

CONCEPTUAL CHANGE IN A CONTEXT OF COLLEGIAL CONSULTATION:  
A CASE OF TWO SECONDARY TEACHERS

by

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## ABSTRACT

This case study is based upon the experiences of Tim and Joe, two experienced, competent, reflective, secondary teachers who chose to engage, for the first time, in observing and discussing one another's lessons. The purpose of the study was to gain some insights into how teachers learn from each other and, more specifically, to describe the processes involved in teachers' conceptual change within a context of collegial consultation. It was hoped that framing collegial consultation in terms of teachers' conceptual change would demonstrate the value of such an activity, inform the collegial practice of teachers, and enable those who would facilitate this means of professional growth. Data consisted of field notes on observed lessons, transcripts of post-observation conferences, and transcripts of stimulated recall interviews conducted with each participant on each conference. These data were collected through four rounds of observation and were analysed for participants' conceptions and conceptual change, using the constant comparative method described by Glaser and Strauss (1967) and elaborated by Lincoln and Guba (1985). A constructivist perspective on learning (e.g. Von Glasersfeld, 1989) and a theory of conceptual change proposed by Posner, Strike, Hewson, and Gertzog (1982) informed the analysis. The results of this analysis were descriptions of some aspects of the participants' conceptions of teaching and collegial consultation, three examples of conceptual change, and a more detailed 'story' of conceptual change. Findings were constructed with respect to the nature of participants' conceptions, evidence of conceptual change, the process of conceptual change, events that contributed to conceptual change, and factors in the collegial relationship that seem to be associated with conceptual change. The findings of the study led to the general conclusions that (1) teachers will attempt to make sense of an anomalous situation by constructing an intelligible and initially plausible 'new' conception that resolves or explains the

anomaly and (2) collegial consultation provides teachers with opportunities for experiences that initiate and enable such conceptual change. In addition to these two general conclusions, the findings of this study led to eight specific conclusions--four with respect to the process of conceptual change, and four 'parallel' conclusions with respect to collegial consultation.

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# **CHAPTER 1**

## **INTRODUCTION TO THE STUDY**

When introduced, some years ago, to a constructivist perspective on learning and the notion of conceptual change, I found them to be what can only be described as 'intuitively appealing'. These ideas made more sense of my own experience, as both teacher and learner, than other conceptions with which I had attempted to work. As a teacher, I became aware that students come to class with their own ideas, that these ideas are legitimate (being the products of the students' own experience of the world), and that some new experience (perhaps discrepant or anomalous in nature) would probably be necessary for them to want to change their ideas. This provided a whole new outlook on life in the classroom and my focus there shifted from ways of teaching to ways of learning. I came to see teaching as somehow facilitating students' learning and changed my practice accordingly. In time, I began to wonder whether this perspective might be fruitful in seeking to understand the teacher as learner, and consequently teacher change. As a result, I began to reflect on the notion of conceptual change in the context of teachers' professional development. For example, I came to understand that teachers come to the profession with their own ideas about teaching and learning, that these ideas are legitimate (being the products of their experience), and that some new experience (perhaps discrepant or anomalous in nature) would probably be necessary for them to want to change their ideas. Perhaps this constructivist perspective would provide a way of understanding of how teachers learn, and this understanding would enable the facilitation of teacher learning and professional growth. I had many questions. What is meant by conceptual change in teachers? How might conceptual change take place? What kinds of processes are involved in teachers' conceptual change? How might conceptual change be enabled? Does conceptual change occur at all?



An opportunity to explore questions such as these was provided by the teacher development project being carried out by Dr. Peter Grimmett and Dr. Pat Crehan, through the Centre for the Study of Teacher Education at the University of British Columbia. One part of this research project studies pairs of teachers engaged in 'collegial consultation', an activity that involves two teachers in observing and conferencing on each others' lessons. Collegial consultation provides a setting for participants to engage in discourse about their own practice and has the potential to provide opportunities for conceptual change. I assumed that, just as the notion of conceptual change had allowed me to view the classroom in different and more fruitful ways, so too this perspective might provide insights into how teachers learn through interaction with a colleague in an activity such as collegial consultation.

### **Purpose of the Study**

The purpose of this study<sup>1</sup> was to gain some understanding of how teachers learn from each other in a context of collegial consultation. More specifically, the purpose was to understand and describe processes involved in teachers' conceptual change as a result of such collegial interaction. It was hoped that framing collegial consultation in terms of conceptual change would demonstrate the value of such an activity, inform the collegial practice of teachers, and enable the facilitation of this type of professional growth for teachers. The question that provided an initial focus for the study was:

- 1.0 What are the processes by which teachers' conceptual change occurs within a context of collegial consultation?

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<sup>1</sup> In order to avoid confusion, the teacher development project will be referred to as the 'project' and the study described in this paper will be referred to as the 'study'.

As Lincoln and Guba (1985) point out, while the focus of the study "defines the terrain, as it were, that is to be considered the proper territory of the inquiry" and "effectively determines inclusion-exclusion criteria for new information that comes to light" (p. 227), it might be expected that the focus will change as the study progresses.

Far from being destructive, they are constructive, for these changes signal movement to a more sophisticated and insightful level of inquiry. Thus the naturalist begins inquiry with a particular focus in mind (however tenuous) but has no qualms about altering that focus as new information makes it relevant to do so. (Lincoln & Guba, 1985, p. 229)

In this study the analysis of, or 'conversation with', the data became focussed around three, more specific questions:

- 1.1 What is it that might change? That is, what is the nature of the participants' conceptions that can be inferred from the data? And, which of these might actually change?
- 1.2 What might count as a change? That is, what evidence is there that conceptual change is taking place? And, what is the relationship between participants' conceptual change and subsequent classroom practice?
- 1.3 How might such change take place? That is, what events or conditions seem to be associated with or contribute to participants' conceptual change?

## Rationale for the Study

These days we constantly read and hear about change in education. Not so much about change that *has occurred*, but more about recommended or *proposed* change. There are many levels within the educational hierarchy, from classrooms and staffrooms to ministries of education, where such change might be discussed; but, it is within individual classrooms that such change must take place. As Fullan (1982) points out, "Educational change depends on what teachers do and think -- it's as simple and as complex as that" (p. 107). It follows that what is necessary is not only an understanding of what teachers do and think, but also of how they might *change* what they think and do. There are three areas in which the results of this study might be both informative and useful: (1) implementation of educational change; (2) encouragement and facilitation of collegial consultation; and (3) increased understanding of processes involved in conceptual change.

Although much has been written on implementation of innovations and educational change (e.g., Fullan, 1982, 1985) or the lack of it (e.g., Goodlad, 1984; Cuban, 1982, 1989), it seems that processes by which conceptual change occurs in individual teachers have not been well understood or even addressed. If implementation is 'actual use' of an innovation and an innovation is something 'new' to teachers, then it follows that teachers must undergo a process of learning whereby the innovation becomes no longer 'new' -- outside or in opposition to their current conceptions of teaching and learning -- but becomes understood, internalized to some degree, and a part of their normal repertoire of practice. McLaughlin and Marsh (1978), recognizing the central place of teachers' learning in educational change, state that "innovation is more a learning process than a systems design problem" (p. 93).

It seems to me that change might be accomplished more readily if the processes involved in individual change were better understood. Fullan (1982) points out that "real change involves *changes in conceptions* and role behavior, which is why it is so difficult to achieve" (p. 31; emphasis added). He describes the process of change as being one of learning; of making meaning within a social context, which he refers to as "resocialization" that results in change. However, we do not really understand the cognitive and affective processes involved. Fullan (1985) argues that, "Research needs to go beyond theories of change (what factors explain change) to theories of *changing* (how change occurs, and how to use this new knowledge)" (p. 392; emphasis in original). Such "changing" involves conceptual structures, e.g., change in beliefs, values, and assumptions. For example, educational innovation or reform might necessitate change in teachers' "orientation" (Miller & Seller, 1985, Eisner, 1985) to their work. This is not easily accomplished. What seems to be required is a better understanding of the processes of conceptual change itself, within a context of educational change, innovation, or reform.

Collegial interaction and the post-observation conference have been studied, or considered, from the point of view of reflection (e.g., Grimmer & Crehan, 1990), personal understanding and transformation (e.g., Oberg, 1989), and a critical perspective (e.g., Smyth, 1986, 1989). Little work has focussed on the nature of any conceptual changes which might occur in or as a result of a post-observation conference. Garman (1990) questions whether or not the post-observation conference is an "educative act" at all. This is a useful stance to take because it points to the need for further understanding of the conference in terms of learning. Collegial interaction around concerns of practice seems to have potential for teacher development, and empowerment, and therefore is something that should be encouraged. Understanding how teachers learn from each other, particularly how (and if) the experience contributes to teachers' conceptual

change, will assist those who wish better to understand, encourage, and enable such collaboration. Further, if teachers are to invest their time, energy, and expertise in collegial consultation, they should see some benefit to be gained from collegial consultation. And, if schools or districts are to allocate some of their resources for such an activity, then again there should be some benefit, in this case for the system. It is necessary, then, to be able to demonstrate both that teachers' learning and professional development may take place as a result of collegial consultation and how this learning might occur.

Students' learning as conceptual change has been studied in the context of science classrooms (e.g., Driver, 1987, Posner, Strike, Hewson, & Gertzog, 1982) and various findings have contributed to the development of a theory for students' conceptual change. This study extends the work of these researchers by utilizing and adapting a theory of conceptual change, developed largely from working with science students, and applying it to teachers involved in collegial consultation. The relationship in this context is not one of student and teacher, but rather of two colleagues, or peers, engaged in mutual examination and discussion of their actions and ideas. Thus, the findings of this study could possibly inform our understanding of how conceptual change might occur for students engaged in group work, e.g., cooperative learning or paired activities, by demonstrating how observation of and conversation with a peer can provide experiences that initiate or enable change to students' ideas.

### **Delimiting the Study**

This study was delimited with respect to: (1) selection of a site and participants; and (2) selection of data for analysis. These decisions effectively set the context for this particular study of teachers' conceptual change.

With respect to the selection of a site and participants it must be recognized that my own biases, given my background and experience as a secondary teacher, that has influenced the conception and execution of this study. These biases are represented in a concern for and an interest in secondary teachers who are experienced and competent yet continue to reflect on and improve their practice, albeit within the isolation that is typical of teaching (Lortie, 1975). Consequently, the site chosen for this study was a secondary school and the two participants seemed to be experienced, competent, and reflective teachers. This choice was made after initial data collection for the teacher development project had begun and I became familiar with those eight pairs of teachers participating in the project, while working in my capacity as a research assistant.

Data for this study were gathered within the teacher development project. Participants' lessons were observed and field notes written, post-observation conferences were videotaped and transcribed, and interviews on each post-conference, with each participant, were audiotaped and transcribed. One round of data collection for a single pair of teachers resulted in field notes on their two lessons, transcripts of two post-observation conferences, and transcripts of four interviews about the conferences. Thus, each round of observation and data collection of the project resulted in eight documented 'events' and provided a rich and varied source of data for this study. Data were collected by the project during two rounds of observation in early March and late May of 1990. These data were then analyzed for evidence of the participants' conceptions and possible conceptual change. When some aspect of conceptual change seemed apparent, the data were examined for inferences that might be made about the processes and conditions that may have been involved with those changes. As analysis proceeded, and conceptions and incidents of conceptual change were identified, data from these two rounds of observation were sampled more and more selectively. For example, conceptions and 'stories' of conceptual change that

began to emerge from the data of the first round of observation were followed and became a focus for analysis of data from the second round of observation. Data collection for the project continued through two more rounds of observation, in October of 1990 and March of 1991. Some of these data were sampled selectively to round out the conceptions and stories developed to that point. Details of the design of the study and method of analysis are presented in Chapter Three.

### **Overview of the Study**

This study is presented in six chapters. Chapter one has introduced and briefly outlined the study in terms of its purpose, rationale, and context. Chapter two will review relevant literature on constructivism and conceptual change, and a number of ideas that informed the analysis of the data in this study will be developed. The notion of collegial consultation will be addressed through a review of relevant literature on collegiality and clinical supervision. Chapter three will describe the research design, method of analysis, and "trustworthiness" (Lincoln & Guba, 1985) of the study. In Chapter four participants' conceptions of teaching and collegial consultation will be described, and some examples of conceptual change will be presented. A particularly illustrative story of conceptual change will be presented in chapter five; that of an English teacher's conceptual change with respect to math as a result of observing his colleague's math lessons. In the final chapter conclusions will be presented and discussed, limitations of the study will be considered, and recommendations will be made for practice and for further research.

## **CHAPTER 2**

### **LITERATURE REVIEW**

Although the arguments to justify this study come largely from literature on educational change, analysis of the data was informed by a body of literature on constructivism and conceptual change that comes largely from research in science education. A theory of conceptual change, derived from this literature, will be presented in this chapter. As well, a discussion of relevant literature on collegiality and clinical supervision will be provided to facilitate understanding of the context within which this study took place.

#### **Conceptual Change**

The notion of "conceptual change" must address three pertinent questions, each of which will be discussed with reference to relevant literature. These are:

1. What is it that changes?
2. What might count as a change?
3. How might such change take place?

The first question asks what is meant by 'concept', 'conception', and 'conceptual framework'. The second addresses the kinds of changes to these constructs that might take place. It is the third question, about the processes of conceptual change, that is of particular interest in this study and will be elaborated in some detail.



## What is it that changes?

From a constructivist perspective (e.g., Von Glasersfeld, 1987, 1989, Magoon, 1977), conceptual change occurs within a complex framework of interrelated concepts, or a "scheme" (Von Glasersfeld, 1989), constructed by an individual on the basis of his or her perceived experience of the world. It is this conceptual framework which bestows meaning upon events occurring in the world and allows one to function there. Driver and Erickson (1983) offer a definition of conceptual framework, in the context of analysis of students' ideas in science.

By the construct 'conceptual framework', we shall mean the mental organisation imposed by an individual on sensory inputs as indicated by regularities in an individual's responses to particular problem settings. (p.39)

This definition specifies that organisational aspects of a framework are important; especially with respect to organizing or directing an individual's perception and action. It also seems to imply that we organize our perceptions in relation to one another and that their connections and interactions produce the meaning we ascribe to any particular set of experiences. Posner, Strike, Hewson, and Gertzog (1982) use the term "interpretive framework", which stresses the use of conceptual frameworks in interpreting new experience. The term "alternate framework" (Driver & Easley, 1978 cited in Nussbaum & Novick, 1982) to describe children's ideas about science is both useful and informative, as well as respectful of the ideas of others. It recognizes that individuals' experiences of the world may differ, that there may be a variety of ways of interpreting experience, and that individuals might, as a result of these, construct different, or "alternate", frameworks.

*Webster's Seventh New Collegiate Dictionary* defines a concept as "something conceived in the mind", for example a "thought" or a "notion"; and further, "an abstract idea generalized from particular instances". A concept resides in the mind and is constructed from experience of "instances". Novak and Gowin (1984) state, "We define *concept* as a regularity in events or objects designated by some label" (p. 4). Preceding this definition they have established that "objects" are things and "events" are happenings, that both may be observed, and that observation is the first step in the construction of knowledge. The notion of "regularity" seems to indicate repeated observation and again the building up of an idea.

In simple terms a concept, such as 'learning' or 'teaching', consists of a label (the word itself) and its *meaning*. This meaning for any individual who has a concept of 'learning' or 'teaching' depends on his or her experience with activities considered to be instances of those concepts. As well, linguistic experience obtained through dialogue or reading about what meanings others seem to ascribe to the term will have an influence. Thus 'personal meaning' is constructed and associated with words.

We do not construct personal meaning in isolation (Von Glasersfeld, 1989). As noted above, a meaning we observe others to hold may affect our own. But there needs to be a distinction between shared, or public, meaning developed by a group and personal meaning developed by an individual. In one attempt to reflect this difference, Court (1988) distinguishes between "concept" and "conception".

A concept may be seen as a publicly-held set of 'rules' or norms governing the use of a term, and a conception as an individual's more idiosyncratic interpretation of a concept or cluster of concepts.  
(p. 17)

This distinction recognizes and highlights the idiosyncratic nature of conceptions but does not allow for the possibility of publicly-held conceptions within any particular group.

The shared understanding of any particular group may be greater or less than and differ in substance from that of an individual, depending on the size and composition of the group and who the individual is. There are two important points to be made in this regard. For one of these Von Glasersfeld (1989) will be of assistance. For the second I will draw upon Feldman (1980).

Von Glasersfeld (1989) points out that we cannot be in touch with an objective, observer-independent reality; rather we each construct our own "subjective reality" as "conceptual networks", or "schemes", which fit our experience. That is, our understanding of the world consists of networks of concepts and conceptions that allow us to make sense of and function in the world successfully. Von Glasersfeld characterizes conceptions as "adaptive" and "viable". It might be reasonable to expect that particularly viable conceptual schemes that we hold are shared by others, and in fact we can add "a second level of viability to our scheme" (p. 131) when we observe evidence in the actions of others that indicates they operate out of a similar scheme. But, because we cannot be in direct contact with others, there is no way of knowing for sure. Language, Von Glasersfeld points out, does not "actually *carry* or *contain* what we think of as 'meaning'" (p. 132). It is up to the receiver of a communication to construct meaning that seems to "fit rather than match ... what the speaker had in mind" (p. 134). And in doing so one will make use of one's own conceptual schemes. This may make communication with others, and simply getting on in the world, seem like an impossibility. But, if the 'fit' is good it feels like reality and we operate as if it were (Driver, 1990). In everyday conversation about commonplace items few difficulties may be encountered. It is when ideas become more abstract

or sophisticated that conceptual differences become noticeable. Feldman's notion of development in various domains provides some insight into this.

Feldman (1980) notes, with reference to the work of Piaget,

We have found that concepts of development can be extended in useful ways when stages are defined not as holistic structures, but as levels of achievement within a specific field or domain. (p. 4)

The notion of different domains of knowledge sheds light on the distinction between shared meaning of a group and the more idiosyncratic meaning held by an individual. It also addresses the level of sophistication of meaning of a particular conception that an individual might hold. Feldman presents the idea of progression of an individual within (and in some sense through) "universal", "cultural", "discipline-based", and "idiosyncratic" domains of knowledge; with a possible culmination in "unique achievement", which is a "form of organization within a domain that has never before been accomplished in quite the same way" (p. 11). He conceives of these domains along a continuum and there is a sense of linear progression. But beyond the universal domain (which is quite limited and, interestingly, evolves along with human society) individuals begin to take different paths, depending on the culture within which they live, the discipline(s) they choose to study, the one they choose as their specialty, and whether or not they reorganize something within that discipline-based domain. Thus, for example, teachers will come to the profession (domain) of teaching with their own personal meaning for 'teaching' and a shared (cultural) meaning. Once in the domain of teaching, experiences in *that* world will result in the development of one's own professional meaning, at least some of which may be shared with other members of the profession.

Solomon (1983) and Garrison and Bentley (1990) use the notion of domains of knowledge to explain some of the difficulty students have in learning science. Based on the "Many Worlds Thesis" of Alfred Schutz, these writers distinguish

different worlds of experience for which we develop different conceptual frameworks or schemes. They suggest that being able to think and work in two domains enriches understanding in each, although their emphases and reasons for this differ. On the one hand, Solomon is concerned with the ability to move from one domain to another and claims,

The deepest levels of understanding are achieved neither in the abstract heights of "pure" physics, nor by a struggle to eliminate the inexact structures of social communication, but by the fluency and discrimination with which we learn to move between these two contrasting domains of knowledge. (p. 58)

Thus teachers may construct meaning for what it is they do, with reference both to the 'life-world' of everyday experience (Schutz & Luckmann, 1973, cited in Solomon, 1983) and the 'symbolic-universe' (Berger & Luckmann, 1967, cited in Solomon, 1983) of the profession and their understandings will be enriched as a result. On the other hand, Garrison and Bentley are concerned with "breaking with everyday experience" in order to focus on the particular experience of the discipline. They point out that understandings based on everyday experience can interfere with the development of disciplinary understandings.

Each discipline provides a distinct set of concepts, criteria of rationality, dispositions, interests, values, etc., each different from those of everyday life, that allows us to organize and structure experience in unique ways. (p. 32)

Thus (if teaching can be viewed as a discipline or at least a field of knowledge) teachers will construct meaning about "concepts, criteria of rationality, dispositions, interests, values, etc." embedded in that discipline, and will make use of these in interpreting new experience within the discipline. I would add that the way each individual makes sense of a particular domain of knowledge will be to some extent idiosyncratic. Some of the meaning with respect to a single

concept will be shared with others. Other aspects of the meaning of that concept will be uniquely his or her own.

### **What might count as a change?**

Conceptual change might be defined broadly as any change to or within a conceptual structure. Such change might range from straightforward addition of information that easily fits into an existing conceptual framework and enhances the meaning of a particular concept, to a difficult and time-consuming reorganization that changes the meaning of concepts and conceptions, *and* relationships among them, thereby radically altering the way in which one views the world. It is useful to consider the range of possible kinds of change to a conceptual structure and to recognize that each of these represents, in its own way, some form of conceptual change.

The terms "assimilation" and "accommodation" (using Piaget's terms but not his exact meaning) are often used to describe processes of change that involve adding to existing structures and alteration of those structures, respectively. Posner et al (1982) use these terms but disclaim any commitment to Piaget's theories. They see "assimilation" as analogous to Kuhn's (1970) "normal science" and consider it to be "the first phase of conceptual change" (p. 212). "Accommodation" they note is a "more radical form of conceptual change" (p. 212) and similar to Kuhn's notion of "revolutionary science", wherein central concepts are reorganized or replaced. It seems to me that, as in science, the 'successful' working of assimilation precludes the immediate need for more radical change.

Kinds of change, as distinct from processes of change, describe the results of learning. Rumelhart and Norman (cited in Vosniadou & Brewer, 1987) present three kinds of changes to "schemata". "Accretion" involves a "gradual

accumulation" or addition of information within existing schema. "Tuning" involves "evolutionary changes" to schemata to improve, over time, their accuracy and functioning as interpretive frameworks. "Restructuring" results in "the creation of new structures" as a result of old information being reinterpreted or new information being accounted for.

Vosniadou and Brewer (1987) suggest that development of knowledge might best be understood as "domain-specific restructuring" (restructuring of knowledge within a domain) rather than "global restructuring" (Piaget's restructuring of cognitive functioning). They then distinguish between "weak" and "radical" domain-specific restructuring and, as do others, draw an analogy to Kuhn's interpretation of the progress of science. Their unpacking of the notion of restructuring further emphasizes, and adds to, the range of possible kinds of conceptual change. Both weak and radical restructuring involve change to a previously-held theory<sup>2</sup>. In weak restructuring, the change involves the number and kinds of connections and/or the level of abstraction within a theory. That is, a particular theory develops with experience. In radical restructuring, the change is to the structure, the individual concepts, and/or the "domain of phenomena" explained, and results in a different theory. That is, a new theory is constructed based on experience. These ideas have been developed based on novice/expert studies. *Total change? Replacement?*

There are two other kinds of conceptual change (Driver, 1990) which might add to the range of possibilities. One of these involves development of a conception through coordination of a number of "mini models" into one large, coherent model. The other involves development of an understanding of context, or situation, and of when to use a particular model. In this latter fashion, cognitive structures become related to particular situations. This is interesting because it

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<sup>2</sup> Vosniadou and Brewer seem to use "theory" as synonymous with 'framework'.

addresses the problem of a distinction between "propositional knowledge" and "knowledge-in-action" (Driver & Erickson, 1983). The literature on teacher development and supervision of instruction speaks of "theories of action" and "theories in use" (Sergiovanni & Starratt, 1988, p. 40), i.e., the difference between what a person says and does. Schön and Argyris (1974 cited in Sergiovanni & Starratt, 1988) point out that one may not be compatible with the other and "the individual may or may not be aware of the incompatibility of the two theories" (p. 40). Conceptual change might occur for a teacher who becomes aware of such an incompatibility during collaboration with a colleague, and is assisted, or supported, by this colleague in conceptual restructuring, perhaps of the 'situational' type.

### **How might conceptual change take place?**

Posner et al (1982) distinguish between the use of existing concepts to deal with new phenomena (assimilation) and the replacing or reorganization of 'central concepts' (accommodation). It is this latter form of conceptual change that is addressed by the theory of conceptual change which they have proposed, in which they describe both "conditions for" conceptual change and a "complex conceptual ecology" that guides the process. Strike and Posner (1985) elaborate on these and add the notions of understanding and commitment at the level of accommodation. Hewson (1981) offers an elaboration of the conditions for conceptual change and discusses a conceptual change "model" in terms of the relative status of new and existing conceptions.

There are four conditions for conceptual change (Posner et al, 1982, Hewson, 1981). One of these -- "dissatisfaction" -- might apply to a conception that is currently held. The other three have to do with a 'new' conception that has somehow become known to an individual. These conditions are "intelligibility",



"plausibility", and "fruitfulness". Although the following discussion of these conditions will tend to indicate a linear process, Posner et al (1982) stress that accommodation,

rarely seems characterized by either a flash of insight, in which old ideas fall away to be replaced by new vision, or as a steady logical progression from one commitment to another. Rather, it involves much fumbling about, many false starts and mistakes, and frequent reversals of direction. (p. 223)

Dissatisfaction with an existing conception occurs when it is realized that it no longer works, i.e., there exist anomalies which cannot be explained using this conception. Given this condition, there may be conceptual change if a new conception is intelligible, i.e., understandable and internally consistent as constructed by the individual. As well, the new conception should appear plausible, i.e., consistent with other conceptions already held by the individual. Finally, the new conception should appear to be fruitful, i.e., it should solve problems that the previous conception could not and "lead to new insights and discoveries" (Posner et al, 1982, p. 222). Each of these conditions is necessary but not sufficient for conceptual change.

Posner et al's (1982) and Strike and Posner's (1985) use of the term "conceptual ecology" provides an interesting and informative analogy to assist the reader in making the presented ideas intelligible. It permits an understanding of how the various parts of a person's conceptual environment would influence whether or not a new conception might be viable within that environment. The various "resources" that make up the conceptual ecology of a person, as listed in Strike and Posner (1985), function as criteria in the evaluation of both new and currently-held conceptions and assist in establishing the conditions for conceptual change. Essentially, this rather comprehensive list specifies the various 'classes' of ideas with which a new conception must fit.

1. *Anomalies* present and the nature of these. Anomalies indicate the failure of an idea and contribute to dissatisfaction. A new conception may appear plausible if it deals with existing anomalies and fruitful if it identifies and solves new problems.

2. *Analogies and metaphors* an individual has available for use. These can "suggest" new ideas and will be of assistance in understanding, or establishing the intelligibility of, a new conception. Analogies which can be made to existing conceptions tend to increase the plausibility of a new conception.

3. *Exemplars and images* available for use. These also aid in establishing the intelligibility and plausibility of a new conception, by influencing "a person's intuitive sense of what is reasonable" (Strike & Posner, 1985, p. 217). For example, exemplars function as "standard cases" to which a new conception can be applied.

4. *Past experience*, which should not be contradicted by new conceptions. Dissatisfaction results when conceptions do not fit with past experience; while, new conceptions gain plausibility if they are able to interpret past experience.

5. *Epistemological commitments*, consisting of "explanatory ideals" and "general views about the character of knowledge". Strike and Posner (1985) describe explanatory ideals as "subject matter specific views concerning what counts as a successful explanation in the field" (p. 217). They function as criteria, within a domain, for judging possible explanations of phenomena or events. Strike and Posner suggest that general views about the character of knowledge are probably "subject matter neutral" and consist of such notions as "elegance, economy, parsimony and not being excessively ad hoc" (p. 217).

6. *Metaphysical beliefs and concepts*, with respect to a particular domain of knowledge, which should not be 'disturbed' by new ideas. In science, metaphysical beliefs about the fundamental nature of the universe can affect

whether or not an explanation is accepted or rejected. In teaching, metaphysical beliefs about human nature might have such an effect.

7. *Other knowledge* (a) in different domains with which a new idea must fit or (b) which compared to a new idea might appear less promising. New ideas should not be incompatible with knowledge in other domains and should appear to be more fruitful than competing conceptions within a domain.

This unpacking of the process of conceptual change in terms of conditions and a complex conceptual ecology might provide a useful means for analysis and understanding of teachers' conceptual change in the context of collegial consultation. However, there are some important things missing from this theory. Posner et al (1982) and Strike and Posner (1985) state that they have developed their theory based on the idea that learning is a rational activity. But, West and Pines (1983), in responding to Posner et al (1982) state, "We want to argue that nonrational components are intrinsic to conceptual change in the individual, and that these should not be excluded in investigations of conceptual change" (p. 37). They then go on to say they can see where affective components are alluded to in Posner et al's discussion, and to articulate what some of these components might be. They have a good point. This is not to criticize Posner et al for what they have done, but rather to add to their work an articulation of affective components and thereby construct a more fruitful theory of conceptual change.

There is, however, an important aspect of the affective component of conceptual change that West and Pines do not elaborate sufficiently. This is the notion of the risk involved in change, and the fear and insecurity with which such risk is associated. It seems that an important component of, and possibly a necessary condition for, conceptual change might be safety, security, or "support" (e.g., Bird & Little, 1986 cited in Hargreaves & Dawe, 1989) and this raises the question of the role of others in facilitating conceptual change in an individual.

As well, it makes one wonder whether or not there might a part of an individual's "conceptual ecology" which helps to navigate the process of conceptual change by reducing or otherwise dealing with feelings of insecurity, inadequacy, and fear. For example, Novak (1988) cites the work of Robertson (1982) and Sherris and Kahle (1984) who found that students with a "constructivist commitment" tended to demonstrate an "'internal' locus of control" and to "believe that they are generally in control of their own destiny" (p. 93).

There is something else that seems to be missing from Posner et al's theory. Probably because the theory was developed in the context of teaching science, it seems to be assumed that a new conception will be presented to the learner in some fashion. With respect to teachers who are working together to improve their practice, however, such an assumption does not always apply; rather, the important question becomes one of where does a new conception come from? And whether characteristics of the source of a new idea have any effect on the process or outcome of conceptual change?

The work of others (e.g., Driver, 1987, Nussbaum & Novick, 1982) might also be considered with respect to processes involved in conceptual change. The writings of these researchers imply a sequence of events in conceptual change and they have developed teaching sequences based on this notion. It might be that "elicitation" of currently held conceptions, followed by a "discrepant event" and/or events that enable restructuring, would be necessary for conceptual change to take place. As well, opportunities to apply a new conception, and to reflect on how and why conceptual change took place, might be necessary for conceptual change to be lasting and not transitory.

## Conceptions of Collegiality

Recently, considerable attention has been paid to the nature of collegiality (e.g., Little, 1987, 1989), and its relation to clinical supervision (e.g., Grimmer & Crehan, 1991) and to peer coaching (e.g., Hargreaves, 1989). Teachers are being encouraged to collaborate in various ways, to develop new or existing collegial relationships, and to consult with each other on their own classroom practice; all of this with a view to enhancing teacher development. It was this linking of "collegiality" to various supervision and coaching models that led to the label 'collegial consultation', coined to describe the activities of pairs of teachers in the teacher development project.

Little (1987) considers benefits of teachers working together, such as increased range, depth, and flexibility of classroom instruction, an increased influence on and respect from colleagues, and an increase in rewards and daily satisfaction in the work of teaching. She notes that two of the things that colleagues actually engage in together are classroom observations and talk about teaching. Little (1987) suggests that classroom observations are a common feature in schools that encourage collegiality, for "by engaging in systematic observation, teachers explore central issues in student learning and consider teaching practices and their improvement" (p. 505). With respect to teachers' talk about teaching, Little states,

Colleagues' efforts to speak clearly, fully, and concretely about their work help to take the mystery out of teaching without diminishing its essential artistry. This helps to make clear the understandings that teachers hold about connections between their actions and student learning (Bussis, Chittenden, & Amarel, 1976). It illuminates underlying principles and ideas in a way that allows teachers to understand and accommodate one another, to assist one another, and sometimes to challenge one another. (p. 503)

However, such positive and obviously rewarding collegial experiences do not come easily (e.g., Little, 1987, 1989; D. Hargreaves, 1984; A. Hargreaves, 1989; Grimmett & Crehan, 1991). Little (1987) concludes that "serious collaboration, by which teachers engage in the rigorous mutual examination of teaching and learning, turns out to be rare" (p. 513). There are serious impediments to collegial activities, such as time constraints and the risks involved. For example, "precedents of noninterference are powerful, and claims to individual autonomy are closely guarded" (p. 500). David Hargreaves (1984) also notes teachers' "concern for autonomy" and claims that this concern represents more than a desire for freedom from control by others. He recognizes in teachers a desire for "autonomy *from each other*", with respect to classroom practice, and offers an insightful account of why fear of evaluation is at the center of teachers' concern.

The heart of the matter, at the experiential level, is the teacher's fear of being judged and criticised. Any observation will be evaluative of the teacher's competence, and the threat therein becomes the greater because such judgements may remain implicit and unspoken, and therefore incontrovertible. ...Differences in educational philosophy and pedagogical preference among teachers exacerbate this sensitivity; nowhere would a teacher be more ready to agree with the interactionist tenet that reality is a social construction and judgements about effectiveness are in the eye of the beholder. (p. 142)

Hargreaves argument points out that all observation involves judgement, even when the purpose of an observation is not to report on the teacher's competence. Similar concerns are central to much of the literature on collegiality.

What seems to be required in order to support teachers' collegial experiences are "norms of collegiality" (Bird & Little, 1986 cited in Hargreaves & Dawe, 1989), exemplified in collegial relationships characterized by trust, support, and sharing. Hargreaves and Dawe cite the work of Nias, Southworth, and Yeomans in an effort to describe collegiality more fully.

Nias and her colleagues describe such qualities and relationships [of collegiality] as amounting to cultures of collaboration which are found not in formally organized bureaucratic procedures, nor in specific projects and events, but in the small details of school life that hold it together and give it meaning and value -- in the gestures, jokes and glances that signal sympathy and understanding; in kind words and interest shown in corridors or outside classroom doors; in birthdays, treat days and other little ceremonies; in overt praise, recognition and gratitude; and in sharing and discussion of ideas and resources. (1989, p. 24)

Collegiality then is a complex phenomenon composed of particular kinds of relationships among colleagues - individuals perceived by each other to be engaged in work together - and of the kinds of activities in which colleagues engage.

### **Conceptions of Clinical Supervision**

As originally conceived by Cogan and Goldhammer, the purpose of clinical supervision was "the improvement of students' learning through the improvement of the teacher's instruction" (Cogan, 1973 cited in Holland, 1988, p. 99). Acheson and Gall (1987) refer to helping the teacher "improve his or her instructional *performance*" (p. 11; emphasis added), while Lovell and Wiles (1983) state, "we agree [with the improvement of instruction and learning] but also support the emphasis that Cogan placed on the *development of the teacher as a self-directing and self-improving person*" (p. 170; emphasis added). Such a self-improving teacher might practice what Schön refers to as "reflection-on-action" (cited in Grimmer, 1988, p. 9).

The essence of supervision of instruction is the observation of teaching and subsequent discussion between teacher and supervisor. Sergiovanni and Starratt (1988) describe eight phases of Cogan's clinical supervision cycle, from "establishing the teacher-supervisor relationship" to "resumption of planning"

(p. 359). Essentially this supervision cycle consists of preobservation planning by both teacher and supervisor, a key component of which is the establishment of a focus for the observation, observation of the lesson by the supervisor, and postobservation analysis and conference. Acheson and Gall (1987) refer to the "three phases of the clinical supervision cycle" as "planning conference", "classroom observation", and "feedback conference" (p. 13). Lovell and Wiles (1983) prefer the notion of "three interdependent dimensions" which they term "preobservation behavior", "observation behavior", and "postobservation behavior" (p. 172). Yet, although seemingly different in its interpretations, the basic structure of clinical supervision remains the same for these writers, i.e., activities undertaken before the observation, during the observation, and after the observation. Acheson and Gall emphasize the cyclic, and therefore continuous, nature of the process. Similarly, Lovell and Wiles, although they refer to the postobservation conference as "the end of the process", refer also to keeping the lines of communication open "for future work together" (p. 180).

An essential component of clinical supervision for Cogan was the "colleagueship relationship" between teacher and supervisor, which was to be "based on mutual trust and support" and involved "inducting the teacher into the role of co-supervisor" (Sergiovanni & Starratt, 1988, p. 359). This relationship might be considered to be part of the basic structure of the process of clinical supervision, however, as a result of my own experience and interpretation of Cogan, I believe that the relationship is best viewed as a separate and parallel, or perhaps interwoven, process. In this regard, it is interesting that Cogan (cited in Sergiovanni and Starratt, 1988, p. 359), when identifying and describing the eight phases of a supervisory cycle, states that in the last phase there may be a "resumption of planning". This would mean that one reenters the series of steps at phase two, the "intensive planning of lessons and units with the teacher"; and thus it appears that phase one, "establishing the teacher-supervisor



relationship", is not reentered but viewed as an ongoing phase which never ends. Blumberg and Jonas (1987), when they speak of teachers' ultimate control of supervision through "granting access", in response to particular characteristics or qualities of supervisors, hint at the importance of a "colleagueship" relationship.

Legitimacy of access does no more than open the structural door; thereafter teachers decide whether or not to grant access to their teacherhood. (1987, p. 60)

Various factors in the relationship between the teacher and supervisor would probably influence a teacher's decision to grant such access.

### **Orientations to Supervision**

Holland (1988) makes a distinction between three orientations to supervision: empirical, interpretive, and critical. She notes that Cogan had both an empirical and interpretive orientation in his rationale for clinical supervision and argues that a "maturation" of the process would result from more emphasis on the interpretive orientation and the inclusion of a critical orientation as well. The purpose of supervision from each of these orientations differs. For example, Holland (1988) notes that an interpretive orientation would have as its purpose "an understanding of one's own professional actions" and further,

The collaborative development of knowledge by reflecting on the events of teaching and on the meanings these events hold for the supervisor and teacher is an essentially interpretive process because the knowledge is both personal and situational. This knowledge supplements rather than supplants existing knowledge. (1988, p. 105)

Supervision with an "empirical orientation" asks the question 'What is happening?', attempting to be objective by focussing on events as they occurred ("brute data"), and seeking behavioral change. Supervision exercising an "interpretive orientation" asks the question 'What does it mean to the people involved?', focussing on the meaning of events within a particular context ("sense data"), and seeking "an understanding of one's own professional actions [which] can lead to what Garman has called "professional progress" as opposed to behavioural change" (Holland, 1988, p. 105). Supervision with a "critical orientation", or "critical perspective" (Smyth, 1986), seeks to understand and challenge the values and assumptions underlying observed events to "uncover the manifold contradictions, dilemmas, and paradoxes that plague us in teaching and schooling" (p. 332). Smyth refers to the process undertaken from this orientation as "problematizing" or "posing problems about our teaching" (p. 332).

Taking a critical perspective involves moving through the empirical and interpretive orientations to examine critically that which underlies the meaning of events, i.e., Oberg's (1989) "ground of practice....what is basic, fundamental, foundational". Oberg seeks, through the supervisory process, to change or recreate this "ground".

By characterizing supervision as a creative activity, I want to focus on the creation rather than the discovery of meaning. Instead of uncovering something implicit in teachers' practice, I want to explore the opportunity *supervision* provides for educators to remake their image of themselves and of their professional practice....The mode of inquiry appropriate in such a quest is reflection -- not on framed or reframed "problems of practice" but on the limitless and perpetually changing "ground of practice". (p. 60; emphasis in original)

## Variations of Supervision

There are a number of modifications or interpretations of clinical supervision in the literature. Each seems to represent an attempt to make the process as meaningful and useful as possible for individual teachers, or for supervisors and administrators charged with a responsibility for 'quality control', by taking a particular perspective on the purpose and best practice of supervision. Clinical supervision with a critical perspective for the purpose of "problematizing practice" (e.g., Smyth, 1989) might be considered such a variation. Four other variations which seem to represent the range of possibilities are considered here.

Glickman (1985) modifies clinical supervision to take into account differences in teachers. His approach permits the use of directive, collaborative, or non-directive behaviours, depending on characteristics of the teacher, e.g., conceptual level and commitment. Within each approach, Glickman specifies supervisory behaviours and organizes these into three processes, consisting of eight to ten steps and aimed at problem-solving.

Glatthorn (1984) has recognized the need for a variety of models of supervision to meet the needs of a variety of teachers. Basic clinical supervision may be fine for beginning teachers and some experienced teachers, but what should be done in terms of supervision for experienced, competent, reflective teachers? Glatthorn describes "cooperative professional development" and "self-directed development" as models appropriate for such teachers. Unfortunately however, he does not seem to be able to let go of the supervisory role for administrators and as a consequence gives them the ultimate choice, through their veto power and monitoring, not only of which model a teacher might undertake but how it might be experienced by that teacher.

Hunter's (1984) supervision model is based on a "science of teaching" and recommends the use of 'checklists' of particular questions about teaching, to

ensure that teachers are making use of the findings of research in their decision-making and to assist them when they are not. The role of the principal is "observe, assist with, and evaluate the effective translation of any content into students' understanding and successful use" (p. 183).

For Showers (1985), the purpose of peer coaching is to provide "a structure for the follow up to training that is essential for acquiring new teaching skills and strategies" (p. 44). Teachers are "trained" in peer coaching as well, i.e., they are taught how to coach colleagues in the use of new teaching skills and strategies. Showers claims that another purpose of peer coaching is to build "communities of teachers" who continue to engage in the study of teaching and develop "the shared language and set of common understandings" necessary for that study. However, the focus for observation is newly acquired skills and "the study of their craft" seems to be with respect to the research literature or particular innovations being implemented. Thus, although the process attempts to be collegial it appears that much of the decision-making is out of the hands of the teachers.

Holland (1987) contrasts coaching according to Joyce and Showers with coaching as described by Donald Schön and notes that these are quite different conceptions; the former "as transfer of technical rationality" and the latter as "a hermeneutic process". There is not only a wide variety of conceptions of activities resembling clinical supervision but also considerable confusion with respect to labels applied to these various conceptions. Therefore, the adjective "collegial" was chosen to describe the activity engaged in by participants in this study in order to relate it to the literature on collegiality previously discussed and to avoid the use of the term "peer" which may have resulted in confusion with conceptions of peer coaching. In order to avoid confusion with the term "supervision" as used by Hunter (1984) and in other evaluative models, and to steer clear of the difficulties Holland has pointed out with respect to "coaching", both of these terms

were ruled out in favour of 'consultation', which was the term chosen to represent the reciprocal observing and conferencing on lessons as it occurred in this study.

### Summary

In conceptual change an individual's somewhat idiosyncratic ideas (conceptions), constructed as a result of past experience, may be modified in a variety of ways as a result of new experience. The construction of a 'new' conception and its interaction with existing conceptions within a complex conceptual ecology have been proposed by Posner et al (1982) as a theory of conceptual change. Within this process judgements will be made with respect to four conditions - intelligibility, plausibility, fruitfulness, and dissatisfaction - of conceptions.

Various conceptions of collegiality describe relationships between and activities engaged in by colleagues. Various conceptions of clinical supervision imply teachers' professional development or learning as a result of observing and conferencing on a lesson. In this study, teachers' conceptions and conceptual change are explored in a context of collegial consultation, which involves a collegial relationship and activities similar to clinical supervision. The next chapter will describe the methods of the study.

## **CHAPTER 3**

### **DESIGN OF THE STUDY AND METHOD OF ANALYSIS**

The purpose of this chapter is to describe and provide a rationale for the methods employed in the study. Through description and discussion of the teacher development project, the participants in the study, and methods of data collection and analysis, an understanding of the context of the study will be developed. The final section of this chapter will address the problem of "trustworthiness" of the study.

#### **The Context of the Study**

The teacher development project being carried out by Dr. Peter Grimmett and Dr. Pat Crehan, through the Centre for the Study of Teacher Education at the University of British Columbia, provided both the data for this study and the context within which the activities of the participants took place. This project is a longitudinal study, the purpose of which is to understand teachers' professional development through supervision of instruction and collegial partnerships.

#### **The Teacher Development Project**

The teacher development project assembled a volunteer sample of participants willing to work with either an administrator or colleague in professional growth through: (1) observation of and consultation on teaching, and (2) workshops on classroom management and supervision of instruction. The initial sample consisted of 54 'dyads', each dyad composed of a teacher and his or her observer (either an administrator or a teacher colleague). A pair of teachers in this sample resulted in two dyads, one in which teacher A acted as observer for teacher B, and another in which the same teacher B acted as observer for teacher

A. The sample was divided into treatment groups which involved participation in various combinations of workshops. There was considerable variety in the sample. The dyads I worked with ranged from a kindergarten teacher and her principal, through various combinations in both elementary and secondary schools, to a pair of senior secondary teachers. Tim and Joe, the participants in this study, were that pair of senior secondary teachers.

### **The Participants**

Tim and Joe were selected, as discussed in chapter one, largely because of this researcher's interest in experienced secondary teachers. Other factors which contributed in the choice were: (1) the length and quality of their relationship as colleagues; (2) their teaching of academic courses; (3) that they had never undertaken collegial consultation before; and (4) their openness and willingness to share their ideas in interviews. It was felt that Tim and Joe were representative of a case that is relatively common in secondary schools -- that of experienced, competent, and reflective academic teachers, who have been working together for some time, and who might be interested in and benefit from collegial consultation. It was also interesting that Tim and Joe taught different academic subjects.

Tim and Joe had known each other for fourteen years when the study began. They had begun their teaching careers at the same time and in the same junior secondary school. Having progressed through various career changes, they were now teaching together at a senior secondary school in their district.

Tim began his career as a science teacher. He is now one of two vice principals of the school but, for the seven years he has held this position, Tim has continued to teach and to view himself as a teacher. During each of the two school years spanned by this study, Tim taught two math 11 classes. As most teachers

have seven classes, this represents an approximate 30% teaching load, in addition to his regular administrative activities.

Joe, in his own words, is "a humanities person". He has a drama background and began his career as a drama teacher. He now teaches English 11 and 12 and photography, teaching English 12 for the first time during the first school year in this study. His expertise in photography and his drama background made Joe much sought after for assistance in a variety of school-wide activities. In my opinion, both Tim and Joe are excellent teachers and it was both a pleasure and a privilege to observe their lessons and conferences.

In sharp contrast to their experience and expertise as teachers was the pair's inexperience with respect to collegial consultation. Joe often worked with student teachers and frequently had colleagues into his classroom to participate in lessons, and Tim as an administrator often observed teachers and wrote reports. But they had never attempted a reciprocal relationship such as collegial consultation. As Tim commented, they were "very much rookies at observing each other" (1.8-SR-Tim-0)<sup>3</sup>. This is not to say they were not *good* at it, but rather that this was a situation new to the participants, in which the confidence that comes with experience was not yet in evidence. And, in fact, some of the most interesting possibilities for conceptual change occurred with respect to the participants' conceptions of collegial consultation itself.

During the first round of observation for the project, both Tim and Joe seemed thoughtful, reflective, and willing to share their ideas and feelings about what they were experiencing. This final criterion -- willingness to share with the researcher -- was an important consideration in selection of participants because

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<sup>3</sup> Each quote from the data will be referenced to its source. The reference in this case means 'round of observation and data collection 1, event number 8, which was a Stimulated Recall interview, with Tim, who was the Observer of the lesson'. A more complete discussion of the organization of the data has been provided in Appendix A.



it was from them that I would learn whether or not conceptual change was taking place and how that change was enabled.

### Collegial Consultation

Collegial consultation, as construed by the teacher development project, was designed to reflect and encourage genuine rather than "contrived collegiality" (Hargreaves & Dawe, 1989). This process, as it was undertaken and experienced by the participants in this study, was consistent with Hargreaves' and Dawe's description.

We do, of course, very much support teachers improving their skills by *working closely and practically with each other*, especially where that process is *genuinely voluntary*, where teachers have *high control* over determining and reflecting about which skills are to be coached, and where *critical reflection* about the content and context of those skills is not only permitted but actively encouraged. (1989, p. 26; emphasis added.)

Tim and Joe worked "closely and practically with each other" through their involvement in (1) observation of each others' lessons, (2) conferences on these observations, and (3) discussions at workshops they attended and experienced together. That the process was "genuinely voluntary" has been specified in the previous discussion of the sample assembled by the teacher development project and was corroborated by comments of the participants in the first round of data collection. These comments indicated enthusiasm for the project tempered by concern regarding time constraints and a degree of caution with respect to a process that they did not yet fully understand. It was Tim who first chose to participate in the project and he invited Joe to participate with him.

Tim and Joe were asked to schedule and conduct a total of eight observations and conferences over a period of fifteen months, spanning two school

years, and they were given "high control" over this process. Before each round of observation, the pair was contacted and a mutually agreed upon time was arranged<sup>4</sup>. The two research assistants (Janet Tyler and myself) who arrived at the school for the observed lesson were observers only and had no input into the focus or conduct of the participants' collegial consultation activities. We were not present during conferences, which were videotaped.

The fact and format of interviews about conferences provided an opportunity for participants' "critical reflection" on the content and context of their actions and activities in collegial consultation. Control of these interviews was held by the participants, who viewed the videotape of the conference and stopped it when they chose to offer thoughts and feelings they had experienced during the conference or on viewing the videotape. Participants' reflection was encouraged by research assistants' restriction, in the interviews, to questions of clarification and probing for understanding of ideas initiated by the participants.

Workshops were presented, for groups of participants in the project, on classroom management and conferencing skills. Tim and Joe attended these workshops. Although features of classroom management were discussed both with and among participants, there was no sense of training and the content and manner of presentation of conferencing (particularly questioning) skills in no way implied a coaching model or transfer of training. Participants were left to decide how they would conduct their collegial interactions, perhaps based on ideas presented and generated in the workshops.

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<sup>4</sup> Considerable flexibility was required of the projects' research assistants as both Tim and Joe were busy and needed to reschedule various events.

## **Data Collection**

The data for this study were generated during four rounds of observation and data collection, in early March, late May, and early October of 1990, and in late March of 1991. These data were collected by myself and Janet Tyler as a part of our role as research assistants on the teacher development project. Data were collected on observed lessons, on post-observation conferences, and on stimulated recall interviews.

### **Observed Lessons**

As part of the collegial consultation process Tim would observe one of Joe's lessons and Joe would observe one of Tim's. During each of these observations Janet and I were present and made detailed descriptive notes on the lesson. These were later transformed into field notes and made available for analysis. The focus of the independent observation was to be classroom management, and a standardized classroom management instrument was completed on each lesson for this purpose. The standardized focus of the larger project did not, however, limit my observations and my own field notes on Tim's and Joe's lessons, which became part of the data collected for this study.

### **Post-observation Conferences**

At some point within one day of an observation of a lesson, Tim and Joe would conduct a conference to discuss the observed lesson. No research assistant was present during the conferences, but they were videotaped. Tim and Joe, because they had other demands on their time, often chose to videotape themselves conferencing at their own convenience. The four conference

videotapes from the first two rounds of data collection were transferred to audiotape, transcribed, and made available for analysis. In addition, videotapes of all eight conferences were available for analysis.

### **Stimulated Recall Interviews**

After a conference, "stimulated recall" interviews were conducted and audio recorded, first with the teacher and then with the observer in each case. These interviews, depending on the time constraints of the participants, were conducted the same day or later in the week. In a stimulated recall interview a videotape of the conference was played for one of the participants, in the company of either Janet or myself<sup>5</sup>. The participant had complete control of the videotape and could stop it whenever he wished to comment, sharing his thoughts and feelings during the conference or on viewing the conference videotape. The research assistant was limited to questions of clarification and probing for extension of ideas initiated by the participant. Audio recordings of eight stimulated recall interviews from the first two rounds of data collection were transcribed and made available for analysis. In all, sixteen audiotapes of stimulated recall interviews from the four rounds of data collection were available for analysis.

### **Data Analysis**

The method chosen for data analysis in this study was the "constant comparative method", as described by Glaser and Strauss (1967) and elaborated by

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<sup>5</sup> Janet Tyler conducted interviews on all conferences in which Joe was the observer. I conducted the interviews of all conferences in which Tim was the observer.

Lincoln and Guba (1985)<sup>6</sup>. This is an inductive method of analysis aimed at the development (or emergence) of "theory" from data. Conducted in concert with a flexible focus, "theoretical sampling", and an "emergent design", it seemed a plausible way in which to make sense of what might be happening in any particular context, and therefore well suited to the purpose of this study -- to increase our understanding of processes involved in teachers' conceptual change within a context of collegial consultation. The analysis was informed by a 'sensitizing framework', consisting of theories of conceptual change, notions of collaboration and collegiality, techniques of and perspectives on clinical supervision, and findings of studies of teachers' conceptions of their work (as outlined in chapter three).

Although it might have been possible to develop a priori categories, I was aware of two studies (Belenky, Clinchy, Goldberger, & Tarule, 1986, Tyler, 1989) in which the use of a priori categories led to difficulty, was not particularly fruitful, and had to be modified or abandoned. Thus, rather than testing hypotheses arising from a priori theory, use of the constant comparative method of analysis allowed hypotheses to emerge from the data. In addition, given that this was an initial, exploratory study of the processes involved in teachers' conceptual change, in a particular case of collegial consultation, it seemed best to observe such collegial activity, select appropriate data, and analyze these data for emergent categories and ultimately generalizations about such processes.

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<sup>6</sup> A description of this method of analysis has been included in Appendix D.

## Concerns

The following two 'concerns' are excerpts taken from the reflexive journal I kept during this study and are presented here to provide a more honest picture of the analysis of the data as it occurred in the study.

I cannot in good conscience present the analysis of data in this study as a logical, methodical, or simple task. In fact it was characterized by fits and starts and much spinning of wheels. There were times when things seemed to fall into place and all was well with the world, and then suddenly something would not feel right and I would need to back off, circle the data warily, and reenter from a slightly different angle. I came to realize that I was developing a method of analysis -- based on the constant comparative method -- that suited the data, my research questions, and my own biases and particular 'style' of interpretation.

Meaning does not emerge from the data but is imposed on it by the researcher. Therefore, when Marshall (1981 cited in Lincoln & Guba, 1985) speaks of "chunks of meaning which come out of the data itself" (p. 345) she must mean "chunks of meaning" that come out of the data for a particular researcher when s/he reads them. What I had not understood initially was the degree of interpretation that would be necessary in the process of identifying units in the data and assembling these into emerging categories<sup>7</sup>.

It, therefore, must be pointed out that I *learned* this method of analysis in the process of using it and that the following are descriptions of method developed during the analysis. Data were analysed for participants conceptions and processes of conceptual change.

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<sup>7</sup>Grove (1988) offers an informative "analysis" of the constant comparative method, which I would highly recommend to anyone attempting to use this particular method. He compares the ideas of Glaser and Strauss (1967) and Lincoln and Guba (1985), identifies assumptions of the method, and offers clarifications and suggestions with respect to unitizing data and refining categories. MacKinnon (1989) discusses the process of and provides useful insights into "identifying events" in data.

## Analysis for Conceptions

It was important to gain an understanding of participants' conceptions for a number of reasons. First, if evidence for conceptual change was to be found it was necessary to attend carefully to participants' initial, or current, conceptions and to note any apparent change. Second, if conceptual change was to take place as a result of interaction with a colleague it might be expected that exposure to the (possibly alternate) conceptions of the colleague might 'cause' or initiate the process of change. Third, and perhaps most importantly, participants' actions would be undertaken and experiences interpreted in light of their existing conceptions. If understanding of participants' actions and interpretations was to be achieved in this study, it would be necessary to view that understanding in terms the participants' own conceptions.

A variety of data were analysed for participants' conceptions. Field notes of lessons described participants' words and actions in the practice setting; and these were words and actions directed towards a student audience. Conference transcripts provided participants' perceptions of and ideas about the events of a lesson, expressed in conversation with a colleague. Because of the reciprocal nature of collegial consultation, participants ideas were expressed in two distinct, alternating 'roles' in these conferences: (1) the role of a teacher whose lesson had been observed and was now being discussed; and (2) the role of an observer having watched a colleague's lesson. Stimulated recall interview transcripts provided participants' perceptions of and ideas about the events of the conference in particular, and also about the lesson and the teacher development project. In this case ideas were expressed to a research assistant. This variety of settings, roles, and audiences allowed access to participants' ideas in a number of educational contexts and thereby increased the credibility of the findings with respect to participants' conceptions. For example, Hewson and Hewson (1988) acknowledge

that the 'interview about instances' in their study, although providing useful insights into student teachers' conceptions of teaching science, would need to be supplemented by observation of the respondents' teaching.

Initial analysis was for conceptions 'in general', but as the analysis progressed it became more and more focussed on aspects of participants' conceptions of teaching, of collegial consultation, and of the relationship between the two participants. Incidents, or units of data, from all three data sources were coded into categories, i.e., incidents that were somehow similar were 'placed together', and through a comparison of these incidents, both within and across categories, "properties" of the categories emerged<sup>8</sup>. Because of the focus of the study these properties were, for example, beliefs and values that a participant displayed or demonstrated in the incidents. As properties of categories became apparent, and were noted, new incidents were considered and coded in light of these, and these incidents either supported or necessitated changes to the properties of categories. The constant comparative method was very effective in the analysis for participants' conceptions.

### **Analysis for Conceptual Change**

Conceptions don't 'stand still'. During analysis for participants' conceptions, incidents were discovered that seemed to indicate some degree of change and to display some sort of process involved in the change. These incidents (or units of data) tended to be large, e.g., a segment of conversation between Tim and Joe in a conference or a long reflective description or explanation in a stimulated recall interview. Such incidents were collected into categories based on apparent similarity and each was interpreted in terms of

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<sup>8</sup>Coding similar incidents by colour and writing memos directly on transcripts allowed the incidents to remain in context.



three very general questions: (1) What is it that changes?; (2) What might count as a change?; and (3) How might such change take place? Categories in this case came to be composed of incidents, from all three data sources, relating to change with respect to a particular conception; and in 'conversation' with these data the three questions above were continuously asked. Asking question number two led to the discovery of changes in the participants' conceptions. An answer to question three involved interpretation of events in terms of theories of conceptual change. In this manner, stories of conceptual change emerged. Because it would not have been possible to work out all of the stories that had begun to emerge from the data, a choice was made to focus subsequent analysis on only a few of these.

With respect to the construction of stories in interpretive research, Louden (1989) has introduced the notion of "a story worth telling" which he characterizes as "an episode that can stand alone, and seemed likely to strike a responsive chord with readers" (p. 54). Stories are constructed by the researcher and involve the "the creation of meaning from the text or experience in the light of the meaning-maker's preconceptions and the tradition of interpretation within which he or she acts" (p. 59). It is important that the stories be contextually-rich so that the reader might experience "an intuitive sense of what it was like to be there" (p. 57). A single story of conceptual change has been selected for presentation as a part of the results of this study. This story exemplifies the kinds of processes seen to be involved in other stories and it seemed to be the story most worth telling.

### **"Establishing Trustworthiness"**

Concern for internal and external validity, reliability, and objectivity is found as much in a naturalistic inquiry as it is in more traditional, or conventional, research. Guba (1981 cited in Lincoln & Guba, 1985) suggests replacing traditional terms with ones that fit naturalistic research. He suggests

"credibility" for internal validity, "transferability" for external validity, or generalizability, "dependability" for reliability, and "confirmability" for objectivity. As much as possible, activities through which these four criteria might be achieved were made a part of this study.

## Credibility

For credibility, Lincoln and Guba (1985) recommend "prolonged engagement", "persistent observation", and "triangulation". Other activities which tend to increase the credibility of naturalistic studies are "peer debriefing" and "member checks". Each of these were addressed in the research design.

*Prolonged engagement* was necessary for thorough understanding of the context and recognition of "distortions [which] might creep into the data" (p. 302). Data were collected for this study over a period of twelve months, from March 1990 to March 1991. During that time four rounds of observation were undertaken. As well, this researcher had numerous conversations with the participants when scheduling visits, at two of the sets of workshops conducted as part of the teacher development project, and on several other occasions, e.g., during site visits. *Persistent observation* required that the investigator be attentive to all relevant aspects of a situation and focus on these in detail, that nothing of importance to the study be ignored. In this study, as part of persistent observation, negative cases were found and considered; and relevant "slices of data" from four rounds of observation were sampled, although the analysis largely focussed on the first two rounds of observation.

*Triangulation*, or approaching an issue or problem from a number of points of view, for verification of findings and increased credibility, was achieved in this study by analyzing data from a number of sources (lessons, conferences, stimulated recall interviews) and by "member checking". In this study there was

built in triangulation with respect to the post-observation conference because the videotape was observed and commented on by both participants and their perceptions were added to the perceptions of the researcher. Triangulation was also built in with respect to participants' conceptions and conceptual change because data was collected from three different contexts -- teachers' lessons, post-observation conferences, and stimulated recall interviews.

*Peer debriefing* involved discussing and comparing findings with other members of the research team during data analysis. In the teacher development project, data collection on Tim and Joe was the responsibility of two research assistants -- myself and Janet Tyler. Janet's comments were taken into account in the interpretation of the data in this study. Our conversations (and those with other members of the research team) were invaluable to me for checking ideas that emerged during analysis. *Member checking* involves continuously taking the results of the data analysis, "analytic categories, interpretations, and conclusions", back to the participants for their consideration and critique. This step is important for credibility in a naturalistic study and allows for the emergence of "negotiated outcomes", whereby the participants in the study actually participate, to varying degrees, in the development of the study's findings. This would certainly lead to a deeper understanding than if a researcher simply put forth his or her own interpretation of a situation and its events. In this study, although a number of informal checks were undertaken during analysis, member checking was left until after the final round of observation. At this stage, the analysis and findings of the study were shared with the participants and their comments solicited. Their reactions were positive and no changes were necessary on their account.

## Transferability

Transferability is 'in the eyes of' one who would seek to transfer the findings of a naturalistic study to his or her own context. A judgement must be made as to whether or not that context is sufficiently similar to the context of the study to allow the findings to inform practice. In order to facilitate judgement by the reader, the context of this study has been specified on a number of levels and results of the analysis have been presented in a contextually-rich fashion.

## Dependability and Confirmability

Lincoln and Guba maintain that dependability and confirmability may be checked by a "confirmability audit". This procedure involves someone outside of the research team checking the records of the study, and is conducted with much similarity to a financial audit. In this study, the candidate's committee may take the place of an external auditor and lend dependability and confirmability to the study through its critique of the work in progress. As well, and in order to facilitate such an audit, a "reflexive journal" has been kept. A reflexive journal is described by Lincoln and Guba as:

...a kind of diary in which the investigator on a daily basis, or as needed, records a variety of information about *self* (hence the term "reflexive") and *method*. With respect to the self, the reflexive journal might be thought of as providing the same kind of data about the *human* instrument that is often provided about the paper-and-pencil or brass instruments used in conventional studies. With respect to method, the journal provides information about methodological decisions made and the reasons for making them -- information also of great import to the auditor. (p. 327, emphasis in original)

The reflexive journal was felt to be one of the most important means for establishing trustworthiness and was made an integral part of this study.

## Summary

This study has sought to describe and understand processes involved in teachers' conceptual change. Through naturalistic inquiry and inductive analysis of data some aspects of such processes were discovered, and can be described and possibly explained. Careful attention was paid to the context within which the processes took place, so that the findings might gain credibility and reasonably inform the practices of teacher professional growth and implementation of educational change. It was hoped that, in bringing together research on learning as conceptual change and teachers as colleagues, fresh insights might be gained into how it is that teachers change their conceptions and their practice.

What emerged from the analysis were: (1) participants' conceptions of collegial consultation and teaching; (2) apparent change to some aspects of these conceptions; and (3) factors associated with conceptual change. The results of the analysis are presented in the next two chapters.

## **CHAPTER 4**

### **PARTICIPANTS' CONCEPTIONS AND CONCEPTUAL CHANGE**

Tim's and Joe's conceptions of the context in which they work, e.g., conceptions of the school, their relationship, the teacher development project, and collegial consultation, will affect what they think and do. As well, conceptions of themselves, colleagues, teaching, and learning are all part of a context for conceptual change, i.e., the "complex conceptual ecology", or conceptual context, within which new or alternate conceptions are perceived, understood, considered, and either accepted, modified, or rejected. In this chapter, Tim's and Joe's conceptions of collegial consultation and of teaching -- a part of their respective conceptual ecologies -- will be described. Three examples of conceptual change will be presented, in terms of what it was that changed and how that change seemed to occur, and with reference to the theory of conceptual change introduced by Posner et al, 1982 and described in chapter two. These examples of conceptual change appeared to take place as a result of the collegial interaction between Tim and Joe.

#### **Conceptions of Collegial Consultation**

Conceptions may be large and inclusive, such as conceptions of teaching and collegial consultation. Or they may be smaller and subsumed within larger conceptions, such as conceptions of questioning or a particular student activity, within a conception of teaching, and of the role of the observer or of the collegial relationship, within a conception of collegial consultation. It was possible to infer some aspects of Tim's and Joe's conceptions of collegial consultation from an analysis of conference and stimulated recall interview transcripts. Because collegial consultation was new to the participants there was evidence of

conceptual change as they attempted to make sense of what they were experiencing. Ideas which emerged, and changes to these, centered around their conceptions of their relationship, Tim's conception of the role of the observer, and Joe's conception of the purpose of collegial consultation.

### **The Relationship Between Tim and Joe**

Tim's and Joe's conceptions of their relationship were amazingly close. I do not wish to imply that there were no differences, but rather that the similarities were striking and, in this instance, it was informative to deal with them together and to provide a description of the relationship as it was conceived of by both of them.

Tim and Joe have a relationship not only as colleagues but also as friends. They both commented on the length of their relationship and there seemed to be a special bond because they went through those first, tough, few years of teaching together. Their early years together were referred to often in initial conferences and interviews, as if to remind themselves of and reinforce the long and special relationship they have.

Mutual trust and respect were evident between Tim and Joe, and both spoke of the importance of these with respect to collegial consultation. Joe expressed his respect for Tim when he described him as "innovative", "up-to-date", and "trying new things in the classroom" (1.5-SR-Joe-T). Tim expressed his respect for Joe's "creativity" (1.4-C-Joe)<sup>9</sup>. The length and quality of their relationship allowed Tim and Joe to speak plainly with each other. Strong comments, though often tempered, were evident in their conversations and seemed to come from a caring for each other as professionals, colleagues, and friends. Tim pointed out, on

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<sup>9</sup> In this case the quote comes from the first round of observation, fourth event, which was a conference on Joe's lesson.

viewing the post-conference on Joe's first lesson<sup>10</sup>, that their knowledge of each other and their mutual trust were important in this regard.

Tim: The relationship does make a difference I think, in this particular case, and I think, you know, he can say just about anything to me and I can say just about anything to him, regardless of our particular bureaucratic positions. Both of us feel that each person is doing a good job, and I think that's the bottom line. We both think that we have the best interests of the kids at heart. So, if that's the case, then we both trust that the other person is only saying these things to try and give us some more insights. Not to try and, you know, get everybody upset. (1.8-SR-Tim-O)

Joe seemed to corroborate this when he said, on viewing the conference on his first lesson,

Joe: But I would really have to trust the person I was working with...I think that respecting has to be there, and I don't respect Tim's talents because we are friends. I taught with him in the junior high school. I know he's an innovative teacher. I know he's attended workshops on contemporary and up-to-date things. And so I sort of value everything that he has to say. I think that's an integral and very important part of teaming up with somebody and getting involved in a session like that...I have a feeling like if it was a different person, who I may not necessarily have wanted to work with, I might have been more argumentative. (1.5-SR-Joe-T)

And, on viewing the conference on Tim's first lesson,

Joe: I just called it like I saw it. I [sometimes] tried to be overly cautious, too polite, but I'm not sure whether that's useful for anybody; you

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<sup>10</sup> Participants' comments from the data have been 'cleaned up' for readability, although transcripts contain all of the ums, ahhs, hesitations, and repetitions characteristic of human speech when articulating complex ideas, as was often the case in this study.



know, mutual admiration society rather than going on and saying this is what I saw, and this is how I feel about what I saw, how do you feel?...and I think the reason why that happened is because I trust Tim. (1.7-SR-Joe-O)

Thus, the notions of "trust" and "respect" built up over time, through experience of the other person in a number of contexts, seemed to be important factors in their relationship. Being able to speak plainly, as a result of the trust, allowed the articulation of conceptions that might be different from or in opposition to the conceptions of the other person. And attending carefully to what was said by the other person, as a result of the respect, allowed a perception of conceptions that might be different from or in opposition to one's own.

Tim and Joe seemed to have been working towards, and to have achieved in later interactions, "co-supervisor" (Cogan, 1973 cited in Sergiovanni & Starratt, 1988) status in their collegial consultation relationship. By the fourth round of observation, Tim and Joe had developed an understanding of and an ease with each other that enabled their conversations to flow and joint problem-solving to be the norm in their conferences.

### **An Example of Conceptual Change**

Joe's conception of Tim and their collegial relationship changed as a result of experiences during the first round of observation. In fact, many of Joe's ideas about their relationship were expressed while talking about this change. As mentioned previously, Joe conceived of Tim as experienced, competent, and knowledgeable. In the role of observer during their first post-observation conference, Joe pointed out to Tim his many "positives", referring to his experience and knowledge with respect to teaching.

Joe: ...clear, articulate instruction...good, solid voice projection...you make your voice work for you...you don't talk down to students...good, physical, confident presence in front of the classroom...fourteen years of teaching...[students are] polite...you've built that in...you know what it is... (1.2-C-Tim)

In stimulated recall interviews he described Tim as "innovative" and "up-to-date", and as "someone I wholly respect in the classroom". This conception of Tim was mentioned by Joe in his role as the observer in collegial consultation and as the teacher being observed. In his role of observer, and considering how this might be different than working with student teachers, Joe said of Tim,

Joe: ...[he's] an experienced fourteen-year teacher and also an administrator who's really on the ball -- on top of things -- he's really innovative, he's got a lot of confidence, he's using new techniques in the classroom...(1.7-Sr-Joe-O)

But, in the role of a teacher being observed, Joe expressed a tension he felt going into the collegial consultation process with Tim and spoke of how that had been resolved. He mentioned, first, his initial conception of Tim as a colleague,

Joe: ...Tim and I have worked together. We were hired at the same school way back in junior high school and we began as *mutual colleagues in the classroom*. (1.5-SR-Joe-T, emphasis added)

But, he immediately expressed dissatisfaction with this conception, which was based on experiences years ago and in another context. It did not seem to account for Joe's understanding of Tim's professional development in the intervening years. There was an anomaly, for Joe, because Tim was now an administrator and also had become very knowledgeable about teaching. Were they still colleagues in the classroom?

Joe: One of the things that I really was tossed around with, and I'm sure he would be -- I don't know if he would be offended, but it's a reality -- is that he is now the administrator and that I'm a teacher. But Tim and I are also good friends and so on. But there was -- it was still, you know, he's got a lot of knowledge about innovative new curriculum ideas and so on, cooperative learning, etc. And he's become a very knowledgeable person with regards to new and innovative techniques in the classroom. And I felt a bit threatened by the fact that I was working with him under that premise. (1.5-SR-Joe-T)

It might be said that Joe's conception of Tim included a feeling of being threatened, both by Tim's status as an administrator and by Tim's knowledge and innovative ideas. Joe went on, however, to articulate an intelligible 'new' conception of their relationship, constructed as a result of experiencing their conversations in the conferences. The change seemed to be of the 'situational' type, when an understanding of the situation or context enables one to apply a particular conception that is already held. Yet, some change to Joe's original conception was reflected in the fact that the notion of "mutual" was now missing.

Joe: But after we actually began speaking I was sort of able to break and overcome that a little bit later on, realizing that we were just, you know, *colleagues in the classroom*. (1.5-SR-Joe-T, emphasis added)

Ideas Joe expressed at the end of the interview demonstrated that his new conception of their relationship was plausible. It was consistent with aspects of his conceptual ecology, such as a belief about himself -- "I'm not intimidated by things like that" -- and a feeling about the experience of collegial consultation -- "I liked the exercise". It also fit with his ideas about collegial consultation.

Joe: I made a comment earlier -- that Tim being an administrator -- and I almost kind of want to take that back, because I don't think I would have done it with just anybody. I would have done it with somebody that I would, you know, wholly respect in the classroom. ... I would really have to trust the person I was working with. I just wouldn't let anybody into my classroom. (1.5-SR-Joe-T)

A "second level of viability" (Von Glasersfeld, 1989) was added, increasing the conception's plausibility, because it appeared to Joe that Tim held a similar conception of their relationship.

Joe: And actually I wasn't the instigator. I wasn't the one who was looking for the study. It was Tim that came to me, which I thought was kind of neat. I'm not sure if I was easy prey or whether he just, really, was curious about what I was doing and we could, you know, help each other out. I tend to think it's the latter. (1.5-SR-Joe-T)

This understanding of why Tim had approached him to participate in the teacher development project also demonstrated that Joe's 'new' conception of their relationship, as "colleagues in the classroom", was fruitful. That is, it allowed him to explain Tim's actions in terms of mutual benefit and collegueship, and to see that Tim could learn from him. This new conception was also fruitful in that it led to new insights. Joe came to view collegial consultation as an opportunity to observe and talk with a colleague, whom he respected and valued for his expertise in teaching, and who, "oddly enough", was "dead on just about everything" (1.5-SR-Joe-T).

Beginning with a conception of collegial consultation with Tim that seemed to imply a hierarchy and included a feeling of being threatened, Joe came to see that the two of them were on an equal footing in terms of the classroom. The tension, or dilemma, was resolved and the threat reduced through construction of

a 'new' conception of Tim and their collegial relationship. In the next section, other aspects of Joe's conception of collegial consultation will be discussed.

### **Joe's Conception of Collegial Consultation**

Joe most often spoke of and acted in collegial consultation as if it were more an opportunity for him to learn than an opportunity for him to help Tim; although, in his eyes, these two were not mutually exclusive or unrelated. This view seemed to be a result of his experience with student teachers.

Joe's prior experience with observing and conferencing on lessons had been with student teachers. He stated that he often sponsored student teachers and did it "for the very reason -- it's partly selfish -- that I can sit in the back of the room and see what's going on in my classroom" (1.5-SR-Joe-T). He believed that "we have to keep constantly re-evaluating ourselves" and that in "giving [student teachers] the ins and outs to run a smooth operation, I'm as well evaluating myself"; adding, "I learn so much from student teachers" (1.5-SR-Joe-T). Thus, Joe's purpose in collegial consultation seemed to be to learn, not only as a result of Tim observing and commenting on his lessons, but also as a result of his observation of Tim's lessons. In the role of observer, in another interview during this round of observation, Joe stated that he had heard good things, from students, about Tim's teaching and wanted to be able to observe how these things happened. It was interesting that Joe began the first two conferences, when he was the observer, by stating something significant that he himself had learned from the observation.

Joe: The first really interesting observation on my part was of myself. That means, being a humanities person and then observing something going on in the math/sciences kind of a situation put a whole totally different perspective on things, and instead of me being

influenced by colourful material and so on, that you would normally get say teaching an English class -- you know, more sort of flexibility, literature, and presentation -- it allowed me to sort of concentrate a little bit more on the mechanics and structure of the actual lesson. (1.2-C-Tim)

and,

Joe: Well, first of all it was interesting to see the cooperative learning thing taking place in the classroom. But more importantly what I learned was -- by going round to all the groups -- not just working to solve the various problems and objectives that you set, but also just dealing with the dynamics of working with each other, like the dynamics of the group and so on. (2.3-C-Tim)

From the manner in which Joe initially conducted himself as observer (1.2-C-Tim) it seemed apparent that he saw this role as one of sharing his own perceptions of the lesson with the teacher and allowing the teacher to "counter with anything you wish". In a discussion early in their first conference together, Joe argued that what he was sharing were "positives and *concerns*", rather than the idea Tim expressed, which was "positives and *negatives*". The concerns were to be "points of discussion, really", should Tim share the concern and choose to discuss it. When Joe asked questions of Tim in a conference it often appeared that he wanted to know, for his own information, or that he was trying to get Tim to attend to something that Joe felt was significant in the lesson, e.g., "I'm just curious -- the forming of your own group -- is that part of the process?" (2.3-C-Tim).

Although Joe did not appear to change these ideas they figured prominently in the process of change with respect to his conception of teaching (described in the last section of this chapter) and with respect to his conception of math (described in chapter five).

## **Tim's Conception of Collegial Consultation**

Tim's conception of and actions in collegial consultation changed over the course of the study. His purpose in entering the study seemed to have been to understand the activities of observation and conferencing, and especially to understand and improve his own actions in the role of observer. This might be expected because Tim, as well as teaching two classes, was one of two vice principals in the school and in that capacity observed and conferenced with teachers.

Tim's initial conception of the role of the observer was to provide another pair of eyes, "an enlightened video camera" (1.8-SR-Tim-O), and to gather data for the teacher. He stated, as well, that "the purpose of the conference really is for the teacher to see themselves and therefore make some adjustments themselves, I think" (1.8-SR-Tim-O). Observations and conferences were to have a focus and Tim referred to and came "back to the focus" frequently in early conferences. It seemed that it was the responsibility of the observer to keep the conference "on track".

## **An Example of Conceptual Change**

In stimulated recall interviews in the first round of observation, Tim expressed real concern about the process of conferencing demonstrated by Joe and himself in the videotaped conferences. His initial conception of the role of the observer was not sufficient to either explain his experiences as a teacher being observed or allow him, in the role of observer, to conduct the conference as he would have wished. During the interviews, when he watched the videotapes of the two conferences, Tim stopped the tape frequently to reflect on what he observed

and, in the process, to change his conception of the role of the observer in the conference.

Tim was surprised by Joe's approach, as observer in their first conference, and concerned by what he considered to be an evaluative stance taken by Joe.

Tim: I wasn't expecting him to look at the holistic aspect of the classroom. When he explained his rationale it seemed logical to me and I agreed with him. But, then he started to say the 'concerns', or pardon me, the 'positives and concerns'; and I thought 'now he's really being an evaluator here', rather than being my sensory input. (1.6-SR-Tim-T)

It seemed, at this point, that Tim held two conceptions of the role of observer. As he expressed it in the interview, the role of "evaluator" was associated with "plusses and minuses", "positives and negatives", and "I'm gonna hear some hot stuff". His preferred conception, from Tim's "own personal growth perspective", was the observer as a provider of "sensory input", both providing "details" from the lesson that might "surprise" Tim and allowing him to come up with his own solutions<sup>11</sup>.

However, as a result of experiences in this first conference, Tim came to see that he also wanted, as the teacher, to be able to say what he thought of his lesson.

Tim: You know, it's funny. I think it might have been more productive if he had asked me at the very first, 'how did the class -- how did you see -- how did the class go?' Rather than for him to tell me how it went, it might have been better for him to just start by saying a very simple question, and that would be 'Well, how did you feel the class went? What was your?' And then I think I could've told him some of the things and it would've given him, I think, a better opportunity to

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<sup>11</sup>This conception of the role of the observer in collegial consultation seems to parallel, in interesting ways, Tim's conception of teaching, described later in this chapter.



see what I saw. And then he could tell me what he saw and, and interweave it better, I think. (1.6-SR-Tim-T)

This seemed to be a 'new' idea that Tim was struggling to make intelligible. The idea appeared to be plausible because it fit with Tim's conception of the preferred role of the observer, as providing sensory input for the teacher. And, it appeared fruitful because it would allow him, as the teacher, to be more involved in the consultation process.

When observing the videotape of the other conference with Joe, when *Tim* was in the role of observer, he made quite a careful analysis, or critique, of the conference and, in particular, his own actions as observer. He expressed dissatisfaction with several of the things that he had done in this conference, and considered what he might have done differently in many of those instances. For example,

Tim: ...just from what I, how I watch myself -- I'm not -- I don't think he understands what I'm really saying right now that well, because I'm going around in circles a bit. Perhaps if I had been much more direct in my statements about, you know, here's what I saw, what do you think? Or, maybe if I had said -- as I said earlier in the other interview -- maybe I should have asked him, as the observer, I should have asked him, how did he feel the lesson went. That's a better opening line than saying well 'let me just start with some things', you know? (1.8-SR-Tim-O)

In this interview, Tim expressed dissatisfaction with his conception of the role of the observer as demonstrated by his actions in the conference. He took the opportunity provided in both interviews to reflect on (1) what he had experienced as the teacher in a conference and (2) what he was experiencing as he watched himself on videotape in the role of the observer. As a result, Tim constructed a different conception of how to begin a conference and at the next opportunity

experimented with this 'new' idea. The 'experiment' appeared to assist Tim in establishing the conditions for conceptual change; in particular, that the 'new' idea was fruitful.

In the next conference when Tim was the observer his actions were quite different, and very much in line with the idea he had constructed during the first round of observation. The tentative nature of his explanation to Joe, and his difficulty in wording the question, indicated that Tim was trying something new.

Tim: And so I'm gonna just do something a little different with this conference if you don't mind. And I, I just want to ask you a few questions.

Joe: Ok

Tim: And, and maybe you -- we can go from there.

Joe: Sure

Tim: And so, the first question, I guess -- and the ultimate question is -- how, how did you think the lesson went? How did you feel it did? It went? Were, were you happy with the lesson?

Joe: Ummm?

Tim: With your class?

Joe: There was only one portion of the lesson that bothered me a little bit and that was getting the kinds of responses I was looking for, for the breakdown of each individual verse. I mean they were, they just left

Tim: They were a little

Joe: They were feeling cold and flat.

Tim: A little flat, yeah.

Joe: Okay, and so like I'm just, still struggling with this poetry unit, and poetry in general, because it is a difficult unit to teach because of the real heavy abstractions...

Tim's comments on this part of the conference, in the interview, indicate that he found the new conception fruitful.

Tim: Interesting, you know, when I look at it again, I see that I accomplished what I wanted to, because in the first part of [the conference] I wanted to make sure that Joe did the talking and that I listened. (2.8-SR-Tim-O)

Tim continued, through the third and fourth rounds of observation, to experiment with a changing conception of the role of the observer in the conference. He particularly worked on asking questions that would encourage and enable Joe to contribute his thoughts on the lesson. By the fourth round of observation, it was evident that Tim was not only gaining considerable expertise in this area but was beginning to demonstrate some confidence in his ability to act on his changed conception.

Joe went along with this different way of doing the conference and commented on it during stimulated recall. He seemed to appreciate being able to say what he had thought of his lesson. It also had important implications for what he experienced during this conference and his own conceptual change with respect to teaching.

### **Conceptions of Teaching**

Tim's and Joe's conceptions of teaching were inferred from analysis of field notes on lessons and transcripts of conferences and stimulated recall interviews. These were conceptions constructed as a result of fourteen years experience as classroom teachers. Included in this section are some aspects of Tim's and Joe's conceptions of teaching and an example of conceptual change for Joe.

## Tim's Conception of Teaching

Tim's conception of teaching might be characterized by the metaphor of a lesson as a journey or quest and an image of the teacher as the leader, e.g., "what we're after is...here we go...follow me" (1.1-L-Tim). He also spoke and acted in terms of students' needs, e.g., "you will need the following...here is a skill you will need..." (1.1-L-Tim), and provided the necessary items and assistance to students in his lessons; expressing concern in the conferences when he had not. For example, Tim carefully demonstrated for students those procedures they were to undertake during a lesson and he seemed to value organization because the students would require that of him. Tim's lessons were well organized, with an objective clearly stated and reiterated during the lesson, materials assembled and ready for use, and examples and information on the board laid out neatly and clearly for the students. The activities he provided, as a part of the journey, were often creative and interesting to students.

Tim was not only concerned with what his students were to learn, but *how* they were to learn it. He was particularly interested in the students having to think something through in the activities and, as a result, having to infer the learning from the activity.

Tim: I'm trying to get students to think...I'm trying to get them to infer from their drawings...to cognitively come up with the relationships that exist among those triangles and then be able to generalize...a more higher order concept that I'm reaching for. (1.2-C-Tim)

In most cases, Tim did not manage to get through all that he had planned for in an observed lesson and he expressed concern about this in conferences. But, it seemed that during the lesson it was more important that he take the time to provide what his students needed. That is, the rate of progress on the journey

was determined by Tim's perceptions of students' needs. His students responded to Tim's caring and task-oriented attitude towards them by working hard to meet his expectations.

These aspects of Tim's conception of teaching were demonstrated in the kinds of things he attended to when observing and commenting on Joe's lessons.

### **Joe's Conception of Teaching**

Joe seemed to operate from an image of himself as a 'director' (in the dramatic sense) of students' actions and learning in his classroom. For example, there was an emphasis on students' 'performance' in response to Joe's questions and in their presentations to the class. Joe would 'coach' these performances both in his responses to students and by his own example. Comments by Joe in conferences, e.g., "...what I require of myself in the classroom" (1.2-C-Tim), seemed to indicate there was an element of his own (dramatic) performance in his image of teaching. In his second lesson Joe seemed to be preparing his students for their performance on the English 12 government exam. He reminded them that he had marked government exams and said that he felt the students had not performed as well as they might because they were "afraid" and therefore did not do what he felt they knew how to do. He told his students that if they "use the procedure I show you this afternoon" they would have "no problems" and that one of the objectives of the lesson was "confidence building" (2.2-L-Joe) for their performance on the exam.

Joe spoke to Tim of "the rapport I have set up" and of how he treated each student differently, depending on their varying abilities to perform in front of the class.

Joe: ...I wouldn't try it on Sue Ho, this poor little girl who would slither into her desk if I raised my voice more than a half an octave [laughs] you know. But, guys like Roy Emmanuel, like he gets it from all ends, being president of the school. And the 'A' students, you know, they've got to be able to handle that kind of stuff". (2.4-C-Joe)

Yet all students were encouraged to perform and for this reason Joe would "hit as many different students as I could" with his questions (1.5-SR-Joe-T), and was pleased with the groups' choice of presenters in his second lesson because they weren't the 'A' or 'B' students.

Group work, and group presentations of the results of their work, figured in three of the four lessons we observed. Joe seemed to value students working together in groups, e.g., "I see the value in [the students] talking with each other" (3.4-C-Joe-T), and there was a sense of 'we're in this together' in his lessons. An interesting contrast between Tim's and Joe's conceptions of teaching was exemplified in the way they spoke to students when answering questions together. Tim said, "Let's *go on* to number two" (1.1-L-Tim) and then led the students, who were to work along with him, through the problem. Joe said, "Let's *take a look* at number three" (2.2-L-Joe), and then judged and coached the students' ideas, and added his own.

Joe demonstrated, during lessons and in conferences, a belief that the subject matter of English was hard, being an academic discipline, e.g., "poetry is tough...take some chances but do it in a very academic, intellectual, [more adjectives] way...This is complex...we're all having trouble, even me" (2.2-L-Joe). Through his questions and responses to his students, Joe 'pushed' their thinking; and, by example and through his questions, he encouraged them to make connections to their own lives and to other works of literature. Joe's lessons were well organized, with everything ready to go, and because of this he was able to put all of his energy into the lesson itself. His lessons were lively, challenging, and

full. Two of the lessons started before the bell and two of them continued after it had rung to end the class.

A central feature of Joe's conception of teaching was questioning. His objective for a lesson was often in the form of a question to be explored, and the manner in which this objective was achieved was largely through Joe's questions, the students responses, and Joe's responses to them<sup>12</sup>. For example:

Who identifies with the old man?  
 Why the title, A Clean Well-lighted Place?  
 Why is it not the same for the old man to go home and drink?  
 (1.3-L-Joe)

and,

What is happening in the stanza, Cheryl?  
 What is the function of a metaphor?  
 You have a poem in front of you [and you are] tearing your hair [because it's hard]. What do you do, Gordon?  
 How are they brought together? What poetic devices are used?  
 (2.2-L-Joe)

His responses to students ideas were varied and generally encouraging.

*During class discussion of a short story --*  
 Possibly.  
 No, you missed the question.  
 You're there; you're getting there; now you're starting.  
 (1.3-L-Joe)

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<sup>12</sup>These examples of questions and responses to students were taken from field notes and I have included only those that were direct quotes. It must be pointed out that questions and responses that were long tended not to be included in field notes as direct quotes. I do not want to give the impression that Joe's questions and responses were all short; nevertheless, these examples *are* representative of the kinds of things he was posing to students.

*During class discussion of a poem --*

That's no good, you've got to clarify.

Great, why?

Ask a question about stanza one.

Are you having problems?

Yes, possibly. What else?

So, stanza one is an introduction of nature in a personified way.

Dead on! That's correct.

Sure. I can accept that as one interpretation. Can we have another one though?

That's true, too.

(2.2-L-Joe)

*To a group during group work --*

Yeah, let's do that.

(2.2-L-Joe)

*In response to groups' presentations --*

Dead on! Excellent.

Dead on once again. And a totally different analysis.

Correct. That's correct [and he points out that they've shown two concrete examples]

That's it?

You're on the right track but it needs a lot of development.

(2.2-L-Joe)

The central role of questioning in Joe's conception of teaching was also evidenced in conferences. For example, in the first round of observation, Joe, in his role as observer, said he had "looked at the questioning procedures" (1.2-C-Tim), although that had not been the focus chosen for the observation. And when, at the end of the conference, Tim and Joe discussed a possible focus for the next observation Joe expressed his own wishes.



Joe: .....what I would like to do is be able to see how much of the class you use in terms of response.....then I can key more on the questions that you design and set up. And then I can see how you interact with the way students answer questions.....I'd like to see what you do in order to get more from them... (1.2-C-Tim)

This desire to observe Tim's use of questions and handling of students' responses demonstrated a central commitment Joe had to the constant improvement of his own teaching. "I think we have to keep constantly re-evaluating ourselves. It's too easy to get sloppy and so on" (1.5-SR-Joe-T). Thus, it was not unexpected that, as a result of collegial consultation with Tim, Joe changed his conception of teaching somewhat or that this was evidenced in his classroom practice.

### **An Example of Conceptual Change**

Over the course of the four lessons that we observed, Joe could be seen to be changing, slowly and almost imperceptibly, his role in the classroom from director to "facilitator" (4.5-SR-Joe-T). This is not to say that a whole new conception of teaching replaced an existing one; but rather, that modifications were being made to Joe's conception of teaching and consequently to his classroom practice. Much of his teaching remained the same -- it was, to use Joe's word, "functional" (1.2-C-Tim) -- but, in some areas important to Joe, he made changes. In a stimulated recall interview during the fourth round of observation, Joe said that his ideas about teaching had been "changing over the last four years" and that he had been trying to become more of a "facilitator" in the classroom.

Joe's first two lessons were fast-paced and intense and, although encouraging and positive about students' ideas, he sometimes displayed "his

gruff manner with students" (1.5-SR-Joe-T). It seemed, however, that in the second lesson Joe was more aware of students' feelings and less "gruff" with them. He also seemed to back off a little in terms of pacing and the intensity was somewhat reduced. In the third and fourth lessons, which took place during the next school year with a different class, it again became obvious that, in subtle ways, Joe's teaching style (i.e., Joe's ideas about teaching *and* how he acted upon these in the classroom) was changing.

During the discussion in lesson three, when the students were asked for their ideas, Joe commented less and encouraged the students to comment on each others' answers. He said, in the post-observation conference on this lesson, that he was trying "to move the kids without me being a part of the discussion" (3.4-C-Joe) and that it was like trying to light a fuse.

Joe: ...You know you keep lighting a fuse with a match and it goes out...and then all of a sudden it does light and it goes. And then you just sit back and avoid the explosion.... (3.4-C-Joe)

Clearly, this was a teacher who had given up some control in the lesson, although he recognized that "as a teacher you always feel you have to give a little bit of something" (3.4-C-Joe) to the discussion.

In the fourth lesson Joe again displayed subtle, and not so subtle, changes in his teaching style. In this lesson the students, who were studying Macbeth, were asked to think, individually this time, whether they preferred to read the play, hear the play on audiotape, or see the play performed; and why. Focussing on the "witches' scenes", Joe allowed the students time to read, to hear an audiotape, to see a videotape, and in each case to note down their thoughts. In the subsequent discussion, Joe consciously encouraged all students to become involved and, even more than in lesson three, Joe's comments were reduced and

students' comments on each others' ideas increased. Thus, it appeared that Joe's conception of his role in the classroom had changed. This was evident in his move from responding personally to each student's idea to encouraging the students to do the thinking and respond to each other. The intensity in his lessons was reduced and this allowed the students more time to think.

Although the changes Joe was making in his own teaching were a result of many factors, the experience of collegial consultation with Tim could be seen to make a contribution. In their conferences on his lessons, Joe was exposed to Tim's perceptions of his teaching and these were sometimes different from his own. Among other things, the notion of "thinking time", introduced by Tim, seemed to be significant for Joe.

In the post-observation conference on Joe's first lesson Tim made the following observations. I have abstracted them from the entire conference to present a picture of a perception that Tim presented to Joe -- that of urgency in the pacing and in responding to students' answers.

Tim: ...everything happened so fast in that classroom. Like there was a lot of intensity, in a hurry, it seemed to me...You didn't tolerate the question being missed very much. You were short....it was a rapid-fire classroom to my, from my experience, because so much happened in such a short time...it was a pretty full plate...I think they need, they would need some more time to do some more detailed thinking...the mechanics were very good, very positive, with the exception of that one harsh, "You missed the question"...Business, business, let's get on with it...watching it, it seemed rather abrupt. And also when you talked to Allan about "Thanks. Thanks a lot. Ah, I already knew that"...The pacing, for me, was another concern that we had and I think, I thought I'd maybe mention a couple of points about that...I found there to be quite a difference in pacing or tempo in the class. ...like a real roller coaster ride...drastic mood changes...They were observers of that whole process rather than

being engaged with you in investigating the novel...And I thought they were missing out on something. (1.4-C-Joe)

Joe shared some of Tim's concerns but had difficulty accepting others. For example, he identified the problem as the students not having read the story and, in their discussion and consideration of possible solutions, Joe's thoughts and decisions centered around this.

That Joe had been thinking about ideas expressed by Tim in the conference was evidenced at the project workshops which took place some time later. During a break, Joe spoke to me of a recent incident with a student and he seemed to articulate a tension or dilemma with respect to his manner with students and the sense of urgency in his classroom. He could not reconcile Tim's comments with his own conception of teaching and was experiencing some dissatisfaction with his conception. The anomaly was that what Joe had taken for granted in his teaching -- that his gruff manner and sense of urgency contributed to students' learning -- Tim had said might actually interfere with the students' learning. This issue came up again in the post-conference on Joe's second lesson.

Tim began this conference by asking Joe how he thought the lesson had gone. Having been given the opportunity to express his thoughts about the lesson, Joe mentioned, among other things, "...or at least giving them some time to think..." (2.4-C-Joe). Tim picked up on this and reflected Joe's concern by saying, "[they] need some time to reflect, I mean to think about it and sort of investigate". And, in the ensuing conversation Tim asked a question that included the idea, "they might have needed more think time". The conversation continued, however, to focus on Joe's concern about the difficulty of poetry and on the strategy Joe had given students, in the lesson, for supporting their ideas about the poem. Then Tim said,

Tim: In the notes I made I wrote down 'rapid-fire approach, intense, pressure'. It was very intensive, and you said it, you know, you called it. And I agree with you. I think it was a very intense, urgent, kind of classroom, and there were very short time lines...and it left precious little time for them to investigate together. (2.4-C-Joe)

In the conference, Joe's response to this was to provide Tim with some of the background to, or context of, this lesson and to consider the students' hesitancy in answering his questions as having to do with the difficulty of poetry. But, what Joe seemed to have taken away from the conference, and what he stopped the videotape to comment on in the stimulated recall interview, was the notion of "thinking time". His comments in the interview were particularly illustrative of the kind of exploration that takes place when a 'new' conception is constructed and 'checked' for intelligibility, plausibility, and fruitfulness. It was also evident that Joe was making use of other conceptions and past experience in constructing a 'new' conception.

Joe: One thing that he said...and it's so basic....He said, the kids weren't given that much time to think. And, um, I never thought of that before [a little laughter] you know, ever. Like, 'thinking time'. And how do you set up thinking time in a classroom? You know? Do you say, 'Now, we're gonna have ten minutes of thinking time'? Does thinking time mean when you give them ten questions in their exercise book, and they're to work out the solutions to the questions? Is that thinking time? So I find that interesting and you know I'm gonna -- I'd like to pursue that a little bit more. You know, what does 'thinking time' mean, you know, exactly?

Int: yeah

Joe: So that was probably one of the things that came out of that.

Int: That kind of an idea, or something that Tim's mentioned, that you would want to pursue?

Joe: Well, that term 'thinking time' is a strange concept. Like it's, it's a really strange thing 'cause, I mean, you think all the time!

Int: yeah (2.7-Sr-Joe-T)

Joe seemed to have recognized, in "thinking time", a possible 'new' conception. He seemed to be trying to make this conception intelligible ("what does 'thinking time' mean?"), but it was not initially plausible because it did not fit with Joe's belief that "you think all the time". He continued, in the interview, to 'think out loud', using analogies and an exemplar from his own conceptual ecology in an attempt to make sense of the notion of "thinking time".

Joe: I mean, you're constantly thinking. But, does 'thinking time' - is that a procedure? Does that imply that, you know, does 'thinking time' mean, in Tim's mind, where you get together in your small groups and, you know, work out a critique or a problem to, to something in literature, for example, in my English class? Or does thinking time mean some time, like in elementary school, when teachers get kids to put their heads down just to calm them down? You know? Or does thinking time mean, you know -- what exactly is he referring to? Now, I think he obviously just means that, okay now you've been presented with a problem now work it out. (2.7-Sr-Joe-T)

Once he had an intelligible and initially plausible conception of "thinking time", Joe immediately began to consider how this conception might be fruitful.

Joe: But I'm wondering if you can't make more out of that, too. I wonder if that couldn't be part of a procedure in the classroom, like a set thing, if you design something called 'thinking time' in the classroom. So, that given time, that 'thinking time' is announced that -- you think! [uproarious laughter] And it's weird; it's very, very strange, but you know, I mean who knows?

Int: Yes! It's [certainly] an idea.

Joe: I, I like the term. You know? I think it's kind of neat.

Int: Just putting those two words together.

Joe: Yeah. And it's, I mean it's a bit silly too, because philosophically you can't say 'okay, it's thinking time, you better start thinking'. I mean how do you monitor that? I guess [pause] I don't know. I'm just

Int: But as you say it's worth exploring.

Joe: yeah

In this sequence, it can be seen that Joe was struck by the notion of 'thinking time' and operated as if it were an alternate conception to his own, i.e., a new conception for him to make sense of and incorporate into his own conceptual framework. Although, in one sense, Joe had introduced the idea himself at the beginning of the conference<sup>13</sup>. Using his existing conceptual framework, Joe explored the intelligibility, plausibility, and fruitfulness of an idea he had heard from Tim. It also appeared, given the time at which Joe stopped the tape to explore the idea, that Tim's comments about the sense of "urgency" in Joe's lessons, and Joe's awareness of his "gruff manner" with students, may have induced or reminded him of some dissatisfaction with his existing conception of himself as a teacher, and that this also contributed to the change.

### Summary

Using an interpretive framework based largely on a theory of conceptual change proposed by Posner et al (1982) and Strike and Posner (1985), the data in this study were analysed for participants' conceptions and conceptual change. Some aspects of their conceptions of collegial consultation and teaching emerged from the data and have been documented. In addition, there was evidence of some changes to these conceptions and of the processes involved in those changes. Three examples have been documented. However, the process of conceptual change, particularly when "restructuring" (Posner et al, 1982) is involved, is

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<sup>13</sup> On a number of occasions in the conferences an idea presented by one colleague was found to be interesting by the other, who perceived it as 'new' when in fact it could be claimed that the idea had originally come from him. It seemed that, in conversation with a colleague about classroom practice, the colleague might hear and reflect an idea of which the other was unaware; thus, bringing it out into the open for consideration. This might have implications for the articulation teachers' knowledge.

complex and on-going. It was felt, therefore, that such a process might best be documented as a 'story' of change. One such example emerged from the data in this study. In the next chapter this story of conceptual change will be told.



## CHAPTER 5

### A STORY OF CONCEPTUAL CHANGE: "THERE'S A LITTLE BIT OF MAGIC THERE"

This is a story of Joe's conceptual change with respect to math and of how collegial consultation, as Tim and Joe chose to conduct this activity, contributed to the change. It is "a story is worth telling" (Louden, 1989) because, amongst other things, it relates to an issue or dilemma pertinent to a secondary school context. Hargreaves (1989) describes the existence of "separate and sometimes competing groups" within a school culture. He points out that such "balkanization" is a particular feature of high schools, and says:

The curriculum is at the centre of this. The division of learning and the curriculum into specialized domains we call 'subjects' creates not only different categories of knowledge but different communities of teachers who teach them, identify with them and invest their careers in them too. (p. 11)

In this story, through 'exchange visits' (observations) and 'rounds of negotiation' (conferences), an English teacher gained new understanding of math and began to see and to act on similarities in the teaching of the two disciplines. This is also a story worth telling because Joe asked, in our final stimulated recall interview, about the worth of teachers from different disciplines working together in collegial consultation and said he would be interested in the project's findings along this line. And finally, this story may have something to contribute to the discussion on integration of subjects at the secondary level that is currently taking place in British Columbia, in light of the Sullivan Commission and with respect to the Year 2000 initiative.

The story will be told in five 'episodes'. Each episode could probably stand on its own to demonstrate change; but, taken collectively, they tell a story that

demonstrates significant conceptual restructuring. The story is told in a language of conceptual change, introduced by Posner et al (1982), and events are interpreted from this perspective. This is not to say that there are not other possible interpretations and at times reference may be made to some of these.

### Joe's Surprise

In their first post-observation conference together, after Tim's first lesson, the following exchange took place between Tim and Joe.

Joe: ...Students were impressively on task, genuinely with regards to interest level; which I hadn't expected coming from a math class. [laughs] But they were, you know, and I think it's got to do with just some little things -- using coloured paper, oddly enough, and comparing diagrams -- just, I mean the simple task of holding their diagrams up to light -- ah, there's a little bit of magic there. You know, it's silly but it -- there is.

Tim: Oh, I know

Joe: It's like when kids look at negatives almost, you know.

Tim: Yeah. There's ownership of what they're doing, and comparison

Joe: exactly

Tim: and all kinds of magic.

Joe: So, you know, that was a good idea. I mean, and so they were, you know, the test, you know, they had to consult with peers

Tim: umhmm

Joe: and find out just how well on track they were with the various things you set up. ...

Joe hadn't expected the high level of interest and on-task behaviour demonstrated by the students in the lesson, and with laughter he shared this with Tim. This observation did not fit with his conception of math, which he spoke of, for example, in the post-observation conference on Tim's second lesson,

Joe: ...I guess I've got these strange um illusions -- being an English person -- about math, because it wasn't one of my more favourite subjects and because you always hear grumbling about how bored kids are with math...

and later in the conference,

Joe: ...Because again everybody has that old historical viewpoint of math being very structured, book-oriented, and you don't move for an hour and you come out with a headache, you know...

What he had observed in Tim's lesson was an anomaly, or a discrepancy, for Joe and may have contributed to his dissatisfaction with his existing conception of math. There had been a high level of interest by the students in Tim's lesson, and that the two incidents mentioned by Joe -- using coloured paper and comparing diagrams -- had been significant was corroborated by my field notes.

The different colours of paper added an interesting twist..... This particular "trick for testing congruency" [when the students superimposed their diagrams and held them up to the light] really captures the students' imagination...the feeling in the room is really quite excited at this point. (1.1-L-Tim, field notes)

Joe's comments to Tim indicated that he had been trying to make sense of the anomaly. The use of a metaphor ("magic") and an analogy ("like when kids look at negatives almost") from his own experience allowed Joe to make sense of what he had observed, and in the process to construct an intelligible and initially plausible conception of a math class being interesting to students. He also looked at the activity from the students' perspective; "they had to consult with peers and find out just how well on track they were". Instances of both Tim and Joe looking

at events from the students' perspective were evident on a number of occasions in the data. Such explanation in terms of a 'student perspective' seemed to satisfy an "explanatory ideal" (Strike & Posner, 1985) for Joe, in this case. Explanatory ideals are "subject matter specific views concerning what counts as a successful explanation in the field" (p. 217), i.e., they function as criteria for explanations of phenomena or events and for the appraisal of new ideas. In the field of education it might be suggested that "successful explanation" for events would take into account the perceptions and actions of students and teachers. Joe being able to explain the observed event in terms of students seemed to be judged by him to be a "successful explanation".

Aspects of Joe's own conceptions of teaching (e.g., students should be actively involved in a lesson), of Tim's teaching (e.g, he's innovative), and of collegial consultation (e.g., Joe's purpose was to learn from Tim) influenced what Joe attended to in Tim's lesson and how he made sense of what he observed. Joe shared his own ideas about math, in the conference, perhaps because they represented a "positive", i.e., an opportunity to compliment Tim on something important to Joe, and because as long-term friends their conversations would go beyond discussions of practice to discussions of self.

Joe's construction and consideration of this new conception -- a math class is interesting to students -- continued into the second and third rounds of observation. However, it was important to consider what Tim heard in the conference and how this might have affected his own ideas and actions. It was Tim's actions in the practice setting, as experienced by Joe, that provided an opportunity for Joe's development of an alternate conception of math. In a reciprocal relationship such as collegial consultation, however, the effect is not one-way; rather, there is a complex interplay of cause and effect between the perceptions, ideas, and actions of both participants.

### What Tim Heard

What Tim heard, when Joe shared his thoughts on the students' interest and on-task behaviour, was approval and a somewhat different conception of the activity in his lesson. Tim's response to Joe in the conference indicated that he agreed with Joe's assessment, had his own conception of the activity that involved "ownership" and "comparison", and perhaps had added the notion of "all kinds of magic" to his initial conception.

In the stimulated recall interview Tim stopped the videotape to comment on this incident. His conception of Joe was important in his interpretation and it should be noted that his comments were made after he had observed Joe's lesson and talked with him, as observer, in their other post-observation conference. The following is an excerpt from the stimulated recall interview with Tim.

Tim: [begins to speak over the videotape] You know, I felt really good when he used the word 'magic'. Yeah, I really did. Especially from him because he's

[Interviewer stops the videotape and points out that Tim was speaking over the videotape]

Tim: I'm sorry. I felt really good when he told me that -- he said, 'there's a bit of magic there' -- because I did that just on the spur of the moment really; although I had in mind it might work. But I really just did it ad-lib; and that was to have the kids hold the paper up with each other to compare it, hold it up to the light. And coming from him, because of his credentials -- and I know his creativity; and his interest in visual effects made it very -- it really boosted me up for him to say 'boy that was a nice idea'. So I

Int: Nice, nice imagery with, with 'magic',

Tim: Exactly. Yeah. And with 'magic' boy he, that word just captured a feeling, you know.

Tim's response to the incident in the conference was so spontaneous that he began to speak over the videotape. It seemed that what was significant for him was that he "felt really good when he used the word magic" and "it really boosted me up for him to say 'boy that was a nice idea'". Tim's experience of the conference had not been positive to this point. Although Joe had been pointing out positive things about Tim's teaching, and voicing concerns he thought Tim might share and respond to, it seemed that this was the first real compliment that Tim had heard. And what seemed to be significant were Joe's "credentials".

Joe's creativity, and Tim's incorporating it as part of his conception of Joe, are documented in the data. I will never forget the amazement I experienced when we first walked into Joe's classroom. It was set up for a drama production by a student group, who were to do a presentation that day on a short story by Ernest Hemingway. The desks were moved and equipment was brought in to create a 'theatre' in an otherwise regular classroom. Three overhead projectors were used to provide a backdrop for scenery on sheets hung across one side of the room for that purpose. The first part of the presentation was a play, created by these students from the short story, and Joe's creative influence on the students was felt throughout the presentation. In three return visits to Joe's classroom, the room arrangement was never the same twice; and the classroom displays and design of his lessons also attested to Joe's creativity. Tim commented in the post-observation conference on Joe's first lesson,

Tim: ...Oh, I thought it was fantastic. I mean just to have the kids go through the creativity, the creativity exercise of creating a message or a system to get information out to others -- like a sales job as you said -- is, I think, a great, you know, is great because it makes them look at the content of the material and look at the process too, so, you know, I think it was fantastic...

In light, then, of Tim's conception of Joe, and especially his respect for him as a teacher and a creative person, Joe's approval took on special meaning.

Whether or not Tim changed his ideas about the activity, however, was not clear. His own conception of the incident was articulated as "I did that just on the spur of the moment really", "I had in mind it might work", "I really just did it ad-lib", and "the kids hold the paper up with each other to compare it, hold it up to the light". It might be that Tim's conception of the activity had changed to include the "feeling" of magic; but, more importantly, it might have been that Joe's approval of the activity and Tim's own positive feeling influenced his planning of the next lesson that Joe observed.

What Tim did in his second lesson was a cooperative learning activity called a "jigsaw", which involved students spending time in two different groups and might be characterized as quite creative. This lesson was observed at the end of the school year and Tim said in the post-observation conference that he had only tried the strategy "maybe about three times this year, with various packages, all to varying levels of success". In terms of the story of Joe's conceptual change with respect to math, it was interesting that Joe, the observer, became involved in the lesson itself.

### **Joe Gets Involved in Tim's Lesson**

Joe came to Tim's second lesson with a somewhat changed conception of math lessons, i.e., a math lesson can be interesting to students. In this lesson he again observed a high level of student interest (corroborated by field notes on the lesson) and commented in the post-observation conference:

Joe: I guess the one really positive thing, and probably the most important thing is -- the thing that impressed me most -- is everybody was on task and everybody was busy. I've got, I guess, these strange

illusions, being an English person, about math, because it wasn't one of my more favourite subjects and because you always hear grumbling about how bored kids are with math. I was really surprised to see how interested they were in what they were doing. And I don't think it was doing the math. I think it was the various tasks that you had set up. So I was really impressed with what was going on....

Again there was the experience of an anomaly that resulted in surprise and dissatisfaction with an existing conception. Joe presented an intelligible representation of what was going on when he said, "And I don't think it was doing the math. I think it was the various tasks that you had set up". Again, there was evidence of an "explanatory ideal", in this case in terms of the teacher; that if something is going well in the lesson then it probably has to do with what the teacher is doing or has done. In addition to taking the students' perspective, Joe continued to use this explanatory ideal relating to the teacher, later in the conference when he said:

Joe: ...then when you actually gave them the responsibilities and told them what their specific tasks were, I noticed in many of the facial expressions around the class a sense of anxiousness, a sense of concern. Everybody perked up and really concentrated, including Angela. And listening skills were, were far more attentive. And everybody was just outright serious. And I thought now maybe that's what, you know, really that's what it's all about. You've thrown the whole thing into their ball park. Now they've got a responsibility to their peers. And I suppose that's what cooperative learning is all about.

At this point, although there was still some surprise and working out of a new conception of math, Joe became intrigued (through his attention to students' on-task behavior and interest level) by the cooperative learning activity and the "group dynamics" in this lesson. His changing conception of math to this point,



and his conception of collegial consultation as an opportunity for him to learn from Tim, allowed Joe to begin to see a relationship between teaching math and teaching English. And in this endeavor, the significance of group work in Joe's conception of teaching seemed to function as an "exemplar or image" (Strike & Posner, 1985) for his interpretation of the students' interest and on-task behavior in the lesson.

Joe termed what he did during Tim's lesson an "experiment" and "playing around a little bit during your class". He explained that "the only reason I did that was 'cause I was so fascinated" by the level of interest and the group dynamics. Joe went around to the groups as they worked and, after watching and listening for awhile, he got involved with the groups in two ways. In the first instance, he entered a group's discussion about the content of the lesson -- quadratic equations and extraneous roots. He characterized this interaction with a number of groups as "role playing".

Joe: ...I just played the role of a complete idiot, like I was dead honest and I said 'look' -- and I did this to every group -- I said 'the last math that I took was, you know, in grade ten when I went to summer school for it'...

In this context Joe asked the students to explain extraneous roots to him and to relate the idea, somehow, to their lives. He was pleased with and shared the results of this in the conference, where Tim and Joe then considered the possibility of inviting other non-math teachers into the class to take on a similar kind of role. In the second instance, Joe interacted with the groups in terms of group dynamics. He asked questions of a group that was not working well together, to allow them to discover and remedy this themselves. These interactions paralleled Joe's own teaching of English and the "experiment" seemed to have allowed him to develop the idea that a math class can be

interesting for students when tasks are creative and interesting, *like in an English class*; and that a math class can involve students' interactions and group dynamics, *like in an English class*.

### **The New Conception is Fruitful**

Probably one of the most important conditions for (new) ideas in an educational context is that they be fruitful, i.e., that they somehow inform or enable improved practice. There were a number of instances in the post-observation conference when Joe seemed to find his new conception of math fruitful. For example, he said of his experience of the students' "responsibility to their peers" in the cooperative learning activity, "So, you know, it's certainly gonna motivate me to, one of these days, get started on something like that" in his own class. A second instance of the conception being fruitful involved Joe making a suggestion to Tim. Having understood what was going on in Tim's lesson in terms of his own conception of teaching, and especially the notion of group work, Joe could see that the activity might need to be debriefed. He mentioned this to Tim, who was enthusiastic about the suggestion, and they discussed how it best might be done in the next lesson. Thus Joe, having changed his conception of math and seen similarities with the teaching of English, was better able as an observer to assist Tim with his teaching. Through the activities of observation and conferencing, Joe had developed a conception of math that was closer to Tim's and this facilitated their subsequent conversations about observed practice. That he had entertained this changed conception of math was, indeed, noteworthy; how he acted on his changed conception in his own teaching proved to be illuminating.

### **Acting on a Changed Conception**

In the fall of 1990 we were all assembled to observe Joe's third lesson. This was a new class, so Joe introduced the three observers and briefly explained that Mr. Jones (i.e., Tim) and he were working together, and that the "two people from UBC" were observing them. What he said next was amazing because, although I had been following the story of Joe's conceptual change with respect to math, I had not expected it to be acted upon in this setting. The class was studying Solzhenitsyn's "One Day in the Life of Ivan Denisovich". Joe said that working with Mr. Jones had helped him to understand how Solzhenitsyn, who was trained in physics and math, could have "made the shift" to become "sensitive and creative" and "a writer of great literature". He told his students that he now understood that "you can juggle both disciplines nicely". It struck me as significant that a conception of math constructed, or reconstructed, in one domain (teaching) had been applied in another domain (literature) and found to be fruitful when it added meaning to Joe's conception of Solzhenitsyn and his work. This new understanding of the relationship between the sciences and the humanities in general, and of Solzhenitsyn in particular, was then shared with students, seemingly becoming a part of Joe's "pedagogical content knowledge"; "that special amalgam of content and pedagogy that is uniquely the province of teachers" (Shulman, 1987, p. 8).

### **Summary**

Although he was still not interested in the content of math lessons -- "because to be quite honest I wasn't wholly interested in the math part of it" [with laughter] - Joe's conception of math lessons had changed as a result of collegial consultation with Tim. As he it stated in the post-observation conference on Tim's

second lesson, "...they were right into it and quite frankly that dispelled a lot of illusions that I had about math". In constructing this new conception Joe made use of his own existing "conceptual ecology" and could be seen to be testing its intelligibility, plausibility, and fruitfulness. As well, dissatisfaction with his existing conception of math was expressed on a number of occasions. Joe's conception of Tim and their relationship seemed to play a part in this story and it is possible that, with continued association through collegial consultation, the change begun here might continue and result in other significant change in Joe's practice. It was also significant that during the third round of observation Joe told Tim, and me, that he had made arrangements to visit the classrooms of three other teachers in the school. He said that he would comment on their lessons if they asked him to, but that he was going to observe in order to learn.

## **CHAPTER 6**

### **CONCLUSIONS, LIMITATIONS, IMPLICATIONS**

The purpose of this chapter is to frame and present the conclusions of the study. The chapter will begin with a brief review of the study and, in the second section, the findings will be discussed with respect to each of the three research questions. In the third section, conclusions will be offered in answer to the initial focus question: What are the processes by which teachers' conceptual change occurs within a context of collegial consultation? In the following section, limitations of the study will be discussed. The chapter will conclude with some of the implications of this study for theory, practice, and further research.

#### **Overview of the Study**

The purpose of this study was to gain some understanding of how teachers learn from each other; more specifically, to describe the processes involved in teachers' conceptual change in a context of collegial consultation. It was hoped that framing collegial consultation in terms of teachers' conceptual change would demonstrate the value of such an activity, inform the collegial practice of teachers, and enable those who would facilitate this means of professional growth. The two participants in this study were experienced, competent, secondary teachers who were engaging in collegial consultation for the first time. The data in this study consisted of field notes on observed lessons, and transcripts of conferences and stimulated recall interviews, through four rounds of observation, although the analysis was focussed primarily on rounds one and two. A theory of conceptual change (Posner et al, 1982, Strike and Posner, 1985) informed the analysis of the data, which were analysed for evidence of participants' conceptions and conceptual change. Examples of conceptions and

conceptual change have been described in chapter four and a more detailed story of conceptual change was told in chapter five.

### **Discussion of the Research Findings**

The findings of this study have emerged from the data, through the constant comparison and refinement of categories and their properties during analysis, to address the research questions which served as a focus for the study. These three questions are highly interrelated and move one, in a step-wise fashion, towards an understanding of the process of conceptual change. They are:

- 1.1 What is it that might change? That is, what is the nature of the participants' conceptions which can be inferred from the data? And, which of these might actually change?
- 1.2 What might count as a change? That is, what evidence is there that conceptual change is taking place? And, what is the relationship between participants' conceptual change and subsequent classroom practice?
- 1.3 How might such change take place? That is, what events or conditions seem to be associated with or contribute to participants' conceptual change?

Findings have been constructed with respect to the nature of participants' conceptions, evidence of conceptual change, the process of conceptual change, events that contribute to conceptual change, questions associated with conceptual change, and factors in the collegial relationship that seem to be associated with conceptual change. Each of these will be discussed in turn.

## Participants' Conceptions

As might be expected, given the task in which Tim and Joe were engaged, analysis of the data revealed aspects of their conceptions of teaching and of collegial consultation. More specifically, and depending on the situation at the time, conceptions of the role of the observer, of the purpose of collegial consultation, of the collegial relationship, of the role of the teacher in the classroom, of how to structure a lesson, of various student activities, and of the subject matter of a course were evident in their words and actions.

It was also interesting to note the kinds of conceptions that were *not* articulated or acted on by the participants in this study. Some examples of what they did not talk about (perhaps a little extreme in order to make the point) were conceptions of gardening, their wives, the Gulf War, teaching French, and so on. As Posner (1982) points out, with respect to a conception of human activity in terms of tasks,

...the tasks in which people engage structure to a great extent what information is selected from a situation and how that information is processed. Tasks organize experience and 'changing the [person's] task changes the kind of events that the [person] experiences'. (p. 343, edits in original)

And further, with respect to experiencing a task,

It is the [individuals'] *interpretation of the tasks* and their subsequent *task engagement* that determines what and how much they learn...the girl's interpretation of the task is determined both by her *available concepts* and by her *purposes* in the particular situation. Furthermore, her *interpretation of the task* will affect how she experiences and what she learns from the activity. (p. 343, 344, emphasis in original; edit added)

The task in collegial consultation was observing and conferencing on each others' lessons. How Tim and Joe each chose to interpret this task seemed to

determine the conceptions with which they made sense of and acted on their experiences in observed lessons, in conferences, and in stimulated recall interviews. It was found that the participants' purposes and available concepts influenced their interpretations of the task.

The nature of the participants' conceptions was found to be consistent with the existence of a "complex conceptual ecology", as described by Strike and Posner (1985). There was evidence, in the participants' words and actions, of the existence and use of analogies, metaphors, exemplars, and images. For example, Tim's image of himself as the leader in the classroom was evident in his teaching and seemed to influence his conception of the role of the observer in the conference. The use of past experience, various epistemological commitments, metaphysical beliefs and concepts within a domain, and other knowledge in different domains was also evident, particularly, when participants were trying to make sense of anomalous experiences in collegial consultation. For example, when constructing a new conception of their relationship, Joe referred to his past experience with Tim and to an epistemological commitment reflected in his belief that he could learn from observing the actions of other teachers.

Although Strike and Posner (1985) do not include it as part of a conceptual ecology, there was evidence in this study of an affective component in the participants' conceptions; and, it appeared that feelings associated with a conception might also change. For example, during the first round of observation, Joe said that he had been "intimidated" by the prospect of collegial consultation with Tim, but he had "overcome that" as a result of their conversations. The feeling of intimidation had been a part of Joe's initial conception of their collegial relationship, but was not a part of his changed conception.



Participants' conceptions that might actually change were those that seemed to be contradicted by what the participant had experienced. For example, his experience of his own and Joe's actions in the first round of observation did not fit with Tim's initial conception of the role of the observer in the conference. And, Joe's experience of the students' interest and on-task behavior in Tim's math lessons contradicted his conception of math. In each case, dissatisfaction or surprise was expressed when an idea held by either participant did not fit with what he had experienced.

### **Evidence of Conceptual Change**

Evidence of a process of conceptual change could be seen both in participants' words and actions; but, it was with respect to the latter that the results of conceptual change seemed most obvious. In conferences and stimulated recall interviews, there was evidence that conceptual change was taking place when participants were surprised, expressed dissatisfaction, and seemed to be constructing and considering the possibilities of new conceptions. Further evidence of conceptual change was seen when a participant acted on a new conception in the practice setting. In this instance, it seemed that there had, in fact, been some change because the participant was able to act on a new conception and chose to do so. There were two kinds of changed practice observed in this study. As the following paragraphs show, one seemed to be the result of conceptual change, whereas the other was not.

In the first situation, a change in practice was characterized by a participant 'experimenting' with a new conception by acting on it in the practice setting. This activity seemed to be related to a consideration or test of the fruitfulness of the new conception. For example, Tim began his second conference as observer by acting on an idea he had constructed during the the

first round of observation. Whereas, in the first round, Tim had begun the conference by telling Joe what *he* had thought about the lesson, in the second conference he began by asking Joe for *his* thoughts on the lesson. The tentative manner in which he did this indicated that it was new to Tim, and he told Joe that what he was doing was "something a little different". This experiment worked out well and Tim continued to experiment with questioning, in his role of observer in a conference, until, by the end of the study, he was becoming quite proficient and seemed to be gaining confidence in this new ability. Joe, also, could be seen to be experimenting with new conceptions in the practice setting. As described in chapter four, he gradually changed his teaching practice to allow students more time for thinking and to reduce his own involvement in responding to students' ideas, while encouraging students to increase theirs. Joe also seemed to be experimenting--in his words, "playing"--with a new conception of teaching math, when he became involved in Tim's second math lesson.

An example of the second kind of changed practice was observed when Tim was reminded, by Joe's comments on his lesson, of something that he already knew, i.e., that students can be distracted from a lesson by an open classroom door. The ease and confidence with which Tim changed his subsequent practice indicated that he may have been going back to something he had done before; perhaps, to demonstrate for Joe that he had this knowledge and that he could act on it to prevent the occurrence of student distraction. This changed action did not appear to involve any conceptual change. However, there did appear to be a change in the significance, for action in the practice setting, of that part of Tim's conception of teaching having to do with student distraction. That is, what was already known had come to be seen as more important and therefore was acted upon.

## The Process of Conceptual Change

The findings of this study were consistent with the ideas of Posner et al (1982) and Strike and Posner (1985) with respect to the process of conceptual change, although it appeared that dissatisfaction was not only expressed with respect to existing conceptions, but also during construction of various 'successive approximations' towards a new conception. When an instance of conceptual change was found in the data, possible contributing incidents were analysed in terms of Posner et al's theory of conceptual change. Analysis was done on two levels. First, incidents were analysed and understood in terms of conditions for conceptual change, i.e., dissatisfaction with an existing conception, and intelligibility, plausibility, and fruitfulness of a new conception. Second, and often concurrently, incidents were analysed for evidence of the influence of "a complex conceptual ecology" (Posner et al, 1982). This theory of conceptual change was found to be helpful for both describing and understanding processes involved in conceptual change for the participants in this study. It seemed that the conditions for conceptual change arose from an interaction between newly constructed conceptions and an existing and complex "conceptual ecology", in much the same fashion as described by Posner et al (1982) and Strike and Posner (1985). There was evidence of the use of explanatory ideals, analogies and metaphors, exemplars and images, past experience, and other knowledge in different domains, with which a new idea must fit or which, compared to a new idea, might appear less promising. However, in this context, it was found that, rather than "constructing a coherent representation of what a passage or theory is saying" (Posner et al, 1982, p. 216), participants were constructing or reconstructing their own, internally consistent, 'new' conceptions to account for an anomaly or discrepancy experienced during collegial consultation. In this context, the existence of an anomaly was a necessary, but not sufficient, condition

for conceptual change. There were other factors, particularly with respect to the social context, that appeared to influence whether action was undertaken to resolve an anomaly. That is, although some anomalies might be 'ignored', others were perceived as salient and acted upon.

Thus, as well as supporting the ideas of Posner et al (1982) with respect to conceptual change, other events and conditions were evident within the context of this study that contributed to or enabled participants' conceptual change. Observations of lessons, post-observation conferences, and stimulated recall interviews all provided opportunities for participants' conceptual change. The use of questions in the conference and stimulated recall interviews contributed to participants' conceptual change. And, four factors in the relationship--trust, respect, caring, and communication--were identified as being important. Each of these is discussed below.

### **Events that Initiate Conceptual Change**

During observation of a lesson, an event may occur that does not fit, or would not have been predicted based on, the observer's existing conceptions. Such an observation creates an anomaly, which may necessitate an attempt to reconcile the observation with existing conceptions. Whether or not this occurs, and how it occurs, depends on the observer's existing conceptual framework. Not only on existing conceptions directly associated with the observation, but also on conceptions with respect to the importance of the anomalous situation. That is, the observer's existing conceptions influence both what is perceived and how the perception is dealt with. For example, Joe's observation of students being on task and interested in a math lesson did not fit with his existing conception of math. This anomaly was significant, or salient, to Joe for a number of reasons. First, it intrigued him because the students' attitude and behaviour was so different from

what he had expected. Second, it indicated that Tim was doing something in the classroom from which Joe could learn. And, third, it represented a "positive" he could share with Tim in the conference. For these reasons, the anomaly was perceived as significant by Joe. Over time, and with further experience of the anomaly in other observations, Joe constructed a new conception of teaching math.

Conceptual change may be initiated during conversation with a colleague in a post-observation conference. In the discussion between colleagues, about events observed in and issues arising from practice, participants' conceptions are articulated. When the conceptions of another seem to be different, especially if the other is a trusted and respected colleague, an anomaly may be created and a process of conceptual change initiated. Von Glasersfeld (1989) has pointed out that our conceptions may gain "a second level of viability" (p. 131) when the actions of others *do* seem to fit with those conceptions. However, when the actions of another *do not* fit with our existing conceptions an anomaly may be created and conceptual change initiated. An example of this was Tim's introduction of the notion of "thinking time", which Joe perceived as an idea that was important and different from his own.

Although it is not necessarily a part of the collegial consultation process, the viewing of a conference videotape was also found to initiate conceptual change. Because Tim was particularly interested in the role of the observer in collegial consultation, the opportunity to observe himself in this role, i.e., his actual practice, allowed him to note various discrepancies. The format of the stimulated recall interview provided an opportunity for him to reflect on these discrepancies. For Joe, viewing the videotape seemed to remind him of ideas presented in the conference and, like Tim, he took the opportunity provided by the stimulated recall interview to reflect on them. In addition, as will be discussed in

the next two sections, the manner in which conferences and interviews were conducted contributed to the process of conceptual change.

### **Questions and Conceptual Change**

It was found that asking questions was associated with conceptual change for the participants. The following three examples show how a question can contribute to conceptual change.

First, when Tim asked Joe, in a post-observation conference, how he thought his lesson had gone, Joe had an opportunity to make explicit to himself and Tim what his conception of the lesson was. Joe was then able to see the difference between his own conception and Tim's (which he presented to Joe in direct statements and embedded in further questions), to perceive Tim's notion of "thinking time", and to explore the possibilities of this 'new' conception.

Secondly, when Joe asked Tim, in another conference, if his objective for the lesson had been met, Tim had an opportunity to articulate his ideas. Interestingly, in the stimulated recall interview on this conference, Tim experienced his own attempt to articulate the objective of his lesson and was not satisfied with what he heard. He commented in the interview:

Tim: This part really is interesting 'cause I'm having a lot of trouble articulating the purposes of my lesson, and that is very instructional to me just watching this tape...obviously the lesson did not have as clear a focus as I, you know, thought.

Observation of himself answering a question posed by Joe may have provided an opportunity for conceptual change for Tim.

A third type of question that seemed to be associated with conceptual change for the participants in this study was the question asked of them in

stimulated recall interviews. Participants were asked to share, in the interview, their thoughts and feelings that occurred either during a conference or on viewing a videotape of the conference. This focus on thoughts and feelings allowed participants to articulate and reflect on their ideas.

### **Relationship Factors and Conceptual Change**

When discussing opportunities for conceptual change in the events of collegial consultation, the notion of a trusted and respected colleague was introduced. It was found that an important part of the participants' conceptual ecologies, that guided the process of conceptual change, seemed to be each participant's conceptions of his colleague and of their collegial relationship. In each case of conceptual change that emerged from the data in this study, relationship factors seemed to figure prominently. Both Cogan's (1973 cited in Sergiovanni & Starratt, 1988) notions of mutual trust, respect, and support in a "colleagueship relationship", and Bird and Little's (1986) notions of trust, support, and sharing in collegial relationships, are supported by the findings in this study. Further, the findings of this study have something to say with respect to the *meaning* of these notions.

Four conditions of the relationship--trust, respect, caring, and communication--have been identified. These factors are highly interrelated and have been 'pulled apart' with some difficulty. They represent a part of Tim's and Joe's conceptions of each other and of their relationship and were found to influence the process of conceptual change; thus, adding an affective component to the process as described by Posner et al (1982) and Strike and Posner (1985).

**Trust.** In stimulated recall interviews in the first round of observation both Tim and Joe referred to "trust". It seemed that through long experience with each other in a variety of contexts, Tim and Joe had each developed an

understanding of the purposes and intents of the other. This understanding was a part of the conceptions they had constructed of one another over fourteen years. Thus, in observation and conversation they were able to "trust" their own understanding of the reasons for what the other was doing or saying. As Tim stated it, "we both trust that the other person is only saying these things to try and give us some more insights. Not to try and, you know, get everybody upset." Joe commented that, "if it was a different person...I might have been more argumentative."

**Respect.** Respect for the other as a professional--as a teacher--was an important aspect of Tim's and Joe's relationship. I came to understand that, when the participants spoke of respect for the person, it was respect for the ideas and abilities of that person to which they were referring. Joe made it quite clear, in initial interviews, that he had entered into a collegial consultation relationship with Tim because he had heard from students that he was a good teacher and Joe wanted to see for himself both what Tim did and how he did it. Such respect for the ideas and abilities of the other seemed to be particularly important in the process of conceptual change when, as in Joe's case, the participant's apparent purpose in the activity was to learn from the colleague.

**Caring.** I have characterized this factor in Tim's and Joe's relationship as caring because it seemed to go beyond the notion of support. Caring for each other was evident in the actions and comments of both Tim and Joe. On a number of occasions, when viewing the videotape of a conference, Tim commented in a manner which indicated a genuine concern for how Joe had felt at the time. During their conferences, caring was demonstrated when, for example, Joe paid particular attention to the "positives" in Tim's lessons and Tim articulated his enthusiastic approval of the creativity of the student presentation in Joe's first lesson. Both of these instances seemed to be a result of a participant's perception of how the other might have been feeling at the time. Both Tim and Joe talked



about "fragile egos" in stimulated recall interviews. Their light-hearted banter and joking on other occasions seemed designed to reduce for each other the stresses of discussing one's own, observed teaching practice. Such demonstrations of caring contributed to the creation of an environment in which the risk associated with change was somewhat reduced. Change often involves feelings of insecurity, inadequacy, and fear. But, these may be reduced when a caring colleague works to create an atmosphere that includes elements of safety, security, and support. Caring in this case went beyond caring, or concern, for the *feelings* of the colleague. There, also, was displayed a genuine concern for and interest in the *ideas* expressed and demonstrated by the colleague.

**Communication.** Although their backgrounds and experience (e.g., humanities versus sciences) and their conceptions of teaching and collegial consultation differed, Tim and Joe were able, in most cases, to speak plainly with each other and to clarify what was meant in any given instance. This is not to say that shared understanding was always achieved; but, that in this relationship it was possible to attempt it. Joe pointed out that, in a conference with Tim, he was given "room for clarification" and was glad of it. He added, "it was really important for me to really clarify that this is the kind of rapport I have set up." Tim also took the opportunity, in stimulated recall interviews, to point out a number of times when he had been allowed to clarify something that had occurred, or that he had said, and that this was important to him. The ability to communicate their ideas to each other seemed to be related to Tim's and Joe's long-term experience with one another, and the understandings they had constructed as a result. Indeed, the experience of four rounds of observation added to this understanding. For example, their experience of one another in the practice setting added to their conceptions of each other, and this new information could then be used to interpret and understand what the other was saying. Being

able to speak plainly with each other meant that alternative views were articulated and perceived, often resulting in anomalies.

### **Summary of the Findings**

In this study, conceptual change was found to occur for the participants. Conceptual change seemed to occur when a new experience did not fit with a participant's existing conceptions. With respect to the process of conceptual change, the findings of this study indicate that the process involved the participants' use of their existing conceptions (the "complex conceptual ecology", described by Strike and Posner, 1985) in constructing 'new' conceptions and in establishing various conditions associated with these new conceptions (i.e., intelligibility, plausibility, fruitfulness, and dissatisfaction). Further, it appeared that feelings associated with a conception might change and that participants' changed practice was characterized by the participant experimenting with a new conception in the practice setting.

With respect to collegial consultation, the findings of this study indicate that the various events of collegial consultation may provide opportunities for experiences that challenge participants' existing conceptions. Opportunities for conceptual change were found to occur during observation of a colleague's lesson, during conversation with a colleague in a post-observation conference, and on viewing the videotape of a conference in a stimulated recall interview. Further, it was found that questions, in the conferences and stimulated recall interviews, seemed to facilitate participants' conceptual change. In addition, four factors (trust, respect, caring, and communication) in the collegial relationship were identified as enabling or contributing to conceptual change.

## Conclusions

The findings of this study have led to the general conclusion that teachers will attempt to make sense of an anomalous situation by constructing an intelligible and initially plausible 'new' conception that resolves or explains the anomaly. It also may be concluded, in general, that collegial consultation provides teachers with opportunities for experiences that initiate and enable such conceptual change. In addition to these two general conclusions, the findings of this study have led to eight specific conclusions--four with respect to the process of conceptual change, and four 'parallel' conclusions with respect to collegial consultation.

### The Process of Conceptual Change

With respect to the process of conceptual change, the findings of this study suggest four specific conclusions, as follows:

1. **Conceptual change may begin when a teacher experiences something that does not fit with his or her existing conceptions.** In this situation the teacher may express surprise and/or dissatisfaction. The recognition of an anomaly or discrepancy is a necessary but not sufficient condition for conceptual change.
2. **Teachers construct and test the intelligibility and plausibility of new conceptions and, in doing so, make use of their existing conceptual ecologies.** Analogies, metaphors, images, and exemplars that a teacher has available for use may assist in this process. Epistemological commitments, metaphysical beliefs and concepts, knowledge in other domains, and past experience are particularly important in determining the plausibility of new conceptions.

3. In addition to being intelligible and plausible, a new conception should appear to be fruitful; which, in an educational setting, means that it should inform or improve the teacher's practice. To this end, **teachers will act on a new conception in the practice setting and may, through such experimentation, add to or change the conception.** That is, teachers will test the fruitfulness of new conceptions in the action setting and the process of conceptual change may continue there.
4. **Feelings are part of teachers' conceptions and, as such, are subject to change.** That is, an affective component, or feelings associated with an idea, is not only a legitimate and important part of conceptions, but may be altered through the process of conceptual change described above. Although learning may be a rational activity, as suggested by Posner et al (1982) and Strike and Posner (1985), it appears that one may 'learn' to feel differently.

### **Collegial Consultation**

Collegial consultation may provide teachers with opportunities for conceptual change in the following ways:

5. Depending on the teacher's purposes and existing conceptions, **the various events of collegial consultation may provide experiences that contradict his or her existing conceptions and result in an anomaly.** Anomalies may be created as a result of observation of a colleague's lesson, conversation in a post-observation conference, or observation of the videotape in a stimulated recall interview.
6. **Conversation with a trusted and respected colleague allows a teacher the opportunity to articulate and consider the intelligibility, plausibility, and fruitfulness of new conceptions.** In particular, the use of open-ended questions, to which a teacher might freely respond in conferences and stimulated recall interviews, allows the teacher to articulate and test his or her ideas. Mutual trust and respect seem to allow more a

more open, detailed, and honest communication of ideas between colleagues.

7. **The various events of collegial consultation provide opportunities for teachers to act on, and thus to test the fruitfulness of, new conceptions.** This testing, or experimentation, may occur during an observed lesson, and perhaps be discussed in the post-observation conference. Or, to test the fruitfulness of newly constructed conceptions related to collegial consultation, experimentation with new conceptions may occur in the conference itself.
8. **Trust, respect, caring, and communication, in a collegial relationship, contribute to the process of conceptual change in important ways.** That is, both affective and cognitive components of a teacher's conception of his or her colleague will influence his or her own conceptual change in collegial consultation. For example, it is difficult to ignore a discrepancy between one's own conception(s) and something observed in the classroom of a respected colleague.

### **Limitations of the Study**

One limitation of this study was the result of taking an exploratory stance and allowing a broad focus. If processes of conceptual change were to be understood and described, it was necessary first to understand and describe participants' existing conceptions, then to look for and document instances of conceptual change, and *only then* to consider possible processes involved in the change. This led to a broad range of findings and conclusions, any one of which is worthy and requiring of further and more focussed study.

Another limitation of the study was that it focussed on experienced, competent, reflective secondary teachers (and then, only two) in a particular context, i.e., collegial consultation as structured by the teacher development project, and further, as conceived of by the participants. I cannot make claims of

"generalizability" to other teachers or contexts, but leave it to the reader to judge whether or not (1) the findings make sense in terms of his or her own experience, and (2) the ideas developed in the conclusions section might inform his or her own practice.

A third limitation of this study was the short time line. Although Tim and Joe were observed over a period of one year, and instances of conceptual change were found, significant conceptual change involving beliefs and values may take many years. Joe made this point when he said that his conception of teaching had been changing over the last four years.

### **Implications of the Study**

The findings of this study have implications for theory, for the practice and facilitation of collegial consultation, and for further research into teachers' conceptions, conceptual change, and collegial consultation. Although highly interrelated, each will be dealt with separately.

#### **Implications For Theory**

This study was informed by a theory of conceptual change proposed by Posner et al (1982) and elaborated by Hewson (1981) and Strike and Posner (1985). The findings of this study indicate that, although this theory is useful for understanding and describing the process of conceptual change, the affective component which they have chosen to ignore<sup>14</sup> may contribute in important ways.

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<sup>14</sup>With respect to their decision to consider learning as a rational activity, Strike and Posner (1983) state, "The decision is motivated by several considerations: That evidence does make a difference, that understanding the role of reasoning in learning is important, and that *one should wade through one conceptual quagmire at a time*. It is surely not motivated by any conviction that learning is always and only rational" (p. 43; emphasis added).

For example, in this study, feelings of security associated with trust in a well-known colleague seemed either to reduce or allay some of the risk associated with change and, in fact, contributed to the process of conceptual change for the participants. As well, it seemed both legitimate and informative to consider a change to a participant's feelings associated with a conception as an example of conceptual change. As demonstrated in this study, such a change in Joe's feelings with respect to collegial consultation enabled him to participate in an activity that contributed to significant change in his ideas and practice with respect to teaching.

A cursory look at Schön (1983), and a more careful consideration of those who write with reference to Schön's work (e.g., Grimmett, 1988, Clarke, 1991), reveal striking similarities between Schön's ideas with respect to reflective practice and Posner et al's theory of conceptual change, as it appeared to 'operate' in this study. It appears that Schön's notion of "framing" a problem and Posner et al's (1982) notions of the conditions for conceptual change have much in common. For example, when Posner et al speak of a new conception being plausible in terms of one's conceptual ecology, i.e., consistent with respect to other conceptions held, it sounds as though one might be "framing" a problem, in Schön's terms. As Clarke (1991) points out,

For Schön, a practitioner is reflective when he or she becomes intrigued or curious about some element of the practice setting, attempts to reframe that element in the light of past experience and knowledge, and then uses that frame to guide future action. (p. 6)

In using a "frame to guide future action", one might be testing the fruitfulness of a new conception. I suspect it might be useful to investigate further, whether or not Schön's notion of reflective practice could be informed by Posner et al's notions of conditions for conceptual change and of a complex conceptual ecology that directs the process, and vice versa. The findings and conclusions of this study

suggest that the result of such an endeavor would be a more fruitful conception of how teachers learn through reflecting on their practice and through activities such as collegial consultation.

### **Implications For Practice**

If Tim's and Joe's experience of collegial consultation has anything to say to other teachers, it is that the opportunity to observe and discuss the teaching of a colleague is well worth the effort. In particular, the opportunity to observe a colleague who teaches a different subject was found to be instructive. Recognizing the similarities and discussing the differences might help to overcome the isolation of teachers who teach in different subject areas. And, some possibilities may be seen for the integration of subjects at this level.

Although it is not considered to be a part of collegial consultation, the stimulated recall interviews in this study provided opportunities for participants to experience anomalies and to articulate and test new conceptions. This seems to point to the usefulness of videotape in both providing opportunities for conceptual change and for improving the way in which teachers practice collegial consultation.

Fullan and Hargreaves (1991) have pointed out that "in modern organization like our schools" it is necessary to "trust in processes".

Processes to be trusted here are ones that maximize the organization's collective expertise and improve its problem-solving capacities. These include improved communication, shared decision-making, creation of opportunities for collegial learning, networking with outside environments, experimenting with new ideas and practices, commitment to continuous inquiry, and so on. Trust in people remains important, but trust in expertise and processes supersedes it. (p. 74)



I would argue that the participants in this study did engage in processes such as those described above. They seemed to have done so, however, because they trusted the other person involved. Once Joe was familiar with and could trust the process of collegial consultation, he invited other teachers in his school to join him in a similar process, by allowing him to observe their lessons. And, in doing so, he had some understanding of what might be necessary for these teachers to engage in collegial consultation with him. Thus, the findings of this study indicate that embarking on a new activity, such as collegial consultation, with a trusted and respected colleague allows one to become familiar with and begin to trust the process, while in a safe and supportive environment.

### **Implications For Further Research**

I believe the method employed in this study has implications for those who would investigate teachers' conceptions or practical knowledge. As Hewson and Hewson (1988) have pointed out (and was corroborated in this study) the use of interviews is not sufficient to gain an understanding of teachers' conceptions. In this study, teachers' words and actions in the practice setting, in conversation with a colleague, and in response to viewing a videotape of that conversation, were all considered when constructing a representation of their conceptions with respect to teaching and collegial consultation. The analysis of data from a number of sources, which differ in important ways, increases the credibility of the researcher's constructions. In this study, the sources of data differed in (1) the audience for the teacher's words and actions, (2) the role of the teacher in the situation, and (3) the purpose of the activity.

Secondly, I would recommend the constant comparative method of data analysis, as discussed by Glaser and Strauss (1967), Lincoln and Guba (1985), and Grove (1988), for understanding teachers' conceptions. The collection and

comparison of similar incidents from a variety of sources permits one to construct a picture of what is behind the participants' words and actions, i.e., the conceptions from which they operate.

With respect to questions arising from this study, and as mentioned when considering the study's limitations, it is the opinion of this researcher that all of the findings of this study are worthy of further research. For example, in this study it was found that opportunities for conceptual change occurred when a participant experienced something that contradicted his existing conceptions. And, the participants in this study, Tim and Joe, had different academic backgrounds, somewhat different roles in the school, and somewhat different conceptions of teaching. It appeared that these differences contributed to the creation of opportunities for conceptual change. It would be interesting to carry out a similar investigation with participants who were more similar in their backgrounds, roles, and conceptions of teaching, e.g., two secondary teachers from the same department who teach their subject in similar ways. I have a suspicion that the opportunities for conceptual change would be reduced in such a case.

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## Appendix A: Organization of the Data

One round of data collection for a single pair of teachers engaged in collegial consultation resulted in either field notes or a verbatim transcript for each of eight separate events - two lessons, two conferences, and two stimulated recall interviews on each conference. Each of these data sets was assigned a code that identified the following:

- the round of observation (1, 2, 3, or 4);
- the order of the event in that round (.1, .2,... .8);
- whether it was a lesson (L), conference (C), or stimulated recall interview (SR);
- the name of the participant involved; and
- the role of the participant, if necessary.

Thus, 1.1-L-Tim indicates that the first event in the first round of observation was a lesson by Tim. 1.2-C-Tim identifies the second event in the first round of observation as the conference on Tim's lesson. 1.6-SR-Tim-T identifies the sixth event in the first round of observation as a stimulated recall interview with Tim, on the conference when Tim was the teacher. And 2.6-SR-Joe-O identifies the sixth event in the second round of observation as the stimulated recall interview with Joe, on the conference when Joe was the observer.

Data sets available for initial sampling and analysis consisted of the following, and as can be seen by comparing the two sets, the order of events was subject to change within limits:

1.1-L-Tim	1.5-SR-Joe-T	2.1-L-Tim	2.5-SR-Tim-T
1.2-C-Tim	1.6-SR-Tim-T	2.2-L-Joe	2.6-SR-Joe-O
1.3-L-Joe	1.7-SR-Joe-O	2.3-C-Tim	2.7-SR-Joe-T
1.4-C-Joe	1.8-SR-Tim-O	2.4-C-Joe	2.8-SR-Tim-O



## **Appendix B: The Constant Comparative Method of Data Analysis**

Described by Glaser and Strauss (1967) and elaborated by Lincoln and Guba (1985), the constant comparative method of data analysis is an inductive method aimed at the development (or emergence) of theory from data. Conducted in concert with a flexible focus, "theoretical sampling", and "emergent design", it seems a plausible way in which to make sense of what is happening in a particular context. The analyst's sensitizing framework - e.g., the process of conceptual change, in this study - informs the coding of incidents. The following is a brief description of the process of analysis.

### **Analysis of the Data and Emergent Design**

In the constant comparative method, items or events in the data are coded into categories by perhaps writing them onto cards and placing these cards in relevant piles or otherwise categorizing incidents. Initially this is done intuitively, or tacitly, but through the constant comparison of new items to those others already coded, properties of categories begin to emerge, and coding and comparisons become based on these properties. Glaser and Strauss (1967) point out that as coding and comparison proceed the analyst will notice a conflict, as his or her thinking begins to proceed along two lines: (1) emerging theoretical ideas based on the analysis and (2) the coding and comparison of the next incident. Stopping at this point to write a "memo" is an important part of the constant comparative method. Writing the memo gets ideas down while they are fresh, helps to resolve the conflict, and should be allowed as much time as necessary to logically develop those ideas which emerge from the data.<sup>15</sup> This systematic and

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<sup>15</sup> If the analyst is part of a research team it is useful to discuss emerging ideas and categories with other team members, and to make comparisons with the kinds of ideas emerging from their analyses.

regular recording of ideas, in the margins of the field notes (next to an example) and on cards (for later rearrangement), provides the "fracturing" of the story for the time when writing the theory takes place. Once the memo has been written, and sufficient time has been allowed to think through emerging ideas, the analyst continues in the coding and comparison of incidents.

As sampling and analysis proceed integration of categories and their properties will occur, according to Glaser and Strauss (1967), through the process of constant comparison. Initially, "[t]his process starts out in a small way" (p. 108) but as the study proceeds the "constant comparative units" change and integration occurs. The beginning comparisons, of incident to incident, which resulted in the emergence of categories and their properties, give way to subsequent comparisons of incident to properties of categories, with the result that "the accumulated knowledge pertaining to a property of the category [becomes] related in many different ways, resulting in a unified whole" (p. 109). As the analysis becomes more focussed, comparison of property to property and then category to category result in further integration. This process of integration is aided by concurrent theoretical sampling and analysis, recommended in this method.

By joint collection and analysis, the [analyst] is tapping to the fullest extent the in vivo patterns of integration in the data itself; questions guide the collection of data to fill in gaps and to extend the theory -- and this also in an integrative strategy. (Glaser and Strauss, 1967, p. 109)

### **Delimiting the Emerging Theory**

As the theory develops, various delimiting features of the constant comparative method begin to curb what could otherwise become an overwhelming task. (Glaser and Strauss, 1967, p. 110)

There are two levels at which delimitation of theory occurs; those of theory and category. With regard to the first, as the analysis progresses theory "solidifies", in that "major modifications become fewer" and the theory is 'tightened up' through clarification of the logic, discarding of irrelevant properties, integration of properties and categories, and "reduction".

By reduction we mean that the analyst may discover underlying uniformities in the original set of categories or their properties, and can then formulate the theory with a smaller set of higher level concepts. This delimits its terminology and text. (Glaser & Strauss, 1967, p. 110)

Glaser and Strauss argue that "constant comparisons" force this reduction in terminology and consequently the generalization of the theory so that "the analyst starts to achieve two major requirements of theory: (1) *parsimony* of variables and formulation, and (2) *scope* in the applicability of the theory to a wide range of situations, while keeping a close correspondence of theory and data" (p. 110-11; original emphasis). The theory becomes more general and contains a smaller number of more all encompassing concepts.

The reduction of the theory itself contributes to delimiting the categories. That is, as the theory becomes 'tighter', the list of original categories can be reduced to those most applicable and the coding and analysis of incidents becomes "more select and focussed". Only those incidents that are "clearly applicable to this smaller set of categories" will be considered; although incidents that appear to be negative cases will be coded and compared. "Theoretical saturation<sup>16</sup>" of categories is another delimiting factor.

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<sup>16</sup> "Saturation means that no additional data are being found whereby the [analyst] can develop properties of the category. As he sees similar instances over and over again the researcher becomes empirically confident that a category is saturated. He goes out of his way to look for groups that stretch diversity of data as far as possible, just to make certain that saturation is based on the widest possible range of data on the category." (Glaser and Strauss, 1967, p. 61)

This method of analysis allows the sampling of a wider "universe of data" because of its delimiting features. That is, data may be collected from the wide range of samples and cases that will aid in emergence of the theory, but as time goes on only those incidents that are relevant to the development of existing categories and their properties, and negative cases, need be coded and compared. Decision making, based on constant comparisons and integration, allows the researcher to sample sources and "slices" of data more widely as the analysis itself becomes more selective within that range.

The universe of data that the constant comparative method uses is based on the reduction of the theory and the delimitation and saturation of categories. Thus, the collected universe of data is first delimited and then, if necessary, carefully extended by a return to data collection according to the requirements of theoretical sampling.....Without theoretical criteria, delimiting a universe of collected data, if done at all, can become very arbitrary and less likely to yield an integrated product; the analyst is also more likely to waste time on what may later prove to be irrelevant incidents and categories. (Glaser & Strauss, 1967, p. 112-13)

## **Writing the Theory**

It is appropriate to discuss the writing of theory, when considering analysis of data and emergent design, because the analysis may need to continue into the writing phase. When it is time to write one has the coded data, a number of memos associated with categories, and a theory. Glaser and Strauss note that the categories provide the major themes of the theory and should probably be section headings and the memos contain the "content of the categories" and can be easily collated and summarized, perhaps with further analysis. The data may be referred to in order to provide illustrations and examples, to "pinpoint data behind a hypothesis or gaps in a theory" or to "validate a suggested point" (p. 113).

When the researcher is convinced that his analytic framework forms a systematic substantive theory, that it is a reasonably accurate statement of the matters studied, and that it is couched in a form that

others going into the same field could use -- then he can publish his results with confidence. (Glaser and Strauss, 1967, p. 113)

It should be pointed out that in closing out the study and writing the report it may be necessary to go back to a site for further observation to fill in "data gaps" discovered during the writing phase. Because this may be a necessity, participants should be alerted to the possible further need of their assistance, and arrangements made for a final meeting to present the results of the study and solicit a final member check.