipulated by the chief executive officer. In my own judgment, the latter perception was more accurate, as it had not been clear to me what was going on until late in the project. I wrote the report, left the company, and started my preparations to travel to New Zealand.

Specifying Learning: Lost in a Sea of Data In this first iteration of the AR cycle, I began what became a habit throughout my research—to write a paper for submission to a conference first, and, after revisions, to a refereed journal, summarizing the main findings of the research iteration. While time-consuming, this proved to be a very useful habit, as it forced me to compile the results of the data analysis conducted during each iteration, review these results against those of previous iterations, summarize them as part of a model, and draw implications for research and practice. An additional benefit from this habit was that I was able to know what several researchers, who served as conference and journal reviewers, thought about my research.

Having just left the research site, I found myself overwhelmed not only by the large body of data to be analyzed but also by important decisions that I had to make in order to be able to produce what I saw as "relevant knowledge," the main goal of the "specifying learning" stage of the AR cycle [64]. It is common in AR for the researcher to become an agent of change, and, thus, be deeply involved with the subjects and the environment being studied. In my experience, this is most likely to induce broad and unfocused data collection. Every observable event, comment by a BPI group member, printed document, electronic posting, etc., became a data point for me. Also, since I had collected a large number of relatively unfocused data, key questions emerged in connection with what to address in the analysis of the data. For example, should the use of groupware-supported BPI by management as a means of (arguably unethically) adding value to a soon-to-be-sold company be

the main focus of my analysis, or should the target of my analysis be the impact of groupware on BPI groups?

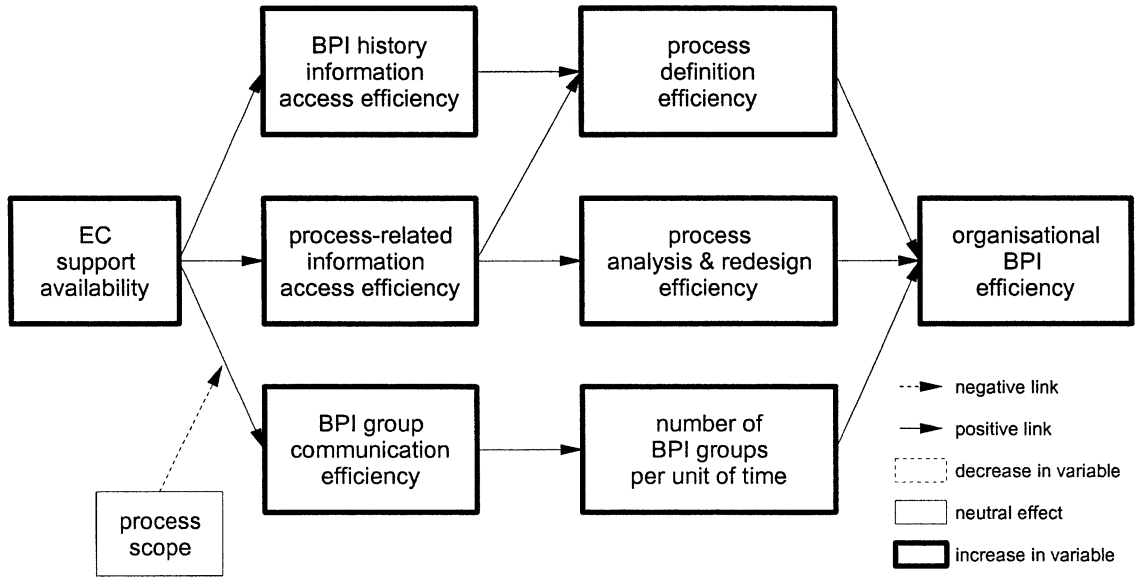
As with past research projects, what saved me from total confusion was the use of a systematic method, namely an adaptation of Glaser and Strauss's [81] grounded theory methodology to my particular situation (see the Appendix). Also, I decided to stick with the original goal of the research, which was to investigate the impact of asynchronous groupware support on BPI groups. This led me to disregard the selling-out incident and focus on the interaction between people and technology at the group level of analysis.

Central to grounded theory methodology [79]–[82] is a three-phase iterative coding process, which starts with open coding, moving then to axial coding, and ending with selective coding. While this process is well explained in the normative literature on ground theory methodology, translating it into practice was no easy task, requiring some creativity and a clear idea of how the research findings were to be modeled. Otherwise, I must admit that I could have easily confused open with axial or with selective coding. After trying different alternatives to modeling research findings, I decided to use traditional causal models [87], [88] as the one shown in Fig. 2.

Causal models are made up of four types of variables: independent, intervening, moderating, and dependent variables [89]–[91]. Open coding consisted in identifying individual variables in the causal model. Axial coding consisted in identifying causal links between pairs of variables. Selective coding consisted in identifying dependent variables and sets of interrelated variables that made up each causal model (which meant that several causal models were developed). More details on this coding process are provided in the Appendix.

It is not uncommon to find in the AR literature the recommendation to begin the research with a clean slate, so as to allow the findings to truly emerge from the data [66], [92]. This is also one of the main premises of grounded theory methodology [80]. However, the extent to which emergence occurs varies considerably as one moves from open to axial and to selective coding. In open coding, where variables are identified, the degree of emergence is apparently higher than in axial coding, where a basic set of variables already exists and the researcher searches for cause-effect links between variables. The degree of emergence in axial coding is, in turn, apparently higher than in selective coding, where sets of linked variables are grouped. As a result, it is apparently easier to define criteria and guidelines for selective than for axial coding, and for axial than for open coding, that will lead to similar results if employed by different coders. Having said that, I also must say that I had tremendous difficulty getting started with open coding and would have preferred to skip this step altogether if I could. It is possible to devise reliable [46] analysis procedures for selective coding and for axial coding, but the same seems very difficult for open coding, which apparently did not escape Strauss and Corbin's [93] attention in the latest version of their grounded theory methodology book. The key reason here seems to be that, when using open coding

Fig. 2. Example of causal model. (Generated during the first iteration of the AR cycle. EC = Email conferencing.)



with data collected through AR, the researcher tries to extract constructs from a very large body of unfocused and unstructured data. I put this to the test by asking two colleagues to analyze a subset of the data I had analyzed using the adapted grounded theory coding process described in the Appendix. While open coding led to conclusions that were difficult to reconcile, when we started with the same initial constructs, axial and selective coding led to very similar results (i.e., effects, explanations, and causal models). Whenever it is difficult to devise coding procedures that can be replicated by others, it is also difficult to convince others (and even oneself) that the coding process has not been influenced by subjective factors, such as personal preconceptions and feelings toward particular individuals. This leads me to Lesson 2, which is summarized below.

Lesson 2: Open coding is unlikely to lead to reliable analysis results in AR. While apparently straightforward, the grounded theory methodology technique known as open coding is unlikely to lead to the same results when employed by different researchers on the same body of data.

As a result of Lesson 2, I decided to eliminate the open coding step in further iterations of the AR cycle by collecting data around a set of predefined variables tied to a set of research questions; this proved to be a wise decision from a data analysis perspective. The problem of devising reliable coding procedures was particularly acute in this Brazilian phase of the AR project, regarding the open coding step. That problem was compounded by the fact that data collection had been done in an unstructured and, most importantly, unfocused way. Thus, my conclusions were very tentative and accompanied by several caveats and limitations. Nevertheless, I summarized this phase of the research in a conference article that eventually received the best conference paper award at a large conference in Australia. Frankly, I am unsure as to whether I really deserved the award. I interpreted the award primarily as a sign of AR's appeal in the field of information systems (the focus of the conference), where seldom do researchers bridge the gap between them and the practitioners they study [12], [19], [23].

New Zealand Phase of the Study: Second, Third, and Fourth Iterations of the AR Cycle

The city in New Zealand where my university was located had a population of about 300 000, and its economy revolved around the production of industrialized food, paper, and plastic products, as well as genetic enhancement of edible plants and animals. Gaining access to client organizations in New Zealand was nowhere nearly as easy as it had been in Brazil. I had to face a new reality; this was a country to which I had recently arrived and in which I had no business contacts. My level of English skills and my difficulty understanding the local accent and idiom did not make the situation any easier.

Most of the organizations I contacted declined participation. Some organizations were willing to discuss the AR project but demanded changes in the research topic to fit their specific needs. For instance, the plant manager of a manufacturer of plastic products showed some interest in the research project but was skeptical about the usefulness of an email conferencing system as a new interaction medium for BPI groups. He was, nevertheless, interested in the workflow control features found in some commercial asynchronous groupware systems. Given this, he proposed that the research project be carried out at his plant, on one condition—that the focus of the research was on the development of workflow control applications. The change would allow the company to tie the AR project to an ongoing effort geared at improving the productivity of production and inventory control processes at the plant. I analyzed the situation carefully and decided to decline the offer on two main grounds. First, most of my research work done up until then (literature review, general research design, etc.) would be lost. Second, my interest as a business communication researcher was primarily in people's behavior toward technology rather than in technology development issues.

At the beginning of my doctoral research, I had discussed with my advisor the possibility of conducting one or more iterations of the AR cycle at our own university. The rationale for this was that being an insider would allow me to interpret any patterns in the data very accurately and better understand similar patterns in other organizations. After about six months, my inability to gain access to an appropriate external site provided the extra motivation that I needed to put this idea into practice. Coincidentally, our university had recently begun a university-wide BPI program, and one of its colleges was going through the final stages of ISO9000 certification. I approached the dean of that college and some of the members of his office about conducting BPI groups with email conferencing support. The idea was well received and led to my second iteration of the AR cycle, where a pilot BPI group completed its work with success under my facilitation. Later, I conducted a fourth iteration of the AR cycle (the third iteration was conducted at a different organization), involving five BPI groups in the college (CollegeOrg, a pseudonym).

While conducting the second iteration at CollegeOrg, I kept trying to gain access to outside organizations, without much

success. Toward the end of the second iteration, I met an official of a branch of the New Zealand Ministry of Agriculture and Fisheries (GovernOrg, a pseudonym) during a chance encounter and, sensing the opportunity, described my AR project and invited him and his organization to participate. He agreed to arrange a meeting where I could discuss the project in more detail with him, one of GovernOrg's quality managers, and an information systems team leader. The meeting went well, in part due to the supportive remarks by my new friend, who served as a business communications and public relations officer at GovernOrg and who had by then assumed the role of champion of the AR project. Two other meetings with senior executives followed this first preliminary meeting, after which I was given formal permission to conduct part of my research project at GovernOrg. A few months later, I completed a report summarizing interviews with management and line employees at GovernOrg and proposing a more detailed project plan. The plan was formally approved and allowed me to conduct my third iteration of AR cycle, beginning in September of 1995. This experience highlights an important lesson about gaining access to organizational field research sites, summarized in Lesson 3 below, that has been aptly put by Barley: "despite an academic's proclivity to think otherwise, who one knows is often far more practical than what one knows" [26, p. 228].

Lesson 3: Gaining site access in AR is a matter of knowing the right people. While in AR the researcher may think that by offering a service to organizations and presenting himself or herself as an expert in a particular area will make it easy to gain access to a site, that will never happen without the "right contacts" and the support of the "right people."

Structure of the Second, Third, and Fourth Iterations of the AR Cycle The second, third, and fourth iterations of the AR cycle, conducted in New Zealand at GovernOrg and CollegeOrg, had each the same stages as the previous iteration: diagnosing, action planning, action taking, evaluating, and specifying learning. Each iteration led to the building of explanatory causal models based on the analysis of the evidence gathered during the iteration. At the end of each iteration, I compared its findings with the findings of previous iterations. The comparison highlighted invariable patterns and discrepancies, which I tried to explain by revising existing causal models and creating other higher-level causal models (or "meta"-models that explained patterns and discrepancies across iteration-specific causal models.

As mentioned before, in the second iteration of the AR cycle, I led and facilitated one BPI group at CollegeOrg. This allowed me to refine the BPI group methodology and the asynchronous groupware tool used by BPI groups in Brazil. At the end of that iteration, I wrote a brief manual to help guide the work of future BPI group members. Also, during the second iteration, I developed a refined asynchronous groupware tool based on a commercial groupware system used at both CollegeOrg and GovernOrg, namely Novell Groupwise (trademark of Novell Corporation). During the third and fourth iterations, I facilitated eleven BPI groups using the BPI group manual and the asynchronous groupware tool refined in the second iteration. Six of these groups were conducted at GovernOrg. The five remaining groups were conducted at CollegeOrg.

Describing each stage of the three iterations conducted in New Zealand would be somewhat repetitive and take a considerable amount of space. Instead, I will focus my attention in this section on other issues that are more generic and directly related to conducting AR. I will start by highlighting differences between this phase of the research and the previous phase.

More Focused Approach for Data Collection: Did it Affect "Emergence"? One of the key differences between this (in New Zealand) and the previous phase (in Brazil) was a more structured approach to the collection of research data, which included the use of semistructured interviews addressing specific variables (identified in the previous phase of the research). I refer to the interviews as semistructured because even though they were based on a predefined list of questions, they were IN-DEPTH INTERVIEWS, as defined by Sommer and Sommer [63]. As such, each question from the predefined set of questions led, once answered, to several other follow-up questions. Even though the follow-up questions depended on each respondent's answers, they were based on simple guidelines, such as probing further for "why" and "how." Semistructured interviews let researchers focus the data collection on a set of predefined variables and, at the same time, allow them to identify other variables that were not addressed by the questionnaire. These new variables usually emerge from the analysis of answers to the follow-up questions.

While not based on a rigorous empirical test, one strong perception remains. My decision to use semistructured interviews removed some of the uncertainty associated with open coding because it focused data collection, at least initially, around certain variables. It also limited the amount of evidence I collected, which in turn, facilitated data analysis. Given that in the first phase of the research (in

Brazil) data collection was much less structured and that key variables were identified then, it seemed reasonable to design the semistructured interviews based on those variables. This did not do much to reduce emergence though, as new variables emerged in each iteration (see Table II) from my attempts to explain (see the Appendix) the effects observed.

The first iteration had begun with a pseudoresearch framework of only three variables. These were the main independent variables of my research, namely "email conferencing support availability" and two variables that reflected the impact of technology on BPI at the organizational level, namely "organizational BPI efficiency" (or the "productivity" of BPI) and "organizational BPI effectiveness" (or the "quality" of BPI). Several new variables were added to these, in a particularly intense way in the second and third iterations. This taught me Lesson 4, summarized below.

Lesson 4: Skipping open coding does not prevent construct emergence in AR. While a bit counterintuitive, skipping open coding in AR by collecting data in connection with predefined constructs does not prevent the researcher from identifying new emerging constructs from the data, as long as not only quantitative data is collected.

Only three new variables emerged in the fourth iteration, which signaled that the criterion proposed by Ketchum and Trist to identify the final cycle of a multi-iteration AR study was satisfied and that the fourth iteration could be the last [94]. Ketchum and Trist saw the frequency of the iterations of the AR cycle as likely to decrease and eventually stop as the match improves between the researcher's conception of what they refer to as the sociotechnical system and the actual sociotechnical system being studied [94]. This match can be assessed based on the similarity between the models generated in the specifying learning stage of each pair of successive iterations of the AR cycle.

TABLE II
NUMBER OF VARIABLES IN EACH OF THE ITERATIONS

Iteration	1	2	3	4
Initial No.	3	9	21	42
No. Dropped	0	0	8	1
No. Added	6	14	29	3
No. Used in Causal Models	9	17	42	34

Being Part of the Action: Is It Always Fun? The researcher's involved stance in AR has undoubtedly a great appeal to many, but it also has its downsides, as noted in the narrative of the Brazil phase of the research project. The researcher can easily get entangled in factional fights for power and control, organizational politics, and personal animosities between individual participants. While in New Zealand my perceived status at both GovernOrg and, particularly, CollegeOrg was much lower than at EventsInc, my involvement in the "action" was just as intense.

At GovernOrg, two senior executives who reported directly to the chief executive officer had sanctioned the AR iteration to be conducted in their divisions. It became clear as the research progressed that these two senior executives had very different personalities and management styles. Among the differences was that one adopted a very democratic and consultative management style, whereas the other adopted a more autocratic and somewhat authoritarian style. While the democratic manager rarely did so, the autocratic manager often made key organizational decisions alone. The effect that computer-supported BPI groups had on the senior executives was equally distinct. After four BPI groups had been conducted, involving employees from both divisions, a clear divergence of perceptions could be observed. The democratic manager's view of computer-supported BPI groups was very positive. He believed that a national program should be instituted so as to use computer-supported BPI groups to improve business process throughout the Ministry of Agriculture and Fisheries (of which GovernOrg was a branch). The autocratic manager, on the other hand, felt that computer-supported BPI groups were a big waste of time, as well as an obstacle to swift senior management decisions.

One interesting effect of computer mediation on BPI groups was that, even though asynchronous electronic contributions were in no way anonymous (contributors were identified in the "sender" field of their electronic postings), many participants admittedly expressed their opinions more freely than they would have in face-to-face meetings. Even though computer mediation had no effect on the actual organizational status of the participants, it did seem to make it harder for a traditionally dominant member to take control of the group. Dominant members in face-to-face meetings are usually the ones higher in the organizational hierarchy. While computer-supported BPI groups allowed the democratic manager to learn more about what his subordinates thought, it also created situations where the autocratic manager heard (i.e., read on electronic messages) things that he did not want to hear from outspoken employees. His misgivings were compounded by the fact that I had performed a simple audit of the divisions run by each manager, democratic and autocratic, at the beginning of the research iteration to identify opportunities for improvement. That audit unveiled the fact that the productivity (assessed by

standard metrics such as revenues per employee) in the democratic manager's division was higher than in the autocratic manager's division.

From the fifth BPI group on, the autocratic manager became openly hostile toward me. Among other things, he openly questioned my credentials, arguing that someone else with a better understanding of the New Zealand culture could do a better job and pointed at some of my English mistakes to highlight my foreign origin and strengthen his argument. Since my Ph.D. was on the line, it was relatively easy for me to find enough reasons to ignore these expressions of hostility.

However, hostility turned into a direct order to abandon the research site during one of my interviews with a BPI group leader. Unlike in EventsInc, I had not been given an office at GovernOrg. Therefore, I usually conducted my interviews either in the interviewee's office or at the local cafeteria. In the middle of one of these interviews, at one of the tables in the cafeteria, the autocratic manager approached me and said, screaming: "You have a very cushy lifestyle, huh? Every time I see you here, you're in the cafeteria taking a break! What makes you believe that you can drag my people into this kind of lifestyle too? We have work to do here! You know?" Several employees who were at the cafeteria at the time looked at us, while the person whom I was interviewing (a manager who reported to the person screaming at me) noticeably paled. I explained to the autocratic manager that I usually conducted my interviews at the cafeteria because I did not have an office at GovernOrg. He continued his public reprimand for what seemed to be a minute or so and eventually told me that both my interview and my research at GovernOrg were over. Five BPI groups had been conducted at that time, and I had intended to facilitate another one soon.

A few days later, the autocratic manager called me on the phone and apologized for his actions. In his own words, "You made some mistakes, but did not deserve that much." I accepted his apology and asked to facilitate one more computer-supported BPI group. He reluctantly agreed and was obviously relieved when I assured him that the group would be the last I would facilitate at GovernOrg. That signaled the end of my third iteration of the AR cycle, even though I would have preferred to facilitate a few more BPI groups and collect more data before leaving GovernOrg. It also reinforced Lesson 1, which states that intervention does not equate control in AR. That is, even though it may appear otherwise, since the researcher is an agent of change, in AR the researcher has very little actual control over the environment being investigated.

While the incidents above might be seen as very interesting from a research perspective, hinting at strong technology effects on the behavior of certain managers, I was not able to unequivocally link technology causes (computer support for BPI groups) with the effects observed (the negative reactions from the autocratic manager). The reason was the existence of a key confounding factor—my initial audit and its effect on the autocratic manager. As discussed previously, my initial audit suggested a low productivity in the division run by the autocratic manager, which might have played a major role in triggering his reactions. He certainly expressed discomfort and concern about that audit on several occasions, and even ordered another audit (a "real one," in his words) from a large independent accounting firm whose outcomes were very similar to mine. I could not ignore this source of "noise" that prevented me from making unequivocal conclusions in support of previous empirical research on the topic [95]. This highlights one important aspect of AR: the researcher's deep involvement often works against him, so to speak, as the existence of confounding variables becomes very clear. The clear existence of confounding variables prevents the researcher from making otherwise relatively conclusive interpretations of the research findings. This taught me Lesson 5, summarized below.

Lesson 5: In AR the researcher's actions may strongly bias the results. While in AR the researcher is primarily interested in the impact of certain factors (e.g., presence of a technology) on people, the researchers' own actions may have a much stronger impact than the original factors of interest on the subjects and, consequently, significantly bias the results.

During my fourth iteration of the AR cycle at CollegeOrg, I took a much more careful approach, trying not to step on anyone's toes; however, for an agent of change, this is easier said than done. One BPI group, for example, run by an information technology laboratory consultant, put me in hot water with a CollegeOrg senior administrator who had not been invited to be part of the BPI group. His division was cited (in a critical way) in electronic postings exchanged by group members. Those postings found their way to him, and he commented to a faculty member of my department that it had been unethical of me to facilitate the BPI group without inviting him. In fact, it had been the self-appointed group leader who had decided not to invite him. I restricted my involvement to technical facilitation to avoid making what I believe is a basic yet common mistake in AR investigations: to shepherd research subjects into taking certain actions and then

later claiming that other factors (e.g., computer support) influenced that behavior. Fortunately, the incident was soon forgotten.

Another BPI group working on the redesign of a support unit involved one senior faculty who posted remarks that were seen as offensive by several members; this eventually led to the group's dissolution before any process redesign suggestions had been proposed. Some members vowed never to get involved in computer-supported BPI groups in the future and blamed me for bringing up the idea in the first place. Later, in my interview with the senior faculty, he explained his behavior

> Sorry, but this whole computer- mediated thing ... it was a dumb thing to do ... people need to meet face-to-face! [...] I was a bit naughty, but I had already made my decision that [the BPI group discussion] was not going to be effective, so I felt it was not going to be so much of a loss anyway. So, I basically, quite deliberately, upped the stakes by using phrases and language which were very exclusive, and quite controversial ... It was my way of saying: 'You guys need to get a life, we need to move on because this is not going to work.' It was the ultimate form of arrogance, if you want. I was playing a game.

At this point, it became clear to me that I had learned an important lesson about AR, summarized below as Lesson 6.

Lesson 6: Researchers who employ AR must have a "thick skin." While AR appeals to many researchers because it puts them "in the middle of the action," this can also lead to anxiety and anger if the researcher does not develop a "thick skin" approach to dealing with behavior from subjects that appears to be less than grateful or polite.

In spite of the incidents above, 67% (8 out of 12; half at GovernOrg and half at CollegeOrg) of the computer-supported BPI groups conducted succeeded in producing process redesign proposals of which all or part of the recommendations were implemented with positive business results. Their own members, as well as managers who had not been part of the groups but who had opportunity to observe the impact that the outcomes of the groups had on their areas, saw these groups as successful and beneficial to their organizations. This contrasted with the widely quoted 30% success rate for traditional (i.e., conducted primarily face-to-face) BPI groups reported by Champy [96]. Moreover, computer support appeared to have drastically reduced the organizational cost of conducting BPI groups by eliminating or reducing transportation, accommodation, disruption, and other costs associated with face-to-face BPI meetings.

Even though it may appear otherwise, I benefited tremendously from the research and was gratified by its general positive impact on the organizations. I learned a great deal about GovernOrg's operations and the intricacies of CollegeOrg's processes, and I made many friends along the way. Even though not everyone was happy with the research and its results, the general sense that I was doing something to improve the organizations and the lives of those who worked for them remained strong throughout iterations 2, 3, and 4 and was often reinforced by the feedback I got from employees.

Comparing AR With Other Research Approaches: Did I Really Make a Wise Choice?

While AR rewards the researcher in many ways and may potentially lead to findings that other research approaches may not, it is not an efficient research approach [10], [97]. The researcher has to spend a considerable amount of time providing services to its client in order to be able to collect research data. Once research data are collected, usually in the form of large bodies of text, the analysis is very demanding and time-consuming [78]. This became particularly clear to me as I had the opportunity to compare my progress with that of other doctoral students in my university who began their experimental, survey, or case research at about the same time I began my AR: it appeared that mine was considerably more labor intensive. Originally, my doctoral student colleagues perceived my research as little more than consulting and, as such, as a smart choice on my part. I had, in their eyes, received an "easy ticket" to my doctorate, particularly because my industry background would, in their opinion, allow me to quickly and easily collect all the research data that I needed. Later, when they were already writing up their theses while I was still collecting field data, it appeared that I had become a source of comfort for them. They would first whine about how hard they had been working on their doctorates and then look at me and say something like: "but at least thank God I am not in your shoes."

My general feeling at that time was one of having been cheated, even though the decision to conduct AR had been entirely mine and I thoroughly enjoyed what I was doing. One of the problems was the unforeseen amount of work required to appropriately serve two masters with different and often contradictory needs—the academic community (or at least the members of my Ph.D. committee) and the client organizations [98]. This can be illustrated by a simple comparison. From my observation of my colleagues, I would argue that Phillips and Pugh's [29] general chronology

of "traditional" (i.e., positivist and noninterventionist) doctoral research is fairly accurate. To it, I added that of my own doctoral research in Fig. 3 for the sake of comparison.

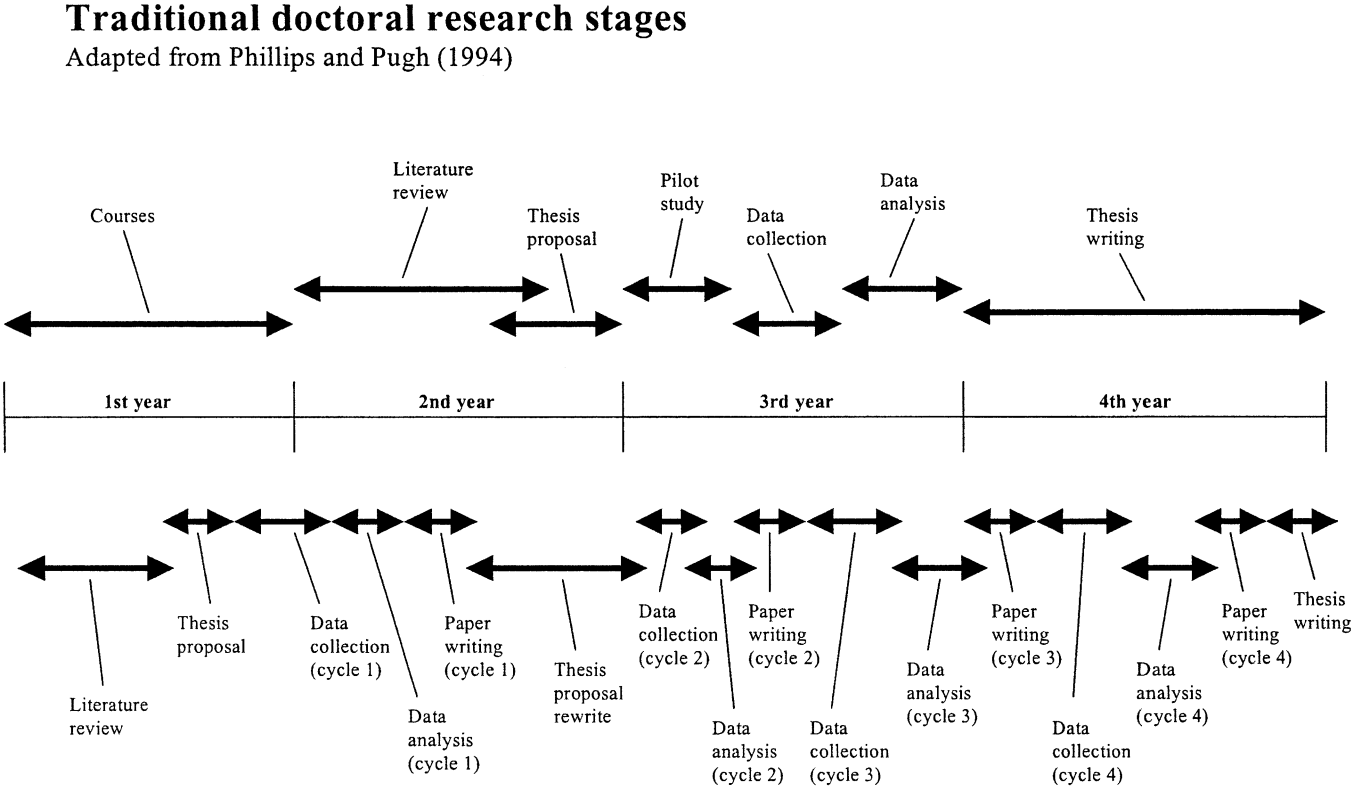
In the British doctorate system, which is adopted in New Zealand, doctoral students are not required to take courses. As a result, some elect to take courses and some, as in my case, do not (I opted to only audition parts of some courses). Nevertheless, I added one year of courses to the chronology of traditional doctoral research proposed by Phillips and Pugh [29] in Fig. 3 to make the comparison more meaningful for those more familiar with the American doctorate system. In the American system, courses are usually required—often as many as 18 courses, or approximately 2-1/2 years of coursework. A simple inspection of Fig. 3 clearly suggests that, if I had to take courses (even if only during one year), I would have never been able to complete my doctoral research in 4 years unless I had performed fewer iterations of the AR cycle. This taught me Lesson 7, summarized below.

Lesson 7: AR is not an "efficient" approach for research. While allowing the research access to "rich" data, AR may require significantly more time and effort from the researcher than other, more traditional research approaches.

Another difficulty inherent in AR that became clear from the comparison with other more traditional research approaches (summarized earlier in Lesson 1) is the higher risk that data collection will be delayed or prevented by organizational events outside the researcher's scope of control. As implied by the sequential nature of the stages depicted in Fig. 3, a delay in data collection in any of the iterations of the AR cycle, such as a temporary "freeze" on computer-supported BPI groups,would have had a ripple effect throughout the whole project.

Publishing AR: Not for the Faint-Hearted As mentioned earlier, I developed the habit of writing a paper for submission to a conference first, and, after revisions, to a refereed journal, in the specifying learning stage of each iteration of the AR cycle. Each paper summarized the main findings of the iteration and compared them with the findings of previous iterations. I believed that this approach, if followed systematically, had the potential to place me in a very solid position when the time for the final defense of the thesis

Fig. 3. My doctoral AR compared with "traditional" doctoral research.



arrived [99]. By exposing my ideas, theoretical interpretations, and empirical methods throughout the research, I ensured that they were reviewed and criticized by a wide range of (usually more seasoned) researchers.

The habit above led me to acquire some valuable experience with the peer-review process of several conferences and journals, particularly in regard to AR papers. Notwithstanding the fact that English was not my first language, my experience with the peer-review process suggests that it is very difficult to publish AR, particularly in "top" North American journals, for a variety of reasons. Among the reasons is, undoubtedly, the dominance in North American academic circles of other business research approaches, particularly case, experimental, and survey research [23], and a dearth of published examples of AR, particularly AR addressing technology issues [12]. Not only does this pose difficulties for those trying to publish AR studies to identify model papers on which to base their own papers, but it also makes it difficult to find reviewers familiar with, and favorable toward, AR. The latter difficulty was particularly acute in my chosen area of research—referred to, at the time, by a few related names such as "group support systems," "groupware" and "computer-supported cooperative work." The reason was because the vast majority of previous research in the area had been experimental [35]–[37], [100]. This practically ensured that at least one of the reviewers (and, quite often, the senior and associate editors) for any paper I submitted for publication held (even if subconsciously) assumptions about research rigor that were grounded on experimental research. That reviewer usually provided hints of his or her research orientation in the review, along with recommendations on how my research approach could be improved if more control was applied judiciously and focus was directed to a few variables. In other words, at least one reviewer saw AR as a form of poorly conducted experimental field research. In my experience, the opinion of one single reviewer, especially if stated in strong and unequivocal terms, will more often than not seal the fate of a paper submission for a journal whose acceptance rate is 15% or less. The consequence is that AR papers, as well as others that do not conform to the current norm, normally fall into the 85% that get rejected. This perpetuates a vicious cycle, since reviewers for reputable journals are often selected by editors based on their publication record in those journals and others of similar stature.

Other difficulties with publishing AR, however, are intrinsic to the research approach itself. For example, it is very difficult to describe an AR project in detail within the confines of a typical journal article without going beyond the maximum length prescribed. Consequently, authors have to limit their discussion to certain aspects of the AR project, which often creates inferential gaps that are picked up by reviewers. For instance, I once submitted a paper to a North American journal that went beyond the prescribed number of pages and was asked by the associate editor assigned to the paper to reduce its size by (approximately) half. The associated editor asked me to focus my revision on certain sections, a few of which, he or she believed, could be entirely eliminated. I then revised the paper based on those comments and resubmitted it. The next verdict from the reviewers was "revise and resubmit" because "there was an interesting story to be told" but "more details were needed" to fully assess how my conclusions followed from the narrative. I added more details and resubmitted the paper. The ensuing verdict was "reject," decided by the associate editor and without letting the paper go to the reviewers because the paper was now "too long and descriptive."

It is also very difficult to describe the chronological stages of an AR project in the way they actually occur. The reason seems to be that the resulting paper does not conform to the usual "theory-test-findings-conclusion" (or similar) structure of most empirical journal articles. As such, extra costs are associated with reading the paper, particularly for reviewers accustomed to papers following that more traditional structure. This is often reflected in comments such as "the paper is written in a confused way," "the ideas in the paper do not flow logically," and "the structure of the paper is awkward and confusing."

The experience of writing up my doctoral thesis, in addition to writing and submitting conference papers and journal articles, also taught me an important lesson, summarized in Lesson 8. It is difficult to publish AR in conference proceedings and journal articles. Currently, the book (or long report) format is better suited for AR reporting than the traditional conference paper or journal article format. The latter require a level of summarization that often is just not appropriate for AR, often forcing the researcher to fall into some of the traps discussed above. I like to compare conducting AR to making a legal case in a court of law. In it, the researcher presents a large body of (often-scattered) evidence in order to support a thesis, which can be represented as a causal model, "beyond reasonable doubt." This requires considerably more elaboration than describing a causal model and discussing the results of a test of the model.

Lesson 8: It is difficult to publish AR in conference proceedings and journal articles. While appealing to practitioners, AR studies usually require a level of detail to be appropriately described that

makes it difficult to report them in conference papers and journal articles, and that makes books and monographs presently better outlets for AR reporting.

Lesson 8 is not aimed at discouraging authors from trying to publish AR in conference proceedings and journal articles. Rather, it is a statement that reflects the status quo that I hope to help change. To change the status quo, it is important that editors, senior editors, associated editors, and reviewers of journals recognize the difficulties associated with reporting on AR. The editorial teams of a few prestigious journals are already moving toward that direction, which is indicated by the recent publication of AR articles in those journals. IEEE TRANSACTIONS ON PROFESSIONAL COMMUNICATION is one such journal.

CONCLUSION

The narrative in this paper may give the reader the impression that AR is not an appropriate approach for business communication research. That is not, however, the main message of this paper. To be sure, conducting AR is a risky proposition, one that carries a number of difficulties and personal costs. Yet, it also carries rewards that may far outweigh its difficulties and costs. This brings me to one of the main messages of this paper: AR is better tailored to certain types of researchers. It is reasonable to argue, based on the narrative, that AR is particularly well-suited for researchers with previous industry experience and who want to do research related to the solution of complex problems in settings they are familiar with. In AR, the researcher must be able to provide the client organization a service (e.g., consulting or software development) that is seen as valuable by the client organization and that at the same time enables him or her to collect enough data for building a theoretical or normative model. This should be done with the eight lessons discussed earlier in mind.

Regarding the lessons learned, it is important to note that several of them are applicable to other research approaches. This should not be surprising because AR shares a number of important characteristics with other research approaches. For example, like other research approaches, AR is aimed at generating new and valid knowledge through a rigorous and methodical process of discovery. Like AR, case study research is often seen as inefficient, presents open coding difficulties, and is difficult to find publication outlets for. Challenges in gaining site access are not restricted to AR either: case, experimental, and survey research share this characteristic. Also, quasi-experimental field experiments may share with AR the ability of the researcher's actions to bias the results [101]. Unique to AR is the attempt at positive intervention in the organization, and therefore the "thick skin" and the understanding of the lack of control that this requires.

Another key message of this paper is that the researcher's background and personal interests are as important as the goal of the research when it comes to choosing AR over other research approaches, particularly whether the goal is to test or build theoretical models. For many years, especially during the 1970s and 1980s, there has been an epistemological debate between AR proponents and detractors [1]. In that debate, AR has often been presented as opposed to positivism [51], [102] an argument that is hard to justify as AR and positivism can hardly be placed in the same conceptual category. AR is an approach, like experimental research, not an epistemology, like positivism or interpretivism [23], [103]–[105]. Thus, comparing AR with positivism is equivalent to comparing a "painting technique" (e.g., oil painting) with a "school of painting" (e.g., impressionism). Yet, accepting this argument leads to an inevitable conclusion, which is that there can be "positivist AR." While I believe that AR can be conducted in a positivist manner, my experience suggests that AR is a research approach that is particularly useful for the development of theoretical models and somewhat difficult to use in the test of theoretical models.

Of course, a researcher may choose to conduct an AR study to test a theoretical model (or a set of hypotheses), but to do so successfully, the researcher needs to address the problems associated with the lack of control and unfocused data collection often associated with AR. If those problems are not addressed, tests will not conform to well-established positivist methodological standards. In consequence, it is likely that reports generated based on the study will be questioned based on methodological standards and most likely denied publication in "top-tier" journals, unless the reports are judged based on standards that are different from those used to evaluate traditional positivist research. To this, it can be added that AR is not a very efficient theoretical model-testing approach. That is, testing a theoretical model using AR requires considerably more time and effort from the researcher than using, say, experimental research.

The above problem can be addressed by structuring AR projects as quasi-experiments [101], [106], as originally envisioned by one of its forefathers, namely Kurt Lewin [6], [7]. In that sense, hypotheses could be tested by comparing data collected before and after the researcher's intervention in each AR cycle, with the possibility of conducting only one iteration

of the AR cycle. Nonparametric techniques [107] could be used for quantitative analysis, and the results triangulated with the qualitative data collected and compiled during the AR study [77], [78].

In addition, instead of using a strictly positivist approach to conduct AR, one could use a modified approach to positivist research that builds on Popper's falsifiability criterion, as exemplified by Kock [108], [109]. In that study, the researcher used AR to test a hypothesis not only by looking for evidence that supported the hypothesis, but also by looking for evidence that suggested the existence of an exception to the hypothesis (or evidence supporting the negative version of the original hypothesis), and showing that no such evidence could be found. According to Popper's modified positivist epistemology, every hypothesis should be clearly falsifiable, and absence of contradictory evidence becomes a stronger corroboration of the hypothesis than the mere presence of supporting evidence [108]. Since in AR the researcher is an insider as opposed to a removed observer, and thus has access to a broader body of evidence than in other research approaches, AR seems to hold great promise when employed in conformity with Popper's modified positivist epistemology.

Recently, there has been much discussion about the role of relevance in business research, particularly research addressing technology-related issues and its relationship with rigor [110]. It has been argued that rigorous research can often be irrelevant [111] and that much of the relevant research currently conducted ends up not being published in academic outlets because it does not conform to traditional standards of scientific rigor [112]. AR provides a partial solution to this problem, as it is, by definition, relevant to practitioners and can be conducted in a rigorous way. To be sure, the scope of relevance of AR findings to practitioners may vary. For example, the outcomes of an AR study may be relevant to a single company, if the problems addressed through the research are specific to that company. The outcomes may be relevant to a whole industry, if the problems are faced by all (or most) companies in the industry; to a whole sector of the economy, if the problems are faced by all (or most) companies in the sector in question, and so on.

Should business communication researchers in general, and doctoral students in particular, embark on AR projects? My answer is "yes," if they are aware of the rewards and difficulties associated with the approach, feel strongly that the former outweigh the latter, and believe that they can overcome those difficulties. I hope that this paper will help researchers who are considering using AR to identify potential difficulties and rewards, and make an informed decision about whether to use this approach.

APPENDIX
CODING PROCEDURE USED IN THE DATA ANALYSIS

The process involved in the identification of causal links based on the research data collected was centered around one of the sources of data, against which evidence from other sources were matched. Central data sources were chosen based on their volume and perceived degree of coverage of the research topic. In the first stage of the research, in Brazil, the central data sources were field notes based on participant observation and unstructured interviews. The central data sources in the second research stage, conducted in New Zealand, were semistructured interview transcripts. Below are the main data analysis steps employed and their corresponding coding steps in grounded theory methodology [79]–[82].

Step 1: Categorizing, or Open Coding In the categorizing step, I actively sought variables in the research data associated with relevant events. A relevant event clearly indicated an effect of technology support on a BPI group. One example of a relevant event in the first research phase was an increase in the number of BPI groups per unit of time after the email conferencing system was made available to prospective BPI group members. Although other variables have emerged from the analysis of the research data, two variables were initially identified as being associated with this event—email conferencing support availability and organizational BPI groups capacity. The related effect was that the first variable caused an increase in the second.

Step 2: Tabulating, or Preparing the Stage for Axial Coding In the tabulating step, I created tables showing the variation in the contents of variables along units of analysis in either a quantitative or qualitative scale, an approach suggested by Miles and Huberman [83, p. 177] as particularly useful to prevent data overload from "numbing" the researcher. Tables were indexed by number and description and saved into a "tables" MS Word file. One example is a table showing the variation across different BPI groups in the content of the variables "departments involved" (i.e., number of departments represented in a BPI group) and "scope of change" (i.e., breadth of the process changes targeted by a BPI group). In this example, the contents of the first variable varied along a quantitative (i.e., numeric) scale, whereas the contexts of the latter varied along a qualitative (i.e., symbolic) one.

Step 3: Explaining, or Axial Coding In the explaining step, I tried to explain the effects previously identified in the

categorizing step, using evidence from both the categorizing step itself and the tabulating step. This explanation process was carried out for each relevant effect and included the building of explanations based on evidence pertaining to the effect. An illustration of this process is provided in Fig. 4. The names and context in this illustration have been disguised to protect confidentiality.

In the illustration in Fig. 4, three explanations (E1, E2, and E3) were derived from the sets of confirmatory and disconfirmatory evidence summarized above them. The evidence is presented in the form of facts extracted from different research data sources: 1) structured interview transcripts, referred to as IT1, IT2, etc., indicating each of the interview transcript files; 2) tables, referred to as TB1, TB2, etc., indicating each of the tables in the tables file; and 3) field notes (i.e., participant observation notes), referred to as FN1, FN2, etc., indicating each of the field notes files. Each reference to a data source was followed by its page in the respective file to allow for quick location, if necessary, of the piece of data referenced.

One rule followed throughout the research was that a set of explanations related to a particular effect should account for all the evidence related to that particular effect, whether the evidence was confirmatory. In doing so, I followed an approach similar to what is referred to by Richardson [99, p. 520] as experimental writing,

Fig. 4. Deriving explanations for an effect based on research evidence.

Variable 1: EC support availability
Variable 2: BPI group member satisfaction
Effect: EC support availability increases BPI group member satisfaction

Confirmatory evidence

1. Among structured interview respondents 31.25 per cent perceived EC support as having increased their satisfaction from group participation (TB4, p. 8).
2. Three members perceived as being less stressful to input ideas in EC-mediated discussion and easier to say what they felt. These members had good computer skills - Chris (IT1, p. 6), Paul (IT4, p. 7) and Sara (IT11, p. 6).
3. Five members noted that a face-to-face meeting would not likely have happened without EC support, which would have frustrated them - Chris (IT1, p. 5), Paul (IT4, p. 7), Sara (IT11, p. 6), Paula (IT2, p. 8) and Angus (IT7, p. 7).

Disconfirmatory evidence

1. Among structured interview respondents 43.75 per cent perceived EC support as having no effect on their personal satisfaction; and 25 per cent as decreasing it (TB4, p. 8).
2. Three members found it difficult to participate in EC-mediated discussions with a busy commercial schedule because their computer skills were limited, which made it time consuming for them to contribute postings - Cynthia (IT5, p. 6), John (FN, p. 17), and Carl (IT3, p. 7).
3. Three members noted that there was little or no personal contact, which they saw as negative - Mark (IT3, p. 7), Phil (FN, p. 32), Tod (IT17, p. 5).

E1: EC support allows people to interact without having to compete for air time and at their own pace. This leads some members to perceive an increase in their satisfaction, as the contribution of ideas is seen as less stressful than in face-to-face group discussions.

E2: EC support leads to lower control on member participation, that is, on whether members participate or not and how they do it, which can lead to a low level of interaction. This, plus the fact that the EC system filters non-verbal cues and does not allow for personal contact, can lead to the perception that EC support decreases social interaction, which is in turn likely to decrease member satisfaction.

E3: EC support reduces member function disruption due to group discussions, which allows members with busy schedules to participate. The perception that these discussions would not otherwise occur, and that therefore EC support enables increased social interaction, leads to an increase in member satisfaction.

and Eisenhardt [113, p. 541] as shaping hypotheses.

The building of explanations initially leads to the identification of new variables, almost as if this analytic process had no end. However, as the researcher moves on through several iterations of the steps described in this Appendix, the building of explanations gradually moves into a "synthesis phase" as several variables begin merging together. A clear indication that the analysis is moving toward this stage is the systematic finding of causes that are the same for different effects, which is aided by the building of causal models in the modeling step, as discussed next.

Step 4: Modeling, or Selective Coding In the modeling step, I built explanatory causal models based on the explanations generated in the explaining step. These causal models followed to a large extent the typical conventions used in previous research aimed at building and structuring knowledge as sets of causal relationships between research variables [87], [88]. They were composed of four types of variables: independent; intervening; moderating; and dependent variables.

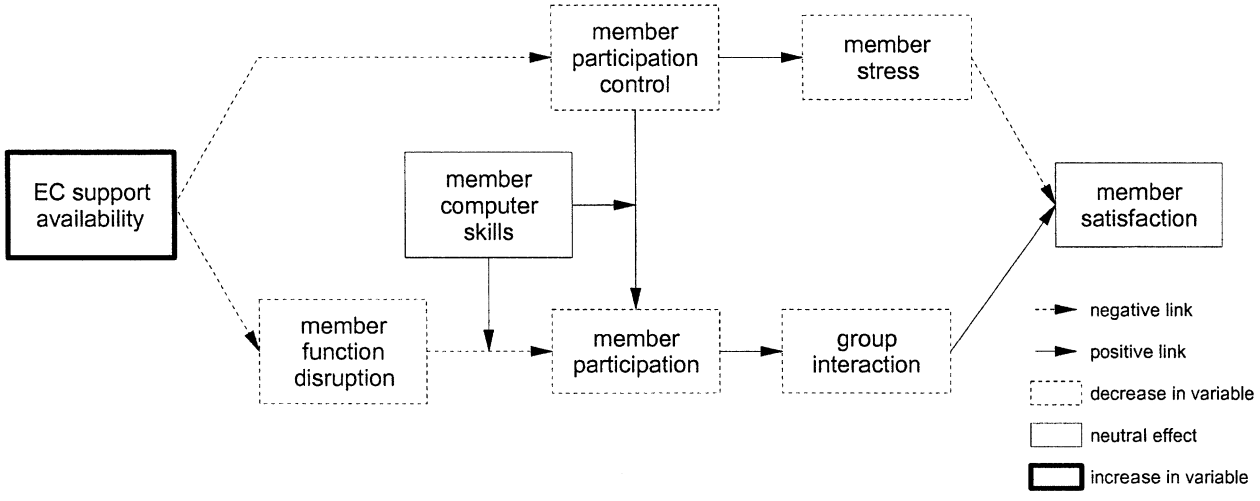
The causal model illustrated in Fig. 5 was built based on the example provided above (in Step 3), where three explanations accounted for evidence related to the effect that EC-support availability has on the perceived degree of satisfaction experienced by members of PI groups. Each explanation in Fig. 4 led to a different path of links between variables in Fig. 5. Explanation E1 led to the path linking the variable EC-support availability, member participation control, member stress and member satisfaction. Explanation E2 led to the path linking EC-support availability, member participation control, member participation, group interaction, and member satisfaction. Finally, explanation E3 led to the path linking EC-support availability, member function disruption, member participation, group interaction, and member satisfaction.

Causal links between variables are represented with an arrow pointing toward the direction of the causal link. Each arrow is drawn with a solid or dotted line. A solid line indicates that the causal link is positive, that is, that an increase in the variable at the beginning of the link will contribute to an increase in the variable at the end of the link; a dotted line indicates that the causal link is negative.

Research variables were represented by rectangles with the name of the variables. Rectangle borders could be either normal solid, bold solid, or dotted. Normal solid borders indicate a neutral effect on the variable they represent, that is, neither an increase nor a decrease in the variable. Bold solid borders indicate an increase in the variable; and dotted borders a decrease. This static type of representation is used in a descriptive, rather than a predictive, way. That is, the causal model showing increases and decreases in certain variables tries to describe what happened in a given research context in a summarized way.

When building causal models, I tried to explain the evidence obtained in the research, rather than the lack of evidence. That is, if there was no link connecting two variables in a model, it was because there was no evidence for the existence of the link. Given my almost full-time presence in the companies and my deep involvement with management and employees, the absence of evidence was itself interpreted as an important piece of "evidence."

Fig. 5. Example of causal diagram.



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