Chapter 1

Introduction

1.1   BACKGROUND TO THE PROBLEM

Information Systems development (ISD) is a complex, social process.   The art of ISD has changed over the years and there has been a growing recognition that Systems Analysts need more than just technical skills in order to do their job. Developing these skills, along with the technical skills is the challenge facing IS lecturers today.

Information Systems (IS) departments at tertiary institutions have tended to prepare students very well for the technical needs of systems development. They have given the students the tools and techniques that they need to develop systems in a mechanistic way.   There, however, has been some neglect of the skills that the students need in order to be able to find shared meanings, practise argumentation and be effective in working with users as change managers. This does not mean that the technical should be neglected, but that students should be able to augment their technical skills with the business and interpersonal skills.

"For quite some time, conventional systems development approaches have acknowledged the importance of the social element of ISD.   Nevertheless, they concentrate on the technical process of systems development. They equip the developer with, neither the tools, nor the knowledge, for dealing with the social processes intrinsic to ISD. Simple platitudes such as "get the support of senior management" or "involve the end user" are hardly sufficient to guide systems development. They tend to mask the social nature of ISD or portray it in simplistic ways. They do not allow developers to understand, let alone fully appreciate, the social nature of systems development." [Hirschheim & Newman, 1991].   This problem also occurs in tertiary institutions where

students are prepared for the technical side of ISD but not the social.

Joint Application Development (JAD) methods have been used in industry in order to allow diverse groups of users to become involved in the process of designing their own systems. The method brings together users from different parts of the organization and allows them to debate, in a structured way, about their needs for a new system. The users meet with IT professionals in a structured workshop. Techniques for effective management of group dynamics are used and a facilitator manages the creativity and conflict resolution among the participants [Purvis & Sambamurthy, 1997].

Bringing the JAD methods into the classroom should foster debate in the classroom in a structured manner. Students discuss their ideas about the modelling of systems with one another, debate their ideas and come up with a group model for the systems. Incorporating the JAD techniques used in industry into the classroom, enables students to get more practice at working in groups while learning the modelling techniques used at the same time. The method allows the students to get a deeper understanding of the material, as they have to defend their own ideas and hear the perspectives of others. They are also confronted with their own misconceptions. At the same time, they should also be learning the group, communication and interpersonal skills that are so important in IS development. JAD places an emphasis on group dynamics issues and how to deal with making a group work effectively, getting the group to participate and ensuring that the group comes to consensus about decisions made. If these skills can be learned by the students, then they will become better IS developers.

The research described in this thesis develops a theoretical framework for bringing the JAD techniques into the classroom in order to enhance students' learning of modelling techniques while also helping them develop the skills that they need for interacting with others, working with diverse people, working in groups and conflict handling in groups. Co-operative learning methods were combined with the JAD techniques in order to promote more effective learning in the classroom. These methods were also adapted for use in a classroom with diverse student groups.

The research was done at Technikons in South Africa. A Technikon is a tertiary institution that offers career-oriented programmes and degrees.

1.2 RESEARCH QUESTIONS

Process-based research suggests that the researcher should try to use the different research paradigms in order to view the problem from different perspectives. Instead of doing the research from one particular point of view, the researcher tries to pose a variety of questions that will explore the different aspects of the problem [Roode, 1993].

Roode [1993] proposes that research questions should be structured around the following:

- What is.................?
- Why is ....?
- How does...................?
- How should...................?

1.2.1 What is..........................?

The what is.... questions are aimed at determining the underlying structure of the problem or finding the underlying meaning of concepts or ideas. This allows a precise and unambiguous description of the problem [Roode, 1993].

The type of questions that one would need to answer here are:

- What is involved in IS development?
- What social skills are needed by an IS developer?
- What is JAD?
- What is the social constructivist learning theory?
- What is co-operative learning?
- What is meant by diversity?
- What is actor-network theory?

1.2.2 Why is.......................?

This question allows one to focus on the real-life behaviour and characteristics of the problem and the relationships that exist within the domain of the problem [Roode, 1993].

- Why should tertiary institutions help IS students develop interpersonal and group skills?
- Why do people use JAD in industry?

1.2.3 How does.......................?

The How does..... question allows the researcher to determine how the problem has been manifest in real life.

Questions about how things work that need to be answered are:

- How does JAD work in industry according to the literature?
- How does a diverse student population affect the classroom?

1.2.4 How should.......................?

This question focusses on the conclusions and implications of the research results. The answers to these questions allow the researcher to explain the new insights obtained during the research and the conclusions that can be drawn from that [Roode, 1993].

- How should we model JAD in industry?
- How should one deal with diverse students in the classroom and in groups?
- How should lecturers combine the methods of JAD and the methods of co-operative learning in their classrooms?
- How should a framework be designed in order to promote the learning of group skills, interaction skills and modelling skills in a classroom with diverse students?

1.3   RESEARCH OBJECTIVES

The main objective is to develop a framework, that models how JAD and co-operative learning techniques can be used to promote the learning of group skills, interpersonal skills, communication skills and modelling skills in a classroom with a diverse student population. This framework will help lecturers who wish to use the JAD techniques in the classroom to do so in a way that is effective for learning.

In order to do this, the following sub-objectives had to be achieved:

- The first sub-objective was to determine if one can take the methods of JAD used in industry and use them effectively in the classroom.   This included determining what teaching, learning and group strategies (like co-operative learning methods) should be used in order to make the method effective.

- The second sub-objective was to determine if this method of learning was effective in helping students to learn the modelling techniques that need to be learnt for Systems Analysis and Design.

- The third sub-objective was to determine if the students perceive that their social skills improve using this method of learning.   This included their skills acting as a facilitator, as well as the interpersonal and communication skills needed for working in a group.

1.4   METHODOLOGY

Research methodology and the reasons for choosing a particular paradigm and research design are described in detail in Chapter 2. An overview of what was done is given here but the motivation can be found in Chapter 2.

The research paradigm chosen was a pluralistic one, mixing the critical and interpretive approaches to research. The researcher was involved in the research situation which meant that an objective view was not possible.

A framework for this learning environment was developed. A combination of using Case Studies and Action Research was used in order to build the framework. The Case Studies were used to get an in-depth, contextual understanding of the situation. This analysis was then studied to determine what problems were experienced and what changes were needed. Literature studies were done and the ideas gleaned from these were used to help determine the changes that were needed to make the classroom environment more effective. These changes were then incorporated into the framework. Figure 1.1 gives an indication of the research approach used.

During the first cycle of the research a literature study on IS development and the use of JAD in industry was done to determine the skills needed by an IS developer and to help determine how the JAD techniques could be adapted for use in the classroom. The initial framework was developed for the use of JAD in the classroom and this was evaluated using the first case study. The first cycle is shown in purple on the diagram in Figure 1.1. The first case study was done as a pilot study in 1998 with the Information Systems II students at the Port Elizabeth Technikon. A questionnaire giving both quantitative and qualitative results was used to study the situation as it existed in 1998.

On the basis of this study, it was decided that many of the problems experienced could be addressed by incorporating some of the ideas of co-operative learning. Co-operative learning methods were studied and these ideas were added to the framework and a further study was done in 1999 with the Information Systems II students at Port Elizabeth Technikon. This is shown in the second cycle in pink in Figure 1.1.
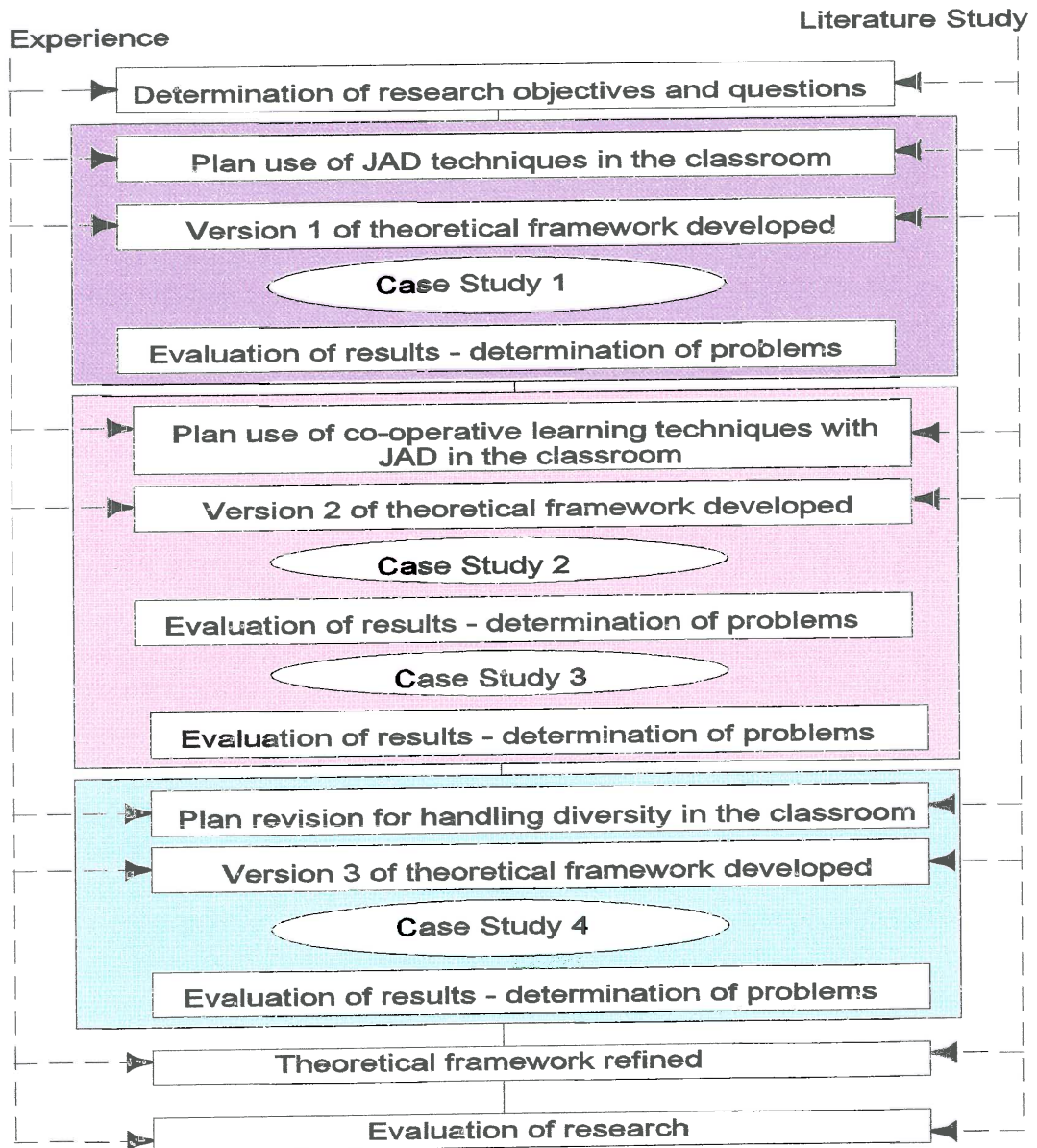
Experience   Literature Study

| Determination of research objectives and questions |
| Plan use of JAD techniques in the classroom |
| Version 1 of theoretical framework developed |
| Case Study 1 |
| Evaluation of results - determination of problems |
| Plan use of co-operative learning techniques with JAD in the classroom |
| Version 2 of theoretical framework developed |
| Case Study 2 |
| Evaluation of results - determination of problems |
| Case Study 3 |
| Evaluation of results - determination of problems |
| Plan revision for handling diversity in the classroom |
| Version 3 of theoretical framework developed |
| Case Study 4 |
| Evaluation of results - determination of problems |
| Theoretical framework refined |
| Evaluation of research |

Figure 1.1: Research approach used

Although a significant improvement was found, there were still some problems. Some of these problems seemed to be experienced by the Xhosa-speaking students in the class. It was suspected at this stage that the problems being experienced were as a result of the diverse cultures in the group and not because of the Xhosa-speakers inherent culture. It was therefore, decided to test the same framework in a situation where the groups were almost homogeneously Xhosa speaking. This was done at the

Border Technikon with their third year students. The Xhosa speakers had no difficulties interacting and participating in the homogeneous groups. The problem was thus a result of the diversity of the students, as suspected. This was still part of the second cycle shown in pink in Figure 1.1.

Methods of dealing with diversity, particularly in group work, were then studied and ideas from this were incorporated into the framework. This was done in Cycle 3 shown in turquoise in the diagram. These ideas were tested in a fourth case study done at the Port Elizabeth Technikon.

The final framework was then developed and the research itself evaluated.

1.5   LIMITATIONS OF RESEARCH

The research was carried out in the Eastern Cape region of post-apartheid South Africa. The possibility exists that the results of the research cannot be generalised to other parts of the world or even to South Africa a few years in the future. The context for the research is described in detail so that the readers can consider if the findings would be applicable in their own setting.

The method has only been used on Information Technology students at Technikons and not on traditional university students or students from other disciplines. It is probable that adaptions might be necessary to cater for different types of students.

1.6   A ROAD MAP TO THE THESIS

Figure 1.2 gives an indication of the structure of the thesis. This road map will be given on the introductory page for each chapter in order to position each chapter within the thesis.
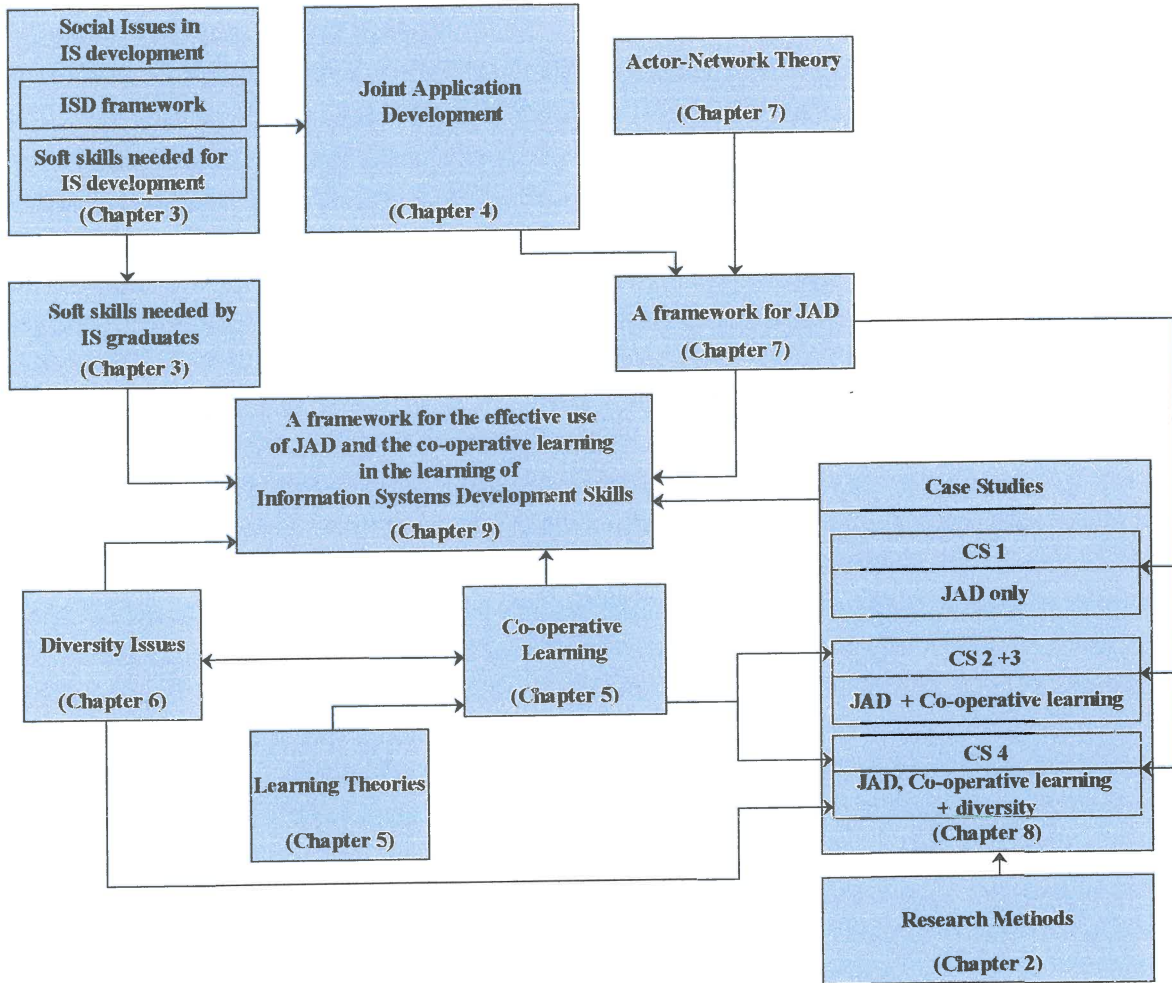
Figure 1.2: A road map to the thesis

Chapter 2 describes research paradigms and designs that are currently in use in IS research. The rationale for the choices of research paradigm, design and methodologies for this study are given in this chapter.

Chapter 3 gives an overview of the social side of IS development. The chapter describes a framework presented by Hirschheim, Klein & Lyytinen [1996] for IS development. These systems development issues are used to motivate that IS developers require not only technical skills, but also business and social skills. Lastly the chapter looks at what this means for tertiary education in terms of social skills development for students. The research questions answered in this chapter are: "What is involved in IS development?",

"What social skills are needed by an IS developer?" and *"Why should tertiary institutions help IS students develop interpersonal and group skills?".*

Chapter 4 describes the JAD process and techniques that foster its effective use in industry. The research questions answered are; *"What is JAD?"*, *"Why do people use JAD in industry?"* and *"How does JAD work in industry according to the literature?".*

Chapter 5 gives a background to the educational side. Different learning theories are briefly described with an emphasis on the constructivist learning theory. This then leads into a literature study of co-operative learning. Research questions answered in Chapter 5 are: *"What is the social constructivist learning theory?"* and *"What is co-operative learning?".*

Chapter 6 deals with the issues around a diverse student population. During the study, it was found that the diverse student population caused some difficulties for the different students in the groups. This chapter looks at the research questions: *"What is meant by diversity?"*, *"How does a diverse student population affect the classroom?"* and *"How should one deal with diverse students in the classroom and in groups?".*

Chapter 7 gives an overview of actor-network theory (ANT). Parkin's ANT network for decision making in a group is presented and used to develop a framework for the use of JAD in industry. This network is then used as a basis for the development of the framework for the thesis. The research questions answered in this chapter are: *"What is actor-network theory?"* and *"How can we model JAD in industry?".*

Chapter 8 gives an overview of the research done in determining the best method of combining JAD and co-operative learning methods in the classroom. The four case studies are described and the framework is developed as the research progressed. Research questions addressed in this chapter are: *"How should lecturers combine the methods of JAD and the methods of co-operative learning in their classrooms?"* and *"How*

should the framework be designed in order to promote the learning of group skills, interaction skills and modelling skills in a classroom with diverse students?".
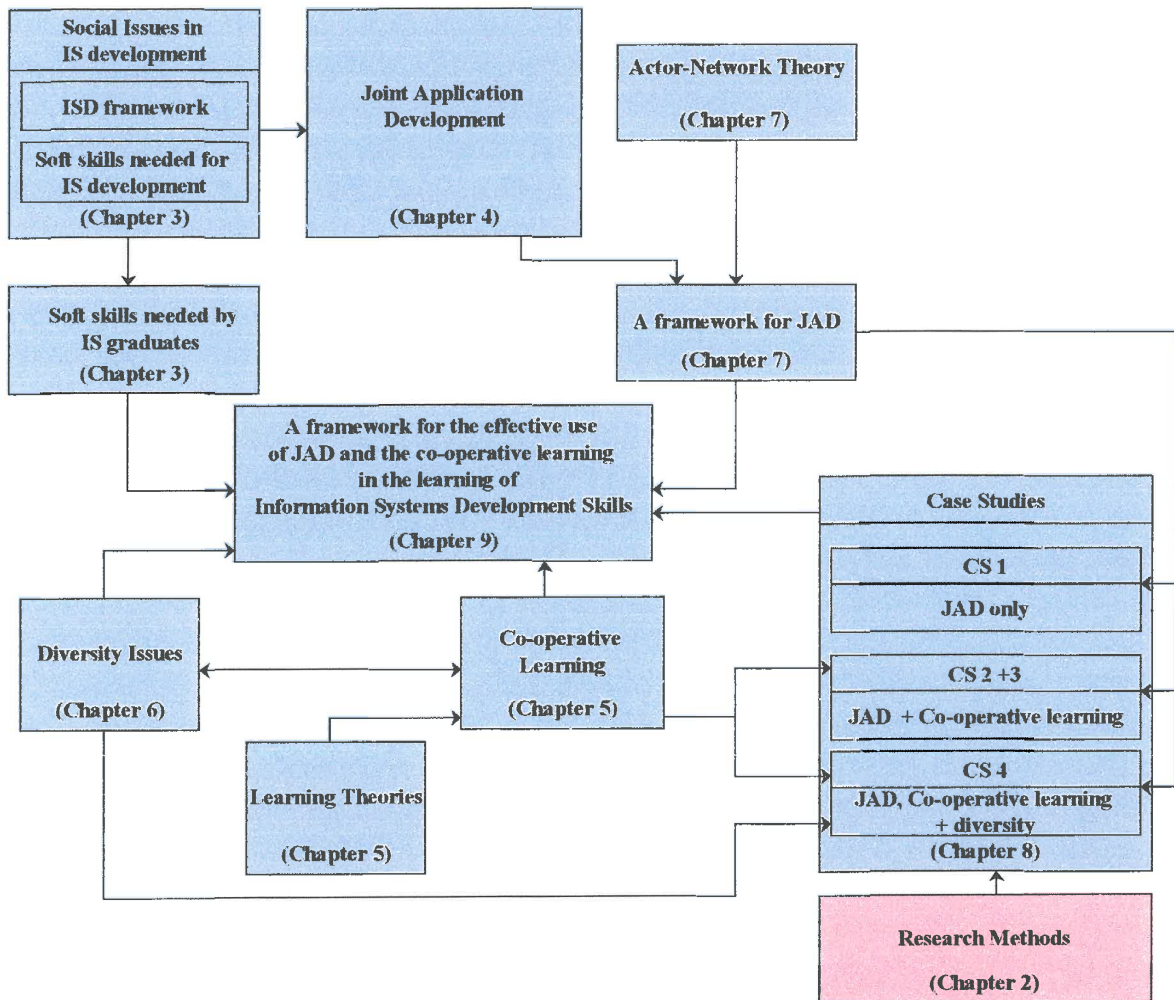
Chapter 9 presents the final framework and completes the answers to the questions addressed in Chapter 8.

Chapter 10 revisits each of the research questions and shows how they were answered. The research is evaluated and ideas for future research are proposed.

The questionnaires used in the case studies are found in Appendix A. Appendix B gives some of the details of the results of the case studies and Appendix C gives some examples of the types of exercises given to the students.

Chapter 2

Research Methodology

Social Issues in IS development		
ISD framework		
Soft skills needed for IS development		
(Chapter 3)		

Joint Application Development

(Chapter 4)

Actor-Network Theory

(Chapter 7)

Soft skills needed by IS graduates
(Chapter 3)

A framework for JAD

(Chapter 7)

A framework for the effective use of JAD and the co-operative learning in the learning of Information Systems Development Skills

(Chapter 9)

Case Studies

CS 1

JAD only

CS 2 +3

JAD + Co-operative learning

CS 4

JAD, Co-operative learning + diversity

(Chapter 8)

Diversity Issues

(Chapter 6)

Co-operative Learning

(Chapter 5)

Learning Theories

(Chapter 5)

Research Methods

(Chapter 2)

Chapter 2

Research Methodology

The purpose of research is to extend knowledge. This can involve research into areas where little is known or trying to fill in the gaps in existing knowledge [Behr, 1988]. Wagner [1993] extends this by saying that research can be used to *"fill in the blank spots"* when doing research to answer questions already posed, and *to "illuminate blind spots"* when doing research that provokes one to ask new questions. He defines research as a strategy for reducing ignorance rather than a method of pursuing truth.

Research in IS, especially in the United States, has been primarily empirical over the last twenty years with almost all of the research reflecting a positivist orientation [Alavi & Carlson, 1992; Orlikowski & Baroudi, 1991; Lee, Barua & Whinston, 1997]. This means that the researchers have assumed that IS can be studied in an objective manner using the methods that have been so successful in the natural sciences.

Davenport and Markus (1999) suggest that IS researchers should emulate researchers in medicine and law rather than those in business or science in order to make sure that more relevant research takes place. Commenting on this Lee (1999) notes that medicine and law are professions rather than natural sciences. He suggests that *"Inquiry in the natural sciences pursues the goal of truth in formal propositions; inquiry in the professions pursues the goal of effectiveness in actions. Inquiry in the natural sciences produces knowledge about what the world is; inquiry in the professions produces knowledge about how to intervene in the world and change it in order to satisfy real world needs."* [Lee, 1999, p.29]

IS is about more than just technology, however, and IS research has shifted in recent years from the technological to include the social and organisational aspects [Banville,

1991; Hirschheim & Newman, 1991; Myers, 1997; Iivari, Hirschheim & Klein, 1998]. Researchers in Europe have been using alternative approaches for a number of years and have criticised the emphasis placed on quantification [Lee, Barua & Whinston, 1997; Mumford, 1991, Nissen, Klein & Hirschheim, 1991]. In natural science research the nature of the phenomena being studied does not change. In social sciences, however, researchers enter the real world and the actors in the research are affected by the research [Orlikowski & Baroudi, 1991]. Many IS and Management Information Systems' (MIS) researchers [Alavi & Carlson, 1992; Nissen, Klein & Hirschheim, 1991; Orlikowski & Baroudi, 1991; Walsham, 1995] have come to believe that using a positivist approach to research alone is restrictive. They promote the use of alternative methods to study IS and the relationships between information technology, people and the organisation.

The same problems have been found in educational research, also a social science, where researchers are also calling for more flexible approaches [Gage, 1989; Martin & Sugarman, 1993]. Martin and Sugarman [1993, p.19] take the position that *"research on teaching has been misconstrued as a primarily empirical activity and that, as a consequence, it has been overly preoccupied with question of methodology"*. Traditional educational research has been depicted as being inadequate to make any important decisions about how teachers should work in a classroom [Gage, 1989].

This chapter firstly introduces the Research Methodology terminology. The different research paradigms and designs are then described. As each one is described, its appropriateness for the study of the social sciences, and in particular, IS and Education will be discussed. This chapter only discusses designs suitable for doing in-context research. The chapter will conclude by discussing the research paradigm/s, design and methods that will be used for the doctoral study and the motivation for using them.

2.1 INTRODUCTION

Before discussing research in more detail, it is important to clarify the terms that will be used and how these relate to one another.

The term **paradigm** refers to the philosophy or school of thought that underlies the research approach. It can be seen as the beliefs and values that are shared by the research community using that paradigm [Farhoomand, 1992]. The different paradigms will be described in Section 2.2.

The term **design** refers to how the approach is handled with respect to issues like representativeness and causal attribution [Hedrick, 1994]. It refers to the way in which a person goes about doing the research. One design may use different methods or techniques [Galliers, 1992]. Quantitative designs are considered scientific and adopt such approaches as experiments and quasi experiments with representative samples and statistical analysis. Qualitative researchers are not as concerned with generalising results in their research designs. The research is often used for exploratory or descriptive research. Some designs, for example case studies, may use either a qualitative or a quantitative approach or both. Research designs will be described in Section 2.3.

The term **method** refers to how data collection occurs and what form that data will take [Hedrick, 1994]. The most important issue here is how the data exists and whether it can be quantified or whether it is qualitative. Quantitative methods tend to use systematic approaches to gathering data whereas qualitative methods are more concerned with broadening the information base. Some forms of qualitative data may be coded and used quantitatively as, for example, in text analysis of unstructured interviews [Lacity & Janson, 1994]. The research methods or techniques themselves will not be described in this chapter. Their appropriateness within the different research paradigms and research designs will be mentioned but a detailed explanation of their use is not given.

2.2   RESEARCH PARADIGMS

A paradigm can be defined as consisting of "*assumptions about knowledge and how to*

acquire it, and about the physical and social world" [Hirschheim & Klein, 1989, p.1201]. It is a fundamental philosophy or set of assumptions that allow the members of the research community to share their perceptions and engage in similar practices.

Orlikowski and Baroudi [1991] suggest three paradigms covering the three research epistimologies of positivism, interpretivism and critical.   Gage [1989] also uses the traditional/scientific (positivist), interpretive and critical theory paradigms when discussing the paradigms for educational research.

Braa and Vidgen [1999] propose the research framework given in Figure 2.1 for doing in-context IS research.   The points in the framework represent the research outcomes with prediction being aligned with reductionism as depicted by the positivistic approach, understanding being aligned with the interpretive approach and change with the intervention approach.
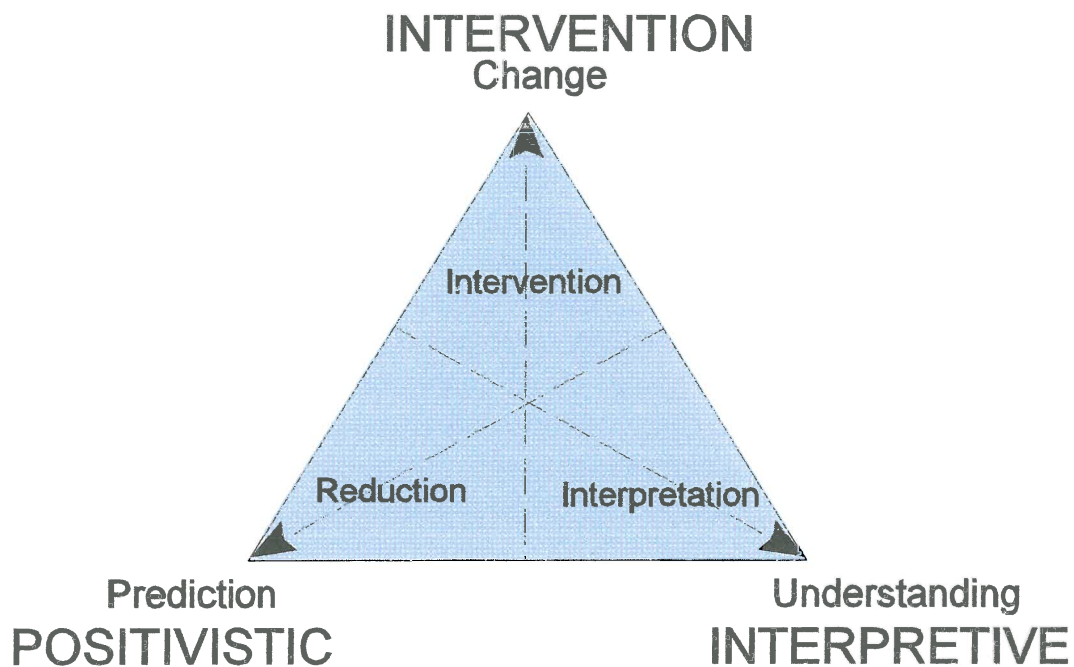
INTERVENTION
Change

Intervention

Reduction   Interpretation

Prediction   Understanding
POSITIVISTIC   INTERPRETIVE

Figure 2.1: An IS research framework for in-context research
[Adapted from Braa and Vidgen, 1999, p.28]

Prediction is shown as the outcome of the positivistic method of research as this method

is seen as being able to control and predict. Change is the outcome of intervention as this research method is motivated by the desire to improve the situation. Interpretive research should help to promote understanding of the situation being researched. The points of the triangle are seen as ideal and are not really attainable in practice, according to Braa and Vidgen [1999]. The dotted lines represent the research dynamics as movements towards or away from these ideal types. The space of the triangle implies that the three dynamics, namely reduction, intervention and interpretation are all present but with different mixes and emphasis. As the researcher moves, for example, towards a greater process of interpretation, greater understanding will be achieved.

The discussion that follows describes the three main paradigms, namely positivistic, interpretive and critical, in terms of their beliefs about physical and social reality, knowledge and the relationship between theory and practice. Beliefs about social and physical reality include the ontology (subjective versus objective), human rationality and social relations. Knowledge includes beliefs about epistemology (how knowledge is constructed and evaluated) and methodologies that are appropriate to the research paradigm. The relation between theory and practice looks at the purpose of the research in practice [Orlikowski & Baroudi,1991; Iivari, Hirschheim & Klein, 1998]. The possibility of using a pluralistic paradigm is then considered.

2.2.1 Positivist Paradigm

The positivist paradigm has its roots in natural science research. It has been linked to the so-called "scientific" approach. This approach has been very successful in the natural science field and has helped to assure quality research and build knowledge. Studies done in positivist research are usually done to test theory.

2.2.1.1 Positivist beliefs about physical and social reality

Positivist researchers assume that there is an objective physical and social world that exists independently of humans. They assume that one can objectively measure and

categorize that world. The role of the researcher is to measure dimensions of that world in order to discover the social and physical reality. It is assumed, by positivists, that all objects in the universe, whether they be inert, living, conscious or rational, can be studied in the same way and are fundamentally and qualitatively the same [Oliga, 1991].

Human action is seen by positivists to be intentional and rational. Humans are perceived to interact with their environment in a deterministic manner. The activities of man are perceived to be completely determined by the situation or environment in which he or she is found [Iivari, Hirschheim & Klein, 1998].

Positivists believe that human beings interact in stable and orderly ways. They do not see conflict and contradiction as being normal in society - they are rather seen as dysfunctional and something to be suppressed [Orlikowski & Baroudi, 1991]. Positivists believe that there is only one valid way of accounting for any social situation [Walsham, 1995].

2.2.1.2 Positivist beliefs about knowledge

The epistemological belief of positivists is that research consists of the empirical testing of theories to see if they are true or false. Positivistic researchers use controlled experiments with universal rules and impersonal procedures to gain knowledge [Oliga, 1991]. They work deductively to try to discover causal relationships and believe that one can predict and control events if one can determine that certain principles and premises explain that event. Positivists search for laws that can be generally applied [House, 1994].

Positivists tend to believe that there are only a few appropriate research methodologies from which knowledge can be obtained. The research instruments must be proved to be valid and reliable and any samples used must be representative. The use of experimental designs with subjects assigned randomly to groups and control groups is promoted. Hypothesis testing is another common method of positivist research. Surveys

are also used for data collection. Positivists believe that the "scientific method" is appropriate for all forms of research [Hirschheim, 1992].

Braa and Vidgen [1999] say that positivism tries to reduce the area of investigation in order to be able to make predictions and explanations that are reliable. In order to do this they use methods of reductionism and focus on experiments that are repeatable and irrefutable. Complexity is tackled by reductionism [Fitzgerald & Howcroft, 1998].

2.2.1.3   Positivist beliefs about the relationship between theory and practice

Positivist researchers assume a value-neutral stance. They believe that researchers must distance themselves from the research in order to objectively evaluate or predict what happens. The researcher must not get involved in moral judgements or subjective opinion [Ackoff, 1991].

Positivists believe that if they can know the general laws and can manipulate the initial conditions, they will be able to produce the desired state of affairs - whether they be natural or social. The world is believed to conform to fixed laws of causation [Fitzgerald & Howcroft, 1998].

2.2.1.4   Applicability of positivism for information systems and cooperative learning research

While the positivist approach has been successful in the natural sciences and engineering, its applicability to the social sciences and IS research has been questioned [Orlikowski & Baroudi, 1991]. Positivists try to look for universal laws ignoring the influences of history and context on humans. Aspects like time, locale, politics and culture can influence the development and use of IS and education and this needs to be recognised. Smith [1990, p.125] describes the problem this way: *"In applying natural science methods and techniques to social science problem, positivist approaches assume that social science is at a point of development whereby methods and*

techniques appropriate to explanation and prediction may be employed and that much of the complexity of social phenomenon can be ignored."

Glass introduced a BITNET electronic discussion on educational policy by saying that *"Education is no science. Nothing like it has ever yielded its mysteries to scientific investigation"* [Glass, 1993, p.17]. Educational systems have historically been seen as "machine bureaucracies" which could be studied using a positivist approach [Capper & Jamison, 1993]. Some educational researchers are questioning this and calling for alternative or pluralistic approaches [Capper & Jamison, 1993; House, 1991; Martin & Sugarman, 1993]. Smith [1994] comes out strongly against using only a positivist approach to educational evaluation, saying that it leads to distortion and oversimplification, while sacrificing relevance in order to claim to be objective and rigorous.

Despite this there have been a great number of studies in the field of cooperative learning that do try to adhere to the positivist paradigm [Slavin, Sharan, Kagan, Lazarowitz, Webb & Schmuck, 1985; Sharan, 1990; O'Malley, 1995a]. The negative view of positivism is not shared by all educational researchers. Schrag [1992] argues that even critics of positivist research must admit that they need to follow a positivist approach in order to test many of their propositions. He seems to suggest that all causal research is positivist, which is untrue according to Eisner [1992]. He says that the positivist paradigm is much more than just causal research, it also believes in separating value from fact, methodological monism and a view that ethical claims are meaningless. For these reasons Eisner deems the positivistic approach unsuitable for educational research.

2.2.2 Interpretive Paradigm

Interpretive researchers try to understand the situation being studied from the perspective of the participants. They try to gain a deep understanding of the situation and use that to inform people in similar situations. Interpretivists believe that reality is

"incapable of being understood independent [sic] of the social actors (including the researchers) that construct and make sense of that reality." [Orlikowski & Baroudi, 1991, p.13]. Interpretive researchers thus focus on the complexities of human sense making within the research situation [Klein & Myers, 1999].

2.2.2.1 Interpretive beliefs about physical and social reality

The interpretive paradigm emphasises subjectivity. Researchers try to understand the subjective meanings that participants give to situations. Our knowledge of reality is believed to be a social construction by the people who participate in that reality [Walsham, 1995]. Human beings (including researchers) will interpret a situation in different ways and if they are aiming at understanding a situation fully, then they will need to try to understand the insider's point of view [Braa & Vidgen, 1999]. There is thus no universal truth [Fitzgerald & Howcroft, 1998].

The social world is believed to be produced and reinforced by people as they interact within the organisation, groups or with each other. This means that organisations and groups cannot be studied and measured in some objective way [Orlikowski & Baroudi, 1991]. The interpretivists thus lean towards a voluntaristic view of human nature and human beings are seen as being creative in their dealings with their environment [Burrell & Morgan, 1979]. Interpretive researchers will focus on people's assumptions, beliefs and desires [Henfridsson, 2000].

The interpretivists believe, with the positivists, in orderly interaction within society but believe that this is a result of the shared norms and interests of the people involved. Cultural and political issues will affect how people interact and will also affect the shared meanings, social rules and interpretations that people experience. Interpretive researchers believe in social systems being open to more than one interpretation [Walsham, 1995]. Social reality cannot be discovered but must rather be interpreted.

2.2.2.2 Interpretive beliefs about knowledge

In order to understand social processes, the interpretive researcher believes that one has to get involved with those that participate in that process. People working together will share language and norms and in order to understand their social reality and gain knowledge, the researcher must understand how these people practise and form meanings. Boland [quoted in Orlikowski & Baroudi, 1991, p.14] says that "*individuals act towards things on the basis of the meanings that things have for them, that meanings arise out of social interaction, and that meanings are developed and modified through an interpretive process*". Reasoning, ideas and spontaneous individual insights are seen as the source of knowledge [Klein, Hirschheim & Nissen, 1991].

The interpretivist does not seek generally applicable laws, like the positivist, but rather seeks understanding [House, 1994]. This understanding allows the researcher to get a basic descriptive foundation which may lead to the generation of an hypothesis [Fitzgerald & Howcroft, 1998].

Field studies are used a lot in interpretive studies as these enable the researcher to study people within their social settings. The researcher does not have pre-defined sets of constructs and measuring instruments for doing the research, but rather attempts to derive these from the study of the situation and the people involved. Experimental methods are replaced by more context-dependent observational methods [Walsham, 1995]. Qualitative techniques are used, sometimes with quantitative techniques, in order to interpret and illuminate [Fitzgerald & Howcroft, 1998].

Interpretive researchers attempt to get a rich, comprehensive, in-depth understanding of what has happened from the point of view of the participants. They try to incorporate all the available information into a pattern in order to explain and understand the situation. Inconsistent information is incorporated into the explanation rather than ignored [Datta, 1994].

Klein and Myers [1999] propose that, when doing interpretive field study research using in-depth case studies or ethnographic research, one should cater for most if not all of the following seven principles:

- Principle of hermeneutic circle - This suggests that understanding can only be reached by studying both between the parts and the whole of the phenomenon.

- Principle of contextualisation - The social and historical context of the research must be taken into account in the research situation.

- Principle of interaction between the researchers and the subjects - This requires critical reflection on how the research materials were constructed and what the interaction was between the researcher and the subjects.

- Principle of abstraction and generalisation - Theoretical abstractions and generalizations should be carefully related to the context-specific situation being studied. Giving rich insight helps readers to know if they can abstract and generalise to their situation.

- Principle of dialogical reasoning - This principle suggests that the researcher must be sensitive to possible contradictions between the theoretical preconceptions and the actual findings.   Any preconceptions or prejudices of the researcher should be confronted and related to the results achieved.

- Principle of multiple interpretations - The researcher should acknowledge and be sensitive to the fact that the different participants in the research might have various interpretation of the situation being studied.

- Principle of suspicion - The researcher must be aware of possible biases and distortions in the stories told by the participants.

They say that these principles must not be thought of as mandatory, but should be used as a guide by the researcher in determining what is appropriate for his or her research. These principles will be explained further where they are used to evaluate the research in the final chapter.

2.2.2.3   Interpretive beliefs about the relationship between theory and practice

Interpretivists believe that the researcher can never be neutral and will always be involved in the situation being studied. The researchers' prior beliefs, values and interests will always influence their research. The researcher interacts with the actors in the situation being studied and comes to share a set of meanings about the situation [Orlikowski & Baroudi, 1991].

2.2.2.4   Applicability of interpretivism for information systems and education research

Walsham [1995] describes a shift in what mainstream MIS journals are saying that they will accept from positivistic research alone to include interpretive research. Henfridsson (2000) believes that interpretive research is particularly useful to the IS researcher wanting to understand IS in a cultural and social context., however.

Educational researchers are also recognising that multiple interpretations of reality are possible and that subjectivity is unavoidable [Capper & Jamison, 1993]. Gage [1989] says that interpretive research will help us examine the meaning created by students and teachers and this can form a basis for explaining the differences among students' achievement and morale.

Some criticisms of the interpretive paradigm are that [Orlikowski & Baroudi, 1991; Jackson, 1991]:

- It does not examine the external conditions that give rise to certain meanings and experiences.
- It does not explain unintentional consequences of actions.
- It does not address structural conflicts and contradictions in society. It cannot explain why participants' accounts of their behaviour are inconsistent with their actual behaviour.
- It is limited in its ability to bring about change in social systems.

It does, however, allow a deep understanding to be gained of a particular situation and helps to get varying viewpoints of the situation being researched.

2.2.3 Critical Theory Paradigm

The primary objective of critical theory, according to Ngwenyama [1991], is that of improving the human condition. The critical theory researcher tries to investigate the social reality and critically evaluate and transform it. The researchers use research to reveal any conflicts and contradictions within the system being studied and then try to overcome these problems through their understanding.

The word "critical" need not necessarily have negative connotations, but rather involves the examination of reality and becoming self aware [Boughey, 1998]. Critical research is usually started as a response to the experiences, desires or needs of an oppressed group of people [Lather, 1986]. Fien and Hillcoat [1996] mention three related objectives for critical inquiry, namely scientific understanding, social critique and social transformation. This suggests that the research carried out must be scientific, critical and practical.

2.2.3.1 Critical theory beliefs about physical and social reality

Critical theorists believe that although social reality is produced and reproduced by humans, it also has objective properties. They thus see both the subjective and objective sides of social reality. While the other paradigms are satisfied with understanding and analysing the status quo, critical theory tries to find alternatives to the status quo.

Critical researchers maintain that our subjective views are not only internally constructed but are also influenced by outside social forces. This means that individuals should not be considered outside of their social context [Fien & Hillcoat, 1996]. The goal of critical inquiry is to alleviate oppression making people aware of who they are and making them

conscious of themselves as people with a choice [Lather, 1991].

Social relations are seen as based in history and must be studied in this context. Social forms will have contradictions, inequalities and conflicts and these must be exposed by research so that new social forms can emerge.

People are thought to be the creators of their world and they can change that world if they wish [Ngwenyama, 1991]. Critical theorists perceive man as being able to understand himself and what he has become through society, **but** man can also liberate himself and this contributes to a better society [Boughey, 1998]. Central to critical research is self reflection and the gaining of a deeper understanding by the people being researched [Lather, 1986].

Critical theorists see society as an oppressive social system which needs enlightenment and emancipation of the oppressed individuals [Jablonsky, 1991]. Human beings are perceived as dominant or dominating figures and an awareness must be created of this in order to eliminate it. This is based on Marxist theory. Critical theorists often assume that this conflict is between management and labour and ignore the fact that other factors like race or gender could also lead to dominating social relations [Orlikowski & Baroudi, 1991].

Social reality is seen as a system which must be looked at in totality and where the parts cannot be studied in isolation but should be studied in the context of their relationships within the system. Organisations, for example, need to be studied in the context of the industry, society and nation wherein they operate.

2.2.3.2 Critical theory beliefs about knowledge

Knowledge is grounded in social and historical practices. Critical theorists believe that they need to understand the language of the people they are studying but also believe that this is bound by time and space. Historical analysis is necessary in order to

understand the situation. Interpretation of the social world is not enough, the conditions of domination in that world must also be understood. This means that the knowledge gained from this research is usually not generalisable but is used to "*illuminate the forces that work in society as a totality*" [Orlikowski & Baroudi, 1991, p.20].

The knowledge gained by critical theory research will not necessarily be generally valid as it is valid within the limits of the interconnections and consequences found in the situation being researched. This knowledge will change over time and any predictions made will only be able to be realised by the purposeful actions of people [Thomas & Lockett, 1991]. Critical inquiry is often concerned with studying the "oppressed" as they are in a process of transformation [Lather, 1986].

Methodology is viewed by critical researchers as inherently political and is often tied to issues of power and legitimacy [Lather, 1991]. Critical theorists tend to use longitudinal studies including long-term historical studies and ethnographical studies. Quantitative methods are seldom used. Critical system thinkers advocate the use of pluralistic methods where the different research approaches are used in a complementary fashion [Schecter, 1991].

Research methods are required to be practise-oriented, focussing on change. They must support inquiry into both the organization and the social context. The methods should support individual and organizational needs. Research methods must be collaborative in that the participants must be able to adapt the research to their needs. The methods must allow for critical self-reflection [Ngwenyama, 1991]. Methods like action research, discourse analysis and critical ethnography are applicable in the critical paradigm [Fien and Hillcoat, 1996].

2.2.3.3 Critical theory beliefs about the relationship between theory and practice

The role of the researcher in a critical theory research situation is to determine the problems, contradictions and conflicts of the status quo. This should then be used to

initiate change and help to eliminate these problems. Researchers cannot avoid bringing their values into the research as all scientific knowledge is socially constructed [Ngwenyama, 1991]. The role of the researcher is, therefore, to study and theorize in order to effect a change in what is being studied. This is depicted in Figure 2.2.
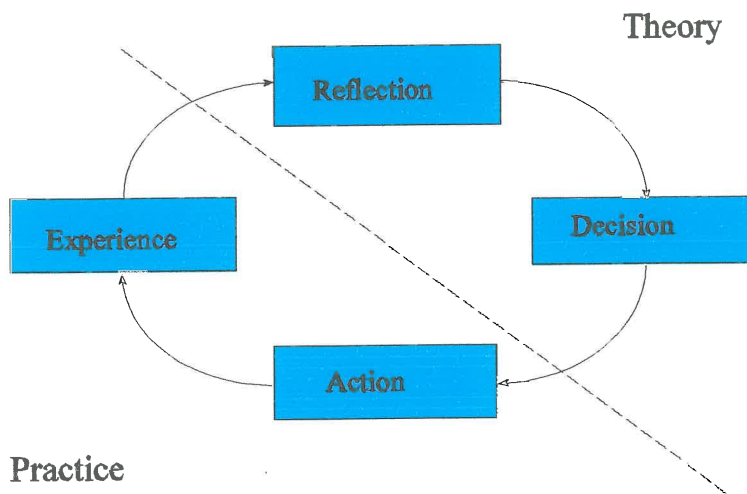

Figure 2.2: The Critical Social Theory and Practice Change Process [Ngwenyama, 1991, p.272]

Theory and practice cannot be separated by the critical theorist as the point of research is not just to analyse or interpret what is happening in the world, but to change it [Thomas & Lockett, 1991]. The results of a critical inquiry would suggest why people should change but the subjects must be given an opportunity to reject that change. The participants must be able to critically reflect and react to the researchers findings.

Critical research must be scientific, critical and practical [Fien & Hillcoat, 1996]. "*A growing concern of critical social science discourse is how to generate knowledge in ways that turn critical thought into emancipatory action.*" [Lather, 1991, p.12]. It can be a problem if researchers with liberal intentions impose their own meanings on situations. It is thus important that the meaning of a situation be negotiated with participants in the research [Lather, 1991].

The process of research should be a self-sustaining process of analysis, reflection and action over a period of time [Lather, 1986].

2.2.3.4 Applicability of critical theory for information systems and education research

A critical researcher of IS will study the information system and its place in the industry, society and culture within which it is found. This is a paradigm that recognises the complexity of systems like information systems.

The critical theorists emphasise power in society and the function of the schools in defining that power. Critical researchers in education stress how schools have traditionally served the interests of the dominant social class [Gage, 1989]. Educational research, from a critical perspective, is geared towards changing this so that people are properly educated and motivated rather than dominated by the system.

Gibson [quoted in Fien & Hillcoat, 1996, p.28] suggests that teachers should be interested in critical theory because it can help answer many of the questions that concern them such as:

> "*Why do some children persistently fail at school? Why are some pupils so unmotivated and so difficult in the classroom? Why do we teach what we do? Why are schools organised as they are?*"

They go on to suggest that critical theory is important to educational researchers as it can help to explain the origins of everyday practices and problems. It also helps foster better relationships with the classroom and move towards a more rational society. "*Critical educational research is grounded in a vision of social change and democratic values, in that it seeks to empower teachers and students to participate in programmes of research.*" [Fien and Hillcoat, 1996, p.29].

2.2.4 Pluralistic Approaches

Paradigms can be restrictive in that they can rigidly define a field, thus determining what should be studied, what questions must be asked and what rules must be followed to interpret the answers. A paradigm can restrict a scientist and cause him/her to observe only what the paradigm says should be observed and put other factors away as irrelevant. This could limit the progress of the field [Banville & Landry, 1989]. A paradigm should rather be seen as "*a lens to illuminate research issues, not as blinkers to help achieve closure."* [Fitzgerald & Howcroft, 1998].

As information systems are seen from a wider perspective to include technological, social and organisational factors, the research area has become more complex, imprecise and ambiguous. This has led to a need for using the interpretive and critical approaches as well as the more traditional positivist approach. Alavi & Carlson [1992] believe that a plurality of approaches will be important to progress in the field as researchers will be able to gain greater insights. This is echoed by Achterberg, van Es & Heng [1991] who suggest that as IS includes the study of so many different disciplines, it should include the methodologies of those disciplines and form hybrid methods if necessary.

Braa and Vidgen [1999] proposed the triangle given in Figure 2.1, as a framework for in-context research in IS. They say that achieving the "ideal" interpretive, intervention or positivistic research method is impossible in research carried out in an organisation. The containment of the triangle is seen as implying that all three dynamics are present regardless of the research method used.   They do not believe that a hybrid method of doing research that satisfies all the needs of change, prediction and understanding and is in the middle of the triangle, is possible. Although this would be great for multi-disciplinary research, it is not possible to maximize all of these. If one wants to have a well-designed experiment, then realism will have to be forfeited to some degree, for example. It is also not possible for a researcher to make interventions and be part of the change process, while also being an objective observer and produce rigorous results in

the positivistic tradition.

The call for multiple paradigm approaches is also reflected in research on educational evaluation [Smith, 1990; Salomon, 1991]. Smith [1994, p.43] says that multiple approaches are the *"only path to rapprochement and true synthesis in the field"* . This is supported by Martin and Sugarman [1993, p.19] who go so far as to say that pluralistic methods are signs of a *"natural and mature state"* in educational research. Multiple paradigms can complement each other rather than being opposing [Salomon, 1991].

Klein, Hirschheim and Nissen [1991] have proposed that there are four approaches to using more than one paradigm or research method. These are:

- The advocates of contingency in research believe that there are a range of research methods, each with their own strengths and weaknesses and that the choice should be made depending on the focus and objectives of the research.

- Pluralists believe that different research methods can be used on the same problem and that each should be judged on its internal merits. Looking at a research problem from different perspectives will allow one to gain different insights.

- Eclectics believe that there are different methods appropriate to a particular research situation but that one can pick and choose methods to build an approach that is best suited to the problem.

- Dialectics try to synthesis the opposing approaches of positivism and anti-positivism (which includes interpretivism and critical theory) and conserve some of the best ideas of both.

Walsham [1995] proposes that the positivist and interpretive approaches are not really opposed and can be reconciled. He claims that there are three levels at which we must try to gain understanding:

- the subjective understanding of the people involved in the social situation;

- the interpretive understanding that the research gains from interacting with the participants; and

- the positivist understanding from testing in an objective manner those understandings.

This would support the idea that a synthesis of the two approaches is possible.

2.3   RESEARCH DESIGNS FOR IN-CONTEXT RESEARCH

The research design determines how the research is carried out within the constraints of the paradigm chosen.   The different designs can be implemented using one or more different research methods.   The term design thus refers to the basic plan or strategy of the research and the logic behind it [Oppenheim, 1992].   Braa and Vidgen [1999] propose the diagram in Figure 2.3 to show how some of the research methods fit into their framework presented in Figure 2.1.   They say that field experiments are used mostly for prediction, case studies to get understanding and action research to change the situation being studied.   Hard case studies are not purely positivistic or interpretive and are a mixture of understanding and prediction.   Quasi-experiments are a mixture of prediction and change.   The action case study is a term that they have labelled themselves and they see this as a hybrid of understanding and change.   Techniques like
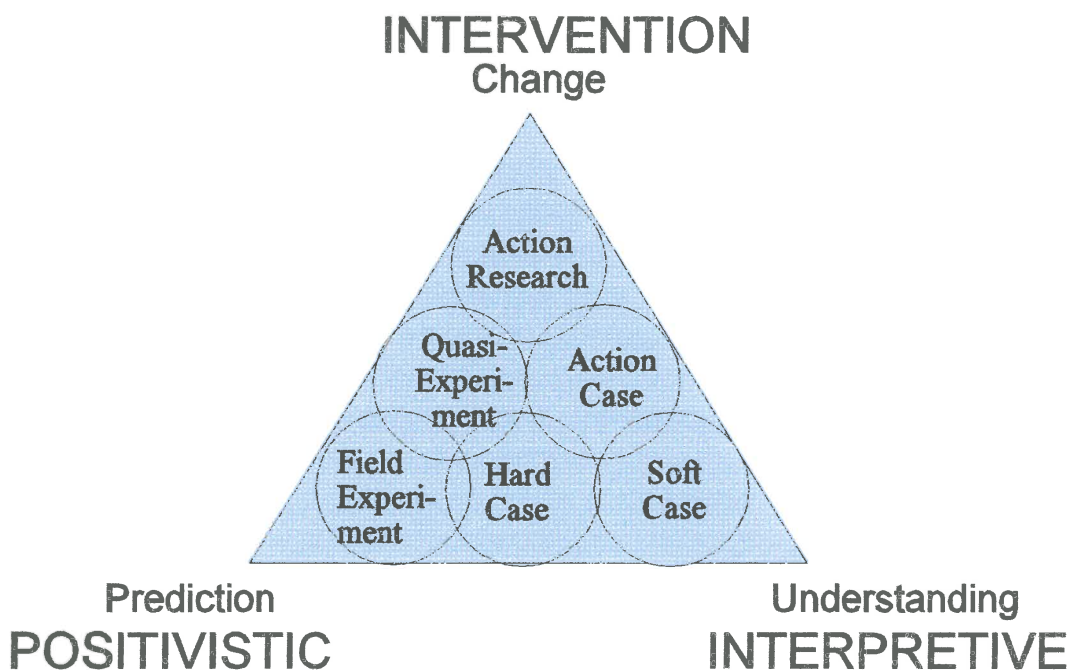

Figure 2.3: Methods to use for in-context IS research
[Adapted from Braa and Vidgen, 1999, p.32]

surveys and interviews are seen as orthogonal to the triangle.

This discussion does not try to be exhaustive but chooses a few of the more prominent research designs used in in-context IS and educational research and gives an overview of their structure, their weaknesses and their strengths.

2.3.1 Survey research

Surveys are seen by Braa and Vidgen [1999], as being orthogonal to their framework as they can be used in any of the three research paradigms. Surveys are undertaken at a particular point in time using questionnaires or structured interviews. Their purpose is to obtain information about prevailing conditions in a planned way [Behr, 1988]. Surveys may be taken from an entire population or from a representative sample of the population [Wynekoop & Conger, 1991]. The survey can collect data from a large number of people at one time. It is not concerned with individual cases but with the overall statistics, and quantitative techniques are usually used to analyse the results [Behr, 1988].

Surveys enable the researcher to investigate many more variables than would be possible with the experimental approaches [Galliers, 1992]. If the samples are properly chosen, the results can be generalized to wider populations [Wynekoop & Conger, 1991].

Surveys are most appropriate when [Pinsonneault & Kraemer, 1993]:
- We want to determine what, how much of and how many, or even how and why, something is happening;
- the control of the independent and dependent variables is not possible or not desirable;
- the phenomena to be researched are studied in their natural setting; and
- the phenomena to be studied occur currently or in the recent past.

Weaknesses of the survey method occur if the sample sizes are too small; if the

respondents are unwilling and give inaccurate answers; or if the respondents are only those who want to respond and the sample becomes biassed in one direction [Wynekoop & Conger, 1991; Galliers, 1992]. The populations of any samples must be "*carefully chosen, clearly defined and specifically delimited in order to set precise parameters for ensuring discreteness of the population.*" [Leedy, 1993, p.187].

Surveys usually give little insight into the causes or the processes behind what is being studied as they are only able to report that a relationship exists and not prove that the relationship is causal [Oppenheim, 1992].

2.3.2 Experimental designs

The purpose of experimental research is to test a belief or hypothesis in a given situation or under given conditions. An experiment consists of objective observation or measurement of variables under carefully designed conditions [Behr, 1988]. The experimental design assesses the cause and effect relationship within a system of controlled conditions [Leedy, 1993].

Experimental designs attempt to identify the precise relationship between different variables. This is often done in a designed laboratory situation but may be done using field experiments [Galliers, 1992]. The experimental method must define the relationship to be investigated and then two groups must be set up, namely an experimental group and a control group. The two groups must be similar in every respect except for the factor being investigated [Behr, 1992]. Subjects are often randomly assigned to groups or matched in the hopes of reducing differences. As may be expected setting up two similar groups is problematic especially for field experiments.

The researcher manipulates the treatment variables (independent variables) to determine what happens to the dependent variables. Variables that are not part of the experiment are assumed to have zero impact [Galliers, 1992].

Two types of experimental designs can be used in in-context research, namely field experiments and quasi-experiments. Field experiments fall within the positivistic paradigm and quasi-experiments between the positivistic and intervention paradigms [Braa & Vidgen, 1999].

Field experiments

Field experiments are an extension of the laboratory experiment into the real world. An attempt is made to construct the experiment in a more realistic environment. They, like the laboratory experiment, use experimental and control groups with extraneous variables being controlled [Wynekoop & Conger, 1991]. The field experiment also tries to identify precise relationships between the chosen variables and uses quantitative analytical techniques to study the situations [Braa & Vidgen, 1999]. They are seen as positivistic and aim to predict results as shown in Figure 2.3.

Field experiments have the advantage that they take place in a more realistic environment, but it is usually difficult to get two groups that are similar to make a control group and an experimental group. It is also very difficult to control the situation sufficiently to assure replication if only the treatment variables are altered [Galliers, 1992]. The major difficulty, according to Wynekoop and Conger [1991] is that of finding, matching and coordinating the research at different field sites.

The experimental approach has been used extensively in cooperative learning research with field experiments being widely used [Slavin et al., 1985; Sharan, 1990; O'Malley, 1995]. Many authors do acknowledge the difficulties in trying to have an experimental and a control classroom that match in every respect except for the cooperative learning, however [Lazarowitz & Karsenty,1990; Knight & Bohlmeyer, 1990].

Salomon [1992] agrees that the research situation in cooperative learning is not one where there is a single or few independent variables that you can relate to a specific independent variable with everything else held constant. The cooperative learning

classroom is "*a complex package of interdependent and mutually defining variables each of which is 'independent', 'mediating', and 'depending' at the same time*" [Salomon, 1992, p. 65].

Quasi-experimental approach

The Quasi-experimental approach is an adaption to the 'true' experimental approach. In a field experiment, one would either have multiple treatments, or one would have one treatment and a control group. Randomization and experimental control are kept as near as possible to the laboratory experimental approach. The quasi-experimental approach does not meet these three criteria but still tries to preserve as much of the experimental approach as possible [Braa & Vidgen, 1999].

The quasi-experimental approach recognises that there are situations where random selection and assignment are not possible. This means that the design of the experiment must take into account the variables that the design is unable to control [Leedy, 1993].

2.3.3 Action Research

Bastide [quoted in Thomas & Lockett, 1991, p.87] says that "*The truth is that which our revolutionary action verifies... theoretical knowledge develops at the same time as practical knowledge.... Human intervention in social reality is both action and science at once, since it permits us at the same time to change the world, and, in changing it, to discover it.*"   Action researchers realise that complex social situations cannot be reduced for study. It tries to study a complex situation by introducing changes to the process and studying the effects of those changes [Baskerville & Pries-Heje, 1999]. Davison and Vogel [2000, p.7] call action research a "*change-oriented research methodology that seeks to introduce changes with positive social values, the key focus being on a problem and its solution.*"

Action research attempts to contribute to the people concerned in the situation being

researched while also adding knowledge to the social field being studied [Thomas & Lockett, 1991]. Action research can help to build theory and descriptions within the context of practice itself [Braa & Vidgen, 1999]. The researcher works with the participants in a collaborative manner to inquire into the problems of the situation and to learn from that inquiry [Jönsson, 1991]. Action research allows participants to find out the meaning of what they do [Achterberg, van Es & Heng, 1991].

Action research is guided by the following principles [Kember, 1997, Ngwenyama, 1991]:

- It is concerned with social practice.
- The researcher is a participant in the process. Researchers work with participants in a collaborative action for learning and to support change.
- The aim of the research is to improve the process. In order to do this researchers practise critique of the status quo and a search for alternatives to it.
- It is cyclical.
- It promotes systematic inquiry.
- It requires a critical reflection and self-awareness.

Action research can be interpretive or critical [Jönsson, 1991]. No attempt is made to be objective as the researcher is involved in the object of his/her research. The output from action research projects will be specific to the situation being studied but may include output that can be applied in other situations. Action research cannot always be planned as the researcher must be prepared to adapt to what happens in the research situation [Baskerville & Pries-Heje, 1999].

Checkland [1991] establishes 7 steps to the process of action research. These are depicted in Figure 2.4. Checkland and Scholes [1990] have used action research extensively for their research into the soft systems methodology. Much of their work has been in the field of ISD.

Action research shares with the critical theory paradigm the following assumptions [Ngwenyama, 1991]:
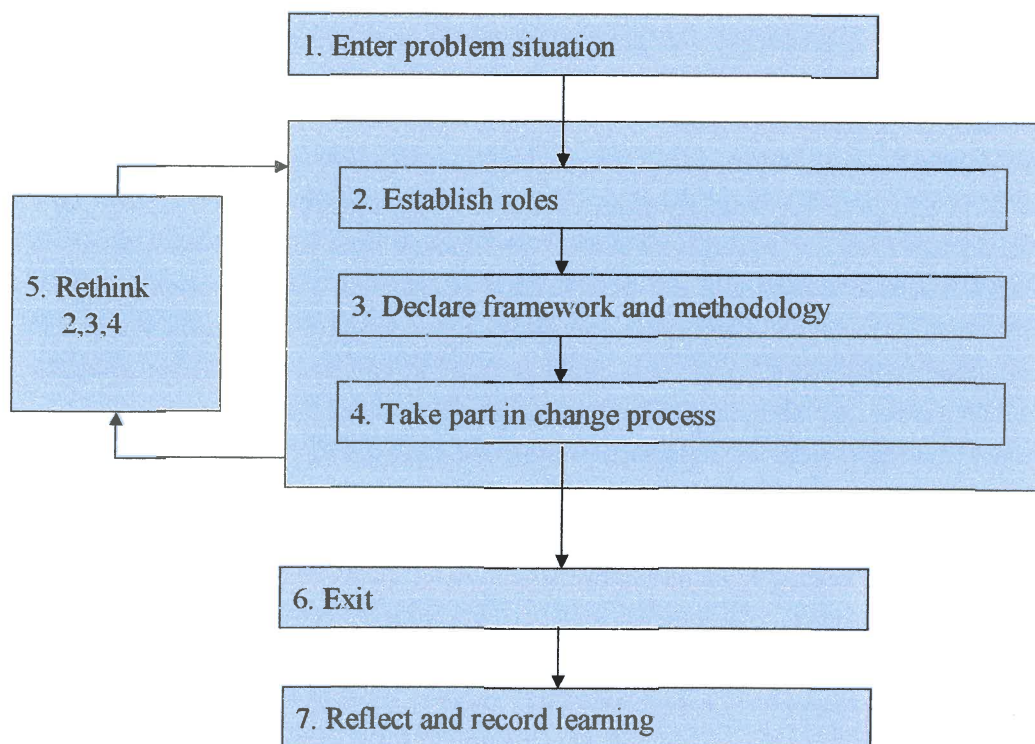
Figure 2.4: The process of action research
[Adapted from Checkland, 1991, p.402]

- critique of the status quo and a search for alternatives to it;

- collaborative action for learning and to support change;

- participation by individuals in the creation of their social world; and

- critical self-reflection in order to improve self-awareness and promote transformation.

There has been a move in educational research towards regarding the teacher as a producer or mediator of knowledge rather than just a recipient of research [Richardson, 1994]. Action research, in the educational sphere, is used for practical inquiry on the part of the teacher or practitioner. The practitioners become systematic in thinking about their problems, collecting and analysing data related to those problems and through this try to understand and improve their practice of teaching [Richardson, 1994]. The

research is used to suggest new ways of looking at the problem and possibilities for changes in the practice rather than as a means of developing general laws. Formal research can be done in conjunction with action research. This will help teachers to apply the research in their teaching instead of regarding formal research as irrelevant to their day-to-day practice.

2.3.4 Case Studies

Case studies are intensive evaluations of individuals, groups, organisations, systems or tools in their natural setting. The main purpose of case studies is for explanation, description and hypothesis generation [Wynekoop & Conger, 1991]. They are used for investigation and interpretation of the attributes, characteristics and behaviour patterns of the entity [Behr, 1988].

Braa and Vidgen [1999] differentiate between hard case studies and soft case studies. They say that **soft case studies** are used within the interpretive approach. They must use plausible and logical reasoning in order to describe results and draw conclusions. The aim of the case study is to gain understanding rather than to have a representative case from which generalities can be extrapolated. Soft case studies depend on the plausibility of logical reasoning used to describe the case study results in order to draw conclusions. **Hard case studies**, on the other hand, try to put a more positivistic method to the study of the case although they are still not able to control variables and behaviour.

Case studies can be used in a variety of ways. Critical cases can be used to explore hypotheses or deviant cases can be studied to show problems with hypotheses. A case study can be used to show threats to generalising. Multi-case studies can be used to make logical conclusions and provide support for theories. One can study cases at different sites or over different time periods. Choosing case studies with divergent properties can be useful if one is trying to discover explanations but will limit the ability to generalise results. Using interpretation techniques for case studies can help to clarify

and understand complexities [Firestone, 1993; Peshkin, 1993].

The strength of the case study approach lies in its ability to capture reality at a deep level and in great detail [Galliers, 1992]. The capture of rich data enables the results to be used for explanations, developing new concepts, elaborating on existing concepts, providing insights, clarifying complexity and developing theory [Peshkin, 1993].

One of the weaknesses of the case study approach lies in its restriction to a single individual, group or organisation which means that it is difficult to draw generalisations from the individual case study. Firestone [1993] maintains that one can have a form of generalisation from case studies using a method called case-to-case transfer. Case-to-case transfer occurs when a person in one setting adopts a program or idea from another setting. If one is to do this then a person must make sure that the original case study is factual, appropriate, reasonable and that the case study can be more generally applied. It should not only have worked because of the specific conditions of the study. The onus of deciding to apply findings from one case study to another situation is left to the reader - not the case study researcher. The researcher must supply a rich, detailed, thick description of the case so that readers can draw their own conclusions. Peshkin [1993] supports this, saying that the goal of case studies is not to generalise so that one can create theory but is rather to describe what is happening as accurately as possible. It is left to the reader to determine how to apply the case in new contexts.

Some authors [Galliers, 1992; Wynekoop & Conger, 1991] claim that a further weakness of case studies is that one is not able to determine cause and effect in a case study approach as control of the variables is usually problematic.

Smith [1990] questions the argument that case studies should only be used for the "exploration, classification and hypothesis development stages of the knowledge building process". He says that this assumption is based on the criticism of case studies being unrepresentative. Smith differentiates between two types of inferencing, namely, statistical inferencing and logical inferencing.

- Statistical inferencing draws conclusions about the relationships between variables in a large population based on the study of a sample of that population.
- Logical inferencing draws conclusions based on some systematic explanation or theoretical propositions.

Case studies use logical inference rather than statistical inference, so the question of representativeness is irrelevant, according to Smith [1990]. The selection of cases are, therefore, not so much by how representative they may be, but rather for their explanatory power.

2.3.5 Action Case

The term action case was used by Braa and Vidgen [1999] in order to refer to case studies that are a hybrid of those aiming to gain understanding and those wanting to effect change. (See Figure 2.3.) This method is a trade-off between the researcher being someone who can make interpretations and bring understanding and the researcher being involved in creating change in practice. Action case tries to gain a deep contextual understanding of a particular case and then to question events and apply new concepts, thus marrying action research and case studies without doing full-scale action research projects.

2.4 RESEARCH METHODOLOGY FOR THIS STUDY

This study attempts to determine how the techniques of JAD (Joint Application Design) and co-operative learning can be used within the classroom and to research if the techniques can be effective for learning and for developing the social skills needed by students. The method will be studied and modified in order to develop a framework to illustrate how these techniques can be used effectively within the classroom.

2.4.1 The Research Paradigm for this study

The situation to be studied was a complex one where the researcher was involved in the situation as a lecturer.   An objective approach was, therefore, not possible.   The cultural background of the students and their situation were expected to influence the research and were not controlled.   The research attempted to study the changing students in their changing environment.   The positivist approach was thus rejected as an option in this study. This did not mean, however, that no quantitative techniques were used.

An interpretive approach was thought to be applicable to the study.   The researcher attempted to understand the subjective meanings that the students gave to the situation. While some quantitative results were used, most of the understanding was reached by allowing the students to use their own words to describe their experiences from their own perspective.   It was believed that the cultural and political backgrounds of the students would affect their experience and this too was studied.

The purpose of the research was not to create generally applicable laws but to give a rich understanding of the process of learning, using the JAD and co-operative learning techniques and the students' experiences of that process.   This is in line with the interpretive paradigm which believes that the purpose of research is not generalisability but rather understanding.

The research was designed in cyclical fashion using the process of reflection, decision, action and experience but the purpose of the research was not to emancipate the oppressed. Thus although there may be a hint of the critical paradigm, the research is thought to be essentially within the interpretive paradigm.

During each case study an interpretive approach, without intervention, was practised. The students' experiences of the learning environment were studied in order to gain understanding. These experiences were then used to analyse the problems that some

of the students experienced as well as to determine which students were experiencing the problems. These problems then led to reflection and further literature studies to determine how the learning environment should be adapted.

2.4.2 The Research Design for this study

The research design determines how the research is carried out within the constraints of the paradigm chosen.   The paradigm is interpretive which means that methods like case studies, action case or possibly even action research are possible.

The research was done using the action case study approach described by Braa and Vidgen [1999]. The action case study used a series of case studies. During each case study the situation was studied in order to get a deep understanding of the situation. Modifications were then made to the learning method to overcome any problems. The actor-network theory (described in Chapter 7) was used to analyse the situation and to create a framework for the learning environment. The modified method was then used in the subsequent case studies.

The action research design is able to combine the theoretical and the practical.   It is a design that allows one to gain an understanding of the situation and to search and test alternatives. Action research also fosters participation. Action case studies also have these characteristics.

Case studies can be used in their natural setting. This allows for a more real situation than if a laboratory setting were used. The students were divided into classes based on the subjects that they take, rather than randomly. This precluded using an experimental approach.   The case study was felt to be an ideal design for gaining a deep, rich understanding of the learning environment.   The situation is a complex one, as mentioned before, and this complexity could be studied intensively using case studies. The action case study allowed the researcher to look at each case study critically in order to determine how the framework for the effective use of JAD in the multicultural

classroom should be adapted.

Carbonne and Kaasbøll [1998] suggest that validity and credibility of research in education are enhanced by gathering data from more than one source, by using observers and by carrying out several cycles in an iterative development. These suggestions were used in this study.

2.5   CONCLUSION

"When we judge a research project solely on the apparent truthfulness of its parts, we neglect its larger purpose: generating new knowledge about education and schooling" [Wagner, 1993, p.15]. This does not mean that the researcher should not be truthful but rather that the researcher should explore different approaches to truthfulness in order to gain knowledge. There is a lot of debate about which paradigm, design or method is best. It would seem that the different paradigms can be complementary to one another, that the best design or combination of designs and methods should be used according to the research questions being asked.

This study tries to develop a framework for the effective use of JAD techniques in the classroom. Carbonne and Kaasbøll [1998] suggest that a study like this should include a comprehensive document of the students' experiences and thoughts as well as the lecturer's model or theory of the students' learning, the lecturer's strategy for lecturing and detailed accounts of how to teach using the strategy. This thesis will attempt to do this.

The next four chapters answer some of the what and why questions posed in the first chapter. First the social side of ISD is discussed, then the JAD process as it is used in industry. The following chapter describes the educational theories and co-operative learning strategies, followed by a chapter discussing the issues around handling diversity in the classroom. These chapters form the background to the literature that was used in the research.