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A case study of cognitive style in a collaboratively structured management class.

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A CASE STUDY OF COGNITIVE STYLE
IN A COLLABORATIVELY STRUCTURED MANAGEMENT CLASS

A Dissertation Presented

by

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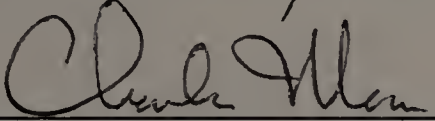
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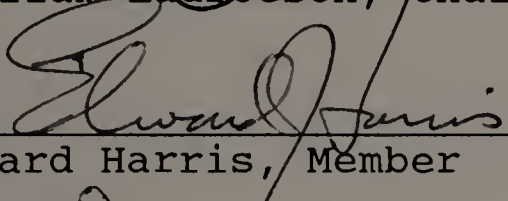
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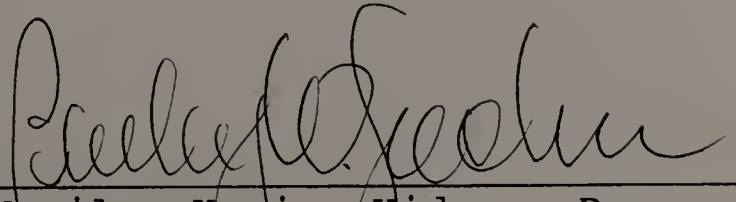
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ABSTRACT

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IN A COLLABORATIVELY STRUCTURED MANAGEMENT CLASS

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The use of collaborative methods in the college
classroom is increasing in popularity due to an interest in
more active forms of learning, increased recognition of the
value of the experience of adult students, and the demand
by organizations for workers who can work productively in a
group.

The purpose of this case study was to look at
collaborative learning from the perspective of one aspect
of student differences - cognitive style as defined by
Witkin's field-independence and field-dependence. This
research involved the analysis of data obtained from
interviews, classroom observations, student evaluations,
and questionnaires from 28 management students from
Quinsigamond Community College.

Analysis of the data, through qualitative and
quantitative methods, revealed that in this study cognitive
style did not make a difference in student perceptions of

the effectiveness of the instructor or of a group based
learning methodology.

Field-independent students described their behavior
more in terms of task roles, while field-dependent students
reported themselves more in terms of maintenance roles.
While field-dependent students in this study seemed to
place a value on the sharing of tangible resources and the
social aspects of the collaborative experience, the field-
independent students were more apt to lead the discussion
by asking questions that stimulated the collaborative
conversations.

There was no statistical difference between five prior
years of non-collaborative student evaluations of this
teacher and those of the collaborative class, nor did
cognitive style seem to make a difference in the way that
the students evaluated the instructor.

The data on cognitive style and the students'
satisfaction with the method of reaching consensus were
inconclusive due to a lack of agreement on the construct of
consensus within collaborative learning and limitations in
the methodology.

Field-dependent, field-independent and mixed cognitive
style students all rated the field-dependent students as
the most helpful to their own learning.

Replication on a larger scale or with an emphasis on
other aspects of individual student differences such as

race, gender, age, grade point average etc., was

recommended.

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CHAPTER I

BACKGROUND

Collaborative learning is a group based teaching methodology in which students use each other as resources and share the responsibility for each other's learning. Although there is a continuum of collaboration in the application of this methodology in the classroom, true collaboration shares four common elements: group-centered instructional methods based on the philosophical foundation of a community of peers who create knowledge by utilizing language through the process of negotiation; delegation of some portion of the instructor's role to the students with the responsibility to teach one's peers; a complex task formulated by the instructor that no member could complete as well on his own; and lastly, as with any other instructional method, the resources to complete the task.

Today collaborative learning is getting more attention in higher education. The most rapidly growing "action community" of the American Association of Higher Education is the collaborative learning group. More than 450 colleges are now using collaborative methods (Watkins, 1989). The AAHE's 1988 research agenda contained four pages of questions about collaborative learning that the organization stated needed clarification (AAHE, 1988). During the past two years, the Fund for the Improvement of

Post Secondary Education, (FIPSI), has funded research grants for collaborative learning projects at Lesley College, the University of California at Berkley, and St. Anselm's College.

Three factors appear to account for this interest in a collaborative approach to learning. First, based on the theoretical work of Dewey, Piaget and Bruner, there is a movement to make college learning a more active process in which the student assumes more of the responsibility for his own learning rather than assuming the role of the passive receiver of information. Several national studies on learning in higher education have called for increased student involvement in the learning process and the use of more active methods of teaching in place of the more traditional lecture format. The Association of American Colleges study, "Integrity in the College Curriculum : A Report to the Academic Community" (1985), the National Institute of Education's study group on the Conditions of Excellence in American Higher Education's report "Involvement in Learning" (1984), and the AAC Task Group "A New Vitality in General Education" (1988) recommended the use of more active methods of teaching that require students to participate more in their own learning.

The distinction between active and passive learning generally refers to the degree of visible student participation in the process. In the more active forms of

learning, such as discussion, simulations, in-class writing, laboratory experiments, etc., the student participates in some form of two-way communication with the teacher or his peers. In what are considered more passive forms of learning, such as lecture, only the instructor is physically and visibly active in the communication process.

However, this does not mean to imply that no mental activity is involved in listening to a lecture and in processing the material but that the student is not taking an active role in the transmission and creation of the knowledge. Eison and Bonwell (1988) cited seven major characteristics associated with active learning: students are involved in more than passive listening; students are engaged in activities such a reading, discussing, writing; more emphasis placed on developing skills than transmitting information; greater emphasis placed on the exploration of attitudes and values; increased student motivation; immediate feedback from the instructor; student involvement in higher order thinking such as analysis, synthesis and evaluation.

Second, there is increased recognition in higher education of the numbers of adult students who bring to the classroom valuable experience that serves as a resource for learning that may be more suited to a collaborative approach. Yet, except for independent study, the self-directed learning approach often advocated by the

adult education literature is not easily adaptable to the organizational structure of higher education. Because collaborative learning utilizes the knowledge and skills of group members to help each other to learn, it supports the philosophy of adult learning research that encourages the use of collaborative methods to meet the needs of adults as learners (Cross, 1976; Smith,1982; Messick, 1976).

Third, while the production-centered industries of the nineteenth and early twentieth centuries placed a high value on rugged individualism and competition, the service industries of the information age require teamwork and collaborative skills because of the trends toward worker participation and increased use of groups rather than individuals to make decisions. The semi-autonomous work group, rather than the individual, is becoming the building block of the organization (Mallinger, 1987). As a result, employers want workers who have developed the ability to work well in groups (Kohn, 1986, Ouchi, 1982, Culbert and McDonough, 1985).

The M.I.T. Commission on Industrial Productivity called for classroom experience in teamwork skills to prepare workers for the organizations of the future (Dertouzos, 1989). In addition, Astin (1988) wrote that using a methodology, such as lecture, that encourages students to be passive learners, discourages the development of such qualities needed for the development of

team skills and termed it the "implicit curriculum." There is a need to structure classroom teaching in such a way that students can learn how to solve problems while learning how to interact effectively with others in group and organizational settings. (Boyer, Weiner and Diamond, 1984-1985).

<div align="center">The Problem</div>

In order to be more adaptable to change, today's organizations are becoming flatter, more decentralized in decision making and increasingly dependent on the worker's ability to function productively as a member of a team (Drucker, 1988). Yet,

> Teamwork is more likely to succeed if members are both competent in the technical knowledge and the skills associated with the performance objective and able to collaborate effectively with one another.
> (Larson and LaFasto, p.84)

These changes in the work place may present problems for people who prefer to work individually in an organizational setting that utilizes group decision making. The collaborative pedagogy has the potential of being a means of teaching business students the process of working together at the same time that they are learning the content of management courses. In collaborative learning students interact in ways that the process of working together becomes a learning outcome along with the usual

content and knowledge outcomes. Beckman writes that

> Collaborative learning, then prepares
> students for this current type of
> organization of capitalist work.
> Through this method, students learn
> that knowledge is socially constructed,
> not static and fixed . . ... These
> cooperative efforts help prepare them
> for the flexibility and adaptation that
> problem solvers need in the ever more
> complicated work world that faces us.
> (1990, p.129)

In addition, collaborative learning is being adopted in college classrooms as a means of solving the problem of increasing student involvement in their own learning, meeting the needs of returning adult students, and teaching students how to function more effectively in small groups. Yet, it is being done without a solid data base of research on the experience of the individual student during the collaborative learning experience.

While some studies, conducted in non-collaborative classrooms indicated that students who favor abstract learning situations prefer not to learn through group methodologies (Loesch and Foley, 1988), at this point the literature of higher education is unclear about which students benefit most or least from the collaborative pedagogy.

Since collaborative learning is emerging from its applications within the disciplines, those who write and research this topic do so mainly from a testimonial case study approach. There is a plethora of material describing

how professors apply collaborative methods in their own classrooms. Yet, in spite of several computer data based searches, hand searches of both the educational indexes, and dissertation abstracts, and attendance at two collaborative learning conferences, this investigator has not found one reference to research on individual students in higher education who were studied in any systematic way about their perceptions and reactions to a collaborative learning experience.

The literature suggests that students with a field independent cognitive style may least enjoy learning collaboratively because they prefer to work independently and require less interaction and feedback (Smith, 1982). In contrast, students who have a field dependent cognitive style are motivated by external rewards and interactions, are more influenced by what others are thinking and doing (Witkin,1976) and are drawn to more collaborative approaches to learning.

The need for this information has been discussed in the literature. Austrom and Dunn (1989) described the research on collaborative approaches as "conceptual or descriptive with a heavy emphasis on narrative accounts and anecdotal evidence." (p.1). Mallinger (1987) cited a lack of rigorous research supporting this model in both the areas of personal students' reaction and changes in the levels of learning. If students who learn well on their

own withdraw from the group, the overall performance of the collaborative group can be effected. McKenzie (1981) suggested that teachers examine all variables before selecting a management style. Yet, some instructors are adopting a collaborative methodology without knowing exactly how it impacts students with differing cognitive styles. Others are afraid to try collaborative methods for fear of making some students uncomfortable (Sheridan, Byrne and Quinn, 1989).

Purpose of This Study

The purpose of this study is to increase the understanding of the individual student's experience within the collaboratively structured classroom through an investigation of the relationship between cognitive style and student reaction, perception and satisfaction with collaborative learning. The hypothesis researched in this study is that field-independent learners will behave differently from field-dependent learners in the context of a collaborative learning experience in ways that inform and direct the management of collaborative learning in the college classroom. The research questions addressed student cognitive style differences in five areas of a collaboratively structured class.

First, does cognitive style make a difference in students' perceptions of the effectiveness of learning in a collaborative group? Second, how do the roles played by field-independent and field-dependent students differ in a collaborative learning experience? Third, do student evaluations of the instructor differ in collaborative and non-collaborative classes and do these evaluations differ according to the cognitive style of the student? Fourth, how does a student's cognitive style affect the way that he reaches consensus in a collaborative group? Fifth, is there any difference in terms of cognitive style in the way that students in a collaboratively structured class rank their peers in terms of which students were the most helpful to their learning?

Definitions of Terms

The important definitions in this proposal are organized into two general groups: those that relate to collaborative learning and those that clarify the terms pertaining to cognitive style. From the literature, there are five reasons for the confusion around the definition of collaborative learning.

First, there is controversy in the literature about the differences between collaborative and cooperative learning that needs to be addressed. Cooperative learning

is a group based method of instruction, more commonly used in elementary education, in which each student completes a portion of the task either together in a group or alone in a jig-saw method. In cooperative learning students may work together on a task or work independently on one component of a group project and report back to contribute their part to the group.

Although some authors use these terms interchangeably, others such as Damon and Phelps, (1987), write that the inherent difference between collaborative and cooperative learning is that the latter does not always require mutual responsibility for another student's learning. In contrast, Johnson and Johnson, perhaps the most prolific writers on the subject of cooperative learning, write that "In cooperative learning the groups' responsibility for each others learning is shared" (1984, p. 9).

Cooperative learning and collaborative learning share more similarities than differences; first, both are group based instructional methods; second, both utilize a cooperative goal structure instead of a competitive or individualistic one; and third, in both the instructor's role is more that of a facilitator than a dispenser of knowledge.

To this author the major difference is really more philosophical and epistemological than operational and parallels the distinctions between andragogy and pedagogy.

Unlike cooperative learning, the term used in the literature of elementary and secondary education, collaborative learning, the term used in the literature of higher education, is rooted in social constructionism. This philosophy posits that knowledge is something that peers generate and create rather than discover. Children's learning theory is based on the assumption of pedagogy, i.e. their experience is built on rather than used as a resource. In contrast, in adult learning, andragogy, (Knowles,1975), adult life experience is used as a resource to socially construct new knowledge.

In reality, these two models represent a continuum rather than a dichotomy. There are some learning situations, such as new content areas, where adults may need a pedagogical teaching strategy until enough material is learned to adopt an andragogical approach.

For the purpose of this research the major difference between cooperative and collaborative learning is the level of educational and life experience that the students have to utilize in their learning. Consequently, the literature of cooperative learning has much to offer and will be included wherever appropriate.

Second, a broad spectrum of educational activities are often described under the umbrella term of "collaborative" such as collaborative interdisciplinary programs, collaboration between faculty researchers, individual

student and faculty collaboration and collaborations between high schools and colleges. While these activities do indeed involve people working together for mutual benefit, they are not necessarily involved in the application of collaboration as a pedagogical methodology.

Third, collaborative learning is a form of group based instruction that often incorporates other group based techniques such as discussion, case study, group exercises etc. So it is somewhat complex to understand how it differs from traditional group instruction methods. Although all collaboration is group based instruction, not all group based instruction is necessarily collaborative unless it involves the students taking on some responsibility for their peers learning and is structured in such a way that student interaction and conversations result in the creation of new knowledge.

Fourth, various authors write about collaborative learning methods, but use different terms, to describe their efforts,such as, "student directed learning groups", (Todd & Todd, 1979), "group investigation", (Sharan 1986), "self-directed groups", (Beach, 1974) and "team learning", (Michaelsen, 1984).

Fifth, because collaborative learning is emerging from the disciplines, the definitions and practices are shifting. A sample of some of the more popular definitions will illustrate that defining collaborative learning is a

complex task. William Whipple, (1987) formerly chair of

the AAHE's Collaborative Learning Action Committee, in

attempting to clarify the meaning of collaborative learning

wrote that

> Collaboration is one of those words
> like "salad" or "game" that is,
> strictly undefinable but that can be
> understood by looking at the
> characteristics with which it is often
> (though not invariably) associated. Not
> all salads consist of vegetables: not
> all are served cold, or precede the
> main course of a meal. But if the
> waiter does bring a plate of cold
> lettuce and other vegetables before
> bringing the main course, we can safely
> call it a salad. (p.3)

Anita Landa, (1989), co-director of the Lesley

College Collaborative Learning Project defines

collaborative learning as a process that

> involves students and faculty working
> together - generally in small groups
> -to create knowledge. In the process, a
> collaborative culture is established
> which transforms a number of
> relationships: between students and
> faculty among students; among faculty;
> between teaching and research; and
> among teachers, learners and knowledge.
> Since collaborative learning is
> relational, it depends upon empathy and
> on language. Dialogue and narrative
> are its vehicles. (p.6)

Kenneth Bruffee, perhaps the most prolific writer on

collaborative learning theory, and its epistemological

basis in social constructionist thought, defined

collaborative learning as "a form of indirect teaching in

which the teacher sets the problem and organizes the students to work it out collaboratively" (1984).

For the purposes of this study the operational definition of collaborative learning comes from the literature where there is general agreement that collaborative learning is a group based pedagogical method, based on the philosophy of social construction, within which the teacher acts as a facilitator and knowledge is generated through the cooperative interaction of students who are mutually dependent upon each other for their learning.

The belief in the social construction of knowledge is the epistemological basis for collaborative learning. It is a philosophy which holds that knowledge is something that people generate together through language and the social justification of their beliefs as opposed to positivist view in which there are objective truths that are valid for all times and cultures.

Learning style and cognitive style are sometimes used interchangeably in the literature. However, learning style is the broader term that refers to many different dimensions of student interaction with the learning environment such as cognitive, sensory, interpersonal and affective indicators. Learning style is often used in reference to the diagnosing of individual learner needs in

terms of matching or mismatching these characteristics with the learning environment.

In contrast, cognitive style is a sub-category of learning style that represents the learner's typical mode of perceiving, thinking, problem solving and remembering. The most highly researched dimension of cognitive style is Witkin's work on field-dependence and field-independence (1981). It is important to remember that field-independence and field-dependence are not discrete categories but refer to a continuous dimension where an individual's relative degree of ability to overcome embedded context in perception has meaning only in relationship to the mean.

Field-independence describes people who are less influenced by their surroundings and can separate out parts from the whole context. Research has shown that people who tend towards a field-independent style tend be more analytical in their approach to learning and less influenced by their environment.

Field-dependence describes the opposite end of this cognitive style dimension. It refers to those people who have relatively more difficulty separating out parts from their context. These students have a more globally orientated cognitive style. Research discussed in detail in the literature review showed that field-independent and field-dependent students differ not only in perceptual

ability but also in social relationships (Witkin and Goodenough, 1981).

The Group Embedded Figures Test (Oltman, Raskin, Whitkin, 1971) is used to measure the relative dimensions of field-independence and field-dependence. This instrument consists of a timed test in which the subject must find simple geometric figures that are embedded in a series of eighteen complex geometric figures. Those who are relatively field-independent tend to be less influenced by the surrounding field and are able to find more of the figures than those who are considered relatively field-dependent.

Limitations

Since the subjects of this study were college-level business students working in a collaboratively structured group, the degree to which students who elected to be business majors may differ from the college student population in general. Consequently, this imposes limits on the generalizability of the findings. There was no attempt made to select students randomly from the student body or the management major. The population for this study was every undergraduate business major who choose to take a Small Business Management course during the semester of the study. Because this research utilized both

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quantitative and qualitative methods, the author allowed the patterns in the data about field-independent and field-dependent learners within a collaborative group to emerge, rather than be concerned with its generalizability to larger populations.

Since this study concerned learning within a collaborative group in the classroom, it specifically excluded one-on-one peer tutoring and limited the meaning of collaboration to classroom collaborative learning. Collaboration in education has many current usages as discussed earlier: such as faculty working with other faculty, high school and college collaborations and collaborations across departmental boundaries. While these are all examples of ways that learning can be altered and improved by working with other people, these are not addressed in this study. This study is limited to the learning that occurs between students in a group in a collaboratively structured college classroom.

Working within the environment of one's own classroom can compromise the objectivity of a study. However, this concern is addressed in this work by both the nature of the pedagogy and the use of triangulation in the methodology. The role of the professor in a collaborative classroom allows for more detachment and objectivity than in a traditional setting. The very essence of collaborative learning is that students teach each other by socially

constructing knowledge. In an essay titled, <u>On Not</u>
<u>Listening in Order to Hear: Collaborative Learning and the</u>
<u>Rewards of Classroom Research</u>, Bruffee,(1988), wrote

> Instructors in this setting teach
> indirectly by means of a conversation
> focusing task. They neither
> 'facilitate' nor 'sit in', but
> literally step out. (p. 11)

Significance of the Study

While collaborative learning is receiving more
attention today both in the literature and as a topic for
conference presentations, the focus is usually on the
instructor and the pedagogy. The researcher has been able
to find little data on the experience of the individual
student who is being asked to learn this way.

This has particular significance in the teaching of
management on the college level. At a time when
organizations are utilizing more group decision making and
are asking for students who know how to work
collaboratively, most business instruction is still
competitive and individualistic in structure. Teaching
management in a collaborative way may help to prepare
students to function in organizations that utilize team
work and group decision making models.

However, the literature on cognitive style suggests
that some students, particularly those with a
field-independent learning style, would least prefer

learning and working collaboratively . Consequently, this framework was used to learn more about the experiences of the individual students, particularly those whose cognitive style least matches a collaboratively structured learning experience.   The results of this study are intended to learn if field-independent learners behave differently than field-dependent learners in the context of a collaboratively structured learning experience from the perspective of the student.

Organization of the Study

The remainder of this dissertation is divided into four chapters. Chapter II reviews the literature on collaborative learning and cognitive style. Chapter III, Methodology, lists the research questions which guided the study, describes the sample used in this research, and explains the methodology used to answer these questions. Chapter IV, Results, reports the findings for each research question. Chapter V presents a discussion of the results, recommendations for the implementation of collaborative methods in the college classroom, and suggestions for future research.

CHAPTER II

REVIEW OF THE LITERATURE

Since the purpose of this research is to learn more
about adult learners' perceptions of a collaborative
learning experience from the perspective of their cognitive
styles, this literature review is organized around the two
main topics that are directly related to this study:
collaborative learning as a social pedagogy and cognitive
style in terms of Witkin's work on field-independence and
field-dependence.

To provide a theoretical framework for this research,
collaborative learning was examined first by reviewing the
literature relating to its historical, and philosophical
roots. To provide a pedagogical framework, the literature
on the major components of collaborative teaching were
reviewed: cooperative goals, changes in the roles of the
instructor and student, and student responsibility for peer
learning.

Next the literature relating to Witkin's and his
associates research on cognitive style, particularly as it
relates to its measurement, learning, and social
orientation in the classroom were reviewed to establish a
context for the design of the study.

Historical, Educational and Philosophical
Roots of Collaborative Learning

To the extent that collaborative learning implies a classroom methodology of teaching through student interaction, it is apparent that this mode of learning has a rich and long history. Wagner (1986) traced the roots of students teaching each other back as far as the time of Aristotle and Plato when teachers were so few in number that rudimentary forms of collaboration were used in education. Out of necessity in pioneer days teachers in the one room schoolhouses across the American west often used older students to teach younger students.

In Holt's (1988) study of collaborative pedagogy in the teaching of writing in American higher education, she cited the influence of collaborative methods of teaching during the 1930's and 1960's when the political climate was supportive of more participatory models of democracy and authority. So the idea of peers teaching each other is not a new phenomenon.

However, collaborative learning in American higher education and as defined in this work, is grounded in the social construction of knowledge and is considered to date primarily from the work of Kenneth Bruffee in the early 1970's at the Brooklyn College writing center (Whitman, 1988). Lindblad (1989) credited Bruffee for the shift in

"the pedagogical emphasis from the individual to the peer group by arguing for the collective nature of knowledge" (p.6).

Some of the major theoretical contributions to current thinking on collaborative learning include Jean Piaget's research on the connection between verbalization and the active construction of learning (1932), John Dewey's writings on the social aspects of learning (1933), Moreno's writings on group dynamics (1960), Vygotsky's belief in the social origins of learning (1978), and Jerome Bruner's work in the area of discovery learning (1979).

Basically collaborative learning is a social approach to knowledge in which the instructor gives students a problem and organizes them to work it out collectively in a group (Bruffee, 1984). In collaborative learning the traditional didactic model of the teacher as the authority is replaced with a style of pedagogy in which students become mutually responsible for teaching each other. Knowledge is created through its transmission in a community of equal group members (Romer, 1985). Philosophically, collaborative learning is based on the social constructionist paradigm which is a belief that there is no universal foundation, framework, or structure of knowledge. In social construction knowledge is generated by communities of peers through the process of justifying their beliefs through the medium of language.

Building on the writings of Dewey, Heidegger, and Wittgenstein, the writing of Thomas Kuhn and Richard Rhorty are considered to be the seminal works on social constructionism as it is applied to this pedagogy. Thomas Kuhn's Structure of the Scientific Revolution (1970) is perhaps best known for the thesis that changes in scientific knowledge are revolutionary new paradigms rather than evolutionary processes. In addition, according to Kuhn, paradigmatic change results from constructs generated by communities of peers, i.e., socially constructed knowledge. In Philosophy and the Mirror of Nature, Richard Rhorty (1979) extended Kuhn's notion of socially constructed scientific knowledge to the theory that all knowledge is socially constructed.

Applied to higher education, collaborative learning is the anthesisis of Hirsch's work on Cultural Literacy (1987). Rather than just the assimilation of content knowledge, collaborative learning is a process in which the students acquire knowledge through the explanation of their way of understanding to others, answering questions, and responding to others' reactions to their work. Changes in the students' thinking and the new ideas that can result from these conversations become an integral part of the learning process.

Cooperative and Competitive Goal Structures

In addition to designing the learning experience to
facilitate the social construction of knowledge, the second
aspect of collaborative classroom learning is a cooperative
goal structure that promotes mutual responsibility for
peer's learning. In a meta-analysis of 122 studies
conducted between 1924 and 1981 Johnson, Marutama, Johnson,
Nelson, and Skon (1981) found that cooperation in learning
experiences tends to promote higher achievement than
individualistic or competitive goal structures. Kohn
(1990) cited positive interdependence between cooperating
learners as the key variable in overcoming the selfishness
and low self-esteem perpetuated by the competitive American
educational system.

In collaborative learning, cooperative goals imply
mutual responsibility for each other's learning rather than
competition between students. In collaboration, all
students can learn without the others necessarily failing
and students need to be encouraged to work cooperatively
for each other's benefit. This does not mean that there is
no conflict in the collaborative process. Instead,
conflict can be natural, helpful, and lead to increased
learning (Hellriegel, Slocum & Woodman, 1986) as long as it
is rooted in a cooperative rather than a competitive or
individualistic value system. Consequently, the type of

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goal structure employed in the classroom influences the interpersonal experience and the learning outcomes.

Role Changes for Faculty and Students

Utilizing collaborative methods in teaching and learning requires new roles for both the instructor and the student. Many of our assumptions about teaching and learning have been based on the linear model in which the teacher is the transmitter and interpreter of knowledge (Kail, 1983). Even in group exercises students may work together but await the "right answer" from the instructor. Consequently, the instructor still maintains a hierarchical role. In contrast, a collaborative learning group is expected to create knowledge by its own authority (Weiner, 1986) with the instructor supporting the process.

Bruffee (1987) cited the distribution and delegation of authority as the key variable that distinguishes collaborative learning from traditional group learning experiences. In fact, in this model faculty function more in the role of facilitators or delegating managers than as the experts. Effective collaborative learning requires that the faculty member dissolve his "Atlas Complex" (Boulton and Garth, 1983) and empower the student as a co-learner who participates in the shaping and management of his own learning (Pratt, 1988).

Adult learning literature brings additional support for a more participative role for the student because it acknowledges the value of the learner's experience as a resource (Knowles, 1977; Brookfield, 1986). Conti (1979) credited the writings of Edward Lindeman, and Laurent Dalozas as supporting collaboration in adult learning because of their emphasis on the role of the adult student as an active learner.

> The role of the teacher in this process is to organize and maintain an environment that facilitates student learning. The teacher brings ideas, values and experiences to the learning transaction and is charged with the task of drawing ideas, opinions and values out of learners. In this transaction, teachers and learners are mutual partners. (Conti, p.5)

However, this does not necessarily mean that the collaborative role is one that is easily adopted by instructors. Franklin (1989) using the Principles of Adult Learning Scale as an instrument to measure how collaborative professors were, found that although adults learned better through collaborative techniques, "a significant difference was detected in the acceptance and practice of collaborative techniques" (p. 145) by the instructors. Conti (1979) agreed that

> although the adult education literature supports the collaborative mode as the most appropriate way to teach adults, many adult educators do not totally accept or utilize this approach. (p. 5)

Teachers learn from students in this model and students become more like teachers, i.e., taking responsibility for another's learning. Bayer-Shae (1990) wrote that in collaborative learning the instructor's role shifts to that of a more capable peer whose main function is to unify the classroom and to make connections between groups. Likewise, Lochhead (1985), using a student paired problem solving technique in the teaching of mathematics, pointed out that in this pedagogy there is some evidence of role reversal between student and teacher.

Yet, this does not mean that the instructor has little to do in a collaborative classroom. In fact, implementing this pedagogy is initially more time consuming than preparing traditional lectures (Abercrombie, 1974). In collaborative learning the teacher's role involves devising the task, organizing the students for group work, providing training in group skills and dynamics, and helping the group members to learn how to depend upon and work productively with each other.

As a result of this change in the distribution of power in the classroom, the emphasis shifts from the transmission of knowledge to the generation of knowledge, i.e., social construction. The way that the students derive the answer becomes as much a part of the learning experience as the answer itself (Weiner, 1986). The objective is that the students acquire interpersonal,

decision making, and communication skills in addition to content knowledge that will benefit them in their lives and work.

Because of the trends towards decentralization of authority, flatter organizations, and group decision making in industry, the need for these skills for business majors is particularly important and is established in the business literature. Larson and LaFasto (1989) in a three-year study of teamwork in business, found that a collaborative climate was one of the eight characteristics of successful teams. Although Vail (1989) cited the need to be able to function as a member of a leadership team as one of the three characteristics needed for the new styles of management, he acknowledged that business, much like education, has continued to rely on independent, competitive models even though the environment has changed and new collaborative paradigms have become more appropriate.

Since collaborative learning requires that the instructor let go of some of her authority about how the task is accomplished, this means that the students must also be willing to accept more responsibility to initiate and sustain their own learning (Castellici & Miller, 1986).

However, the literature is somewhat mixed on students' willingness to take a more active role in their own learning Bryant (1978) experimented with allowing

psychology students to collaborate on group exams and found
that "most" chose to complete the exam in groups. Saxe
(1988) found that group incentives made no difference in
adults' content learning but that moderate peer interaction
resulted in better achievement than low or high levels of
peer interaction.

Rezler and Rezmovic (1981) concluded that students may
be less comfortable with more self-reliant models of
learning because they are less familiar with them than they
are with traditional lecture models. Likewise, Graham
(1989) in a study of adult students' attrition in a
community college, found that in the first half of a course
students preferred a teacher-centered model of instruction
but were more open to more collaborative methods and
increased student responsibility for learning in the second
half of the semester.

However, none of these studies considered students in
terms of individual differences in learning or cognition.
Ede (1987) wrote that the real challenge of collaborative
learning "lies in maintaining a double perspective: seeing
the social in the individual and the individual in the
social" (p.7). This is the perspective that has been taken
in this study in regard to individual student's cognitive
styles.

Cognitive Style

Since collaborative learning is a group based pedagogy, it raises many questions about the issue of individual students reactions to this type of classroom experience. Although some students develop learning strategies to adapt and to achieve regardless of the teaching methodology, individual differences in ability, motivation, and personality are important variables to understand in relation to the learning process.

Cognitive style, "a person's typical modes of perceiving, remembering, thinking and problem solving", (Messick, 1976, p.5), in terms of Witkin and his associates' work, was used as the framework in this research for studying the individual in the collaborative classroom. Although several typologies such as the Meyers-Briggs Type Indicator, Kolb's Learning Style Indicator, and Hill's Cognitive Style Mapping Inventory have also been developed for the identification and measurement of some of the various dimension of cognitive style, Witkin's work was selected for this study for two reasons. First, it is highly researched and has been the subject of over 2,000 studies during the past 35 years (Cross, 1979). Witkin's "work is the most extensive and in-depth research on cognitive style conducted in the last 50 years" (Guild and Garger 1985,p.xii).

Second, the instrument that is used to measure field-independence and field-dependence in Witkin's work, The Group Embedded Figures Test, is considered to be one of the more culture and value neutral instruments to measure cognitive style because it involves geometric figures rather than words. In contrast, most of the other instruments rely on subjective rankings and ratings and are more susceptible to multiple frames of reference, distortion, and experience that decrease their reliability and predictive validity (Grasha, 1984). Unlike ability or intelligence, the construct of field-independence and field-dependence is considered to be value neutral because having a tendency towards either end of the scale can be positive or negative according to the learning circumstances (Witkin, Moore, Goodenough and Cox, 1977).

While many others aspects of individual differences, such as gender, race, age etc., could have been chosen for this study, research has shown that cognitive style is a core personality dimension and one of the most stable and least changeable of the individual differences (Curry 1983). In addition, its extension to all activities that implicate cognition including social and interpersonal functioning (Witkin, 1976) suggest implications for the study of a group based pedagogy like collaborative learning.

While the exact origins of cognitive style are

unknown, women tend to be more field-dependent than men

(Witkin,1976). Earlier studies attempted to link cognitive

style to genetic sex chromosomes (Bock and Kolakowski,

1973; O'Connor, 1943; Stafford, 1961). However, later

research contradicted the causality of biological

differences and provided some evidence that cultural

influences such as socialization and child rearing

practices may play a stronger role in the determination of

cognitive style. Witkin and Goodenough hypothesized that

> Child rearing practices that encourage
> separate autonomous functioning foster
> the development of differentiation, in
> general, and, more particularly, of a
> field-independent cognitive style. In
> contrast, child-rearing practices that
> encourage continued reliance on
> parental authority are likely to make
> for less differentiation and a more
> dependent cognitive style. (1981, pp.
> 81-82)

The results of cross-cultural research lend additional

support to this position. Witkin and Berry (1975) reviewed

179 studies and found that members of societies that

emphasize conformity to norms, strong parental control, and

strict child rearing practices tended to be more

field-dependent. Conversely, the members of cultures that

encouraged autonomy, role diversity and self-control were

found to be more field-independent.

More recent studies within American cultural

sub-groups corroborated the influence of culture on

cognitive style differences. Jones (1986) concluded that the tendency of both male and female Black Americans to score more towards the field-dependent end of the scale, was positively related to cultural factors that promoted kinetic-tactile rather than visual information processing emphasis and a person-oriented rather than an object-oriented selection style. Likewise, Pine (1984) in a study of American Indians, found that their tendency towards field-dependency was related to the high degree of social conformity inherent in their culture. Because non-whites have a higher tendency towards the field-dependent cognitive style and the word "dependent" has cultural and negative overtones, there has been an increasing substitution of the term "field- sensitive" for field-dependent in later works (Bennett, 1990).

Measurement of Field-Independence and Field-Dependence

The initial studies of field-independence and field-dependence were conducted by psychologist Herman A. Witkin and his associates who were researching people's perception of orientation to space. These tests involved measuring a person's ability to align a rod upright within a tilted room. Some subjects, later called the field-independents, used internal cues to complete the task and

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others, called field-dependents, relied upon the external

room and frame as reference points.

> These experiments led Witkin and his
> associates to define two extreme
> indicators of the extent to which the
> surrounding organized field influences
> the person's perception of an item
> within it. They concluded that a
> person with a field-dependent mode of
> perception is strongly dominated by the
> prevailing field, while the
> field-independent person experiences
> items as more or less separate from the
> surrounding field.
> (Guild,1980,pp.26-27)

An individual paper and pencil instrument, The

Embedded Figures Test, was developed to measure the same

construct without complicated equipment. This instrument

required the subject to locate a simple geometric shape

within a complex design. Subjects at the field-dependent

extreme were less able to find simple line figures embedded

in complex geometric designs. However, subjects who tended

towards the field-independent extreme were better able to

separate the figures from their backgrounds. The

development of The Group Embedded Figures Test (Oltman et

al, 1971), simplified the administration by allowing groups

to take the test in twenty minutes. As in the rod and

frame test, those who were relatively field-dependent were

so influenced by the visual field that they found the task

more difficult to complete, while those who tend to be more

field-independent were able to identify more of the

embedded figures.

Cross (1979) described the progression from the rod and frame test, to the GEFT and the research that extended this concept to social relationships.

> The common element in all of these experiments is the extent to which people are surrounded by a visual field. But the influence is not limited to visual perception. Similar phenomena occur when people are asked to identify a simple tune located in a complex melody or to close their eyes and locate by touch a simple figure embedded in a complex figure with raised contours. Indeed, field-dependents are not likely to differentiate even themselves sharply from the surrounding field. They, more than field-independents, are sensitive to what other people are doing and thinking and are dependent upon others for their own orientation. (pp. 117-118)

Extensive research has documented the fact that in conditions where information is unclear or inadequate to solve the problem, as it would be in a well structured collaborative task, people who rely on the external visual field in perception, i.e. the field-dependents, make greater use of information obtained from other people than do people who rely on their inner senses, i.e. field-independents (Antler, 1964; Balance, 1967; Birmingham, 1974; Shulman,1975).

Witkin,and Goodenough (1981) provided additional evidence on the relationship of cognitive style and social behavior.

> People who are field-dependent in perception of the upright and limited

in disembedding ability have an
interpersonal orientation, whereas
people who are field-independent and
competent in disembedding have an
impersonal orientation. Thus, the
former kinds of people more than the
latter, pay selective attention to
social cues; they favor situations that
bring them into contact with others
over solitary situations; they prefer
educational-vocational domains that are
social in content and require working
with people. (pp. 43-44)

From the preceding discussion of cognitive style and
social relationships, one can see that the collaboratively
structured social learning environment may be more
complicated for the field-independent learner.

Relationship of Field-Independence and
Field-Dependence to Learning

Although field-independence-dependence is not related
to general achievement measures such as college grade point
averages, ability, or memory (Witkin, Goodenough, 1977),
studies document that field-independence and field-
dependence are related to one aspect of intelligence,
analytical intelligence, that requires the separation of
elements from background. (Witkin, et al, 1976).

Consequently, people who tend to score towards the
field-independent end of the scale seem to have an
advantage in learning situations that require analytical
skills, such as mathematics and science. This is because

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of their abilities to separate detail from the surrounding field and to extract patterns from context. In addition, field- independent learners find it easier to structure a learning experience for themselves and seem to require less extrinsic motivation to achieve than field-dependents (Bolocofsky, 1980).

Conversely, students who tend to score towards the field-dependent side of the continuum, perceive a situation in a more global, holistic way, see relationships among concepts and have a greater need for externally provided structure (Greene, 1972). Field-dependent students require more explicit instructions and definitions of performance outcomes than field-independents (Witkin et al, 1977).

Although much of the research involving cognitive style and learning center around the issue of the value of matching or mismatching an individual according to his style and pedagogical method, the results are not definitive. In the review of the literature on matching educational methods with learning preferences, Cronbach and Snow (1977) considered the match to be an important key to educational improvement.

However, Macneil (1980) investigated the relationship between cognitive style and instructional method by randomly assigning field-independent and field-dependent students to three groups: one was taught by an expository, teacher- centered methodology, the second by a

student-centered discovery approach that utilized role play and group problem solving and the third group received no treatment. When each group was tested for concept attainment at the knowledge level, no significant differences attributable to cognitive style within the groups was found. In contrast, McLeod and Adams (1979) in studying students who were preparing to become teachers found "that field-independent students achieve most in a discovery treatment, and field-dependent students learn best in expository instruction" (p. 32).

Further research that extended the constructs of field-independence and dependence from the perceptual to social orientations has important implications for the study of cognitive style differences within a group based collaborative learning environment. Field-dependents like people, are attentive to and "tuned" to the social components of the environment and are sensitive to social cues from others (Witkin, 1977). In addition, Bolocofsky (1980) found that field-dependents' performance is significantly enhanced by the social reinforcement, which comes from the peer interaction in the group. In a study comparing the effectiveness of instructor-centered and peer centered formats in the teaching of chemistry, Andrews (1981) found "that students learn best in settings that meet their socio-emotional needs and are attuned to their predominant patterns of behavior" (p. 176).

Although the literature seems to suggest that field-dependents because of their extrinsic motivation and need for social reinforcement in learning, might prefer and profit more from a group based collaborative environment than field-independents, this has not been established at this time. Since there is a growing interest in implementing more collaborative methods of learning, the literature on cognitive style and collaborative learning considered here established a context for the design and research of the study to be described in the next chapter.

CHAPTER III

DESIGN AND METHODOLOGY OF THE STUDY

This chapter is divided into four sections: the questions that were investigated, the rationale for the research design, a discussion of the methodologies that were employed to answer each question, and a description of the subjects that were studied in this research.

Research Questions

1. Does cognitive style make a difference in students' perceptions of the effectiveness of learning in a collaborative group?

2. How do the roles played by field-independent and field- dependent students differ in a collaborative learning experience?

3. A. Do student evaluations of the instructor differ in collaborative classes from the evaluations in non-collaborative classes ?

    B. Do student evaluations of the instructor and of the class differ according to the cognitive style of the student in a collaborative classroom ?

4. How does a student's cognitive style affect the way that he/she reaches consensus in a collaborative group?

5. Is there any difference in terms of cognitive style in the way that students rank their peers when they evaluate the value of each individual's contribution to the group effort in a collaborative learning experience?

Rationale

The broad purpose of this research has been to learn more about the effect of cognitive style on the experience of an individual student in a collaborative classroom. As stated in the literature review, this researcher was able to locate only one study (Graham, 1989) that addressed any aspect of individual student perceptions and attitudes towards collaborative learning and no research on the relationship between cognitive style and collaborative learning. Although there was evidence that the introduction of this pedagogy into college level classes is growing (Watkins,1989), it has ostensibly been done without much research into the practical application of these techniques in the classroom and without the perspective of how collaborative learning affects individual students. There appeared to be little research that instructors could use to guide them in the practical use of collaborative techniques. For example, only one of the studies reviewed for this research utilized any quantitative measurements

(Graham, 1989), and most of the qualitative studies lacked both the thick description (Geertz, 1973) and the triangulation of methodology (Sevigny, 1973; Mathison, 1988) that are generally recognized as necessary for good qualitative research.

A descriptive case study was the methodology chosen for this research for several reasons. First, when little research has been done on a topic, it is impossible to identify all the important variables ahead of time. Consequently, a descriptive case study becomes an appropriate research design (Olson, 1982: Merriam, 1988) that can be used to generate hypotheses and questions for future research, as well as suggestions for instructors who teach collaboratively.

In addition, collaborative learning is generally considered to be contextual since students can only learn collaboratively within the context of a collaboratively structured class. Yin (1984) found that a case study is particularly suited to a situation where it is impossible to separate variables from their context.

Miles and Huberman (1984) cited the need for the formation of a general proposition, to establish the focus for a case study rather than a hypothesis which is the cornerstone of experimental research. In this research that proposition was: **that field-independent learners will behave differently from field-dependent learners in the**

context of a collaborative learning experience in ways that
will inform and direct the management of collaborative
learning in the college classroom.

Methodology

This study was conducted by using a combination of
qualitative and quantitative methods. Reichard and Cook
(1979) advocated using both methods citing that both are
extreme paradigms and a combination of methods avoids the
worst features of both extremes. Rossman and Wilson (1985)
also rejected the argument that quantitative and
qualitative methods are mutually exclusive. They wrote that
qualitative data can suggest new perspectives and
categories that enhance understanding of quantitative
findings. Conversely, quantitative data can help to
clarify qualitative perspectives.

> Our experience suggests that numbers
> and words can be used together in a
> variety of ways to produce richer and
> more insightful analysis of complex
> phenomena than can be achieved by
> either one alone (Rossman and Wilson
> 1985, p. 641).

Qualitative research is hypothesis generating rather
than hypothesis testing and especially appropriate for
studying a pedagogy that is contextual and emerging from
the disciplines rather than based on a particular learning
theory (Merriam, 1988). However, since this research took

place within the context of the researcher's classroom, there was also a need to add the objectivity that only statistical analysis can provide.

The next section is divided into two parts: a description of the population that was studied; and a discussion of the research questions in terms of how the data were collected and analyzed for each specific question. This research was conducted using 28 business majors from Quinsigamond Community College, who elected to take a Small Business Management class, that met three times a week for a fourteen-week semester. The class was comprised of ten females and eighteen males. All students were white and the average age was 21. Quinsigamond is a state supported, two year urban college that was founded in 1963. Total day school enrollment is approximately 3,796 students, of whom 89% are white and 11% are minorities.

The Small Business Class was chosen for this research because the content was particularly well suited to the use of a collaborative methodology and the use of the pedagogy would be less disruptive to the students. For each student the major semester project is the writing of a business plan, an involved 25 to 35 page report that is essentially a blue print for starting a business. This assignment is particularly well suited to the use of a collaborative pedagogy because the students could learn and profit from

peer feedback and collaboration on individual business plans.

Instead of the traditional lecture format, students were organized randomly into groups of five to six members. Each topic, such as pricing, competition, etc., was introduced with a ten-minute overview. Then the students worked in groups to collaborate with each other in applying the material to the particular business that each had chosen to write about.

In collaborative learning, students teach each other by working in groups on a task that involves the application of the class content. It was up to each member to try to improve his/her peers' thinking and writing about each aspect of the business plan. In collaborative learning students learn while teaching their peers. As its methodology, collaborative learning utilizes conversation, the challenging of ideas, peer review of written work, attempts to reach consensus and the justifications of why decisions are made to other group members.

In classroom research the dual role of the teacher as both instructor and researcher introduced a complication into the research design that must be acknowledged. However, two factors need to be considered. First, the nature of the collaborative pedagogy allows for more objectivity and detachment than in a traditional classroom because in this methodology the students assume a good

portion of the responsibility for teaching each other. Here the instructor defines the task and becomes an observer rather than an active participant in the collaborative groups. Bruffee (1988) in On Listening in Order to Hear: Collaborative Learning and the Rewards of Classroom Research, acknowledged the legitimacy of classroom research in collaborative learning because in this model the responsibility for teaching belongs to the student. He wrote

> Instructors in this setting teach
> indirectly by means of a conversation
> focusing task. They neither
> 'facilitate' nor 'sit in', but literally
> step out. They do hear and hear a
> great deal more than most instructors
> ever hear. (1988, p.11)

Second, the data collected were anonymously coded by the students themselves using any last name other than their own. Interviews were conducted after grades were completed.

Because the subjects were not randomly selected from the entire population of the school and there was no control group involved in the study, quantitative analysis was limited to the use of descriptive statistics. While the design of the study limited its generalizability to larger populations, that was not the intent of this research. Instead, it was to provide a point of departure for inquiry into the application of collaborative learning

in the college classroom from which other questions and hypotheses can emanate.

This is not to say that matters of reliability and validity were not addressed. Internal validity was increased through a triangulation of methods which utilized surveys, interviews, and peer evaluations, that were analyzed both qualitatively and quantitatively. External validity was increased through the use of the well researched and validated Group Embedded Figures Test (GEFT) for the typing of cognitive style. This instrument increased the generalizability of the results to students with similar cognitive styles. Reliability was increased by providing, as Lincoln and Guba (1985) suggested, an audit trail that other researchers may use to duplicate this study in other settings and with other populations. Thus a non-experimental descriptive case study that examined this phenomena in depth was the design used in this research.

Data Collection and Analysis

Because all the questions in this study concerned cognitive style, all subjects took the GEFT to determine their degree of field-independence and field-dependence. To insure that the tests were scored reliably, each test was corrected by two individuals. Cognitive style is a

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continuous variable. Consequently, the authors of the GEFT did not specify exact cutoffs for field-dependence and field-independence. However, researchers have often divided the range of scores into thirds (Frank, 1984). This range was used here because the primary interest is in the two extremes of the range, 0-6 for field-dependent and 13-18 for field-independent. Consequently, students who could correctly identify no more than 6 embedded figures were termed field-dependent, 7-12 mixed style, and 13-18 field-independent cognitive style. The data collected from the GEFT, The Massachusetts Community College System Evaluation of Instruction, (see Appendix A, exhibit 1) and The Survey of Class Group Experience (see Appendix A, exhibit 2), personal interviews, (see Appendix A, exhibit 3), peer evaluations (see Appendix A, exhibit 4), were used to answer the research questions. All data were coded with the respondent's cognitive style and GEFT score. The Info Stat computer program was used to perform the statistical analysis. To increase validity and reliability, the taped half-hour interviews with students were content analyzed by three college professors: one field-dependent, one field-independent, and one with a mixed cognitive style.

Research Question #1:

> Does cognitive style make a difference in students' perceptions of the effectiveness of learning in a collaborative group?

This question was answered by a conducting a t-test of the mean scores typed by cognitive style, from items #2,#3,#4,and #8 from the Massachusetts Community College System Evaluation to see if cognitive style made a difference in students' answers. These items were chosen because they are the ones concerned with instructional objectives, course organization, and methods of instruction. Items #1, #2, #10, #11, #12,and #13 from The Survey of Class Group Experience, which addressed student perceptions about the effectiveness of learning in groups, were analyzed to see if the answers given by the students differed enough by cognitive styles to be statistically significant. Lastly, content analysis of the qualitative data from the interviews was performed to determine if it supported the reliability of the statistical results.

Research Question #2:

> How do the roles played by field-dependent and field-independent student differ within the context of a collaborative learning experience?

This question was researched through content analysis of the student interviews and comparisons of the data with in-class observations. Each of the twenty-eight students who took the Small Business course were interviewed for approximately one half-hour following the completion of the course. (See appendix A, exhibit 3 for a list of the interview questions). The interviews were taped,

transcribed, coded for cognitive style, and then subjected to content analysis by three judges. Using the traditional categories of task and maintenance roles, the three raters were asked to record any incidences of student self-reported task and maintenance behavior expressed in the interviews (See appendix A, exhibit 5 for categorization and coding scheme details).

Research Question #3:

A. <u>Do student evaluations of the course and the instructor differ in collaborative classes and non-collaborative classes</u>?

B. <u>Do students with different cognitive styles evaluate the instructor differently</u>?

In the first part of the question, it was necessary to see if a teacher's evaluations were different when he/she taught collaboratively than they were in traditional teaching. The latter may utilize a variety of methods, such as lecture, experiential exercises, etc. but the teacher still functions as a dispenser of knowledge, and maintains a more hierarchial role. To answer the first part, five years of the investigator's past class evaluations (1984-1988), as measured by the <u>Massachusetts Community College System of Evaluation</u> form were compared with the evaluations from the collaborative class using a t test of significance. The evaluations from 1989 were not

used to eliminate from the study any influence from a gradual adoption of collaborative methods.

To answer the second part of the question, the class evaluations from the collaboratively taught class, which were sorted by cognitive style, were statistically compared to the non-collaborative evaluations using a t test of significance for the items that mention the instructor, numbers #5, #6, #7, #9, #11, and #12. This was done to determine if teaching collaboratively affected the instructor's evaluations and if cognitive style made a difference in how students evaluated the collaborative class.

Research Question #4

How does cognitive style affect the way that students reach consensus in a collaborative group?

A t test was used to compare the students' GEFT scores with their answers to question #8, "People in my group agree just to get the job finished." from the Survey of Class Group Experience to see if cognitive style made a difference in individual students' perception of the way that consensus was achieved within their group. These results were considered in conjunction with the content analysis of the student interviews and observations.

Research Question #5:

Is there any difference in terms of cognitive style in
the way that students rank their peers when they
evaluate the value of each individual's contribution
to the group effort in a collaborative learning
experience?

This question was addressed by tabulating how students ranked their peers in the collaborative groups in terms of each member's contribution to his/her own learning (See appendix A, exhibit 4) and then by calculating the correlation coefficient, rho, to determine if there was a linear relationship. Analysis of the student interviews was used to corroborate the statistical findings.   The results of the data collection are reported in Chapter 4.

CHAPTER IV

RESULTS

This study produced data from two questionnaires, peer
ratings, and interviews to answer the research questions
that involve the relationship between a student's cognitive
style and his/her experience in a collaborative class. The
data that were quantifiable were coded, statistically
analyzed, and presented in both narrative discussion and
summarized in a tabular format. Non-quantifiable data from
the interviews were content analyzed into major categories
and were discussed in relation to the statistical findings
in the text.

This chapter begins with a report of the
characteristics of the participants of the study. Because
there is some variation in the number of participants for
each instrument or research methodology, a discussion of
the response and completion rates accompanies the
discussion of the individual questions. Then the results
of the research are presented for each of the five research
questions proposed in Chapter III. Wherever possible,
graphs and charts are used to clarify the findings
explained in the text. A summary of the findings concludes
this chapter and leads to the discussion and
recommendations for future research found in chapter five.

Characteristics of the Respondents

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Twenty-eight students, taking a collaboratively structured course in Small Business Management at Quinsigamond Community College in Worcester, Massachusetts in the spring of 1990, were the respondents for this study. Any student who had taken an introductory management course was eligible to register for this course, which is an elective in the management major and a requirement in the small business concentration.

The class consisted of ten females and eighteen males. All students were white, and the average age was twenty-one with a range of nineteen to thirty-two years. Although the ages and racial composition of the class were comparable to that of the whole student body, most of the business classes are an even mix of male and female students. Unexpectedly, this group was composed of 35% females and 65% males.

Early in the semester each student was tested for cognitive style using THE GROUP EMBEDDED FIGURES TEST by Oltman, Raskin and Witkin. The test results were scored by two individuals to insure reliability. Since the instrument has a range of scores from zero to eighteen, students were divided into three groups according to the number of embedded figures that they were able to identify. Students scoring one to six were considered to have a

field-dependent cognitive style; seven to twelve a mixed style and thirteen to eighteen a field-independent style (Frank, 1984). Cognitive style is considered a continuous variable that shows a distribution of scores from very low to very high in any group that is studied. However, because of the way that the GEFT was constructed, only whole numbered scores are possible from the instrument.

```
N

5 |
4 |                   Y
3 |              XY     Y        Y
2 |         XY   XYY   XY    YY
1 | X    YY   YYYXX XXX   YYY
  +_____
  0    3    6    9    12   15   18
              GEFT Score
```

X = Female
Y = Male
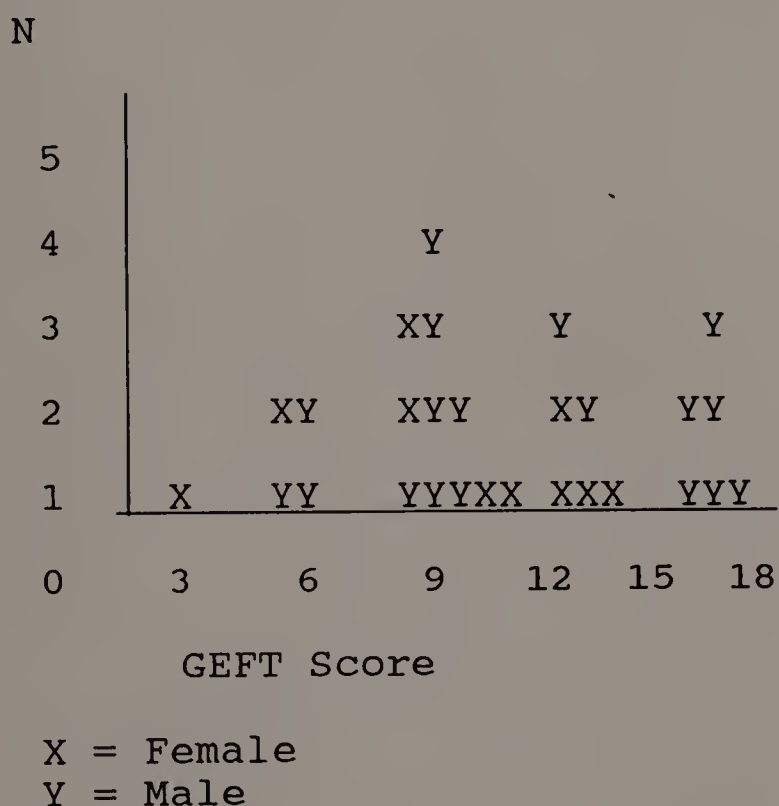
Figure 4.1

Sex and GEFT scores of students who participated in the study of cognitive style and collaborative learning.

The distribution indicated a loading of scores towards the right side of the grid, represented by the field-independent cognitive style. (See Figure 4.1). This was not unexpected for several reasons. First, the sample

consisted of twenty-eight students. With a small sample
size one does not always obtain a normally distributed
group. Second, males tend to score towards the
field-independent side of the continuum. Since this group
contained more males than females, these results are quite
predictable. The distribution of scores by sex is also
illustrated in figure 4.1.

The participants' GEFT scores were next analyzed in
terms of centrality and dispersion. Measures of central
tendency, the mean, median, and mode are numerical values
that indicate some sense of the middle of the data. The
arithmetic mean or average score was 11.11, and the median
or middle score was 10.5. Thus the difference between the
two measures was only .61. The mode, or most common GEFT
score, was 9 with four students obtaining that score.
However, in a perfectly normal distribution, the mean, the
median, and the mode are identical. In a small sample,
like this one, the mean is affected by extreme scores, and
one student obtained a perfect GEFT score of eighteen.
However, in spite of these considerations, the GEFT scores
of this group were dispersed enough to provide this study
with profiles of students with a span of cognitive styles.

The range of scores from the highest, eighteen, to the
lowest, three, was fifteen in comparison to a theoretical
range of zero to eighteen. This indicated that
participants at both ends of the cognitive style scale were

involved in the study. In addition, the standard deviation
was computed as 4.24, indicating a scattering or spread of
scores. For statistical reasons, because the intent of
this research was to provide a beginning place from which
other questions and hypotheses about the application of the
collaborative methodology may emanate, all analysis of
research questions are quantitatively and qualitatively
compared to the extremes of the GEFT distributions, i.e.
the clearly field-dependent with the clearly field-
independent.

Cognitive Style and Collaborative Learning

The first research question was "Does cognitive style
make a difference in students' perceptions of the
effectiveness of learning in a collaborative group?" The
intention of this question was to discover if a student's
cognitive style made a difference in his/her perceptions
about the effectiveness of learning collaboratively.

Since the literature on cognitive style indicated that
field-independent learners usually prefer to learn on their
own, one might expect them to rate a collaborative learning
experience less favorably than field-dependent learners.
In contrast, a collaboratively structured class provided
the peer interaction and group support that would seem to
be a better match for the field-dependent learners'

cognitive style. Thus, one would expect that there would be a significant difference between the student perceptions of the effectiveness of learning collaboratively that would be related to their cognitive styles.

Each student was anonymously administered two instruments to obtain instructional evaluation data: The Massachusetts Community College System of Instruction Questionnaire (Appendix A, exhibit 1) and a Survey of In Class Group Experience (Appendix A, exhibit 2). The former is used in all thirteen Massachusetts community colleges to evaluate instructional effectiveness and was used in this instance to obtain data on the appropriateness of a collaborative methodology in relationship to attaining the goals of the course. Table 4.1 presents the responses of both field-dependent and field-independent learners to these items.

In analyzing the data from the Massachusetts Community College System Evaluation, the four items that refer to the method of instruction, namely numbers 2, 3, 4, and 8 were used to answer the first research question. The first two questions related to the instructional objectives of the course, number four to the organization of the course and the last item the appropriateness of the method of instruction in relationship to the course objectives. Thus the MCC evaluation questions were used to learn how students felt about a collaborative methodology in regard

Table 4.1

Comparison of Field-Dependent and Field-Independent Subjects Assessment of Learning Effectiveness in Collaborative Groups: Massachusetts Community College System Evaluation[a]

Item	Field Dependent			Field Independent			
	N	Mean	S.D.	N	Mean	S.D.	t
Course objectives explained	5	4.20	.84	11	4.36	.67	.38
Instructional objectives accomplished	5	4.20	.45	11	4.18	.75	-.06
Course well organized	5	4.60	.55	11	4.36	.67	-.74
Instructional Method Appropriate	5	4.20	.84	11	4.73	.47	1.32

[a]Positive assessment indicated by agreement code ranging from 1 (Strongly agree) to 5 (Strongly disagree).

to the accomplishment of the task. The results are shown in Table 4.1.

In contrast, <u>The Survey of In Class Group Experiences</u> was used to determine how students felt about the high degree of group interaction, i.e., the people aspect of collaborative learning, working closely with other students in a peer relationship. This instrument was developed by this researcher and pre-tested in two management classes the previous semester. In addition, it was reviewed by two college professors for content validity. The intention of using this instrument was to learn more about the students' feelings about the effectiveness of working and learning in groups. To answer question number one, items #1, 2, 10, 11 and 13, which pertain to the value that the student placed on working in groups, were used. The results are shown in table 4.2.

Because of the small sample size and the greater variability that is expected with small samples such as this one, a student's t test was used to compare the field-independent and field-dependent students' mean scores on these instruments. T-tests are used when the standard deviation of the general population is unknown, but the sample population is assumed to be essentially normally distributed around the mean.

In this study, if the results of a t-test were statistically significant, it would have indicated that the independent variable, cognitive style did make a difference in the dependent variables, that is, in students' perceptions of the effectiveness of the collaborative methodology. T tests that were not statistically significant indicated that the students' cognitive styles were not reflected in their ratings of effectiveness.

On the four items of interest on the Massachusetts Community College System Evaluation of Instruction, (see Appendix A, exhibit 1), students had a choice of checking "excellent performance," (5), "very good performance," (4), "fair performance," (3), "poor performance," (2) or "unsatisfactory performance" (1). The responses of the field-dependent students were summarized and an average (mean) calculated. In addition, a measure of the dispersion of these responses (standard deviation) around the mean was computed. The same calculations were made for responses from the field-independent students. Table 4.1 reports the means and standard deviations.

Twenty seven out of the twenty eight students in the class,(96%), completed the questionnaire. One field-independent student, who missed several classes, did not complete the questionnaire because she was not present on either of the two occasions when it was administered. In this case none of the t-scores were significant. As shown

Table 4.2

Comparison of Field-Dependent and Field-Independent Subjects Perception of Group Experience: Survey of Collaborative Group Experience

	Field Dependent			Field Independent			t
	N	Mean	S.D.	N	Mean	S.D	
I like to work in groups	5	4.00	.71	11	3.73	1.10	-.59
Groups are a good way to get a job done	5	4.00	.71	11	4.18	.60	.50
For me, working in groups is a waste of time[a]	5	4.60	.55	11	4.36	.92	-.64
I learn a lot from other people	5	4.20	.45	11	4.27	.90	.22
Some people in this group do not do their fair share of the work[a]	5	3.20	1.64	9	3.11	1.17	-.11
There is a lack of cooperation in this group[a]	5	3.20	1.64	9	3.44	1.01	.30

[a]Scoring reversed on these items.

in table 4.1, there was little spread between the field-dependent and field-independent students' answers to questions # 2, 3, 4 and 8 on the MCC evaluation. The mean scores were so close, that for this group it did not appear that cognitive style affected a student's assessment of learning in collaborative groups.

The first three items chosen for evaluation from the MCC evaluation form all concerned the organization of the course. Because collaborative learning is relatively unstructured in comparison to the lecture method, field-dependent students who require more external organization might be expected to find it a more difficult way to learn and/or to accomplish the task.

The first item, #2 on the state evaluation form, asks, "How well were the instructional objectives of the course explained?" The possible scores range from 1 to 5 but the students' actual ratings ranged from 3 to 5 and resulted in a mean score of 4.20 for the field-dependent students and 4.36 for the field-independent students. A t test of the significance of the differences between the two mean scores was conducted. As one might expect with such close means between the two groups, a t value of .38 resulted, which is not significant at the .05 level tested. This indicated that cognitive style had no bearing on the student's answer to this question. Students of both cognitive styles felt

that the instructional objectives of the course were well explained.

The second item, #3, "To what extent were the instructional objectives accomplished?", yielded a mean score of 4.20 for the field-dependent students and 4.18 for the field-independent students. The t test value was -.06 which was not statistically significant. This indicated that in this study a student's cognitive style did not affect his evaluation of the accomplishment of the course objectives.

For the third item", #4, on the MCC Evaluation "How well was the course organized?", the responses produced a mean of 4.60 for the field-dependent students and 4.36 for the field-independent students. The t score was computed as -.74. Again the results were not statistically significant. Indicating that cognitive style had no bearing on the way that these students answered this question. Both the field-dependent students, who need external structure and the field-independent students, who tend to supply structure for themselves, rated the less formal organization and structure of a collaborative class very highly.

Question # 8, on the MCC Evaluation, "To what degree do you think that the method of instruction was appropriate to the course objectives?", is perhaps the most interesting in terms of cognitive style and student satisfaction with

collaborative learning. The primary objective of a Small Business Management course is to learn how to start a business and to produce a complete business plan for doing so. These plans are complex, lengthy documents for community college students to write. Most of the papers are 20 to 30 pages long and involve preparation of all of the management, marketing, legal and accounting data that are required to open an actual business. In past experience this has been a monumental task for the students. Given the literature on cognitive style, one would expect that field-independent students would have been able to structure this task for themselves, whether the class was taught collaboratively or not. In contrast, the field-dependent students would need and value more the peer support of the collaborative method. Yet, 8 out of the 11 field- independent students, 72%, rated the collaborative methodology as "excellent" and the remaining three rated it as "very good" when asked if it was an appropriate way to achieve the objectives of the course.

Although the mean score for the field-independent students was slightly higher, 4.73, than that of the field-dependent group, the means were so close that these scores yielded a t of 1.32, which was not statistically significant. These results must be considered in relation to the limitations of the small, non-random sample.

It is most interesting that the field-independent students, those one would have expected to like a collaborative methodology the least, found it a slightly more appropriate way to learn small business management than the field-dependent students. The data from the questionnaires seemed to indicate that the field-independent group involved in this study found some value in a learning experience with a teaching methodology that broadened, rather than reinforced, their primary cognitive style. This aspect of the study will be discussed in depth in chapter 5.

Questions # 1, 2, 10, 11, 12, and 13 from The Survey of In Class Group Experience, were used to learn if cognitive style made a difference in students' perceptions of the usefulness of learning in a group based pedagogy. Field-dependence has been associated with a need for social reinforcement, which could be obtained from the collaborative group and field-independence more associated with learning on one's own. Consequently, one might expect that the two groups of students would provide significantly different answers to these questions.

The first four items concerned students' general attitudes towards the value of groups as a way to work. The last two items were specific to the students' experience in their collaborative group in this class.

All five of the field-dependent students and eleven of the field-independent students completed the questionnaire. The same student, who was not present for the MCC evaluation, was absent for this instrument. Two field-independent students failed to answer the last two items, which were on the reverse side of the paper.

The results of are shown in Table 4.2. For the first item, "I like to work in groups," the field-dependent students averaged a mean of 4.0 and the field-independent students mean was slightly lower at 3.7. A t test for the significance of the differences between the two means resulted in a t of -.59 which was not significant.

On the second item, "Groups are a good way to get a job done", the field-dependent students' answers resulted in a mean of 4.0, the field-independent, a mean of 4.18. With such close means and so little variability in the ratings, the t test was .50 and indicated that in this study cognitive style did not seem to make a significant differences in the way students valued groups as a way of accomplishing a task.

On the third item, #10, "For me working in groups is a waste of time", the field-dependent students scored a mean of 4.60 and the field-independent scores resulted in a mean of 4.36. A t test comparing the two means did not yield a significant difference. Cognitive style for these students

did not appear to be related to how a student felt about the additional time needed to reach group decisions.

With a mean of 4.20 for the field-dependent students and a mean of 4.27 for the field-independent students on item #11, "I learn a lot from other people", the t-score of .22 was not significant. Here students of both cognitive styles felt that they could learn from others.

Since items #12 and #13 produced statistically similar results, they will be discussed together. Item #12, "Some people in this group do not do their fair share of the work" addressed the issue of the students' perception of the equality of the workload and cooperation in the collaborative groups in this class. In the first item, both the field-dependent and field-independent students rated their groups slightly lower than the previous four items. The field-dependent students' scores yielded a mean of 3.2 in contrast to a range of 4.0 to 4.6 for the prior questions. Similarly, the field-independent students' answers produced a lower mean, 3.11, in contrast to a range of means from 3.7 to 4.36 for the questions on group experience.

In item # 13, "There is a lack of cooperation in this group," students with both cognitive styles scored this question lower than the first four items. Field-dependent students again averaged a mean of 3.2 and field-independent students a mean of 3.4. These results indicated as lightly

lower satisfaction with the allocation of the work load and the level of cooperation within the groups. However, the students of both cognitive styles produced lower ratings. Consequently, the t values resulting from the test between groups were not significant. These results indicated that for this sample cognitive style did not seem to make a difference in students' perceptions of the effectiveness of learning in a collaborative group in terms of the accomplishment of the learning task and the effectiveness of using collaborative groups as a learning pedagogy.

Next the student interviews were analyzed to see if there was corroboration of the findings from the quantified evidence and for further insight into the perceptions of the two cognitive styles. In general, the interviews were consistent with the quantitative data revealing that students found collaborative learning an effective way to learn regardless of their cognitive style. All three groups liked the methodology primarily because it involved a more active participation in the learning process than a traditional lecture format. One field-independent learner expressed it this way

> It [collaborative learning] makes you
> think a lot more. You have to rely on
> your group-kind of like a father
> figure. They are up there. They are
> supposed to give you the answer...I
> think being able to talk helps out. You
> just don't stare at the teacher. It
> felt good to be able to converse with
> people on a business level. In other

> classes the overhead goes on and the
> brain goes off.

A field-dependent learner said

> In other classes the student has no
> responsibility as far as anything in
> class that would make you want to say
> 'I can do this'. It's boring that way.
> It's different in this class. If you
> can see a different approach, I would
> accept the responsibility.

However, content analysis of the interviews revealed
three interesting cognitive style differences in regard to
the way that students felt that the learning task could
best be accomplished. The first issue concerned the use of
questions. Eight out of eleven, 73%, of the field-
independent students, cited asking questions as the way
that they contributed to the group learning task. In
contrast, only one field-dependent student, 20%, even
mentioned that she asked questions at all. Yet, 60% of the
field-dependent students said that being asked questions
was the group activity that most stimulated their thinking.
This is consistent with Goodenough's (1976), and Witkin,
Moore and Goodenough's (1977), findings that field-
independent learners display a more active, hypothesis
testing approach to learning, than field-dependent
learners.

Both types of cognitive styles seem to value
questioning as a way to move the collaborative process
along but the field-independents took a more active part in
this aspect of the learning process than the

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field-dependents. Field-independents asked questions to stimulate others thinking. Field-dependent students expressed appreciation for this as "they were always asking me questions and that is what made me talk." In contrast, a field-independent student said, "I almost think that I teach more in a group than I learn from a group."

A second difference between cognitive styles was their assessment of the value of the social interaction that was the heart of the collaborative process. As might be expected from the literature on cognitive style, the field-dependent students cited the social aspects of this model as beneficial to their learning. Four out of five field-dependent learners, 80%, made reference to the group members being like friends, or the group experience as being a way to make friends, while only one out of eleven field-independent learners made a similar statement. Two field-dependent learners, 40%, expressed sadness at the end of the group experience and one said that he wished he had gotten to know his group better. No statements like that were made by the field-independent subjects. What four field-independent members did mention were feelings of discomfort during the early stages of the group process. No field-dependent members made a similar statement.

Third, the interviews produced some evidence that field-dependents were more willing to rely on the resources from their group to solve the learning problem than the

field-independents were. Four out of five field-dependents said that they shared resources and information such as price lists, their own business plans, etc. with other group members while no such statements were made by or about field-independent learners.

While the field-dependents relied more on their peers to accomplish the learning task, the field-independents tended more towards the traditional teacher as authority model. The following two quotations from the interviews illustrate this comparison. A field-independent student said,

> I think that it [collaborative
> learning] is good as long as you [the
> teacher] are there to back something
> up. Just knowing that you are there
> gives me more of a sense of security.
> If my group doesn't help me out, what
> am I going to do?

Three field-independents mentioned wanting to use the teacher as a back up when the group could not agree and two of them repeatedly came to the instructor several times outside of class with questions that they had not asked the group.

In contrast, field-dependent students were more willing to rely on their group which followed the collaborative model than the field-independent students. For example, a field-independent student said,

> I had asked you a question and you said
> to go get help from them [the group].
> What I found out was that one person
> would say one thing and the next person

> would fight with that person about what
> answer to give. When it's you, it's
> just one answer. When its a lot of
> kids, I have to pick which answer I
> want to take.

A field-dependent student, experiencing the same dilemma, expressed a willingness to assume more responsibility for her own learning and to use the collaborative group as a learning resource.

> I learned a lot from Janet and Ray
> both. They had good ideas and it placed
> more responsibility on me. I think that
> is good. In the beginning, I wished
> you'd say this week the target market
> is due and next week the communication
> etc. That would be like your
> structuring it. But now that it is
> done, I kind of really completed it on
> my own. I feel better about myself
> knowing that.

The first research question was "Does cognitive style make a difference in a student's perceptions of the effectiveness of learning in a collaborative group?" The results of student t-tests of statistical analysis, in which the mean scores for the two groups were compared on items pertaining to instructional objectives, appropriateness of the collaborative methodology and group learning, did not show a statistical difference. Caution must be exercised about generalizing from these statistical results because the sample was small. In addition, the student ratings were quite high and tended to cluster in the four and five range thus reducing the variability of the answers, regardless of student cognitive style.

However, analysis of the student interviews helped to identify three differences between the two cognitive styles in a collaboratively structured class. First, field-dependent students' thinking was stimulated by the questions asked by the field-independent students. Second, field-dependent students used the collaborative group as a way to meet their social needs and seemed to adjust easier to a group situation. Third, field-dependent students were more willing to accept their groups as a learning resource than the field-independent students.

Student Roles in Collaborative Learning

The second research question was "How do the roles played by field-dependent and field-independent students differ in a collaborative learning experience?" The purpose of this question was twofold. First, to determine if students with different cognitive styles behaved differently while participating in collaborative groups and second, to learn more about the types of roles that the students played. To answer this question data were gathered from two perspectives: interviews with students and instructor's observations of classroom behavior.

Behavior in groups is frequently described by categorizing by task and maintenance role functions (Benne and Sheats, 1976). Task roles involve behaviors that are

intended to get the job accomplished, such as defining the
problem, suggesting a way to proceed, and giving
information. In contrast, maintenance roles refer to
behavior that supports effective group processes, such as
encouraging and accepting another's ideas, offering a
compromise and attempting to reconcile differences.

In a traditional classroom, where the professor
lectures to the students, she usually performs all of the
task and most of the maintenance behaviors (Schmuck &
Schmuck, 1988). Every group needs both elements to get the
job done and to meet the needs of its participants.
However, the very nature of collaborative learning shifts
the responsibility for meeting task and maintenance needs
more to the students. This question was intended to learn
if cognitive style made a difference in the types of roles
the students chose to assume in a collaborative pedagogy.

After completing the semester, each student was
interviewed for approximately one-half hour, using the
questions listed in Appendix A, exhibit 3. These
twenty-eight interviews were taped, transcribed, and then
subjected to content analysis by three judges: one
field-independent, one field-dependent and one of mixed
style. The purpose of this analysis was to determine which
types of task and maintenance roles the students felt that
they played in the collaborative groups and how often this
behavior occurred. Since this information was gathered from

Table 4.3

Content Analysis of Task and Maintenance Roles Typed by Student Cognitive Style.

Roles	Field-Dependent		Mixed		Field-Independent	
	N	%	N	%	N	%
Task Roles						
1. Initiating	3	9.3	2	7.4	10	13.3
2. Seeking Information	4	12	7	25	15	20
3. Giving Information	7	21	6	22	15	20
4. Clarifying and Elaborating	0	-	0	-	0	-
5. Summarizing	0	-	0	-	1	1.3
6. Consensus Testing	2	6.2	0	-	2	2.6
Total Task Roles	**16**	**48.5**	**15**	**54.4**	**43**	**57.2**
Maintenance Roles						
7. Harmonizing	2	6.2	0	-	5	6.6
8. Gatekeeping	5	15.6	1	3.7	2	2.6
9. Encouraging	8	25	9	33	16	21.3
10. Compromising	1	3.1	2	7.4	9	12
11. Standard Setting and Testing	0	-	0	-	0	-
Total Maintenance Roles	**16**	**49.9**	**12**	**44.1**	**32**	**42.5**
Totals	**32**	**98.4%**	**27**	**98.5%**	**75**	**98.7%**

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the perspective of individual students, for validity and clarification, the results of the content analysis were compared with the instructor's observations.

In table 4.3 the results of the content analysis are summarized according to cognitive style and incidences of task and maintenance behavior as they were described by the students. Because of the differences in sample sizes, the number of times each statement occurred was first counted. Then a percentage was calculated to determine how much of the reported behavior fell into that category out of the total number of responses. For example, using the first entry there were three times that field-dependent students described behaving in an initiating task role in the interviews. Since there were a total of 32 incidents of task and maintenance behaviors described by all field-independent students, those with this cognitive style reported this role as 9.3% of the total task and maintenance behavior that they described in the interviews.

Although caution must be exercised in interpreting the data because of the small sample size, table 4.3 does show some interesting results. From the cognitive style literature one would expect that field-dependent students would have performed more frequently in maintenance than in task roles and they did in relation to the other two groups as shown in table 4.3. However, these results show that they were the group that also indicated the most even mix

of task/maintenance role behaviors. Content analysis of the interviews showed field-dependent students with sixteen examples of both task and maintenance behaviors. In contrast, the field-independent students seemed to exhibit more task oriented behavior, describing fifteen more incidents of task than of maintenance behaviors.

In regard to specific task behaviors reported by the students,the "seeking" and "giving" of information roles were mentioned the most frequently by all three types of cognitive styles: 33% for the field-dependents, 47% for the mixed group and 40% for the field-independents. The roles take on special importance because of the epistemological roots of collaborative learning in the social construction of knowledge through conversation. While the field-independent students reported asking for information as often as they gave it (20%), field-independent students mentioned "giving" (21%) which was more than "seeking" (12%) of their reported behavior.

Classroom observation provided some clarification of the different ways that field-dependent and field-independent students went about giving information. The field-dependent students had a tendency to act as "sharers" of materials. Four out of five field-dependent students brought in tangible resources such as price lists, advertisements, etc., and shared them with other students. In the interviews field-dependent students described this

behavior as "I gave them information and catalogues", and
"I brought in some things on a radio station about what
things cost", and "She didn't even ask me. I just brought
it in."

In contrast, not a single field-independent student
brought in material. Instead, they performed the "giving
information" role more through conversation. In
particular, field-independents gave other students
information by asking questions that required other
students to think and to clarify their ideas through
conversation. More than the field-dependents, the
field-independents asked thought provoking questions,
phrased in a way that stimulated thinking. The questioning
of group members encouraged students to think out loud
which led to the opportunity to construct new knowledge.
When asked how other group members had helped him one
student described it this way. "They questioned me about my
business, once I answered it, maybe my adding to my answer.
They had different knowledge than I did."

Questioning became an integral part of the
collaborative dialogue. When asked about her role in the
group, one field-independent student said from her
observations, it seemed to take place in the form of this
seeking and giving of information. Again, questions,
particularly those asked by the field-independent students,
seemed to be what moved other students' thinking processes

along in their construction of new ideas. One student
described it this way.

> We asked questions. If someone made a
> comment about the business plan, we
> asked questions about it to get further
> information. We asked questions and
> gave more suggestions about how to make
> it work.

When asked about the role that they played in the
collaborative group, a field-independent student said,

> I was the one who was always asked the
> questions. They would pull information
> out of me. At first I resented it. I
> didn't want to be bothered. Once I got
> used to the group, it didn't bother me
> as much.

Not a single incidence of "clarifying" behavior was
described in the interviews by students of any cognitive
style. The reason for this may be that a collaborative
methodology seemed to encourage group members to take a
more active role in the development of their own
alternatives and interpretations. In a similar way, there
was only one incidence of "summarizing" and only four of
"consensus testing" behavior reported by the students.

Although field-independent students reported only ten
(13.3%) incidents of "initiating" behavior, this was the
highest number in contrast to the field-dependents with two
and the mixed group with three. Given the abilities of
field-independents to think analytically, it is not
surprising that they would be more apt to define the
problem or suggest solutions for other students.

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In terms of group maintenance behaviors, the single most frequently reported role for all three groups was that of "encouraging" the participation of other members. Field-dependents reported this type of behavior 25% of the time, field-independents, 21% and the mixed group 33%. Considering the pedagogy of collaborative learning and its emphasis on the importance of socially based learning, it is particularly encouraging that students of all cognitive styles, especially the less peer oriented field-independent students, expressed such a high degree of acceptance and support of others' contributions. One of them expressed it this way.

> If we didn't have to work in our groups
> I probably would have been independent
> about it. The feedback helped a lot.
> It helped me to fix my business plan.

When asked if he felt an obligation to help the other students to learn, another field-independent student said, "Definitely, I think that everybody did. It wasn't like everyman for himself. Everybody tried to help everybody out." This may account in part for the high degree of satisfaction that students reported with a collaborative methodology in the previous question.

Field-dependent students indicated more "gate-keeping" functions (15.6%) than field-independent students (2.6%) or the mixed group (3.7%). Given the more social orientation of field-dependents, these results might be expected. One field-dependent student expressed his obligation to get

everyone involved as "I was trying to get a group going" and another as "I was trying to get everyone to talk."

Both field-dependent and independent students indicated about the same percentage of harmonizing behavior (6%) and no incidents of "standard setting and testing". The latter maybe due to the nature of the collaborative project involved in the study. Because each student was responsible for producing his or her own business plan, it was not necessary for the whole group to proceed in the same way as it would be if the whole group were producing one plan.

The field-independent students reported more compromising behavior (12%) than the other two groups. However, the nature of the compromises mentioned in all three groups seemed to involve making changes in the task such as changing pricing, target markets, the subject of the plan etc., rather than compromises designed to keep the group functioning.

When the behavioral roles of all three types of cognitive styles are considered together, an interesting trend seems to appear as one moves across the range of categories of scores from field-dependent to a mixed style to field-independent. There is some decrease here in the reported incidence of task role behavior and an increase in maintenance behaviors. In this sample, field-dependent students described their behavior more in terms of

maintenance roles (49.9%) than mixed (44.1%) or field-independent students (42.5%). In contrast, field-independent students saw their group interactions more in terms of task behaviors (57.2%) than either mixed style (54.4%) or field-dependent students(48.5%).

Classroom observations confirmed these findings. The most frequent form of communication for the field-independent students was questioning. In contrast, for the field-dependent students the activity that was most characteristic was their sharing of resources. Although there were only seven (21%) mentions of this in the interviews, it was a constant occurrence. Field-dependent students provided members of their groups with many tangible resources such as the results of their research, price lists, addresses, contacts, and even letting others read their business plans. In this research both content analysis of student interviews and classroom observation indicated that cognitive style does make a difference in the roles that students play within collaborative group.

Collaborative Learning and Teacher Evaluations

Since I could not locate any data on the effect of using collaborative methods on classroom evaluations, the third research question is divided into two parts. First, "Do student evaluations of the course and the instructor

differ in collaborative and non-collaborative classes?"
Second, "Do students with different cognitive styles
evaluate the instructor differently?"

Because collaborative teaching emphasizes peer
learning and group interaction instead of an instructor
centered environment, some students may think that the
teacher is not doing his job. If this is reflected in
evaluations of teaching that are used in tenure and
promotion decisions, it could contribute to a reluctance on
the part of faculty members to experiment with
collaborative methods.

To answer the first question, five years of this
researcher's Massachusetts Community College Evaluations
(1984-1988) that represent pre-collaborative teaching in
fourteen management courses at the same community college
were obtained from college archives. The 1989 evaluations
were not used in this study because they represent a
transitional year when collaborative methods were phased in
by the instructor.

The mean values of each of the six items that mention
the instructor: preparedness, response to questions,
effectiveness of presentation, instructor knowledge,
fairness of evaluation method, and availability for help
were compared to the student evaluations from the
collaborative class of 1990 (See Appendix B, tables 1-6 for

a detailed breakdown of the data). T tests for the difference between the means of the pre-collaborative and the collaborative evaluations were not statistically significant for any of the six questions. (See table 4.4)

As one can see, the students' evaluations of this teacher did not change significantly when she adopted a collaborative mode of teaching and t tests between the mean student ratings of each of these six items that mention the word "instructor" and GEFT scores were not statistically significant. In this study cognitive style did not make a

Table 4.4

Comparison of Average Course Evaluations Made by

Collaborative and Non-Collaborative Classes.

Instructional Mode	N	Mean	S.D.
Non-collaborative[a]	398	4.49	.27
Collaborative[b]	28	4.49	.33
t			0

[a]Combined evaluations from 1984 - 1988.
[b]Evaluations from 1990.

difference in the way that the students rated the teacher in a collaboratively structured class.

Although the literature suggests that students often find it easier to learn from a teacher whose cognitive style matches their own and this teacher is field-dependent, a greater difference in the mean ranking scores was expected. However, this is a small sample and all of these evaluations tended to be quite high. In

addition, over the years the evaluations were in the very good to excellent, 4 to 5, range for all but one, 3.9, in the first year of college teaching. A case can be made that a teacher who is evaluated highly by students, will probably be evaluated highly, regardless of the methodology she uses in the classroom.

Yet, these results did show that students still evaluated the teacher quite highly on six items that change when the methodology switches to collaborative learning. For example, the first item (see table 1 in appendix B) asked the students to evaluate "How prepared was the instructor?" In collaborative teaching the preparation of a suitable task can be more time consuming than preparing a traditional lecture. Yet, faculty often fear that their role in collaborative learning looks easier to students who may view this methodology as a way for the instructor to get out of doing his/her job in a more traditional manner. In this study the students rated the instructor higher in preparation, 4.9, than they did in non-collaborative teaching, which received a mean score of 4.6.

The second question addressed "How effective were the instructor's presentations." (See table 2 in appendix B) While the collaborative class rated the teacher as 4.6, the mean for the five years of non-collaborative teaching was 4.4. In the collaborative class the teacher gave many fewer presentations than in a traditional lecture-based

class. Yet, this did not seem to affect her final student evaluations. However, some students may struggle at first with this methodology. A field-dependent student expressed changes in her need for more structure from the instructor this way.

> In the beginning I'd wished that you
> would say this week the target market
> is due and next week the communication,
> etc. That would be like structuring
> it. But now that it is done, I kind of
> really completed it on my own. I feel
> better about myself knowing that.

In the third question the students were asked, "How well do you think the instructor had a grasp of his/her subject matter and related fields?" (See table 3 in appendix B). While the mean score for the five non-collaborative years was 4.8, the collaborative class rated the instructor's knowledge as 4.9. No significant difference in the rankings between the two methods indicated that the students did not feel that the teacher was less knowledgeable because she did not teach from a position of authority in the learning process.

In collaborative learning students are supposed to use their peer groups to develop new knowledge rather than turn to the teacher as an authority who has the "right" answer. When asked to rate "How well did the instructor respond to questions?" (see table 4 in appendix B), the collaborative class actually gave the instructor a slightly higher

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rating, 4.7, compared to the mean of 4.4 for the five year period.

This does not mean to imply that students adapted easily to turning to their peers for help rather than to the instructor. Old habits are hard to break. For example, two field-independent students came to the teacher several times outside of class with questions that they had not asked their groups. It is a possibility that some of them may have missed the authority-expert role of the teacher more than the field-dependent students. In the interviews one field-independent student said,

> I think that this method is good as
> long as you are there to back something
> up. Just knowing that you were there
> gives me more of a sense of security.
> If my group doesn't help me out what am
> I going to do ?

The instructor found herself answering many student inquiries with another question: "What does your group say about that?" However, from these results, I would conclude that students did not resent the teacher taking that stance. As another field-independent student said,

> I like this [collaborative learning]
> more. You aren't just studying what
> the instructor tells you. You get to
> learn whatever people tell you. It's a
> lot easier this way. It's a lot more
> fun this way. You don't have the
> burden of just studying, studying,
> studying. You get a lot of different
> ideas of what is going on. I think you
> pick up easier this way. It makes the
> class more interesting and more fun.
> It's not as boring as a lot of other
> classes.

Evaluation of student work is usually considered to be solely the role of the instructor. However, in a collaborative class, in which learning depends upon the effort expended by one's peers, students are often asked to provide some input for the instructor. In all of the non-collaborative classes used in this comparison, the student evaluations and grading were done only by the teacher. When asked, "How fair was the instructor's method of evaluation of student performance?", she received a mean rating of 4.4 for the five non-collaborative years of teaching (See table 5 in appendix B).

In the collaborative class, student contributions to the group effort and levels of participation accounted for 25% of the final grade. To determine this grade, every student wrote a two page evaluation detailing the contribution of each group member to his learning (See appendix A, exhibit 4). These peer assessments were used by the teacher to assign grades. Yet, student perception of the fairness of this method was exactly the same as it was for the non-collaborative classes, where peers had no input into the grading process, rating the instructor at 4.4.

The last item compared was "Did the instructor meet with you and help when requested?" Both the collaborative and non-collaborative groups scored this item the same at 4.6 (See appendix A, table 6). This was a significant

result considering that in the collaborative model, the
instructor did not answer the questions. Instead, she
referred the students back to the group for help when she
was approached with specific questions about the projects.
Yet, the student evaluations were identical on this item.
As one student said, "With your not helping as much, it
actually helped more because I got more out of it."

The purpose of this question was to learn if a
teacher's evaluations changed when she changed her teaching
methodology from a traditional lecture format to a
collaborative method and if a student's cognitive style
made a difference in his evaluation of the teacher.
Although the results of this study must be considered
cautiously due to the small size of the sample used in this
research, this data indicated no significant differences in
evaluations occurred when the teacher adopted a
collaborative framework. In addition, there were no
significant differences in student evaluations of the
teacher relative to the cognitive style of students.

Consensus and Cognitive Style in Collaborative Learning

The intent of question four, <u>"How does cognitive style
affect the way that students reach consensus in a
collaborative group?"</u> was to determine if there was a
difference in the ways that field-dependent and field-

independent students worked to reach agreement in a collaboratively structured classroom.

The answers to Question #8 on the <u>Survey of Group Class Experience</u>, "People in my group agree just to get the job finished," and input from the interviews were used to determine if cognitive style made a difference in student answers to this question. The mean scores of the two groups, 3.20 for the field-dependent students and 2.90 for the field-independent students, were compared to their GEFT scores by computing a t test. The results, shown in table 4.5, were not statistically significant.

Table 4.5

Comparison of Field-Dependent and Field-Independent
Subjects Answers to the Question, "People in My Group Agree
Just to Get the Job Finished".

Field-Dependent			Field-Independent			
N	Mean	S.D.	N	Mean	S.D	t
5	3.20	1.10	10	2.90	.99	-.52

Both means clustered closely around the middle choice, "undecided," with small standard deviations. This indicated that in this sample, there was no relationship between cognitive style and students' answers to this question.

However, further analysis of the individual scores showed that a measure of central tendency in such a small

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sample can distort the data. Of the ten field-independent students, only one actually chose the answer "undecided" and no field-dependent students gave that choice. Considering the answers on an individual basis, 50% of the field-independent students answered "disagree," and 40% answered "agreed." For the field-dependent student 60% answered "agree" and 40% "disagree." What happened here was that statistical treatment of the answers, caused the scores to average out and presented distorted results that are inconclusive. Other variables could be operating here.

Because I could not draw any substantial conclusions about consensus and cognitive style from the quantitative data, I turned to the student interviews for qualitative information. Approximately half of both the field-independent and field-dependent students indicated that they had agreed to make substantial changes in their business plans based on peer input. However, this does not necessarily mean that there was group consensus on the issue, simply that the individual student accepted a suggestion which could have been supported or not supported by the rest of the group. Neither set of interviews provided enough data about the issue of group consensus to draw any further conclusions.

Cognitive Style and Peer Evaluations

The fifth research question was "Is there any difference in terms of cognitive style in the way that students rank their peers when they evaluate each individual's contribution to the group effort in a collaborative learning experience?" This question was asked to learn if there was a relationship between one's cognitive style and the cognitive style of the students that he/she felt were the most helpful during the collaborative learning experience.

To answer this question each student was asked to complete a peer evaluation form, (see appendix A, exhibit 4). Here they numerically ranked each member of the group in terms of the individual's contribution to their own learning and the successful completion of the business plan. In addition, they were asked to specify what their peers did in the collaborative groups that they felt was the most useful behavior in terms of their own learning.

For the field-dependent and the field-independent students a rank order, rho, correlation was calculated between the GEFT scores of members of their collaborative groups and the rankings that the students gave those members in terms of their contribution to the rankers' learning. The rank order correlation coefficient does not require a normal distribution.

With the exception of one zero-order correlation (-.05), only one negative rho (-.35) emerged. All remaining correlations were positive, indicating a definite tendency for group members who were more field-dependent to be ranked higher than the field-independent students. This was true of the rankings made by both field-dependent and field-independent raters. Table 4.6 represents the correlations.

Table 4.6

Rank Order (Rho) Coefficients between Peer Evaluations and GEFT Scores of Field-Dependent and Field-Independent Students Contributions to the Ranker's Learning.

	Field Dependent Raters(N = 8)[a]	Field-Independent Raters(N = 4)[a]
	-.05	-.35
	.11	.10
	.26	.55
	.40	.90
	.50	
	.50	
	.63	
	.73	
Mean	.30	.38

[a]Four Field-Independent and one Field-Dependent student did not make rankings of group members.

Content analysis of the students' answers to the question "What did the most helpful members in the group do that contributed to your learning?", provided further clarification on the students' higher ranking of field-dependents as the most useful to both cognitive styles.

The field-dependent students were described by both cognitive styles as "helpful", bringing in resources to share with other group members, and contributing "ideas" or "suggestions" to the discussion. The only negative comments on field-dependent students concerned one student being too quiet. A field-dependent student described another field-dependent group member as

> The most helpful in the group. She actually showed enthusiasm about each person's project and always threw in her ideas and suggestions. She helped me and others to develop different aspects of each business plan. I'm sure each person gained something from her handouts and well thought out ideas.

While a field-independent student said

> She had her opinions and offered them to me and challenged me. She also helped me organize what I needed in certain sections of my business plan and was always full of suggestions.

In the collaborative setting both cognitive styles recognized the field-dependents' contribution to a collaborative learning environment and described it in the same terms as Witkin's research: field-dependents are more sensitive to social cues and the needs of others. Their help was described in non-threatening terms such as "useful," "gave suggestions," or "ideas." The most field-dependent student in the sample summed up her own behavior in terms of this social orientation to the learning situation. "I tried to help everyone." Because

of these social skills, the field-dependent students were perceived by both cognitive styles as being the most helpful in a collaborative class where peer interaction is an integral part of the pedagogy.

In contrast, field-independent students were appreciated for their analytical abilities that enabled them to stimulate other's thinking by asking very direct questions. However, in communicating, they were most often described by both cognitive styles in negative terms for being too quiet, not listening, or being too critical. In general, the value of the field-independent students' message often got lost in their more direct style of communication. For example, one field-dependent student described a field-independent member of his group as he

> . . . had good and bad qualities. He tried to help a lot but in doing so he turned each of us off with his arrogant attitude. He did have some good logical comments though. Sometimes he tried to criticize where it wasn't needed.

Another said,

> He kept the group on track. He took over the leadership role, but he did a good job at it. He had good comments but he needs to listen more.

and a field-independent student wrote

> He really broke the ice on topics to start with. I think he was better at giving advice than accepting some. He had a lot of output.

When the groups in the collaborative classes were
observed, the field-independent students' ability to ask
challenging, thought provoking questions moved a group's
thinking along in a way that led to better ideas and helped
the group to socially construct new knowledge in a more
meaningful way than the more supportive behavior of the
field-dependent students.

However, the interviews confirm the statistical
findings. Clearly the social aspect of the collaborative
process was the most useful to these students' thinking.
One student expressed her thoughts about this idea.

> I learned a lot of 'little' stuff from
> my group. But as far as the 'big' stuff
> for my plan, I learned it on my own.
> I'm not blaming my group. When you are
> not sure about a certain subject or
> area, it's kind of hard to answer
> questions that may arise in that area.
> I've got to admit one thing. Knowing
> the people in my group helped me a
> great deal when it came time for my
> presentation. I was less nervous
> because of them.

Summary of Findings

The questions in this study were all related to the
study of cognitive style as measured by Witkin's GEFT and
collaborative learning in a community college management
classroom. Data from student interviews, teacher
evaluations, peer assessments, and student questionnaires
were used to obtain the information which was analyzed both
quantitatively and qualitatively and are summarized in

table 4.7. Because of the size of the sample, 28 students, and the fact that they were not a random sample, caution must be used in generalizing these results to larger populations.

However, regarding this group of students, the following conclusions can be drawn. First, cognitive style, as defined by GEFT, did not appear to make a difference in a student's perception of the effectiveness of learning in a collaborative methodology. Both field-dependent and field-independent students rated the method of instruction and the experience of working in collaborative groups quite similarly. The differences between the two groups' answers were not statistically significant.

Second, student behavior in the collaborative groups seemed to be related to cognitive style. Field-independent students described themselves more in terms of task type roles particularly as **givers** and **seekers** of information and as **initiators** of new tasks. In contrast, field-dependent students reported themselves as performing roles that were categorized as task behaviors such as **encouraging** and **gate-keeping**. The students of mixed cognitive styles reported task and maintenance roles between the scores of the field-dependent and the field-independent students.

Third, cognitive style did not seem to be a factor in how the students in this study evaluated the teacher. In

spite of the changed role of the teacher as less of an authority figure and the increased responsibility on the students to learn from each other in a collaborative way, both groups rated this instructor very highly and there was no statistical significance between the teacher evaluations for the different cognitive styles. In addition, these evaluations were compared with five prior years of this instructor's student/teacher evaluations. The evaluations from this study in collaborative and five years of previous non-collaborative teaching were statistically quite similar and in fact almost identical. Thus, when this instructor changed her methodology to emphasize collaboration, her evaluations did not change.

Fourth, because of the complexity of the issue of consensus and insufficient data that the study produced on the topic of consensus, the fourth area of investigation, the relationship between cognitive style and the way that students reached consensus in a collaborative group did not provide enough data to draw any definite conclusions.

Lastly, the fifth question concerned students' evaluations of their peers within the collaborative groups. A rho correlation as well as qualitative data from the surveys, showed that students, regardless of cognitive style, identified the field-dependent students as the ones who were the most helpful to their own learning in the collaborative group. The field-dependent students

propensity to be more supportive and to communicate well were identified as being important assets in a collaborative group.

In contrast, both field-dependent, field-independent and mixed cognitive style students all rated the field-independent students as being less helpful to their learning. Perhaps this is because of the field-independent students being less supportive and using a more direct communication style and their having less well developed listening skills.

In summation, this study found that cognitive style did not make a difference in student satisfaction or student teacher evaluations within a collaboratively structured class. However, cognitive style did seem to make a difference in the roles that students played within the collaborative group and in the peer assessment of the students who were the most helpful to ones learning.

Table 4.7
Summary Table of Findings

Research Question	Findings
I. Cognitive Style and Student Perception of Effectiveness of Instructor and Group Experience in Collaborative Methodology.	Field-independent and field-dependent students do not differ in their perception of effectiveness of either instructor or of group learning.
II. Cognitive Style and Student Roles in Collaborative Learning Experience.	Field-independent students described themselves more in terms of task while field-dependent students reported themselves more in maintenance roles.
IIIA. Collaborative and non-collaborative class evaluation of instructor.	Collaborative and pre-collaborative classes did not differ in their evaluation of instructor.
IIIB. Cognitive style and student evaluation of instructor.	Field-independent and field-dependent students did not appear to differ in evaluation of instructor.
IV. Cognitive style and reaching consensus in collaborative groups.	Data were inconclusive.
V. Cognitive style and peer evaluation in collaborative groups.	Field-independent, field-dependent and mixed styled students all rated field-dependent students as the most helpful to their own learning.

CHAPTER V

DISCUSSION and RECOMMENDATIONS

The increased interest and use of collaborative methods in the college classroom encouraged this researcher to conduct this study. There has been almost no research on the learners' perception of this methodology. In addition, in the corporate world, organizations are becoming flatter and more group centered in their decision making patterns and the ability to work effectively in groups is becoming more important and more valued by the business community.

Since the literature on cognitive style suggested that field-independent learners might be less likely to prefer a collaborative learning situation than field-dependent learners, this researcher chose student differences in cognitive style, as defined by Witkin's work, as the framework for this research.

The intent of the study of a community college collaborative structured class in small business management was two-fold: first, to learn if field-independent students behaved differently than field-dependent students in the context of a collaborative learning experience, and second, to provide college instructors with some data gathered from the student's perspective that could be helpful to their

teaching and future research. Using both quantitative and qualitative methods, the research addressed five areas in relation to cognitive style and collaborative learning: student satisfaction with a collaborative methodology, student roles within the collaborative groups, teacher evaluations, the process of reaching consensus, and peer assessment.

The findings summarized in table 4.7 have certain limitations due to the small, non-random sample used in this case study which precluded the generalizability of the research to other populations. However, the results of the study did eliminate several questions central to the implementation of collaborative learning in the college classroom and do have important implications that are discussed under recommendations.

In the next section the results of each of the five research questions will be discussed in conjunction with recommendations to college professors planning to use collaborative methods. The chapter concludes with recommendations for future research.

Cognitive Style and Students' Satisfaction

The first research question was "Does cognitive style make a difference in students' perception of the effectiveness of learning in a collaborative group?" Data

obtained from The Massachusetts Community College System of Instruction evaluation form (appendix A, exhibit 1) and the content analysis of student interviews were used to answer this question.

The results of this research indicated that for this sample cognitive style did not seem to make a difference in students' perceptions of the effectiveness of learning in a collaborative group either in terms of the accomplishment of the learning task or in the effectiveness of using collaborative groups as a learning methodology. While one might have expected from the literature that the more socially oriented field-dependent students would be more satisfied with collaborative learning, the fact that the more analytical field-independent learners reported a similar level of satisfaction was somewhat unexpected.

Several factors could account for these results. First, this study was carried out in a community college where innovative and more highly participative types of teaching are the exception. The interviews revealed that even using groups in the classroom was a different learning experience for these students. Although all of these students were in the third or fourth semester at the college, they cited experience with only one other teacher who used group based work in his classes. Students may have liked learning collaboratively simply because it was different and a change of pace from the lecture method that

they had more experience with. Although this is contrary to Rezler and Rezmovic's (1981) findings that students are most comfortable with the learning models that they are most familiar with, content analysis of the interviews indicated that in this study students of both cognitive styles, as well as those with a mixture of styles, positively cited the highly participative aspects of collaborative learning, a model that they were less familiar with in their educational experience than the lecture method.

Second, the term project for this course in Small Business Management was the writing of a lengthy paper, a plan for opening a new business. Although the groups worked all semester collaborating on each other's projects, the final paper was written and assembled by each individual. Perhaps, having a major outcome of the course an individual project met the needs of the field-independent students to structure and exert some degree of control over their learning and thus contributed to their higher than expected degree of satisfaction with this methodology.

Third, collaborative learning requires a high level of student communication and social interaction, behaviors that are usually more associated in the literature with field-dependent people than field-independents. However, hypothesis testing behavior, perhaps best exemplified

within the collaborative groups by the asking of questions, is more characteristic of field-independent students. The collaborative work on the business plans provided the field-independent students with an opportunity to communicate by questioning their peers about how they were planning to do things and why. This in turn stimulated dialogues in the groups that allowed the students to construct and improve upon their ideas for the business plans. The value of this "symbiotic" type of relationship was acknowledged by both cognitive types in the interviews. While 73% of the field-independent students, in contrast to 20% of the field-dependent students, said that asking questions was their primary contribution to the learning task, 60% of the field-dependent students said that being asked questions was the group activity that most stimulated their thinking. Fourth, when a group knows that it is beign studied, as this group did, there is always the possibility of the Hawthorne Effect, i.e., the special treatment of being studied, could affect the outcome.

However, the field-independent students indicated in the interviews that they had more difficulty adjusting to a group situation early in the semester. These results corroborate somewhat Graham's (1989) study of attrition in which she found that community college students preferred a more teacher-centered approach during the first half of the

semester but were more open to the adoption of more collaborative methods in the second half of the semester.

In addition, field-dependent learners in this study did seem more willing to work with the group to construct an answer to other students' questions than the field-independent learners. Several of the latter cited in the interviews the difficulty of choosing the 'right' answer from the discussion provided by the collaborative group. Although two field-independent students came to the instructor several times over the course of the semester trying to get her to choose the best solution from among the group's ideas for their plans, she resisted and sent them back to the group as a resource. Yet, her action did not seem to affect the students' reported level of satisfaction and evaluations of the collaborative learning experience. Perhaps, this behavior was another indication of the field-independent learners, who rely more on internal cues to structure their own learning, having slightly more difficulty adjusting to trusting the group in a more socially based learning model.

In this study cognitive style did not appear to make a difference in students' satisfaction with collaborative learning. However, adjusting to learning in a collaborative group appears to take more conscious effort for field-independent students than for field-dependents. If this is the case, it would make the inclusion of group

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development skills and a gradual introduction of
collaborative methods even more important to the
field-independent learners. Perhaps initial group skill
development at the beginning of the semester and a more
gradual introduction of collaborative methods might make
the adjustment to collaboration more comfortable for
field-independent learners.

Student Roles in Collaborative Learning

The second research question asked "How do the roles
played by field-dependent and field-independent students
differ in a collaborative learning experience?" In this
study cognitive style did not appear to make a difference
in students' satisfaction with collaborative learning roles
students played within the collaborative groups.
Maintenance functions involve the group's interpersonal and
socio-emotional aspects such as encouraging, gatekeeping,
and harmonizing. In contrast, task roles refer to
accomplishing the job, such as seeking and giving
information, initiating ideas, etc.. The content analysis
was considered in relation to informal classroom
observations.

As one might expect from the literature,
field-dependent students reported more incidences of the
social maintenance behaviors (49.9%) than either the

field-independent (42.5%) or mixed (44.1%) cognitive style groups. Conversely, the field-dependent students reported the least task related behavior (48.5%), the mixed cognitive style students were again in the middle of the groups with (54.4%), and the field-independent students reported the most task-centered behavior (57.2%). Given the small numbers studied here, these small percentage differences are not strong evidence.

However, classroom observation revealed that cognitive style did make an interesting difference in how students performed the "giving information" role during the collaborations. Field-independent students tended to give verbal suggestions and critiques and to ask questions. Such behavior is consistent with the literature on the analytical nature of the field-independent thinker. In contrast, field-dependent students actually gave other students tangible things, like advertising rate cards, price lists, copies of their own business plans, etc.. This too is explainable considering that field-dependents find it harder to synthesize and to process ideas that require concepts to be separated from the whole. Providing an on-the-spot analysis of another student's plan might have been a more difficult cognitive task for them to process than for the field-independent students. Sharing resources may be one of the easier ways that

field-dependent students felt that they could help their peers' projects.

In addition, field-dependents tend to place a higher value on extrinsic support and other's approval and may have felt more uncomfortable challenging their peers or giving negative feedback. While the field-independent students shared ideas, the field-dependents shared things.

It is difficult to say which group's definition of sharing behavior was more important to the collaborative process. To the observer, the probing questions and helpful comments made by the field-independent students seemed to contribute more to the process of creating new ideas through collaborative dialogue. However, in light of the results of question five, the students' evaluation of the value of their peers' contribution to their learning, where all three groups gave highest ratings to the field-dependents, this may be a subjective judgement.

In any case, in this research while field-dependent students tended to describe their behavior within the collaborative groups more in terms of maintenance roles, field-independent students described theirs slightly more in terms of task roles. The behavior brought out by the observations that was most interesting was the different manifestations of "giving information" task role. The field-independent students used their analytical abilities to question and to critique their peers work while the

field-dependents were less apt to challenge others but more likely to share tangible resources.

Both extremes of cognitive style seemed to have advantages and disadvantages in a collaboratively structured class. While the challenging behavior of the field-independent students seemed to encourage the analysis and generation of new ideas in the collaborative process, they sometimes seemed to annoy others because of the more critical nature of their comments. In contrast, the field-dependent students displayed their social strengths in their group interactions but did not seem to be as able to hone in on the weak points of their peers' business plans.

These findings are consistent with the literature on cognitive style. An ideal collaborative learning group needs both types of behavior: the analytical skills of the field-independent to construct new knowledge and to solve the learning task and the social sensitivity of the field-dependent for group process. This suggests that the collaborative classroom group should be heterogeneously composed in terms of the range of cognitive styles of its members.

Collaborative Learning and Teacher Evaluations

Because collaborative learning shifts some of the instructor's responsibilities the students, this researcher reasoned the possibility that a professor's classroom evaluations might reflect student resentments about "doing the teacher's work." This becomes a particularly sensitive issue in colleges where student evaluations are given consideration in tenure and contract renewal decisions. Consequently there might be a reluctance on the part of the faculty to experiment with collaborative methods. To cast some light on this, the researcher first asked "Do student evaluations of the course and the instructor differ in collaborative and non-collaborative classes?" and "Do students with different cognitive styles evaluate the instructor differently?"

The results indicated that in this study the instructor's classroom evaluations did not change when she adopted collaborative methods. In spite of the small sample size involved in the collaborative semester (n=28), the prior five years of teaching evaluations provided 398 evaluations for comparison.

The second part of the investigation of teacher evaluations asked if this teacher's evaluations were related to the cognitive style of the rater. As one might expect from the above data, there was no significant

statistical difference in the teacher evaluations according to the cognitive style of the student.

These results need to be discussed in relation to the literature that addresses the matching/mismatching of students' and teachers' cognitive styles. While field-independent teachers tend to use more direct teaching methods, such as lecture, field-dependent teachers have been found to prefer more discussion-centered types of teaching (Claxton and Ralston, 1978; Fuhrmann and Grasha, 1983). Although there were some large scale experiments during the 1960's that involved matching students and teachers according to their cognitive styles, most of the literature on this issue concludes that matching students and teachers with similar styles promotes a mutual attraction but does not necessarily increase learning (Witkin and others, 1989).

Several factors may account for the high positive ratings that the teacher received. First, the individually written business plan was a large component of the course and grade (25%). This may have provided the more intrinsically motivated field-independent students with enough autonomy in the learning task to meet their needs to structure their own learning experience. Second, this instructor had consistently earned high teacher evaluations over the past five years.

In this instance the teacher was trying to teach not only the content of Small Business Management but also to improve students' abilities to work productively in a group, and to prepare them for today's more decentralized organizations. The use of a collaborative methodology provided a way to increase communication among the students, to practice their interpersonal skills, and to teach course content at the same time. In retrospect, the mismatching of the field-independent students with a group based pedagogy may have given them an opportunity to learn the value of working closely with others and could contribute to some increased style flexibility for these individuals.

The teacher evaluations in this study did not appear to be affected by either the use of collaborative methods or the cognitive style of the students rating the teacher. Although this seems to suggest that there may be less risk in the adoption of collaborative methods than one would have anticipated, it must be kept in mind that these findings do represent the student evaluations of only one teacher. In addition, it does not mean to imply, that collaboration should be adopted by every instructor. Instead, this pedagogy needs to be used appropriately. Just as a high degree of delegation may not fit the management style of every manager, collaboration may not be for every teacher.

Effective use of collaboration relates to an instructor's inner notion of authority. If a faculty member's personal philosophy of teaching includes the theme of socially constructed knowledge created through dialogue, collaborative methods are a pedagogical manifestation that may well fit his teaching style. However, if the core of a teacher's belief centers around the instructor as the source of knowledge and authority in the classroom, collaborative methods may be a poor fit.

Consensus and Cognitive Style in Collaborative Learning

Question four was, "How does cognitive style affect the way that students reach consensus in a collaborative group?". The data from this question were inconclusive for two reasons: first, limitations in the design of the study and second, the complexity of the issue of consensus.

Only two questions provided any data for this area of investigation. The first, "People in my group agree just to get the job finished," came from the Survey of In Class Group Experience. One interview question, #8 also contributed, asking if students changed anything in their business plans based on group input. As reported in chapter four, the quality and quantity of the data simply did not produce enough information to be conclusive.

Secondly, the notion of consensus in the collaborative process was much too complex and perhaps initially not well enough defined in this study. Trimbur (1989) described consensus as "one of the most controversial and misunderstood aspects of collaborative learning" (p. 602). In collaborative learning there are two ways of thinking about reaching consensus: as a process and as an outcome. To Bruffee and Weiner consensus is an outcome. The aim of collaborative learning here is to reach consensus through a series of social, ever widening, and more inclusive conversations. These occur first, within the collaborative group, then among all of the groups in the class, then between the teacher and the class, and lastly involving the whole class, the teacher, and the community of knowledge.

In contrast, Trimbur sees the attempt to reach consensus as a process rather than an outcome. To him consensus is a vehicle for the conversation and the exploration of differences among peers.

> The revised notion of consensus I am proposing here depends paradoxically upon its deferral, not its realization. I am less interested in students achieving consensus (although of course this happens at times) as in their using consensus as a critical instrument to open gaps in the conversation through which differences may emerge (1989, p. 614).

Since in this class the collaborative task was for group members to help their peers to produce a business

plan, consensus was more in line with Trimbur's definition
than Bruffee and Weiner's stance. The collaborative
process within the groups allowed the exploration of
alternative viewpoints before consensus was reached and
required only solutions that all parties in the group could
live with. In addition, the student writing the plan,
which was an individual project, made the final decision
whether to utilize other suggestions or not.

Trimbur's definition of consensus better fits the
task of writing individual business plans that did not
require that all students in a group come to a common
agreement about how each and every individual approached
the task. Instead, consensus here meant that students were
free to agree to disagree but the collaborative process was
the mechanism through which alternatives were explored and
options increased.

Sometimes students changed their thinking based on
peer input and sometimes they did not. However, what they
did do was test out each other's ideas before rejecting
them. One student described how this process worked for
him. "I felt that I was right and they were wrong but they
were right. I tried it and it worked." Others had a very
different experience trying to reach agreement. One
student said,

> I had asked you a question and you said
> to go ask the group. What I found out
> was that one person would say one thing
> and the next person would fight with

that person about which answer to give
me. Now that's not right.

Since this study produced no meaningful conclusions about differences in cognitive style and the reaching of consensus in collaborative groups, no recommendations for classroom implementation can be made in this area.

Cognitive Style and Peer Evaluations

The fifth research question "Is there any difference in terms of cognitive style in the way that students rank their peers when they evaluate each individual's contribution to the group effort in a collaborative learning experience?" was asked because peer teaching played such an integral role in the collaborative learning process. Each student numerically ranked every other member of the group and then wrote narrative comments that explained on what basis they awarded the rankings. With only one exception, both field-dependent and field-independent learners and mixed cognitive style learners named people who had been classified as field-dependent learners on the GEFT as the individuals who were the most helpful to their own learning.

Although these results did not establish a cause and effect relationship, they did indicate that in this study people of both cognitive styles found individuals with a

particular style more helpful to their learning in a collaborative group than students with another style.

Given the characteristics of field-dependent learners, these results are not difficult to understand. Field-dependent students have a tendency to consult with others before making decisions (Fuhrmann and Grasha, 1983) which would work easily into this model. One field-dependent student said it best, "It was exciting when you pull the others into the conversation."

In contrast, field-independent students rely on their own internal cues to structure their thinking and find critical analysis easier. Thus the comments made by the field-independent students, while more analytical, might have been construed also as being somewhat critical and harsh even though this behavior was perhaps more useful in the construction of new ideas and more effective business plans. Field-independent students described their behavior in related ways. For example, "Between me and the other kids in the group, we just kept badgering" and "I tend to get a little bit aggressive."

Perhaps the collaborative pedagogy as an active way of learning derives much of its inherent value from creating a safe, social place to think out loud and to benefit from the contributions and reactions of other group members. If this is the case, the heterogeneous make up of

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the group in regard to the cognitive style of the students becomes even more important.

In addition, the social aspect of the collaborative experience may have been even more important to these particular students because they were community college day students who tend to leave campus immediately after classes for jobs and family responsibilities. These students have far fewer opportunities for social interactions with their peers than either residential college students or four year college students who may become more involved in on campus activities.

Limitations of the Study

From a semester-long study of a Small Business Management class at Quinsigamond Community College, quantitative and qualitative data were gathered from 28 students to answer five research questions. Inferences drawn from the results must be tempered in light of the limitations. The sample size was small and not randomly chosen. Consequently, the researcher was limited in generalizability to larger populations. While triangulation of methodologies was employed to increase the validity of the results, it remains that interpretations of the findings are indicative, not conclusive.

Therefore, in interpreting the findings this researcher has been very careful to avoid sweeping

generalizations. The intention of the research was to learn more about collaborative methods from the students' perspective to investigate what it was like to learn this way so that other college instructors could feel more confident trying collaboration in their classes and to set a stage for further inquiry. The data from this study has accomplished these objectives.

Summary of Findings

The intention of this research was to present a case study of a class involved in a collaborative learning experience and to study the individuals from one dimension of difference - cognitive style - as defined by Witkin, to learn more about individual students' satisfaction, behavior, teacher, and peer evaluations during this experience. Although many aspects of student differences such as gender, race, age, grades, etc., need also to be studied, cognitive style was selected because the field-independent students, who the literature tells us are less oriented to learning in groups, and, consequently could probably teach us the most.

This group of students, although small in number, have contributed some valuable insights into what it is like to learn collaboratively. Students of both cognitive styles spoke positively about their experience. The level

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of active participation seemed to be important to the students. With several national educational reports citing the need for increased levels of student participation and responsibility for their own learning, these students told us that they liked doing it and many felt that they had learned more this way.

In addition, collaborative learning allows students an opportunity to practice the task and maintenance roles necessary for effective group interaction. Although this study found some cognitive style differences in the ways that students participated in the groups, today's organizations are increasing their use of groups to make decisions and often even asking for workers who are more team oriented. Consequently, using a pedagogy, especially in the teaching of business management, that provides students experience in working collaboratively could be one way to encourage a valuable specific skill development.

The researcher had hoped to establish some relationship between student evaluations and a change in methodology. However, with only the evaluations from one instructor, this was difficult to do.

Lastly, these students indicated that cognitive style, particularly field-dependence, did make a difference in which students seemed to be the most helpful to their learning. This may be an indication that good communication and interpersonal skills are valued in any

group and confirm the need to incorporate the building of those skills into our educational goals for effective teaching.

Collaborative learning is not new. People have been trying to work together to learn and to solve problems since the beginning of time. A century ago peer teaching was used in the one room schoolhouse as a solution to having many grades in the same room. Collaboration can come almost naturally from the circumstances and needs of people. At the conclusion of one of the student interviews, a field-independent student told the following story that relates to an experience he had in high school that reminded him of his experience in the collaborative class. This quotation from a field-independent student describes both the social and learning benefits of collaboration from the student's perspective.

> There was this regional competition. They give you a written test. There were three kids from each school on the bus. All the way down on the bus, I worked with this Puerto Rican kid, he wasn't very bright, no offense. I worked with him all the way down on the bus, asking him questions, feeding him questions, and I had him do the same for me. We did that back and forth the whole way down. Then we walked around talking about different things. It turns out that I ended up with first place and that kid that I didn't really think was going to do anything ended up with third place and we both went to the state competitions. If I had worked alone I might have ended up with third place or maybe second. When he asked me a question I had to think a

little bit more. Here you gave the
students a chance to teach as well as
to learn.

Recommendations for Future Research

Much additional research is needed on the use of
collaborative methods in the college classroom. The
implications of the findings of this study afford direction
for such research. Replications of research questions one,
two, three and five from this study on a larger scale using
random sample selection and parametric statistical
measures, would confirm or reject our hypothesis about the
relationship between cognitive style and collaborative
learning in a manner that would allow generalizability of
the findings to larger populations.

Second, cognitive style is only one of many
individual variables that could have been chosen as the
framework for the study of the collaborative learning
experience. Age, gender, race, etc., suggest equally
interesting opportunities for future research, particularly
in light of the increasingly older, minority, and female
college populations.

Third, what are the differences in satisfaction,
attitude, participation, learning, etc., for the higher and
lower graded students? Do the students who usually get the
best grades take more responsibility for peer teaching or

do they feel that they learn less within the collaborative
groups than they would from the teacher?

Fourth, organizations are becoming more dependent on
workers' abilities to solve problems and to make decisions
in groups. Studies are needed on how to teach
collaborative skills to today's work force for more
productivity and improved outcomes of the collaborative
process.

Fifth, collaborative learning leaves many unanswered
questions from the perspective of the teacher. The
planning, assessment of learning, and grading of
collaborative projects are more complex. Little research
is available to guide the teacher in the implementation of
these practical aspects of collaborative teaching.

Sixth, the phenomenon of consensus in collaboration
is highly complex and needs special attention in future
research. First, the controversy over whether consensus is
a process or an outcome must be resolved. Then attention
should be given to an investigation of several issues
involving consensus such as: how students reach or do not
reach consensus, but how they adjust to consensus or the
absence of it; the role of "group think" in the attempt to
reach consensus; and the nature of the compromises that
arise during the process.

This study has been an attempt to look at
collaboration from the perspective of student differences

in cognitive styles. The students involved in this work were allowed a voice in this collaborative effort. As a result, a foundation, limited though it is by its methodology, has been laid for more work on this topic. Although collaborative methods are not a new idea in education, they will play an increasingly important role in regard to teaching and learning in the college classroom in the future. The potential for implementation of this methodology is yet unknown.

APPENDIX A

SURVEY INSTRUMENTS USED FOR DATA COLLECTION

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MASSACHUSETTS COMMUNITY COLLEGE SYSTEM
EVALUATION OF INSTRUCTION

Course Number:

Instructor:

<u>Please Read First</u>: The purpose of this form is to evaluate your instructor's performance. Please read each statement carefully and then indicate your rating by placing a check mark under the response you have chosen.

	Response Choices				
	Excellent Performance (5)	Very Good Performance (4)	Fair Performance (3)	Poor Performance (2)	Unsatisfactory Performance (1)
1. How well did the course meet the published course description?					
2. How well were the instructional objectives of the course explained?					
3. To what extent were the instructional objectives accomplished?					
4. How well was the course organized?					
5. How well prepared was the instructor?					
6. How effective was the instructor's presentation?					
7. How well do you think the instructor had a grasp of his/her subject matter and related fields?					
8. To what degree do you think the method of instruction was appropriate to the course objectives?					
9. How well did the instructor respond to student questions?					
10. To what degree were students encouraged and given the opportunity to participate in class?					
11. How fair was the instructor's method of evaluation of student performance?					
12. Did the instructor meet with and help you when requested? (answer if applicable)					
13. How effective overall was the assigned text as a learning aid? (if applicable)					
14. How effective overall were the supplementary course materials as learning aids? (if applicable)					

Date:_____

_____

Student

EXHIBIT 2

SURVEY OF CLASS GROUP EXPERIENCE

The purpose of this survey is to determine your reactions to working with a group. I am conducting this survey to help me to learn more about how students perceive the experience of learning in collaborative class. This survey is anonymous and confidential.

For each statement, please indicate the extent to which you agree or disagree. Circle one of the five possible responses: Strongly Disagree (SD), Disagree (D), Undecided (U), Agree (A), or Strongly Agree (SA). This is not a test. There are no right or wrong answers. The best responses are those that truly reflect your opinions and feelings about working in a group. Please respond to all statements.

Example:
These directions are easy to understand. SD D U A SA

STATEMENT	RESPONSES				
1. I like to work in groups.	SD	D	U	A	SA
2. Groups are a good way to get a job done.	SD	D	U	A	SA
3. People in my group seem to along with each other.	SD	D	U	A	SA
4. Members of my group participate equally.	SD	D	U	A	SA
5. A few people dominate the discussion in my group.	SD	D	U	A	SA
6. People in my group are too quiet.	SD	D	U	A	SA
7. Students in my group work on the task most of the time.	SD	D	U	A	SA
8. People in my group agree just to get the job done	SD	D	U	A	SA

9. The members of my group always
    come on time.   SD   D   U   A   SA

10. For me working in groups is a
    waste of time.   SD   D   U   A   SA

11. I learn a lot from other
    people.   SD   D   U   A   SA

12. Some people in this group do
    not do their fair share of   SD   D   U   A   SA
    the work.

13. There is a lack of cooperation
    in this group.   SD   D   U   A   SA

14. Members of my group help
    each other.   SD   D   U   A   SA

15. Members of my group are
    absent too often.   SD   D   U   A   SA

Thank you for taking the time to complete this survey.

EXHIBIT 3

INTERVIEW QUESTIONS

1. Could you comment on your experiences in working in groups in classes before this semester?

2. What role did you find yourself playing in the group in terms of the projects? Could you cite examples?

3. How did you feel about the role that the instructor adopted during the group discussions? How did it differ from the role that you have seen other professors take during group activities?

4. What roles did other members of the group take during the discussions? Were the other students helpful or not helpful to you in terms of your learning. Please cite examples.

5. Do you feel that the experience would have been more helpful to you if you had been assigned to another group? Could you be more specific?

6. Do you feel that you got to know the members of your group very well? Was that important to you?

7. Could you give me an example of some way that a group member behaved that helped you to write a better business plan.

8. Did you change any of your ideas for the plan based on something said by another group member? Could you be more specific?

9. Describe the behaviors of any group members in terms of a discussion that helped you most in the writing of this plan.

10. Describe the behaviors of any group members in terms of a discussion that helped you least in the writing of this plan.

11. Choose 5 or 6 words that describe your overall evaluation of the collaborative group experience.

12. Do you feel that members of the group were critical of your ideas? How do you feel about that?

13. Do you feel that members of the group were supportive of your ideas? How do you feel about that?

14. Did any members of your group take suggestions that you made? How did you feel about that?

15. Did you feel any sense of obligation to help the other group members?

Please feel free to make any additional comments about your experience in the groups.

EXHIBIT 4

To help me to understand how groups work, I need you to
evaluate the input of the members. I will compare your
cognitive style to that of other group members to see if
cognitive style makes a difference in getting a task
accomplished in a group. This information is for my
research only and will be tabulated into statistics so that
your answers will become anonymous. The individual input
will <u>never</u> be shown to anyone from your organization.

Name each member of your group by first name only in order
of who contributed the most to the accomplishment of the
task. Number one is the most helpful, number two is next
etc. Then assign points to designate how helpful , number
tow is next, etc. Then assign points to designate how
helpful they were to accomplishing the task. You have 100
points that can be divided into among the other three
members of your group. Please use only whole numbers, no
fractions.

        NAME   SCORE

1. _____   _____

2. _____   _____

3. _____   _____

4. _____   _____

5. _____   _____

6. _____   _____

What did the most helpful member in the group do that
contributed to your learning? Please be specific and
describe behaviors, i.e. what they did that made them the
most valuable contributor to your learning, the group, etc.

EXHIBIT 5

CONTENT ANALYSIS OF INTERVIEWS

Subject # _____   **Rater #** _____

Check each incident of described
behavior and indicate page #.

                                          Page #   Comments

1.   Initiating behavior
     (Proposing tasks or goal,
     defining the problem,
     suggesting a procedure
     or ideas for solving a problem.

2.   Seeking information or opinions
     (requesting facts; help; seeking
     suggestions or ideas.

3.   Giving information or opinion
     (giving suggestions or ideas,
     offering facts or data).

4.   Clarifying & Elaborating
     (Interpreting ideas or
     suggestions; clearing up
     confusion; defining terms;
     indicating alternatives.

5.   Summarizing (pulling together
     related ideas, offering a
     decision or conclusion
     for the group to accept or reject.

6.   Consensus testing (testing group
     on a possible conclusion).

7.   Harmonizing (attempting to
     reconcile disagreements;
     getting people to explore
     differences).

8.   Gate Keeping (facilitating the
     participation of others).

9.   Encouraging (accepting another's
      contribution; being warm and friendly.

10.   Compromising (offering a
      compromise, admitting error;
      making changes due to desire
      to achieve group consensus).

11.   Standard setting & testing
      (testing, whether a group is
      satisfied with its procedure
      or suggesting procedures).

9.   Encouraging (accepting another's
      contribution; being warm and friendly.

EXHIBIT 6

THE RELATIONSHIP BETWEEN COGNITIVE STYLE AND STUDENTS; EXPERIENCE IN A COLLABORATIVE LEARNING EXPERIENCE.

I.   My name is Carol Harvey and I am a graduate student int the Department of Higher Education at the University of Massachusetts in Amherst. I am doing research which will include testing students for cognitive style and conducting interviews to determine what are the perceptions of students with different cognitive styles about their experiences in a collaboratively structured class.

II. You are being asked to participate in this study which will require you to be tested for cognitive style, to complete several written questionnaires and to be interviewed about your reactions to the collaborative learning experiences after the completion of the course.

III. All written data will be kept anonymous by allowing you to choose a code name known only to you. The interview will last approximately one-half hour and be tape recorded. On the tapes, students will be identified only by cognitive style, not by name. later the interviews will be transcribed and analyzed to help me to learn more about individual students reactions to collaborative learning.

IV. This information may be used for my dissertation, presentations or journal articles. You will be identified only by cognitive style, not by name. Your anonymity and privacy will be protected.

V.   You will have the opportunity to withdraw from the research project at any time.

VI. If you need to contact me at any time, I can be reached at 853-2300 ext. 456.

If you agree to these guidelines and are willing to participate in this research, please sign and date this from.

Thank you for your help in this project.

Name _____   Date _____

TABLES COMPARING INDIVIDUAL ITEMS FROM THE <u>MASSACHUSETTS COMMUNITY COLLEGE SYSTEM OF INSTURCTION</u> FOR COLLABORATIVE (1990) AND NON-COLLABORATIVELY (1984-1988) TAUGHT CLASSES.

Appendix B
Table 1

Student Ratings of Instructor Preparedness[a]

Instructional Mode and Year	Number of Ratings[b]	Ratings[c]					Average Rating
		5 Excellent	4 Very Good	3 Fair	2 Poor	1 Unsatis	
Noncollaborative							
1984	80	41(51)	33(41)	6(8)	-	-	4.4
1985	83	64(77)	18(22)	-	1(1)	-	4.5
1986	87	72(83)	14(16)	1(1)	-	-	4.8
1987	62	39(63)	20(32)	3(6)	-	-	4.6
1988	82	67(82)	14(17)	1(1)	-	-	4.8
Combined Years							$\overline{X}=4.6$
Collaborative							
1990	27	23(86)	4(15)	-	-	-	4.9

[a]Ratings made to answer the question: "How well prepared was the instructor?"

[b]In 1984, 1985, and 1990, one student chose not to make a rating; in 1987 two students did not.

[c]Percentages appear in parenthesis.

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Appendix B
Table 2

Student Ratings of Effectiveness of Instructor's Presentations[a]

Instructional Mode and Year	Number of Ratings[b]	Ratings[c]					Average Rating
		5 Excellent	4 Very Good	3 Fair	2 Poor	1 Unsatis	
Noncollaborative							
1984	81	25(31)	31(38)	19(23)	3(4)	—	3.9
1985	84	52(62)	24(29)	7(8)	1(1)	—	4.5
1986	86	63(73)	17(20)	6(7)	–	—	4.7
1987	63	29(46)	21(33)	12(19)	1(2)	—	4.2
1988	82	59(72)	20(24)	3(4)	–	—	4.7
Combined Years							$\bar{X}=4.4$
Collaborative							
1990	26	16(62)	10(38)	–	–	—	4.6

[a]Ratings made to answer the question: "How effective were the instructor's preparations?"

[b]In 1986 and 198790, one student chose not to make a rating; in 1990 two students did not.

[c]Percentages appear in parenthesis.

Appendix B
Table 3

Student Ratings of Instructor's Knowledge[a]

Instructional Mode and Year	Number of Ratings[b]	Ratings[c]					Average Rating
		5 Excellent	4 Very Good	3 Fair	2 Poor	1 Unsatis	
Noncollaborative							
1984	81	53(65)	26(32)	2(2)	–	–	4.6
1985	84	69(82)	15(18)	–	–	–	4.8
1986	87	74(83)	12(14)	1(1)	–	–	4.8
1987	64	50(78)	14(22)	–	–	–	4.8
1988	82	75(91)	6(7)	1(1)	–	–	4.9
Combined Years							$\overline{X}=4.8$
Collaborative							
1990	27	24(89)	3(11)	–	–	–	4.9

[a]Ratings made to answer the question: "How well did you think the instructor had a grasp of his/her subject matter and related fields?"

[b]In 1990 one student chose not to make a rating.

[c]Percentages appear in parenthesis.

Appendix B
Table 4

Student Ratings of Instructor's Response to Questions[a]

Instructional Mode and Year	Number of Ratings[b]	Ratings[c]					Average Rating
		5 Excellent	4 Very Good	3 Fair	2 Poor	1 Unsatis	
Noncollaborative							
1984	81	37(46)	35(43)	6(7)	3(4)	—	4.3
1985	84	62(74)	17(25)	5(6)	—	—	4.7
1986	87	64(74)	22(25)	1	—	—	4.7
1987	64	38(59)	23(36)	2(3)	1(2)	—	4.5
1988	82	64(78)	17(21)	—	—	1(1)	4.7
Combined Years							$\overline{X}=4.6$
Collaborative							
1990	27	17(73)	6(23)	1(4)	—	—	4.7

[a]Ratings made to answer the question: "How well did instructor respond to questions?"

[b]In 1990 two students chose not to make a rating.

[c]Percentages appear in parenthesis.

Appendix B
Table 5

Student Ratings of Fairness of Instructor's Evaluation Method[a]

Instructional Mode and Year	Number of Ratings[b]	Ratings[c]					Average Rating
		5 Excellent	4 Very Good	3 Fair	2 Poor	1 Unsatis	
Noncollaborative							
1984	80	27(34)	34(43)	17(21)	2(3)	—	4.1
1985	84	51(61)	29(35)	3(4)	1(1)	—	4.5
1986	85	56(66)	26(31)	3(4)	—	—	4.5
1987	64	25(39)	27(42)	12(4)	—	—	4.2
1988	82	58(71)	21(26)	3(4)	—	—	4.7
Combined Years							$\bar{X}=4.4$
Collaborative							
1990	27	14(52)	10(37)	3(11)	—	—	4.4

[a]Ratings made to answer the question: "Was the instructor's method of evaluation fair?"

[b]In 1984 and 1990, one student chose not to make a rating; in 1986 one did not.

[c]Percentages appear in parenthesis.

Appendix B
Table 6

Student Ratings of Instructor's Availability for Help[a]

Instructional Mode and Year	Number of Ratings[b]	Ratings[c]					Average Rating
		5 Excellent	4 Very Good	3 Fair	2 Poor	1 Unsatis	
Noncollaborative							
1984	53	20(38)	30(57)	2(4)	–	–	4.3
1985	59	46(78)	12(20)	–	1(2)	–	4.7
1986	64	50(78)	13(20)	1(2)	–	–	4.8
1987	39	24(62)	12(31)	3(8)	–	–	4.5
1988	63	48(76)	13(21)	2(8)	–	–	4.7
Combined Years							$\bar{X}=4.6$
Collaborative							
1990	25	17(68)	7(28)	1(4)	–	–	4.6

[a]Ratings made to answer the question: "Did the instructor meet with you and help you when requested?"

[b]In 1984 28 students chose not to make a rating; in 1985 and 1987, 25 did not; in 1986 23 did not; 19 ratings were not made in 1988; 3 students did not respond in 1990.

[c]Percentages appear in parenthesis.

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