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ABSTRACT

This article, which details the benefits of collaborative learning, is intended to promote human interactions through cooperation as the favored educational paradigm. The first part of this article presents four major categories of benefits created by collaborative learning methods: academic, social, psychological, and assessment. Each of these areas is subdivided further to help the reader focus on specific themes within each category. Paragraph headings are used to highlight specific results of cooperative learning techniques. Academic benefits include promoting critical thinking skills, involving students actively in the learning process, improving classroom results, modeling appropriate student problem solving techniques, personalizing large lectures, and motivating students in specific curricula. Social benefits include developing a social support system for students, building diversity understanding among students and staff, establishing a positive atmosphere for modeling and practicing cooperation, and developing learning communities. Psychological benefits of student-centered instruction include increasing students' self-esteem, reducing anxiety, and developing positive attitudes towards teachers. Assessment benefits involve alternate student and teacher assessment techniques as collaborative teaching techniques utilize a variety of assessments. The second section of this report describes each of 67 benefits without regard to any ordering. An outline of the 67 benefits is provided prior to the extended descriptions. Contains 162 references. (RS)

The Case For Student Centered Instruction Via Collaborative Learning Paradigms

By Ted Panitz

This section is divided into two parts. The first section organizes the benefits into categories such as, academic benefits, social, psychological, etc. The second section simply lists each of the benefits without regard to any ordering. An outline of the benefits is provided prior to the extended descriptions.

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Academic benefits-

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CL Promotes critical thinking skills

CL DEVELOPS HIGHER LEVEL THINKING SKILLS

CL STIMULATES CRITICAL THINKING AND HELPS STUDENTS CLARIFY IDEAS THROUGH DISCUSSION AND DEBATE

SKILL BUILDING AND PRACTICE CAN BE ENHANCED AND MADE LESS TEDIOUS THROUGH CL ACTIVITIES IN AND OUT OF CLASS

CL DEVELOPS ORAL COMMUNICATION SKILLS

CL FOSTERS METACOGNITION IN STUDENTS

COOPERATIVE DISCUSSIONS IMPROVE STUDENTS' RECALL OF TEXT CONTENT

Involves students actively in the learning process

CL CREATES AN ENVIRONMENT OF ACTIVE, INVOLVED, EXPLORATORY LEARNING

CL ENCOURAGES STUDENT RESPONSIBILITY FOR LEARNING

CL INVOLVES STUDENTS IN DEVELOPING CURRICULUM AND CLASS PROCEDURES

CL PROVIDES TRAINING IN EFFECTIVE TEACHING STRATEGIES TO THE NEXT GENERATION OF TEACHERS.

CL HELPS STUDENTS WEAN THEMSELVES AWAY FROM CONSIDERING TEACHERS THE SOLE SOURCES OF KNOWLEDGE AND UNDERSTANDING

CL FITS IN WELL WITH THE TQM AND CQI MODELS OF EFFECTIVE MANAGEMENT

CL PROMOTES A LEARNING GOAL RATHER THAN A PERFORMANCE GOAL.

CL FITS IN WELL WITH THE CONSTRUCTIVIST APPROACH

CL ALLOWS STUDENTS TO EXERCISE A SENSE OF CONTROL ON TASK

Classroom results are improved

CL PROMOTES HIGHER ACHIEVEMENT AND CLASS ATTENDANCE

CL PROMOTES A POSITIVE ATTITUDE TOWARD THE SUBJECT MATTER

CL INCREASES STUDENT RETENTION

CL ENHANCES SELF MANAGEMENT SKILLS

CL INCREASES STUDENTS' PERSISTENCE IN THE COMPLETION OF ASSIGNMENTS AND THE LIKLIHOOD OF SUCCESSFUL COMPLETION OF ASSIGNMENTS

STUDENTS STAY ON TASK MORE AND ARE LESS DISRUPTIVE

CL PROMOTES INNOVATION IN TEACHING AND CLASSROOM TECHNIQUES

Models appropriate student problem solving techniques

CL FOSTERS MODELLING OF PROBLEM SOLVING TECHNIQUES BY STUDENTS' PEERS CL ALLOWS ASSIGNMENT OF MORE CHALLENGING TASKS WITHOUT MAKING THE WORKLOAD UNREASONABLE.

WEAKER STUDENTS IMPROVE THEIR PERFORMNCE WHEN GROUPED WITH HIGHER ACHIEVING STUDENTS

CL PROVIDES STRONGER STUDENTS WITH THE DEEPER UNDERSTANDING THAT COMES ONLY FROM TEACHING MATERIAL (COGNITIVE REHEARSAL).

CL LEADS TO THE GENERATION OF MORE AND BETTER QUESTIONS IN CLASS. STUDENTS EXPLORE ALTERNATE PROBLEM SOLUTIONS IN A SAFE ENVIRONMENT

CL ADDRESSES LEARNING STYLE DIFFERENCES AMONG STUDENTS

Large lectures can be personalized

CL ACTIVITIES CAN BE USED TO PERSONALIZE LARGE LECTURE CLASSES

CL CAN BE ADAPTED TO LARGE LECTURES INVOLVING STUDENTS IN INTERACTIVE, CRITICAL THINKING ACTIVITIES DURING CLASS

CL is especially helpful in motivating students in specific curriculum

CL IS SYNERGYSTIC WITH WRITING ACROSS THE CURRICULUM (WAC)

CL IS ESPECIALLY USEFUL IN FOREIGN LANGUAGE AND ESL COURSES WHERE INTERACTIONS INVOLVING THE USE OF LANGUAGE ARE IMPORTANT

JIGSAW IS AN IDEAL STRUCTURE FOR LABORATORY AND DESIGN PROJECTS

CL IS ESPECIALLY BENEFICIAL IN MATHEMATICS COURSES.

Social benefits

Develops a social support system for students

CL PROMOTES STUDENT-FACULTY INTERACTION AND FAMILIARITY

CL DEVELOPS SOCIAL INTERACTION SKI

CL PROMOTES POSITIVE SOCIETAL RESPONSES TO PROBLEMS AND FOSTERS A SUPPORTIVE ENVIRONMENT WITHIN WHICH TO MANAGE CONFLICT RESOLUTION

CL CREATES A STRONGER SOCIAL SUPPORT SYSTEM

CL FOSTERS AND DEVELOPS INTERPERSONAL RELATIONSHIPS

STUDENTS DEVELOP RESPONSIBILITY FOR EACH OTHER

CL Builds diversity Understanding among students and staff

CL BUILDS MORE POSITIVE HETEROGENEOUS RELATIONSHIPS

CL ENCOURAGES DIVERSITY UNDERSTANDING

CL FOSTERS A GREATER ABILITY IN STUDENTS TO VIEW SITUATIONS FROM OTHERS' PERSPECTIVES (DEVELOPMENT OF EMPATHY)

CL HELPS MAJORITY AND MINORITY POPULATIONS IN A CLASS LEARN TO WORK WITH EACH OTHER (DIFFERENT ETHNIC GROUPS, MEN AND WOMEN, TRADITIONAL AND NON-TRADITIONAL STUDENTS)

CL Establishes a positive atmosphere for modeling and practicing cooperation

ESTABLISHES AN ATMOSPHERE OF COOPERATION AND HELPING SCHOOLWIDE

STUDENTS ARE TAUGHT HOW TO CRITICIZE IDEAS, NOT PEOPLE

CL CLASSROOMS MAY BE USED TO MODEL DESIREABLE SOCIAL BEHAVIORS NECESSARY FOR EMPLOYMENT SITUATIONS WHICH UTILIZE TEAMS AND GROUPS.

STUDENTS PRACTICE MODELLING SOCIETAL AND WORK RELATED ROLES

CL FOSTERS TEAM BUILDING AND A TEAM APPROACH TO PROBLEM SOLVING WHILE MAINTAINING INDIVIDUAL ACCOUNTABILITY

CL PROCESSES CREATE ENVIRONMENTS WHERE STUDENTS CAN PRACTICE BUILDING LEADERSHIP SKILLS.

CL INCREASES LEADERSHIP SKILLS OF FEMALE STUDENTS

Develops learning communities

CL PROVIDES THE FOUNDATION FOR DEVELOPING LEARNING COMMUNITIES WITHIN INSTITUTIONS AND IN COURSES

CL ACTIVITIES PROMOTE SOCIAL AND ACADEMIC RELATIONSHIPS WELL BEYOND THE CLASSROOM AND INDIVIDUAL COURSE

IN COLLEGES WHERE STUDENTS COMMUTE TO SCHOOL AND DO NOT REMAIN ON CAMPUS TO PARTICIPATE IN CAMPUS LIFE ACTIVITIES, CL CREATES A COMMUNITY ENVIRONMENT WITHIN THE CLASSROOM.

CI HELPS TEACHERS CHANGE THEIR ROLES FROM THEIR BEING THE FOCUS OF THE TEACHING PROCESS TO BECOMING FACILITATORS OF THE LEARNING PROCESS. THEY MOVE FROM TEACHER-CENTERED TO STUDENT-CENTERED LEARNING

Psychological benefits

Student Centered Instruction Increases students' Self Esteem

CL BUILDS SELF ESTEEM IN STUDENTS

CL ENHANCES STUDENT SATISFACTION WITH THE LEARNING EXPERIENCE

CL PROMOTES A MASTERY ATTRIBUTION PATTERN RATHER THAN HELPLESS ATTRIBUTION PATTERN

CL ENCOURAGES STUDENTS TO SEEK HELP AND ACCEPT TUTORING FROM THEIR PEERS

Cooperation Reduces Anxiety

CLASSROOM ANXIETY IS SIGNIFICANTLY REDUCED WITH CL

TEST ANXIETY IS SIGNIFICANTLY REDUCED

CL Develops positive attitudes towards teachers

CL CREATES A MORE POSITIVE ATTITUDE TOWARD TEACHERS, PRINCIPALS AND OTHER SCHOOL PERSONEL BY STUDENTS AND CREATES A MORE POSITIVE ATTITUDE BY TEACHERS TOWARD THEIR STUDENTS

CL SETS HIGH EXPECTATIONS FOR STUDENTS AND TEACHERS

Alternate student and teacher assessment techniques

Collaborative teaching techniques utilize a variety of assessments

CL PROVIDES A BASIS FOR ALTERNATE FORMS OF ASSESSMENT SUCH AS OBSERVATION OF GROUPS, GROUP SELF ASSESSMENT, AND SHORT INDIVIDUAL WRITING ASSESSMENTS

CL PROVIDES INSTANTANEOUS FEEDBACK TO STUDENTS AND THE TEACHER ON THE EFFECTIVENESS OF EACH CLASS AND THE PROGRESS STUDENTS ARE MAKING BY OBSERVING STUDENTS WORKING IN GROUPS AND INDIVIDUALLY

GROUPS ARE EASIER TO SUPERVISE THAN INDIVIDUAL STUDENTS

Introduction-

This article is intended to promote human interactions through cooperation as the favored educational paradigm. The article presents four major categories of benefits created by cooperative learning methods. They are: academic, social, psychological and assessment benefits. Each of these areas are subdivided further to help the reader focus on specific themes within each category. Paragraph headings are used to highlight specific results of cooperative learning techniques. Extensive research exists on the benefits described below (Johnson & Johnson, 1989). Specific references are provided to document each benefit described below. More research has been undertaken on cooperative learning techniques than on any other educational paradigm.

Nelson-LeGall(1992) captures the nature of cooperative learning when she states "Learning and understanding are not merely individual processes supported by the social context; rather they are the result of a continuous, dynamic negotiation between

the individual and the social setting in which the individual's activity takes place. Both the individual and the social context are active and constructive in producing learning and understanding" (p52). The reality of our current educational system is quite the opposite.

according to Nelson-LeGall (1992) "Relatively few children attend schools that regularly encourage peer interactions as a major means of learning. Moreover, with increasing grade level in school, children are likely to encounter classroom learning situations in which competition and independent performance are increasingly normative (Eccles et al. 1984). It is likely, therefore, that unless children begin elementary school in classrooms that emphasize the social sharing of cognitive learning activities, children will come to cooperative learning groups with perceptions that collaborating with and assisting peers in classroom learning activities are not "normal" behaviors for students." (p60)

Fogarty and Bellanca(1992) highlight the reaction that teachers have after they implement cooperative learning paradigms when they state, "Surprisingly and almost unfaillingly, once the philosophical shift begins, once teachers begin implementing cooperative interactions, the evidence of student motivation becomes so overwhelmingly visible that teachers are encouraged to try more. The momentum builds for both teachers and students, and before long the "new school lecture" becomes the norm in the classroom. By then, the novelty of the models is no longer the challenge. The challenge becomes choosing the most appropriate interactive designs for the target lesson; it is choosing a design in which the final focus rests on the learner, not on the lecturer". (p84) They go on to point out that "The skillful teacher introduces increasingly engaging interactive models over time. As students become more adept in their social skills, the models are selected strictly for appropriateness. Initially, however, the models are subtly slotted into the lessons to familiarize students with the different interactions and to lead them toward involvement in the learning situation". (p86)

WHAT IS COLLABORATIVE LEARNING?

Collaborative learning is a personal philosophy, not just a classroom technique. In all situations where people come together in groups, it suggests a way of dealing with people which respects and highlights individual group members' abilities and contributions. The underlying premise of CL is based upon consensus building through cooperation by group members, in contrast to competition in which individuals best other group members. CL practitioners apply this philosophy in the classroom, at committee meetings, with community groups and generally as a way of living with and dealing with other people (Panitz 1997) .

As a pedagogy CL involves the entire spectrum of learning activities in which groups of students work together in or out of class. It can be as simple and informal as pairs working together in a Think-Pair-Share procedure, where students consider a question individually, discuss their ideas with another student to form a consensus answer, and then share their results with the entire class, to the more formally structured process

known as cooperative learning which has been defined by Johnson and Johnson (Johnson, Johnson & Holubec 1990).

Academic benefits-

CL Promotes critical thinking skills

CL DEVELOPS HIGHER LEVEL THINKING SKILLS (Webb 1982). Students working together are engaged in the learning process instead of passively listening to the teacher present information or reading information off a computer screen. Pairs of students working together represent the most effective form of interaction, followed by threesomes and larger groups (Schwartz, Black, Strange 1991). When students work in pairs one person is listening while the other partner is discussing the question under investigation. Both are developing valuable problem solving skills by formulating their ideas, discussing them, receiving immediate feedback and responding to questions and comments by their partner (Johnson, D.W. 1971). The interaction is continuous and both students are engaged during the session. Compare this situation to the lecture class where students may or may not be involved by listening to the teacher or by taking notes (Cooper, et al 1984).

According to Roberta Dees (1991) "Although it is not clear which components of cooperative learning are responsible for improvement in higher-level thinking, attempts have been made to identify the components. One conjecture is that dealing with controversy may be such an element." (p410) Smith, Johnson, and Johnson (1981) studied sixth grade students who worked on controversial issues. They found that for students engaged in controversy, "the cognitive rehearsal of their own position and the attempts to understand their opponents position result in a high level of mastery and retention of the materials being learned." (p652). The Johnsons have developed a cooperative method called structured controversy where students study and defend one position and then switch with another group which has taken the opposite position. Slavin(1992) emphasizes that "Students will learn from one another because in their discussions of the content, cognitive conflicts will arise, inadequate reasoning will be exposed, disequilibrium will occur, and higher quality understandings will emerge". (p162)

O'Connell et al (1988) found that the initial benefits that accrued from a brief cooperative training experience persisted over relatively long intervals and that students trained in the dyadic cooperative approach successfully transferred their skills to individually performed tasks (McDonald et al 1985).

CL STIMULATES CRITICAL THINKING AND HELPS STUDENTS CLARIFY IDEAS THROUGH DISCUSSION AND DEBATE (Johnson 1973, 1974a) The level of discussion and debate within groups of three or more and between pairs is substantially greater than when an entire class participates in a teacher led discussion. Students receive immediate feedback or questions about their ideas and formulate responses without having to wait

for long intervals to participate in the discussion (Peterson & Swing 1985). This aspect of collaborative learning does not preclude whole class discussion. In fact whole class discussion is enhanced by having students think out and discuss ideas thoroughly before the entire class discusses an idea or concept. The level of discussion becomes much more sophisticated. In addition, the teacher may temporarily join a group's discussion to question ideas or statements made by group members or to clarify concepts or questions raised by students. Nelson-LeGall (1992) comments on the value of debate in enhancing critical thinking skills in students. She states, "An awareness of conflicting viewpoints appears to be necessary in collaborative groups to engender the type of peer transactions (e.g.) arguments, justifications, explanations, counterarguments) that foster cognitive growth (Brown & Palinscar, 1989)" (p55)

Another aspect of the benefits of cooperative discussion is the effect it has on students who peer edit written work. According to McCarthy and McMahon (1992) "Research focusing specifically on revision when peers respond to and edit writing has revealed that students can help one another improve their writing through response. Nystand (1986) found that students who responded to each other's writing tended to reconceptualize revision, not as editing, but as a more substantive rethinking of text, whereas students who did not work in groups viewed the task as editing only." (p19) Combining discussion with peer editing results in an important aspect of developing critical thinking skills in students.

SKILL BUILDING AND PRACTICE CAN BE ENHANCED AND MADE LESS TEDIOUS THROUGH CL ACTIVITIES IN AND OUT OF CLASS (Tannenbergs 1995). Foundational aspects of education, the acquiring of information and operational skills, can be facilitated through the use of collaborative activities (Brufee 1993). In order to develop critical thinking skills students need a base of information to work from. Acquiring this skills base often requires some degree of repetition and memory work. When this is accomplished individually the process can be tedious, boring or overwhelming. When students work together the learning process becomes interesting and fun despite the repetitive nature of the learning process.

Tannenbergs (1995) states "The most significant benefit that I have observed using CL has been for students to engage in the skills and practices of the computing discipline within the classroom. These practices include reading and understanding programs, designing and writing programs, complexity analysis, problem solving, writing proofs, scholarly debate, teaching one another, negotiating meaning, using alternate forms of representation (e.g., drawings of trees, graphs, and other data structures), and building collegial relationships. In a lecture based setting, we are limited to the extent to which we can convey skills and practices -- many of these do not lend themselves well to verbal description. And even for those that do, students appropriate such skills through active engagement, not by watching and listening. By working within a small group setting, students can be encouraged and helped by their peers and the instructor, and they learn from one another by watching and imitating."

Male (1990) reinforces the idea of skill building through CL in her article on cooperative

learning and computers. She states "Initial studies have documented the positive impact of cooperative learning in drill-and-practice computer use as well as in higher order thinking skills(Johnson, Johnson and Stanne, 1986; Webb, Ender and Lewis, 1986)." Slavin (1992) emphasizes that practice explanations make sense when students are learning information or skills with high memory demands but few concepts, such as spelling or math. Two studies found positive effects from cooperative learning forms when pairs were used to study spelling. (Van Oudenhoven et al (1987), Van Oudenhoven et al (1987).

CL DEVELOPS ORAL COMMUNICATION SKILLS (Yager 1985a) When students are working in pairs one partner verbalizes his/her answer while the other listens, asks questions or comments upon what he/she has heard. Clarification and explanation of one's answer is a very important part of the collaborative process and represents a higher order thinking skill (Johnson, Johnson, Roy, Zaidman 1985). Students who tutor each other must develop a clear idea of the concept they are presenting and orally communicate it to their partner (Neer 1987).

Tannenbergr (1995) describes the benefit of developing oral skills which are discipline specific. "As in other disciplines, computer scientists use specialized language to economically and precisely communicate with one another. This involves not only mathematical symbols and programming languages, but additional terms and special uses of natural language. A consequence of having students work together in small groups is that they speak with one another and directly engage in discipline-specific language use. In trying to explain their ideas relating to the problems that they are solving, whether it be about a graph, program, algorithm, or proof, they will of necessity acquire the terms that describe these objects."

Tannenbergr (1995) states "The additional benefit in having our students be fluent language users is that they can then enter into the culture of our disciplines. They will be able to understand specialized publications and talk with more knowledgeable practitioners. That is, acquiring the language of the discipline opens the portal to the vast store of knowledge within the discipline. We should therefore not minimize the value of having our students be able to talk with one another about their work in the disciplines that we teach. The social setting of CL provides this opportunity. And this is where it may be better that the students are interacting with one another rather than with experts, because they are less concerned about looking foolish, about being novices, about not being fluent in the new language and discipline, about being tourists in this foreign land -- how easy it is to chat with other tourists! "

Bershon (1992) points out the role of speech in children's development as identified by Vygotsky. He states "In his research Vygotsky(1978) reports that children's egocentric speech not only accomplished the task but also played a specific role in task solution. IOn this regard, he explained that children's speech and action were part of one and the same complex psychological function, directed toward the solution of the problem at hand. In fact, Vygotsky believes that the more complex the action demanded by the situation, and the less direct the solution, the greater the importance played by speech

in the solution." (p39)

When students work in groups and express themselves orally three benefits occur. First, the more advanced students demonstrate appropriate ways of approaching a problem, how they analyze content material and formulate arguments and justifications for their approaches. Through the process of questioning by peers these students becomes more aware of the thinking processes they are using. Second, instead of an individual thinking about a problem in small increments, in isolation, a group will often look at a problem from a wider perspective and consider many more options as possible solutions than one person thinking alone would. Third, by discussing various aspects of a problem solution and questioning the more advanced students, the novices in the group can participate in actually solving the problem and eventually learn how to solve problems without the help of their peers. Nelson LeGall points out that "Through encouragement from the group to try new, more active approaches and through social support and social reward for even partially successful efforts, individual students in a group come to think of themselves as capable of engaging in interpretatio". (LeGall 1992 p63)

CL FOSTERS METACOGNITION IN STUDENTS Metacognition involves student recognition and analysis of how they learn (O'Donnell & Dansereau 1992). Metacognition activities enable students to monitor their performance in a course and their comprehension of the content material. This includes detecting errors and learning how to make corrections while monitoring one's performance. Cooperative learning approaches create learning strategies which are independent of content and thus are transferable to different content areas. Cooperative learning structures encourage the development of metacognitive learning because they focus on the process of learning, which includes the evaluation of the group's work by individual group members, assessment and improvement of the social interactions which take place during cooperative activities, and efforts to make corrections in each individual's performance. The content matter is almost secondary to the learning process.

For example, Scripted Cooperation, a cooperative structure developed by O'Donnell and Dansereau (1992) includes five generic components which are helpful in the metacognition process: 1. dividing the text into discrete and meaningful sections, 2. having both members of a dyad read the text a section at a time, 3. requiring one partner to recall the pertinent details and information, 4. requiring the other partner to monitor this oral recall to detect errors and omissions (these two roles are evenly interchanged throughout the text), and 5. having both members of the dyad elaborate on this information with methods that may include developing analogies and generating images (Hertz-Lazarowitz, Kirkus and Miller (1992) p7).

Metacognition is reinforced through cooperative activities which ask students to reflect on their group's performance and make suggestions for improvement and likewise asks students to reflect upon their individual contributions and performance and make corrections which will improve future group actions and results. Students act as mediators of their fellow students' thinking because group discussions call for

elaboration and analysis of the initial interpretations made by their peers followed by students modifying their initial approaches (Pressels 1992). Students come to understand the strategic aspects of metacognition and appreciate the value accrued from teaching themselves how to think. Pressel (1992) makes the analogy; "Like debaters and trial lawyers, cooperative thinkers are benefitted by a vital exchange with their colleagues, but they are usually spared the anxiety of competitive risk-taking and embarrassment of ultimate failure". (p3)

Costa and O'Leary (1992) identify several studies which show that students can learn metacognitive skills better when working in cooperative groups (Webb 1985, Weinstein et al 1989, Yager, et al 1985, 1986). They point out that "As students develop group criteria for their own performance of intelligent behaviors, they will develop operational indicators of what they should be doing or saying if they were persisting, listening, restraining impulsiveness, and so forth. These indicators serve as criteria with which to evaluate their own and other's performance". (p52)

Johnson and Johnson (1992) identify several practical reasons why cooperative learning, especially using their constructive controversy approach, enhances student metacognition. The fact that students will be required to explain their strategies or teach other students changes the learning strategies they use compared to how they organize material when they are learning independently. Discussions within cooperative groups require more frequent oral summarizing, explaining and elaboration of what one knows, which in turn consolidates and strengthens what is known through the rehearsal process. The heterogeneity of cooperative groups encourages students to accommodate themselves to their peer's perspectives, strategies, and approaches, to completing assignments. This stimulates divergent and creative thinking and a review of one's own thinking. Students often bring incomplete information to a task and by interacting with other students learn how to share their information and obtain insights on how other students obtain and use information, thus expanding their understanding of their own thinking processes. By sharing their work within cooperative groups, students externalize their ideas and reasoning for critical examination which in turn results in peer monitoring and regulation or members thinking and reasoning. Students give each other feedback regarding the quality and relevance of their contributions and make suggestions on how to improve their performance.

COOPERATIVE DISCUSSIONS IMPROVE STUDENTS' RECALL OF TEXT CONTENT (DANSEREAU (1985); SLAVIN & TANNER (1979))

When students read a text together and explain the concepts to each other and evaluate each other's explanations they engage in a high level of critical thinking. They frame the new concepts by using their own vocabulary and by basing their comments upon their previous knowledge. Thus they construct a new knowledge base on top of their existing base. This process leads to a deeper understanding and greater likelihood they will retain the material longer than if they worked alone and simply read and reread the text. Johnson & Johnson (1979) found that engaging in discussion over controversial issues improves recall of important concepts. Ames and Murray (1982) found that discussion of controversial ideas among pairs of nonconservers on

Piagetian conservation tasks improves their recall of content material. Dansereau(1985) has developed a structure called "cooperative scripts" where pairs of students read a section of text and then one serves as recaller and summarizes the information while the other student listens for any errors, fills in omitted information and thinks of ways both can remember the main ideas. He found that while both students learned more and were able to recall the information longer than students working alone, the recaller learned the most.

O'Donnell and Dansereau (1992) report that cooperating dyads performed better than individuals in their acquisition of descriptive (Spurlin et. al 1984) and technical information (Hall et al 1988; Larsen et al 1986). In addition dyads wrote more communicative instructions than individuals (O'Donnell et al 1985) and outperformed individuals on the immediate and delayed performance of a procedure (O'Donnell et al 1988).

Involves students actively in the learning process

CL CREATES AN ENVIRONMENT OF ACTIVE, INVOLVED, EXPLORATORY LEARNING (Slavin 1990)

The entire focus of collaborative learning is to actively involve students in the learning process. Whenever two or more students attempt to solve a problem or answer a question they become involved in the process of exploratory learning. They interact with each other, share ideas and information, seek additional information, make decisions about the results of their deliberations and present their findings to the entire class. They may tutor their peers or receive tutoring. Students have the opportunity to help structure the class experience through suggestions regarding class format and procedures. This is a level of student empowerment which is unattainable with a lecture format or even with a teacher-led whole class discussion.

CL ENCOURAGES STUDENT RESPONSIBILITY FOR LEARNING (Baird & White 1984)

Promotive interaction, a foundation principle of cooperative learning, builds students' responsibility for themselves and their group members through a reliance upon each other's talents, and an assessment process which rewards both individuals and groups. Students assist each other and take different roles within their groups (such as reader, recorder, time keeper etc.). An emphasis on student involvement is created in the development of the processes which the group follows. The empowerment of students produces an environment which fosters maturity and responsibility in students for their learning. The teacher becomes a facilitator instead of a director and the student becomes a willing participant instead of a passive follower.

CL INVOLVES STUDENTS IN DEVELOPING CURRICULUM AND CLASS PROCEDURES (Kort 1992)

During the collaborative process students are asked to assess themselves, and their groups as well as class procedures. Teachers who are confident in themselves can take advantage of this student input to modify the makeup of groups or class assignments

and alter the mix of lecture and group work according to immediate student feedback. The teacher does not have to wait until the results of the section exam are returned to make alterations which will help the students understand the material. Students who participate in structuring the class assume ownership of the process because they are treated like adults, and their opinions and observations are respected by the authority figure in the class (Meier, M. & Panitz, T., 1996).

Marzano (1992) identifies four specific ways in which students become involved in developing class procedures when cooperative learning is the basis for class processes. The class can identify desired features of the physical environment, such as the arrangement of desks, number and type of breaks that will be taken, the display of classroom accessories to name a few. Students can analyse the affective tone of their groups and suggest activities which will promote positive interactions or deal with conflicts or personality problems within each group. The class may be given responsibility for developing and implementing classroom rules and procedures. Students can help establish and implement rules for physical and psychological safety of their peers, such as a code of conduct which encourages students to respect each other, listen and respond attentively and generally care for their fellow students.

CL PROVIDES TRAINING IN EFFECTIVE TEACHING STRATEGIES TO THE NEXT GENERATION OF TEACHERS (FELDER 1997). As discussed earlier, new teachers are likely to teach using the teaching style they have been exposed to during their education. The primary paradigm at universities is the lecture method combined with a competitive assessment process involving individual exams graded on a curve. If teachers had more exposure and practice using CL methods and were able to observe the significant benefits and student reactions they would be more inclined obtain additional training and to try these techniques in their classes.

CL HELPS STUDENTS WEAN THEMSELVES AWAY FROM CONSIDERING TEACHERS THE SOLE SOURCES OF KNOWLEDGE AND UNDERSTANDING (FELDER 1997)

One reason cited earlier for teacher reticence in adopting CL methods is the fact that professors have spend a lifetime developing their expertise in a subject leading them to feel that their primary function is to impart that knowledge to their students. This after all is how they perceive they learned the subject material when doing their undergraduate studies. In reality teachers become experts in their field when they teach the concepts to others and undertake research activities where they attempt to communicate their findings with their peers. Informal discussion and debate often yields more productive research break throughs than attending lectures.

CL approaches learning from a student centered philosophy by encouraging students to take responsibility for their learning by involving students throughout the class and encouraging their collaboration in group efforts outside of class. The teacher serves as a resource and facilitator rather than as an expert. It is not a passive role for the teacher. CL requires a great deal of planning and preparation on the part of the teacher to develop activities which will help guide students through the curriculum. The effect is to begin to elevate students to the teachers level and create a high expectation that they

have the ability to obtain understand knowledge themselves.

CL FITS IN WELL WITH THE TQM AND CQI MODELS OF EFFECTIVE MANAGEMENT Another benefit to the CL approach is its close relationship to the TQM model. Emphasis in this approach is towards learning how to cooperate in order to achieve the best possible answer or method of approach to a problem. The key is helping learners see the difference between dialogue and discussion. Where dialogue seeks for the best possible information available and discussion tends to focus on who rather than what. Too often learners enter into the job market and then have to relearn how to work together.

CL PROMOTES A LEARNING GOAL RATHER THAN A PERFORMANCE GOAL. Typical teaching paradigms consist of individual student efforts characterized by competitive testing to assess student competence and create an evaluation hierarchy based upon grades. This approach leads to a performance goal as the desired outcome of the educational experience. With CL the primary focus is on the process of learning and how individuals function within groups and independently, but not necessarily competitively. The high level of interaction and interdependence among group members leads to a learning goal instead of a performance goal. CL is student centered versus teacher centered leading to a stronger emphasis on the goal of learning. CL encourages teachers to use alternate assessment techniques further reducing the emphasis on competitive examinations.

CL FITS IN WELL WITH THE CONSTRUCTIVIST APPROACH (Davis, Mahler & Noddings 1990) Only when students formulate their own constructs and solutions are they truly thinking critically. Collaborative techniques create a constructivist approach when students become actively involved in defining questions in their own language and working out answers together instead of reproducing material presented by the teacher or the textbook (Wooley et al 1990).

ALLOWS STUDENTS TO EXERCISE A SENSE OF CONTROL ON TASK (Sharan and Sharan, Gentile 1997)

The interactive, hands on nature of CL exercises places the students in a position of control over the process and encourages them to take full responsibility for the outcome of particular assignments. Students receive training in social skill building, conflict resolution and team management. The locus of control is with the student because the teacher serves as facilitator not director. Students are given a great deal of leeway to decide how they will function and what their group's product will be. CL empowers students to take control over their education.

Classroom results are improved

CL PROMOTES HIGHER ACHIEVEMENT AND CLASS ATTENDANCE (Hagman & Hayes 1986) Students who develop personal professional relations with teachers by getting to know them, and who work on projects outside of class, achieve better results and tend to stay in school (Cooper 1984). Teachers who get to know their students and understand their problems can often find ways of dealing with those problems. They

have a great advantage in formulating ways of assisting their students. Students are often inspired by the teacher who takes the time to get to know them and encourage them to aspire to better performance (Janke 1980). According to (Felder1997) additional benefits occur in that student grades are improved, they show longer retention of information, transfer information better to other courses and disciplines and have better class attendance. There is a strong positive correlation between class attendance and success in courses (Johnson and Johnson 1990) which may help account for the improved performance.

According to Lotan and Benton (1990) "Evaluations of the implementation of the curriculum consistently show that, on average, students in Finding Out/Descubrimiento classrooms (a CL method developed by Elizabeth Cohen(1986, 1991) for use in California schools where ESL is an important factor) demonstrate significantly better learning gains on standardized tests in reading and math, as compared with the normed student population (Cohen and Intilli, 1981, 1982; Cohen and DeVila, 1983; Cohan and Lotan, 1987). Additional studies of the CL methodology known as STAD (Student Teams Achievement Divisions) found that students in this program gained significantly more in mathematics than did control students (Huber, Bogatzki, 1982; Madden and Slavin, 1983, Slavin and Karweit, 1984). Three studies in TGT (Teams Games Tournaments) also found significantly higher achievements in TGT than in control classes (Edwards, DeVries and Snyder, 1972; Edwards and DeVries, 1974; Hulten and DeVries, 1976). Slavin (1978, 1990) reports the largest effects of Student Team Learning methods have been found in studies of TAI (Team Assisted Instruction). Five studies found substantially greater learning of mathematics computation in TAI than in control classes (Slavin, Leavey and Madden, 1984; Slavin and Karweit 1985).

CI PROMOTES A POSITIVE ATTITUDE TOWARD THE SUBJECT MATTER Collaborative learning fosters a higher level of performance by students(Bligh1972). Their critical thinking skills increase and their retention of information and interest in the subject matter improves (Kulick & Kulick 1979). When students are successful they view the subject matter with a very positive attitude because their self esteem is enhanced. This creates a positive cycle of good performance building higher self esteem which in turn leads to more interest in the subject and higher performance yet. Students share their success with their groups, thus enhancing both the individual's and the group's self esteem. Some cooperative learning structures formalize this effect by awarding certificates of achievement or improvement to students, or extra credit to groups for an individual's or group's improvement.

CL INCREASES STUDENT RETENTION Students who are actively involved in the learning process are much more likely to become interested in learning and make more of an effort to attend school (Astin 1977). A class where students interact fosters an environment conducive to high student motivation and participation and student attendance (Garibaldi 1976; Treisman 1985).

CL ENHANCES SELF MANAGEMENT SKILLS (Resnick 1987) Collaborative learning inherently calls for self management by students. In order to function within their groups

they need to come prepared with assignments completed and they must understand the material which they are going to contribute to their group. Students are given training about their responsibilities toward the group and how to be an effective group member. They are also given time to process group behaviors, such as checking with each other to make sure homework assignments are not only completed but understood by each group member. These promotive interactions help students learn self management techniques. From a psychological view CL fosters self efficacy among students. Student self direction is generated in part by the high expectations by the teacher and the high degree of responsibility placed upon the students for their learning

CL INCREASES STUDENTS' PERSISTENCE IN THE COMPLETION OF ASSIGNMENTS AND THE LIKLIHOOD OF SUCCESSFUL COMPLETION OF ASSIGNMENTS (FELDER 1997). When individuals get stuck they are more likely to give up; groups are much more likely to find ways to keep going. This is reinforced by the Johnsons (1990) who state "In a cooperative learning situation, students' goal achievements are positively correlated; students perceive that they can reach learning goals if and only if the other students in the learning group also reach their goals. Thus, students seek outcomes that are beneficial to all those with whom they are cooperatively linked. Students who work together discuss the material with the other group members, explain how to complete the work, listen to each other's explanations, encourage each other to try to understand the solutions, and provide academic help and assistance." All of these activities provide a support mechanism for individual students and encourage the completion of assignments because the potential for success is increased dramatically through the use of CL methods.

Group norms create a powerful dynamic within cooperative behavior (Deutsch 1949). Having norms established by a group instead of being imposed by an outside agent, such as a teacher, increases the likelihood that the norms will be adhered to (Marzano 1992) . This in turn leads to a more positive mental climate within the class and increased student persistence in task completion. When students work together to establish group norms they develop feelings of responsibility for their peers and a sense of camaraderie. Students who might be reluctant to work on a difficult problem alone devote much more energy and time when they do it with others (Costa & O'Leary 1992).

STUDENTS STAY ON TASK MORE AND ARE LESS DISRUPTIVE An enormous hidden benefit of CL is one most attractive to teachers: it negates many forms of student disruptive behavior. As any teacher knows, it is extremely easy for only one (or more) member(s) of an entire class to disrupt class proceeding when the lecture method is employed. In contrast, when students are working in groups, the stage is removed from those who try to act out (Stahl & VanSickle 1992). It is very difficult for an individual to gain the entire class's attention when the class is working in many smaller groups. Within groups intense working is being carried on because more students are involved actively in the process. The CL activities are very focused and often create a high degree of concentration by group members. Thus they will not be distracted by an individual acting out in another group or trying to gain the class's attention.

Hertz-Lazarowitz (1992 p89) studied student behaviors in traditional (teacher-centered_ classrooms. She found that the second most frequent behavior after on-task, noninteractive behavior was off-task, interactive behavior and that this increased with the age of the student. She concluded that "It appears that students engage in such behavior because they need peer interaction in the learning process for their own cognitive and social development. If the context is highly noninteractive, students will look for legitimized and nonlegitimized avenues for interactions.... This off-task interaction is perceived by teachers as an indication of growing discipline problems. For the students, however, it helps fulfill their need for interaction. If interaction is not channeled into legitimate processes, it emerges as social events". (p89-90) Small group cooperative learning structures are mechanisms which provide academic student interactions within social contexts.

CL PROMOTES INNOVATION IN TEACHING AND CLASSROOM TECHNIQUES (Slavin 1980, 1990)

Collaborative learning processes include class warmup activities, name recognition games and group building activities, and group processing. Students work in pairs or larger groups depending upon the task at hand. Group work on content takes many forms, including pairs or groups working on individual questions, problem assignments, projects, study activities, group tests etc. (Panitz 1996). Classes are interesting and enjoyable because of the variety of activities available for use by the teacher. In fact, collaborative learning effectively addresses the "Sesame Street" syndrome in which modern students are used to being exposed to information in short, entertaining sessions. These same students are also used to high tech computer systems which deliver material in a variety of ways including video, text, graphical illustrations, and interactive systems. Collaborative learning effectively matches or exceeds the above approaches to learning by actively involving every student. Bean (1996) points out that CL techniques can be easily integrated with other teaching strategies.

Models appropriate student problem solving techniques

CI FOSTERS MODELLING OF PROBLEM SOLVING TECHNIQUES BY STUDENTS' PEERS (Schunk & Hanson 1985)

Students often learn more by listening to their peers than they do by listening to an authority figure like a teacher (Levin, Glass & Meister 1984). Peers often have a better understanding of what other students don't know or causes them difficulty than the teacher does. The focus is on the student, not the teacher. In addition to shifting responsibility for learning onto students, CI provides an opportunity for students to demonstrate their knowledge by helping their peers (Bargh & Schul 1980), an especially important advantage over the lecture method or class discussion form of teaching.

CL ALLOWS ASSIGNMENT OF MORE CHALLENGING TASKS WITHOUT MAKING THE WORKLOAD UNREASONABLE. (FELDER 1997)

A premiss of CL is the creation of interdependence among group members. This is accomplished by creating mechanisms where students become responsible for each other and for the groups success, as in a Jigsaw procedure. This approach results in group members pooling their

knowledge and resources. Under these conditions it becomes feasible to develop more challenging and advanced activities than would otherwise be possible if students were required to work alone. Longer assignments become attainable when students realize that they may divide responsibility for different aspects of a project. Davidson (1990) points out that "Students in groups can often handle challenging situations that are well beyond the capabilities of individuals at that developmental stage. Individuals attempting to explore those same situations often make little progress and experience severe and unnecessary frustration". Helping groups function well in order to accomplish given tasks is a major component of CL and one of the responsibilities of the professor as facilitator. Once students have been trained to work collaboratively their performance and output increases dramatically.

WEAKER STUDENTS IMPROVE THEIR PERFORMANCE WHEN GROUPED WITH HIGHER ACHIEVING STUDENTS (COHEN 1994) "In studies of collaborative seatwork, Swing and Peterson (1982) found that students of low achievement benefitted from participation in groups heterogeneously composed on achievement in comparison to participation in homogeneously low-achieving groups. Students of average achievement were the only ones not to benefit from their interaction with others of higher or lower achievement." (Cohen 1994) Hooper and Hannafin(1988) reported that low-achieving eighth-grade math students benefitted from working with high-achieving students on a delayed posttest with questions covering factual recall, application and problem solving.

One reason for the improvement may be explained by the intense one on one tutoring which is possible with CL (Felder 1997). Burns (1990) also suggests that with CL there is no waiting for help because it is available from other students or the teacher who circulates among the groups. In addition students are directed to seek help from each other before asking the teacher, relieving the teacher of the tedium of having to give the same directions or information over and over again. Another explanation offered by the Johnsons (1990) is that weaker students are given the opportunity to model the reasoning processes of stronger students as well as preparing each other for tests, checking and correcting homework and helping each other see alternatives.

Vygotsky (1978) found that students were able to solve certain problems, when working cooperatively, prior to being able to solve those problems individually. He hypothesized that the social interaction extended the student's zone of proximal development, the difference between a student's understanding and potential to understand more difficult concepts. The opportunity of students to work with experts increases their ability to solve problems. Thus, when students work cooperatively in groups the more knowledgeable students may lead the less knowledgeable student in the appropriate direction required to understand new concepts.

CL PROVIDES STRONGER STUDENTS WITH THE DEEPER UNDERSTANDING THAT COMES ONLY FROM TEACHING MATERIAL (COGNITIVE REHEARSAL). (FELDER 1997) The process of explaining one's reasoning creates a higher level of conceptual understanding and promotes critical thinking skills. Favorable effects of giving explanations may stem from

what Feltcher (1985) calls cognitive facilitation. In studies on the nature of interactions in CL and regular classes Cohen (1994) reports that "The most consistent, positive predictor of achievement in these studies is the giving of detailed, elaborate explanations (Webb 1983, 1991). In other words, the student who does the explaining is the student who benefits, controlling for how well he or she would have done based on past achievement/ability. Swing and Peterson (1982) also found that high achievers benefitted from participation in heterogeneous groups, especially by giving explanations to others.

CL LEADS TO THE GENERATION OF MORE AND BETTER QUESTIONS IN CLASS. (FELDER 1997) The use of group brainstorming techniques in CL classes create an environment which stimulates questioning by students during class. Felder suggests a procedure where teams of three are asked to take one minute to come up with three good questions about what was just discussed during the class. Groups might be asked to summarize what they have learned and what they still feel they need to work on to gain a better understanding of specific concepts. By sharing this information in a plenary class session the professor and students gain a much better understanding of what they learned and what material needs to be covered in future classes or reviewed through study groups outside of class.

STUDENTS EXPLORE ALTERNATE PROBLEM SOLUTIONS IN A SAFE ENVIRONMENT (Sandberg 1995) Many students are hesitant to speak out and offer opinions publicly in a traditional classroom setting for fear of appearing foolish. When students work in groups, solutions come from the group rather than from the individual. In essence, the focus is removed from the individual, thus diffusing the effects of criticism, even constructive criticism, from any one student. Students can propose ideas and theories to their peers prior to formulating a final response, and then rehearse their presentation in an informal setting. If a group response is the end product, then the entire team becomes responsible for the answer. CL creates a safe, nurturing environment, where students can express themselves and explore their ideas without the fear of failure or criticism. In a lecture format an individual student responds to a question before the entire class without much time to think about his/her answer; such a situation creates a threatening environment.

CL ADDRESSES LEARNING STYLE DIFFERENCES AMONG STUDENTS (Midkiff & Thomasson 1993)

Students working in collaborative classes utilize each of the three main learning styles: kinesthetic, auditory and visual. For example, material presented by the teacher is both auditory and visual. Students working together use their kinesthetic abilities when working with hands on activities. Verbal and auditory skills are enhanced as students discuss their answers together. Visual and auditory modalities are employed when students present their results to the whole class. Each of these learning styles are addressed many times throughout a class in contrast to the lecture format which is mainly auditory and occasionally visual.

Large lectures can be personalized

CL ACTIVITIES CAN BE USED TO PERSONALIZE LARGE LECTURE CLASSES Bean(1996) makes a strong case for the adaptability of WAC exercises and collaborative writing assignments to large lecture classes. By having students work in pairs teachers can overcome some of the limitations created by lecture hall seating arrangements with fixed desks. Even in a large lecture students can be asked to turn to a neighbor and discuss a question posed by the professor, write a consensus summary of the lecture materials, share lecture notes or participate in any number of short collaborative activities. This approach has several benefits. It personalizes the class by creating an interaction among students. It breaks the lecture into more manageable and understandable segments. It places some of the responsibility for the class content with the students instead of it being exclusively with the professor. It helps students reflect upon what they are learning and creates an opportunity for students to ask questions or clarify difficult concepts.

CL CAN BE ADAPTED TO LARGE LECTURES INVOLVING STUDENTS IN INTERACTIVE, CRITICAL THINKING ACTIVITIES DURING CLASS

According to Bean (1996) an advantage of CL is that it can be adapted to large classes. In lecture halls students may be asked to form pairs or small groups by turning around in their seats or working with the student seated next to them. It is nearly impossible to lead a whole class discussion in large lecture classrooms, however it is possible to give students a critical thinking task by having them work with a neighbor for ten minutes or so and then asking representative groups to present and justify their solutions. This technique helps focus student attention on a particular concept or topic, it creates an active learning environment and involves students directly in their own learning, helping them take some responsibility for their learning and that of their peers. Compare this to a lecture where students listen to the instructor, take notes and then leave the class to decipher what was said on their own. This approach also gives the instructor immediate feedback on whether the students have understood the material presented in the lecture.

CL is especially helpful in motivating students in specific curriculum

CL IS SYNERGYSTIC WITH WRITING ACROSS THE CURRICULUM (WAC) Considered individually CL and WAC increase students critical thinking skills and provide numerous other benefits. When combined the benefits are enhanced well beyond the effect of each paradigm. According to Brufee (1993) "Writing enters the collaborative process at several points. In the first place, conversation in consensus groups prepares students to write better on the topic at hand by giving them an opportunity to rehearse and internalize appropriate language. Recorders write reports, and the groups they represent help edit them. Teachers can ask students to write their own essays or reports on the basis of consensus group conversation, or revise what they have already written based upon it." Bean (1996) suggests that "one of the best ways to coach critical thinking- and to promote the kind of talk that leads to thoughtful and elaborated writing- is goal directed use of small groups. Bean(1996) also states "What our students need to understand is that for expert writing, the actual act of writing causes further discovery,

development and modification of ideas." Collaborative learning expands the discovery process, represented in writing activities, by extending it to verbal communication as well.

There occurs a subtle advantage when students peer edit their work in that they can relate to each other better than a teacher can. Gere and Stevens (1985) found that response groups could stay on task and that students attended to the writer's meaning in a way that was more specific than the teacher's comments. (McCarthy & McMahon (1992 p19). Daiute (1989) found that students' individual writing improved as measured by increased elaboration of characters, plot segments, and images. Improvement occurred when there was a balance between playful talk (e.g. role playing, trying out concepts, and using imagery) and controlled talk (e.g. planning, evaluating, labeling, or controlling the writing process) within the collaboration (McCarthy and McMahon (1992)).

When students work on a group writing assignment Saunders (1989) found that co-writers engage in spontaneous, fast-paced, and wide ranging discussions during the planning phase and that interaction during composition involves discussion, conflict and debate focused on reaching consensus.

Cooperative learning is especially useful when writing process models are used as basis for cognitive elaboration by students (Graves 1983). Such models such as CIRC-Cooperative Integrated Reading have been found to be effective in improving creative writing (Hillocks (1984). The variation on cognitive elaboration occurs when students learn how to evaluate others' writing they will become better writer themselves because they more fully understand the criteria for evaluating their writing

CL IS ESPECIALLY USEFUL IN FOREIGN LANGUAGE AND ESL COURSES WHERE INTERACTIONS INVOLVING THE USE OF LANGUAGE ARE IMPORTANT Brufee(1993) emphasizes the idea that learning takes place when individuals move from the society which they are familiar with to the society which they wish to join by learning the vocabulary, language structure, and customs unique to that society. This is true in academic societies which all have their own vocabulary and customs. Working collaboratively is an ideal way to facilitate the acquisition of language and to practice the customs of debate and discussion which occur in a particular academic field such as mathematics or psychology or history. Interacting collaboratively with the professor in and out of class also facilitates the reacclturation process defined by Brufee.

Research conducted using a CL approach (Lotan and Benton, 1990) called Finding Out/Descubrimiento developed by Elizabeth Cohen for use in ESL classes shows significant development in the acquisition of English-language skills by students using the curriculum (DeAvila, 1981; Neves, 1983). Lotan and Benton (1990) further point out that the Finding Out environment for learning language is different from and preferable to the drill and practice of formal language constructions traditionally associated with established ESL training, Researchers (Hatch, 1978, Richie, 1978, Neves, 1983) agree that peer interaction in natural settings is the optimal use of language necessary for

successful acquisition of a second language.

JIGSAW IS AN IDEAL STRUCTURE FOR LABORATORY AND DESIGN PROJECTS (FELDER 1997) In the Jigsaw method individual students develop and share expertise in different aspects of the work. This approach is especially useful in modelling engineering, science, business or other technical careers where the expertise of a variety of individuals may be needed to complete a project using a collaborative approach. In design projects students may develop an expertise in one aspect of the project and teach those concepts and skills to the team. This process benefits all the group members by providing them with an opportunity to teach and learn from their peers. The Jigsaw approach is certainly not limited to technical areas but may be applied to any subject where pieces of information need to be combined to complete the whole project, report or paper etc. Clarke (1994) identifies an important philosophical basis for the Jigsaw approach. She states "Across the world, there is a growing use of heterogeneous work teams, usually through cross-role representation, to draw upon resources of varied specialists within the workplace. Such cross-role teams can create "break the mold" solutions because of the synergy that comes from combining a diversity of thinking and perspectives. All employees, board members, owners, and perhaps clients are acknowledged as valued participants in the ongoing organizational tasks of finding and solving problems."

"The use of the reconstituted work groups in classrooms, such as in the Jigsaw approach, is based on the same principles of interdependence that operate in the cross-team roles in the workplace. Class members bring their personal abilities and ways of thinking and working, as well as specialized knowledge, to analogous cross-role groups. The Jigsaw approach was developed as one way to help build a classroom as a community of learners where all students are valued." (Clarke, 1994)

CL IS ESPECIALLY BENEFICIAL IN MATHEMATICS COURSES. Davidson (1990) points out the following benefits of CL as they apply to mathematics. Math problems can often be solved by several different approaches. Students in groups can discuss the merits of different proposed solutions and perhaps learn several strategies for solving the same problem. Students in groups can help one another master basic facts and necessary computational procedures. These can often be dealt with in the context of the more exciting aspects of mathematics learning through games, puzzles or discussion of meaningful problems. The field of mathematics is filled with exciting and challenging ideas that merit discussion. One learns by talking, listening, explaining, and thinking with others, as well as by oneself. Mathematics offers many opportunities for creative thinking, for exploring open-ended situations, for making conjectures and testing them with data, for imposing intriguing problems and for solving nonroutine problems. Small groups provide a social support mechanism for the learning of mathematics and an opportunity for success for all students in mathematics (and in general). Unlike many other types of problems in life, school mathematics problems can actually be solved in reasonable lengths of time, such as a class period. Mathematics problems are ideally suited for group discussion in that they have solutions that can be objectively demonstrated. Students can persuade one another by the logic of their arguments.

Johnson and Johnson (1990) identify the following attitudinal objectives of CL in mathematics. 1. Positive attitudes toward math, 2. Confidence in one's ability to reason mathematically. 3. Willingness to try various strategies and risk being wrong. 4. Ability to accept frustrations that come from not knowing and willingness to persevere when solutions are not immediate. 5. Attributing failure to not using the right strategy yet, rather than to not being competent. They conclude that "Confidence in one's ability to reason mathematically is considered prerequisite for learning. Once lost, it is difficult to restore."

Social benefits

CL leads to inclusion and better diversity understanding

Develops a social support system for students

CL PROMOTES STUDENT-FACULTY INTERACTION AND FAMILIARITY The collaborative process enables the teacher to move around the class in order to observe students interacting (Cooper 1984). An opportunity is created whereby the teacher can talk to the students directly or in small groups. Teachers may raise questions to help direct students or explain concepts. In addition, a natural tendency to socialize with the students on a professional level is created by approaches to problem solving and about activities and attitudes which influence performance in class. Students often mention offhandedly that they are having difficulties outside of class related to work, family, friends, etc. Openings like this can lead to a discussion of those problems by the teacher and student in a non-threatening way because of the informality of the situation.

CL DEVELOPS SOCIAL INTERACTION SKILLS A major component of cooperative learning elaborated by Johnson, Johnson and Holubec (1984) includes training students in the social skills needed to work collaboratively. Students do not come by these skills naturally. Quite the contrary, in our society and current educational framework competition is valued over cooperation. By asking group members to identify what behaviors help them work together and by asking individuals to reflect on their contribution to the group's success or failure, students are made aware of the need for healthy, positive, helping interactions when they work in groups (Cohen & Cohen 1991).

CL PROMOTES POSITIVE SOCIETAL RESPONSES TO PROBLEMS AND FOSTERS A SUPPORTIVE ENVIRONMENT WITHIN WHICH TO MANAGE CONFLICT RESOLUTION (Johnson and Johnson 1990) Research shows that CL reduces violence in any setting. CL is mentioned in Aggression studies but not promoted heavily because non-coercive pure CL models non-violence, eliminates fear and blame, increases honor, friendliness, quality, and consensus. Process is as important as content and goal. CL takes time, time, time and facilitators who have done the personal work that allows sharing of power,

service to the learners, and natural learning, find CL a joy. Community building is perceived as a threat to those in the control paradigm.

Sherman (1991) makes the following observations from the perspective of psychology. "Most social psychology text books contain considerable discussions about conflict, sometimes instigated by individual or inter-group competition, and its resolution and/or reduction through the use of cooperative techniques. Social Psychologists' interests in intergroup relations are beginning to acknowledge the applications and effectiveness of cooperative learning (Messick & Mackie, 1989). Almost all introductory educational psychology text books (Dembo, 1994; Good & Brophy, 1990; Slavin, 1991; Glover & Bruning, 1990) now contain extended discussions of cooperative pedagogics and their effectiveness with regard to improved racial relations, self-esteem, internal locus of control and academic achievement."

CL CREATES A STRONGER SOCIAL SUPPORT SYSTEM (Cohen & Willis 1985) Collaborative learning uses students' social experiences to encourage their involvement in the learning process. Warmup exercises and group building activities used throughout the course build a social support. The teacher plays a very active role in facilitating the process and interacting with each student. Administrators, school staff and parents become integral parts of the collaboration process, thus building into it many possibilities for support for any individual who develops problems due to influences from outside of the class such as financial, emotional, family problems etc. (Kessler & McCleod 1985)

CL FOSTERS AND DEVELOPS INTERPERSONAL RELATIONSHIPS (Johnson & Johnson 1987) The reliance on base groups to help individuals keep track of each other's performance, the interdependence created by self and group assessment and improvement techniques, and the social nature of collaborative learning processes all combine to improve interpersonal relationships among students. Collaborative learning encourages out of class work by the groups, bringing them together in a combined academic and social experience which continues over long periods of time.

STUDENTS DEVELOP RESPONSIBILITY FOR EACH OTHER In a traditional competitive classroom students are concerned with their individual grades and where they fit into the grade curve (Stahl 1992). Emphasis is placed on doing better than everyone else (Bonoma et al 1974). In the collaborative class the opposite is true. Mechanisms are in place which create interdependence among students and reliance upon others for the group's success. A nurturing atmosphere is created whereby students help each other and take responsibility for their entire group's progress. Group celebration of individual and group performances promote a supportive atmosphere and highlight each student's responsibility to the entire group.

CL Builds diversity Understanding among students and staff

CL BUILDS MORE POSITIVE HETEROGENEOUS RELATIONSHIPS The current educational system rewards students achievement by separating students of differing abilities rather than encouraging students to utilize their abilities to help each other. Collaborative

learning fosters student interaction at all levels (Webb 1980). Research has shown that when students of high ability work with students of lower ability both benefit. The former benefits by explaining or demonstrating difficult concepts which he/she must understand thoroughly in order to do so, and the latter benefits by seeing a concept modelled by a peer. Both observe each other's approaches to problem solving and begin to appreciate their differences (Johnson & Johnson 1985c)

CL ENCOURAGES DIVERSITY UNDERSTANDING (Burnstein & McRae 1962) Understanding the diversity that exists among students of different learning styles and abilities is a major benefit of collaborative learning. Lower level students benefit by modelling higher level students and they benefit by forming explanations and tutoring other students (Swing, Peterson 1982; Hooper & Hannafin 1988). Higher level students benefit by explaining their approaches. Students observe their peers in a learning environment, discuss problem solving strategies and evaluate the learning approaches of other students. Often behaviors which might appear odd when taken out of context become understandable when the opportunity is presented to students to explain and defend their reasoning. For example, Americans signal agreement by nodding vertically while students from India nod horizontally. Very little opportunity exists for students to explain their behavior in a lecture class, whereas in a CL environment discussions of this nature occur continuously. Warmup and group building activities play an important role in helping students understand their differences and learn how to capitalize on them rather than use them as a basis for creating antagonism.

CL FOSTERS A GREATER ABILITY IN STUDENTS TO VIEW SITUATIONS FROM OTHERS' PERSPECTIVES (DEVELOPMENT OF EMPATHY) Students using collaborative learning methods are encouraged to question each other, debate issues and discuss each other's ideas and approaches to answering questions and solving problems. A much deeper understanding of individual differences and cultural differences among students is developed (Yager 1985b). Because students work in a supportive environment where group processing skills are taught, they are much more inclined to accept different approaches than if they work in a competitive, non-interactive system which credits individual effort above team effort (Johnson 1974a, 1975b). Additionally, students are exposed to many more methodologies with CL than those presented by the teacher using a lecture.

CL Helps majority and minority populations in a class learn to work with each other (different ethnic groups, men and women, traditional and non-traditional students (Felder 1997, Johnson & Johnson 1972) Research into the effect of using cooperative learning with students of varied racial or ethnic backgrounds has shown that many benefits accrue from this method (Slavin 1980). Because students are actively involved in exploring issues and interacting with each other on a regular basis in a guided fashion, they are able to understand their differences and learn how to resolve social problems which may arise (Johnson & Johnson 1985b). Training students in conflict resolution is a major component of cooperative learning training (Aronson 1978; Slavin 1991).

CL Establishes a positive atmosphere for modelling and practicing cooperation

CL ESTABLISHES AN ATMOSPHERE OF COOPERATION AND HELPING SCHOOLWIDE (Deutsch 1975, 1985) Most schools celebrate individual student performance through athletics, clubs or extra curricular activities even when these accomplishments are the result of team efforts. In contrast, CL focuses attention on the accomplishments of the group. Students are trained how to interact positively, resolve disputes through compromise and/or mediation and encourage the best performance of each member for the benefit of the group. Teamwork is the modus operandi and intergroup cooperation is encouraged. Even when group competitions are used such as in STAD (Slavin 1987), the intent is to create a positive helping environment for all participants.

STUDENTS ARE TAUGHT HOW TO CRITICIZE IDEAS, NOT PEOPLE (Johnson, Johnson & Holubec 1984) A function of collaborative learning is to help students resolve differences amicably. They need to be taught how to challenge ideas and advocate for their positions without personalizing their statements. They are also taught conflict resolution methods, which are important for real life situations as well as being useful for academic endeavors.

CL CLASSROOMS MAY BE USED TO MODEL DESIREABLE SOCIAL BEHAVIORS NECESSARY FOR EMPLOYMENT SITUATIONS WHICH UTILIZE TEAMS AND GROUPS. Students socialize with family members and friends and work in situations which require team work and group work. Training in collaborative learning followed by group activities and processes provide an environment in which students can practice building good social skills, process beneficial group behavior, and generally observe each other's actions and reactions to their behaviors (Breen 1981).

STUDENTS PRACTICE MODELLING SOCIETAL AND WORK RELATED ROLES In collaborative classes students may be assigned roles in order to build interdependence within the groups. Roles such as reader, recorder, reporter, materials handler, time keeper, skeptic/challenger and others are rotated among group members for each new assignment or project (Johnson, Johnson and Holubec 1984). Students are thus encouraged to develop and practice the skills which will be needed to function in society and the work world (Houston 1991). These skills include leadership, information recording, communication of results orally and in writing, challenging ideas in a constructive manner, obtaining and distributing materials and information to group members, encouraging member participation, brainstorming, meeting deadlines, etc (Sandberg 1995). Wlodowski (1985) observes that, "If students realize the direct applicability of classroom small group problem-solving to their own lives, motivation to learn will show a marked increase." Building strong social characteristics within students can be practiced in a risk free environment with support and training from the teacher.

CL FOSTERS TEAM BUILDING AND A TEAM APPROACH TO PROBLEM SOLVING WHILE MAINTAINING INDIVIDUAL ACCOUNTABILITY (Cooper et al 1984; Johnson, Johnson & Holubec 1984) A major function of collaborative learning is team building. This is accomplished through a variety of techniques used throughout the duration of the semester. During the first few weeks of a collaborative class, warmup activities, getting to

know class members' names, and practice exercises help acclimate students to cooperative learning. As the semester progresses, group building exercises and group processing are important techniques for helping students understand how they are functioning in their groups and what they can do to improve. Regarding individual accountability, at the end of each content section an exam or paper or other assessment mechanism is used to determine how well individual students have mastered the material (Slavin 1983b). Group projects or group tests may be given in addition.. Quizzes during the semester may also be given individually, thus maintaining a strong element of accountability by each group member. Numerous grading schemes exist which bring both elements together such as providing bonus points for group members when the group exceeds its previous group average on a test by a specified amount.

CL PROCESSES CREATE ENVIRONMENTS WHERE STUDENTS CAN PRACTICE BUILDING LEADERSHIP SKILLS. (Johnson & Johnson 1990, Bean 1995) In order to help students learn how to function effectively in groups specific activities need to be employed. One method involves assigning students roles within groups such as reader, recorder, prober, timer, to name a few. The roles are rotated among the group members in order to have each person practice all the roles. The reader is generally considered to be the primary leadership role with responsibility for initially reading the material, ascertaining whether all the group members understand their charge and overseeing the progress of the group, including participation by all members. The recorder also has a leadership role in insuring that the material written represents the groups' thorough analysis of the problem including consensus conclusions and minority reports or dissenting views.

CL INCREASES LEADERSHIP SKILLS OF FEMALE STUDENTS (Bean 1995) Bean states that "Collaborative learning is particularly effective at increasing the leadership skills of female students and for getting male students used to turning to women for help in pressure situations." This benefit is especially important in mathematics classes where men generally try to dominate class discussions and presentations. The Johnsons (1990) point out that "Within cooperative learning situations (compared with competitive and individualistic ones) students tend to like and enjoy math more and be more intrinsically motivated to learn more about it continually. Students are more apt to like and enjoy math and want to take advanced courses when math is taught cooperatively. This is especially important for female and minority students. If large numbers of female and minority students are going to take advanced math courses and enter math-related careers, class mates must encourage and support their doing so."

CL activities tend to equalize interactions between students during class activities and remove the focus on individual students, thus reducing the opportunity for any individual student to dominate a discussion. CL enables the teacher to observe group dynamics and intervene where necessary to encourage participation by all students. If a gender problem does arise the teacher may create an opportunity to address it through group activities followed by a plenary class discussion. Many students are unaware of their behavior when it comes to gender related issues and class behavior.

CL Develops learning communities

CL PROVIDES THE FOUNDATION FOR DEVELOPING LEARNING COMMUNITIES WITHIN INSTITUTIONS AND IN COURSES (TINTO 1997) In his article "Enhancing Learning Via Community", Vincent Tinto makes the following case for using CL to build learning communities. "If universities were serious about enhancing student learning, we would explore other ways of organizing our work. Among several possibilities three spring immediately to mind: First, we should reorganize our curriculum into learning communities which enable student learning to span disciplines. Second, we should reorganize our classrooms to promote collaborative learning experiences within the classroom so that students learn together rather than apart, Third, we should employ forms of classroom assessment that encourage students to engage in a shared discourse with us about their learning and provide them immediate information that they can use to improve their learning. In their most basic form, learning communities are a kind of block scheduling that enables students to take courses together."

The advantages of having students take several courses together combined with CL are found in the benefits listed above and reiterated by Tinto (1997) as follows: "First, students become more actively involved in classroom learning- and as they spend more time learning, they learn more. Second, the new students spend more time learning together. This raises the quality of their learning and everyone's understanding and knowledge is enriched by their working together. Third, these students form social groups outside their classrooms, bonding in ways which increase their persistence in college. Fourth, learning communities enable students to bridge the large divide between social conduct that frequently characterizes student life. They tend to learn and make close friends at the same time. Another advantage: The structure of learning communities for first-year students encourages the two separate fiefdoms of faculty and student services to work closely together with one another in constructing a first-semester curriculum tailored for new students."

CL ACTIVITIES PROMOTE SOCIAL AND ACADEMIC RELATIONSHIPS WELL BEYOND THE CLASSROOM AND INDIVIDUAL COURSE (Bean 1995) There is a significant benefit to CL which is not always apparent because it takes place outside of the classroom. If groups are continued long enough during a course they will get to know each other and extend their activities outside of class. This includes meeting on campus for meals or coffee, forming study groups, getting together at each others homes in the evening and weekends to work on projects or study for exams. Students exchange phone numbers and contact each other to get help with questions or problems they are having. Students will often sign up together for classes in later terms (Bean 1995) and seek out teachers who use CL methods. Students are able to make new friends and establish study groups easier within a collaborative learning environment (Felder 1997).

IN COLLEGES WHERE STUDENTS COMMUTE TO SCHOOL AND DO NOT REMAIN ON CAMPUS TO PARTICIPATE IN CAMPUS LIFE ACTIVITIES, CL CREATES A COMMUNITY ENVIRONMENT WITHIN THE CLASSROOM. Community colleges and many four year colleges are primarily commuter schools. Students do not remain on campus for extracurricular or social activities. Many students have jobs and/or family pressures

which also limit their ability to participate in a campus life. Thus it falls to the classroom teacher to create an atmosphere of community through interactions between students. Based upon the previous discussions of the social benefits of CL it is clear that creating a community of learners is easily accomplished using CL techniques. The traditional lecture method does not provide opportunities for students to socialize in an academic setting. Quite the contrary, lecturing creates a passive, solitary atmosphere where competition is the rule and collaboration is discouraged. Some professors consider collaboration among students cheating or plagiarism. CL brings students together to develop support mechanisms similar to self help groups in their local communities.

CL HELPS TEACHERS CHANGE THEIR ROLES FROM THEIR BEING THE FOCUS OF THE TEACHING PROCESS TO BECOMING FACILITATORS OF THE LEARNING PROCESS. THEY MOVE FROM TEACHER-CENTERED TO STUDENT-CENTERED LEARNING (Hertz-Lazarowitz 1992)

Cooperative learning paradigms represent a philosophy of life as well as a learning strategy. It says that whenever people get together in groups their purposes are best served when they work together collaboratively to reach their goals versus using competition among group members to address problems. Cooperative learning paradigms embody the learning community philosophies. Our current educational system, however, is based upon competition among students for grades, scholarships, admissions to top schools and social recognition, etc. In order to change this paradigm, cooperative learning structures will need to be introduced at the earliest learning situations and used throughout each student's learning career starting in preschool and continuing through Kindergarten and higher education. In order to accomplish this change in student behavioral attitudes teachers will need to adopt a new role. They will need to step down from the podium and switch from lecturing to facilitating student interactions in class. There are many varieties of cooperative learning structures including Problem or Project Based Learning, collaborative learning, cooperative structures, to name a few. Teachers need not be locked into one approach, which may or may not suit their particular personality type. In addition, lecturing is not ruled out entirely in the cooperative philosophy. It is used sparingly, however, to emphasize a point or clarify a concept, and is generally used in response to student initiated inquiries, versus teacher initiated lectures. Training in cooperative learning approaches includes the development of support structures among teachers and ongoing faculty development by experts in the field and eventually teacher's peers. A well developed system will become self sustaining over time. Finally, cooperative approaches are never static. Just as the cooperative approach benefits students in so many ways so does it benefit teachers through the sharing of ideas, brainstorming and critical thinking about problems which arise with the cooperative approach. Effective cooperative teachers are continually modifying their activities and adopting new structures to deal with different classroom situations and populations. This is an aspect of cooperative learning which can be especially rewarding to teachers.

Psychological benefits

Student Centered Instruction Increases students' Self Esteem

CL BUILDS SELF ESTEEM IN STUDENTS (Johnson & Johnson 1989) Collaborative efforts among students result in a higher degree of accomplishment by all participants as opposed to individual, competitive systems in which many students are left behind (Slavin 1967). Competition fosters a win-lose situation where superior students reap all rewards and recognition and mediocre or low-achieving students reap none. In contrast everyone benefits from a CL environment. Students help each other and in doing so build a supportive community which raises the performance level of each member (Kagan 1986). This in turn leads to higher self esteem in all students (Webb 1982).

CL ENHANCES STUDENT SATISFACTION WITH THE LEARNING EXPERIENCE By their very nature people find satisfaction with activities which value their abilities and include them in the process. Effective teams or groups assume ownership of a process and its results when individuals are encouraged to work together toward a common goal, often defined by the group. This aspect is especially helpful for individuals who have a history or failure (Turnure & Zeigler 1958) Passive educational experiences where the student is the receptacle for information presented by the expert teacher are inherently dissatisfying.

CL PROMOTES A MASTERY ATTRIBUTION PATTERN RATHER THAN HELPLESS ATTRIBUTION PATTERN In a typical classes students are given lectures, complete assignments outside of class, and take an exam to demonstrate their knowledge retention of the subject matter. The exams are returned and new material is covered, repeating the process over and over. There is little time for reflection and discussion of students' errors or misconceptions. With the CL paradigm students are continuously discussing, debating and clarifying their understanding of the concepts and materials being considered during the class. They are constructing their own knowledge base. Assessment may vary from individual activities such as tests or oral reports to group tests or projects. The emphasis is on understanding the material as evidenced by the student's ability to explain ideas to their peers. This leads to a sense of mastery of content versus a passive acceptance of information from an outside expert which promotes a sense of helplessness and reliance upon others to attain concepts.

CL ENCOURAGES STUDENTS TO SEEK HELP AND ACCEPT TUTORING FROM THEIR PEERS Students are often reluctant to seek out extra help or tutoring from their peers because help-seeking is interpreted negatively as an indicator of dependency (Hertz-Lazarowitz et al 1992). Beller(1955) points out that help-seeking may lead to self-perceptions of low ability, embarrassment, or feeling of indebtedness. Hertz-Lazarowitz et al(1992) identify additional research in social psychology which indicates that students show a decreased liking toward helpers; negative feelings are generated when students do not see opportunities to reciprocate the help; helping activities reflect adversely upon an person's intelligence.

Hertz-Lazarowitz(1992) point out that "It is important to note, however, that Cook and Pelfrey (1985) found that a person who received help when working as a member of a cooperative group expressed more liking for a teammate who provided help." Cook and Pelfrey surmise that this effect occurs because group settings create norms of responsibility toward teammates which minimizes the negative effects that ordinarily occur when one is unable to reciprocate help that is received . In addition group members often have opportunities to help each other thus reducing the perception of one way help. Members of groups recognize their importance to the group and contributions they may to their peers. Nelson-LeGall (1992) states that "Help-seeking, particularly the seeking of information, is valued more positively than volunteering information in cooperative work conditions; these evaluations are reversed, however, in competitive work conditions." Further "In small cooperative learning groups, students may consult, question, explain, and monitor one another, multiplying the number of helpers and learning opportunities available." Leikin et al (1992) found that students in cooperative math classes in middle schools requested help from their peers frequently, as reported in a self report questionnaire, despite their normal reluctance to do so and they received more help than they actually requested from their peers. This was attributed to the experimental learning environment which encouraged them to ask for help and give help to their peers.

Nelson-LeGall (1992) states "When children are able and willing to take the initiative to gain assistance of more mature and expert others, they can participate, in a supportive social context, in the interrogatory process that mature learners employ to construct the relevant contextual knowledge for task solution" (p52) Compare this to the lecture class where the teacher is the only legitimate helper. Students seeking help during the delivery of a lecture might appear to be inattentive or worse yet ignorant of the lecture content. Students will generally wait passively for a more opportune time to raise questions about lecture material. Nelson-Legall observed students in mathematics classes and noted that "student spent most of their time in whole-class or individual seatwork activities. However, students in need of help were most likely to seek help by asking questions and requesting explanations when in small cooperative learning groups. In small cooperative learning groups, students may consult, question, explain, and monitor one another, multiplying the number of helpers and learning opportunities available". (p64)

Webb (1992) points out that students who do not seek help, even though they may be having trouble with course content or concepts and do need help, may still benefit from group interactions and learn the material by observing the group and seeing the strategies used by their peers as helping occurs within the group. Students can compare their learning strategies and work habits with other students and make changes simply by observing the questioning and answering process which occurs as students help each other.

Veeder (1985) identified five variables which are important for determining whether students will benefit from the help they receive. Each item is supported by cooperative learning structures. First is the timeliness of the help offered. When students are working in groups they have an opportunity to ask questions and seek help immediately, either

from their peers or from the teacher. Their questions will be directly related to the content being studied. Second is the relevance of the help to a student's need for help. During cooperative activities students are focused upon a specific concepts or information. Students tend to seek help which is directly related to answering questions or solving problems being studied. They may redefine and re-ask their questions depending upon the response they receive from the helper. Third is the amount of detail or elaboration in the help given. As students learn how to work together in groups the amount of explanation grows as members question each other, discuss and debate concepts, and work toward a consensus on how to approach a problem or learn content material. There are many more opportunities to ask questions and answers each other's questions than could occur in a lecture or whole class discussion. Fourth is whether the help is understood by the person receiving it. In cooperative groups students observe each other and can respond to each other immediately. If they see that a student has not understood a concept they may try explaining it again or try a different approach. The students being helped can help the tutor in this process by verbalizing their misunderstandings or rephrasing their questions. Students are more likely to understand the nature of their fellow students misunderstandings because they are able to relate to them better than the teacher might. Fifth is whether the student who receives help has an opportunity to solve the problem and uses that opportunity. Cooperative structures call for students to work on problems or answer questions during class. The feedback is immediate and all students in the group work on solving problems, answering each other's questions and developing strategies for future problem solving. The teacher may observe groups and make suggestions in order to insure that all students are participating in the activity.

Cooperation Reduces Anxiety

CLASSROOM ANXIETY IS SIGNIFICANTLY REDUCED WITH CL (Kessler, Price & Wortman 1985). In a traditional classroom when a teacher calls upon a student, he/she becomes the focus of attention of the entire class. Any mistakes or incorrect answers become subject to scrutiny by the whole class. Such experiences produce embarrassment and anxiety in many students. In contrast, in a CL situation, when students work in a group, the focus of attention is diffused among the group. When an answer is presented to the class it represents the work of the entire group; therefore no single individual can be held up to criticism. In addition, the group produces a product which its members can review prior to presenting it to the whole class, thus diminishing prospects that mistakes will occur at all (Slavin & Karweit 1981). When a mistake is made, it becomes a teaching tool instead of a public criticism of an individual student. Coincidentally, the general class attitude is one of cooperation and nurturing, not criticism.

TEST ANXIETY IS SIGNIFICANTLY REDUCED (Johnson & Johnson 1989) Competition increases anxiety and makes people feel less able to perform. CL creates the opposite response from students. It provides many opportunities for alternate forms of student assessment as described above. This situation leads to a reduction in test anxiety because the students see that the teacher is able to evaluate how they think as well as what they know. Students are not locked into a testing format which requires

memorization and reproduction of basic skills. Through the interactions with students during each class, the teacher gains a better understanding of each student's learning style and how he/she performs. An opportunity is thus afforded to provide extra guidance and counseling for the students or to establish alternate forms of assessment. This type of interaction is completely lacking in a lecture class.

CL Develops positive attitudes towards teachers

CL CREATES A MORE POSITIVE ATTITUDE TOWARD TEACHERS, PRINCIPALS AND OTHER SCHOOL PERSONNEL BY STUDENTS AND CREATES A MORE POSITIVE ATTITUDE BY TEACHERS TOWARD THEIR STUDENTS The level of involvement of all the participants in a collaborative system is

very intense and personal. Students get to know teachers personally. Teachers learn about student behaviors because students have many opportunities to explain themselves to the teacher. Lines of communication are opened and actively encouraged. Teachers have more opportunities to explain why policies are established and the system allows students to have more input into establishing policies and class procedures. The empowerment created by the many interpersonal interactions leads to a very positive attitude by all parties involved

CL SETS HIGH EXPECTATIONS FOR STUDENTS AND TEACHERS Being made responsible for one's learning and for one's peers presumes that each student has that capability. Inherently high expectations are established for students. By setting obtainable goals for groups and by facilitating group interaction teachers establish high expectations which become self fulfilling as the students master the collaborative approach, learn how to work well together in teams and demonstrate their abilities through individual tests and a variety of other methods. Higher self esteem and higher expectations are the outcomes.

Alternate student and teacher assessment techniques

Collaborative teaching techniques utilize a variety of assessments

CL PROVIDES A BASIS FOR ALTERNATE FORMS OF ASSESSMENT (Rosenshine & Stevens 1986) SUCH AS OBSERVATION OF GROUPS (PANITZ AND PANITZ (1997), GROUP SELF ASSESSMENT (JOHNSON & JOHNSON 1987), AND SHORT INDIVIDUAL WRITING ASSESSMENTS (ANGELO AND CROSS 1993) Collaborative learning provides the teacher with many opportunities to observe students interacting, explaining their reasoning, asking questions and discussing their ideas and concepts (Cooper 1984). These are far more inclusive assessment methods than relying on written exams only (Cross & Angelo

1993). In addition, group projects provide an alternative for those students who are not as proficient in taking written tests based upon content reproduction. Also, group tests give students an alternate way of expressing their knowledge, by first verbalizing their solution to their partner or group prior to formalizing a written response.

There are many benefits to observing students at work in groups with their peers.

1. You can observe a student working through a complete problem or assignment versus seeing only the final product (exam or paper). 2. You can observe their reasoning techniques, level of basic knowledge, and concept attainment. 3. You can identify their dominant learning style by observing whether their presentation in pairs or groups

is oral, visual or kinesthetic. This information can be invaluable if you help tutor the student in or out of class. (As an aside, cooperative learning lends itself to using multiple learning style presentations throughout each class). 4. Brief, specific interventions are possible by the teacher or other students to provide help and/or guidance for students having difficulties. 5. Informal conversations take place between individuals, groups and the teacher which help highlight problem areas the entire class may be having. These discussions also help create class environment which is more personal, as students get to know the teacher and the teacher learns about the students. 6. Shy students will participate more with their peers in small groups than in a large class and they too can be observed. It is very helpful to identify students who are shy in order to encourage their participation in non-threatening ways.

Standardized tests using multiple choice, true false, fill in the blanks or essay questions provide a limited basis for understanding and evaluating student performance. These methods deal primarily with factual information, rote memory and perhaps some critical thinking through an essay. What is needed in addition to these historic assessment techniques are methods for understanding students' affective learning skills and a variety of student learning styles. The "One Minute Paper", developed by Weaver and Cottrell(1985), modified by Wilson(1986), and popularized by Cross and Angelo (1988) provide an excellent addition to our repertoire of assessment techniques.

Johnson and Johnson (1987) have developed a series of worksheets which may be used to record the number and quality of each group members interactions. They also have devised formal procedures for groups to analyse their behavior with an eye toward improvement. At the end of an activity the group answers questions such as "What three things did we do well today?" and "What one thing could we do better next time?". This type of questioning helps students learn to reflect upon their groups' social interactions as well as activity content.

CL PROVIDES INSTANTANEOUS FEEDBACK TO STUDENTS AND THE TEACHER ON THE EFFECTIVENESS OF EACH CLASS AND THE PROGRESS STUDENTS ARE MAKING BY OBSERVING STUDENTS WORKING IN GROUPS AND INDIVIDUALLY Cooperative learning activities present teachers with unique opportunities to observe students interacting, explaining their theories, arguing for a particular point of view, helping their peers and

being helped. Only a few minutes of observation during a class period can provide significant insights into a student's ability and performance level. The feedback provided is immediate as it is made during each class at the time the observation is made or shortly thereafter.

In using observations it is possible to look for a hierarchy of abilities similar to Bloom's taxonomy by asking the following questions about the students: 1. Do they know the basics- definitions, formulas, vocabulary, rules, and procedures needed to analyse and solve problems? 2. Can they apply their knowledge to similar problems or questions? 3. Are they able to extend their reasoning and analysis to new situations or problems? 4. Can they create their own problem statements or questions based upon the underlying concepts being studied? 5. Can they explain their reasoning in writing or verbally to their peers? By asking each of these questions one can identify the stage of development the student has reached and make recommendations as to what material and procedures the student might apply to help him/her understand the concepts better. .

The benefits of using observations as an assessment tool to help students understand when they have mastered course material are numerous. This approach reduces anxiety markedly, raises students' self esteem, puts them in control of their own destiny and emphasizes that they are responsible for their own learning The results they obtain are based upon their efforts, not the teacher's.

GROUPS ARE EASIER TO SUPERVISE THAN INDIVIDUAL STUDENTS Denis Lander(1995) points out that an obvious advantage of CL is that six groups are easier for a staff member to supervise than thirty individual students. Groups may be monitored for their progress through the use of worksheets or exercises which require an end product. Teachers can observe students working on assignments together and individually within their groups. When students work alone it is very difficult for the teacher to observe most of the students during a class. This is especially true in large classes. Quite the contrary, when students are working collaboratively on an assignment it is easy for the teacher to watch individual students perform. Teacher intervention is also possible when CL is the favored paradigm. Teachers may raise questions, make observations, or suggestions based upon the group's interactions and progress. With the lecture format there is little opportunity for these types of student-teacher interactions and student-student interactions.

Slavin (1992) looks at the classroom perspective of cooperative learning and points out that when students take responsibility for managing themselves in cooperative groups the teacher is freed up to attend to more essential tasks such as working with small groups or individual students. This is especially helpful in writing classes. By having students respond to each other's writing and do peer editing the teacher does not have to evaluate several drafts from each student. The teacher can focus on helping students develop the criteria used to evaluate each other's work, present the criteria to the students that the teacher wishes to be met and work with individual students if necessary.

REFERENCES

Ames, G.J., & Murray, F.B., (1982), "When two wrongs make a right: promoting cognitive change by social conflict", *Developmental Psychology* v18, p894-897

Aronson, E., Blaney, N., Stephan, C., Sikes, J., Snapp, M. (1978) " The Jigsaw Classroom", Beverly Hills, CA: Sage Publications

Astin, A.W. (1977) "Four critical years: Effects of college beliefs, attitudes and knowledge", San Francisco, CA: Jossey-Bass

Baird, J., White, R. (1984) " Improving learning through enhanced metacognition: A classroom study", Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA 1984

Bargh, J., Schal, Y. (1980) "On the cognitive benefits of teaching" *Journal of Educational Psychology* 72 pp593-604

Bean, John (1996) "Engaging Ideas, The professor's Guide to Integrating Writing, Critical Thinking, and Active learning in the Classroom", San Francisco, CA: Jossey-Bass

Beller, E., (1955) "Dependency and independence in young children", *Journal of Genetic psychology*, 87 p23-35

Bershon, B.L., (1992), "Cooperative problem solving: A link to inner speech", in Hertz-Lazarowitz (Eds.) *Interaction In Cooperative Learning* , pp36-48 NY,NY: Cambridge Press

Bligh, D.A. (1972) " What's the use of lecture? Karmondsworth, England: Penguin

Bonoma, J., Tedeschi, J., Helm, B. (1974) "Some effects of target cooperation and reciprocated promises on conflict resolution" *Sociometry* 37 p251-261

Breen, P. (1981) "76 Career-related liberal arts skills" *AAHE Bulletin* 34(2)

Brown, A., & Palinscar, A. (1989), "Guided, cooperative learning and individual knowledge acquisition", in L. Resnick (Ed.) *Knowing, Learning, and Instruction* , pp393-451, Hillsdale, NJ: Erlbaum

Brufee, K., (1993), " Collaborative learning: Higher education, interdependence and the authority of knowledge", Baltimore, MD: Johns Hopkins University Press

Burns, M. (1984), "The Math Solution". Marilyn Burns Education Associates publishers,

reprinted in "Cooperative Learning in Mathematics" Neil Davidson editor, 1990

Burnstein, E., McRae, A. (1962), "Some effects of shared threat and prejudice in racially mixed groups." *Journal of Abnormal Social Psychology* 64 pp257-263

Clarke, J., (1994), "Pieces of the puzzle: The Jigsaw method" "Handbook of Cooperative learning Methods", Shlomo Sharan ed. Greenwood Press

Cohen, E.G., (1986), "Designing Group Work". NY,NY: Teachers College Press

_____ (1991), "Finding Out/Descrubrimiento: Complex Instruction In Science" Cooperative Learning 1:30-31

_____ (1994), "Restructuring the classroom:Conditions for productive small groups", Review of Educational Research Spring 1994 vol 64 #1 pp1-35

Cohen, B.P., Cohen, E.G. (1991) "From groupwork among children to R & D teams: interdependence, interaction and productivity" in E.J. Lawler (Eds.)

Advances in Group Processes vol 8 pp205-226 Greenwich,CN:JAI

Cohen, E.G. & Intilli, J.K., (1982), "Interdependence and management in bilingual classrooms", Final report II (NIE contract #NIE-G-80-0217) Stanford:Stanford University Center for Education Research

Cohen, E.G. & Lotan, R.A., (1987), "Application of sociology to science teaching: Program for complex instruction", Paper presented at the national Association for Research on Science Teaching, April 1987, Washigton, D.C.

Cohen, S., & Willis, T. (1985) "Stress and social support and the buffering hypothesis", Psychological Bulletin 98 pp310-357

Cook, S.W., Pelfrey, M., (1985) "Reactions to being helped in cooperating interracial groups. A context effect." Journal of Personality and Social Psychology, 49(5) p1221-1245

Cooper, J., Prescott, S., Cook, I., Smith, L., Mueck, R., Cuseo, J., (1984) "Cooperative learning and college instruction- Effective use of student learning teams" California State University Foundation publication pp41-65

Costa, A.L., & O'Leary, P.W., (1992)"Co-Cognition- The cooperative development of the intellect" in Davidson and Worsham (Eds.), Enhancing Thinking Through Cooperative learning, NY,NY: Teachers College Press

Cross, P.K., Angelo, T., (1988, 1993 2nd ed.) " Classroom Assessment techniques: A Handbook for faculty" San Francisco, CA: Josey-Bass

Daiute, C., (1989), "Play as thought:Thinking strategies of young writers", Harvard Educational Review, v59 n1 p1-23

Dansereau, D.F., (1985), "Learning strategy research" in Chipman & Glaser (Eds.) Thinking & Learning Skills: Relating Instruction to Basic Research Vol. 1 Hillsdale, NJ: Erlbaum

Davidson, N. (Ed.) (1990), " Cooperative Learning in Mathematics: A Handbook for Teachers", Menlo Park, CA: Addison-Wesley

Davis, R. B., Maher, C.A., Noddings, N. (Eds) (1990) "Constructivist views on the teaching and learning of mathematics" Journal for Research in Mathematics Education by National Council of Teachers of Mathematics

DeAvila, E., (1981), "Multicultural improvement of cognitive abilities: Final report to the State of California, Department of Education, Stanford, CA", Stanford University School of education

Dees, R.L., (1991), "The role of cooperative learning in increasing problem-solving ability in a college remedial course", *Journal for Research in Mathematics Education* v22 n5 409-421

Dembo, M.H., (1994), "Applying Educational Psychology in the Classroom" 4th ed. NY, NY:Longman

Deutsch, M., (1949), "A Theory of Cooperation and Competition", *Human Relations*, v2 pp129-152

_____ (1975) "Equity, equality and need: What determines which value will be used as the basis of distributive justice" *Journal of Social Issues* 31 pp137-149

_____, (1985) "Distributive Justice, A Social Psychological Perspective"

New Haven, CN:Yale Univ. Press

Devries, D.L., Slavin, R.E. (1978) Teams-Games-Tournament: Review of Ten classroom experiments" *Journal of Research and Development in Education*, 12 Fall 1978 pp28-38

Edwards, K.S. & Devries, D.L., (1974), "The effects of Teams-Games-Tournamnts and two structural variations on classroom process, student attitudes and student achievement", Report #172, Center for Social organization of Schools", The Johns Hopkins University

Edwards, K.J., DeVries, D.L., Snyder, J.P., (1972), "Games and teams:A winning combination", *Simulations and Games* 3, pp247-69

Felder, R.M., (1997). e-mail communication from felder@eos.ncsu.edu WWW page
<http://ww2.ncsu.edu/unity/lockers/users/f/felder/public/rmf.html>

Flethcher, B., (1985), "Groups and individual learning of junior high school children on a micro-computer-based task", *Educational Review* 37, pp252-261, 1985

Fogarty, R., & Bellanca, J., (1992), "The new school "lecture": Cooperative interactions that engage student thinking", p84-100, in Davidson and Worsham (Eds.), *Enhancing Thinking Through Cooperative Learning* , NY, NY: Teachers College Press

Garibaldi, A. (1976) "Cooperation, competition and locus of control in Afro-American students" Doctoral Dissertation, Univ. of Minn.

Gere, A.R., & Stevens, R., (1985), "The language of writing groups: How oral response shapes revision" in Freedman (Eds.) *The Acquisition of Written Language: Response & Revision*, pp85-105, Norwood, NJ: Ablex

Glovér, J.A., & Bruning, R.H., (1990), "Educational Psychology: Principles and Applications" 2nd ed. Boston: Little Brown

Good, T.L., & Brophy, J.E., (1990), "Educational Psychology" 3rd Ed., NY,NY:Longman

Graves, D. (1983), *Writing: Teachers and Children At Work*, Exeter, NH: Heinemann

Hagman, J., Hayes, J. (1986) "Cooperative learning: Effects of task, reward, and group size on individual achievement" Technical report 704, Scientific Coordination Office, US Army Research Institute for the

Behavioral Sciences, ERIC document #278720

Hall, R.H., Rocklin, T.R., Dansereau, D.F., Skaggs, L.P., O'Donnell, A.M., Lambiotte, J.G., & Young, M.D., (1988), "The role of individual differences in the cooperative learning of technical material", *Journal of Educational Psychology*, v80, pp172-178

Hatch, E.M. edition (1978), "Second language acquisition: A book of readings", Rowley, MA: Newbury House publishers

Hertz-Lazarowitz, R., Kirkus, V., Miller, N., (1992) "An overview of the theoretical anatomy of cooperation in the classroom" p3-4 in Hertz-Lazarowitz Ed. *Interaction in Cooperative Groups: The theoretical Anatomy of Group Learning* NY, NY: Cambridge University Press

Hillocks, G., (1984), "What works in teaching composition: A meta-analysis of experimental treatment studies", *American Journal of Education*, v93 pp133-170

Hooper, S., Hannafin, M.J. (1988) "Cooperative CBI: The effects of heterogeneous vs homogeneous grouping on the learning of progressively complex concepts" *Journal of Educational Computing Research* 4 p413-424

Houston, L.S. (1991), "Collaborative learning: Preparing for industry, a no-lecture method of teaching English" *ATEA Journal* Dec-Jan 1991-92

Huber, G.L., & Bogatzki, W., (1992), "Kooperation als Ziel Schulschen Lehrens und Lerner",

Tubingen, West germany: Arbeits bereich Padagogische Psychologie der Universitat Tubingen

Hulten, B.H., & deVries, D.C., (1976), "Team competition and group practice: Effects on student achievement and attitudes". Report No. 212- Center for Social Organization of Schools, The Johns Hopkins University

Janke, R. (1980) "Computational errors of mentally-retarded students" *Psychology in the Schools* 17 pp30-32

Johnson, D. W. (1971) "Effectiveness of role reversal: actor or listener", *Psychological Reports* 28 pp275-282

_____, (1973) "Communication in conflict situations: A critical review of the research", *International Journal of Group Tensions* 3 pp46-67

_____, (1974) "Communication and the inducement of cooperative behavior in conflicts: A critical review" *Speech Monographs* 41 pp64-78

_____, (1975a) "Cooperativeness and social perspective taking", *Journal of Personality and Social Psychology* 31 pp241-244

_____, (1974b) "Affective perspective taking and cooperative predisposition" *Developmental Psychology* 11 pp869-870

Johnson, R.T., Johnson, D.W., (1972), "The effects of other's actions, attitude similarity, and race on attraction toward others" *Human Relations*, 25(2)

_____. (1979), "Conflict in the classroom: Controversy and learning", *Review of Educational Research*, v49 p51-70

_____. (1985b), "Relationships between black and white students in intergroup cooperation and competition", *The Journal of Social Psychology* 125(4) pp421-428

_____. (1985c), "Mainstreaming hearing impaired students: The effect of efforts in communicating on cooperation.", *The Journal of Psychology* 119(1)

_____. (1987) "Learning Together and Alone: Cooperative, Competitive and Individualistic Learning" 2nd ed. Englewood Cliffs, NJ: Prentice Hall

_____. (1987b), "Creative Conflict", Edina MN: Interaction Book Co.

_____. (1989), "Cooperation and Competition Theory and Research". Edina, MN: Interaction Book

_____. (1990), "Using cooperative learning in math", chapter in *Cooperative Learning In Math*", Neil Davidson ed, 1990

_____. (1992), "Encouraging thinking through constructive controversy", in Davidson and Worsham (Eds.) *Enhancing Thinking Through Cooperative Learning*, NY, NY: College Teachers Press

Johnson, D.W., Johnson, R.T., Holubec, E.J., (1984), "Cooperation in the Classroom", Edina, MN: Interaction Book Co.

_____. (1984, 1990), "Circles of Learning" Edina, MN: Interaction Book Co.

_____. (1988, 1992), "Advanced Cooperative Learning- Revised" Edina, MN: Interaction Book Co.

Johnson, D.W., Johnson, R.T., Roy, P., Zaidman, B., (1985) "Oral interaction in cooperative learning groups: Speaking, listening and the nature of statements made by high, medium and low-achieving students" *Journal of Psychology* 119 pp303-321

Johnson, D.W., Johnson, R.T., & Stanne, M. (1986), "Comparison of computer assisted cooperative, competitive and individualistic learning", *American Educational Research Journal*, 23(3), 382-92

Kagan, S. (1986), "Cooperative learning and sociological factors in schooling" in "Beyond language: Social and cultural factors in schooling language minority students", Los Angeles, CA: California State University Evaluation, Dissemination and Assessment Center

Kagan, S. (1989), "Cooperative Learning Resources for Teachers" San Juan Capistrano, CA: Resources for Teachers

Kessler, R., McCleod, J., (1985) "Social support and mental health in community samples" in Cohen and Syme (Eds.) "Social Support and Health" New York, NY: Academic Press

Kessler, R., Price, R., Wortman, C. (1985), "Social factors in psychopathology: Stress, social support and coping processes" *Annual Review of Psychology* 36 pp351-372

Kort, M.S., (1992) "Down from the podium" in "New Directions for Community Colleges", San Francisco, CA:

Josey-Bass

Kulik, J.A., Kulik, C.L., (1979), "College Teaching" in Peterson and Walberg (Eds.) " Research in Teaching: Concepts, findings and implications", Berkeley, CA: McCutcheon Publishing

Lander, D., Walta, A., McCorrison, M., Birchall, G., (1995), "A Practical Way of Structuring Teaching for Learning", Higher Education Research and Development, vol 14, No.1 pp47-59

Larson, C.O., Dansereau, D.F., Hythecker, V.I., O'Donnell, A.M., Young, M.D., Lambiotte, I.G. & Rocklin, T.R., (1986), "Technical training: An application of a strategy for learning structural and functional information", Contemporary Educational Psychology, v11 pp217-228

Leikin, R., Zaslavsky, O., (1997) "Facilitating student interactions in mathematics in a cooperative learning setting", p350, Journal of research in Mathematics Education, v28 n3, p331-359

Levin, H., Glass, G., Meister, G., (1984), " Cost-effectiveness of Educational Interventions", Stanford, CA: Institute for Research on Educational Finance and Governance

Lotan, R.A., & Benton, J. (1990), "Finding out about complex instruction: Teaching math and science in heterogeneous classrooms". in "Cooperative learning in mathematics", Neil Davidson edition

Madden, N.A., & Slavin, R.E. (1983), "Effects of CL on the social acceptance of mainstreamed academically impaired students", Journal of Special education, v17 pp171-82

Male, M., (1990), "Cooperative learning and computers in the elementary and middle school math classrooms", in "Cooperative learning in Mathematics", Neil Davidson ed.

Marzano, R.J., (1992), "The many faces of cooperation across the dimensions of learning", in Davidson & Worsham (Eds.), Enhancing Thinking Through Cooperative Learning , NY, NY: Teachers College Press

Meier, M., & Panitz, T., (1996), "Ending on a high note: Better endings for classes and courses". College Teaching, Fall 1996

McCarthy, S.J., & McMahon, S., (1992), "From convention to invention: Three approaches to peer interactions during writing", in Hertz-Lazarowitz & Miller (Eds.) Interaction In Cooperative Groups NY,NY: Cambridge University Press

McDonald, B.A., Larson, C.O., Dansereau, D.F., & Spurlin, J.E., (1985), "Cooperative learning: Impact on acquisition of knowledge and skills", Contemporary Educational Psychology, v10, pp369-377

Messick, D.M., & Mackie, D.M. (1989), "Intergroup relations", Annual Review of Psychology No 40

Midkiff, R.B., Thomasson, R.D. (1993), " A Practical Approach to Using Learning Styles in Math Instruction", Springfield, IL: Charles Thomas Pub.

Nelson-LeGall, S., (1992) "Children's instrumental help-seeking. It's role in the social acquisition and construction of knowledge", in Lazarowitz Ed. Interaction in Cooperative groups: Theoretical Anatomy of Group Learning, p120-141, NY,NY: Cambridge University Press

Neves, A.H., (1983), "The effect of various input on the second language acquisition of Mexican-American

children in nine elementary classrooms", PhD Dissertation, Stanford University

Nystrand, M., (1986), "Learning to write by talking: A summary of research on intensive peer review in expository writing at the University of Wisconsin, Madison", in Nystrand (Eds.) *The Structure of Written Communication* pp79-211, Orlando, FL: Academic Press

O'Donnell, A.M., & Dansereau, D.F., (1992), "Scripted cooperation in student Dyads: A method for analysing and enhancing academic learning and performance. in " *Interaction in Cooperative Groups* Hertz-Lazarowitz, Miller (Ed.) NY,NY: Cambridge University Press

O'Donnell, A.M., Dansereau, D.F., Hythecker, V.I., Hall, R.H., Skaggs, L.P., Lambiotte, J.G., Young, M.D., (1988), "Cooperative procedural learning: The effects of pre- vs distributed learning activities", *Journal of Educational Psychology*, v80, pp161-171

O'Donnell, A.M., Dansereau, D.F., Rocklin, T.R., Lambiotte, I.G., Hythecker, V.I., Larson, C.O., (1985), "Cooperative writing: Direct effects and transfer", *Written Communication* v2, pp307-315

Panitz, T (1996), "Getting students ready for cooperative learning", *Cooperative learning and College Teaching*, v6 N2, winter 1996

Panitz, T (1997) "Collaborative Versus Cooperative Learning: Comparing the two definitions Helps Understand the Nature of Interactive Learning", *Cooperative Learning and College Teaching*, v8 n2, Winter 1997 p5

Panitz, T, & Panitz, P., (1996), "Assessing students and yourself by observing students working cooperatively and using the One Minute Paper", *Cooperative Learning and College Teaching*, v6, N3, Spring 1996

Panitz, T., Panitz, P. (1997) "Encouraging the use of collaborative learning in higher education" *Issues Facing International Education* J.J. Forest ed. Pub. Date Sept 1997 Boston, MA: Garland Pub.

Peterson, P., Swing, S., (1985), "Students cognitions as mediators of the effectiveness of small-group learning", *Journal of Educational Psychology* 77(3) pp299-312

Pressels, B.E., (1992), "A perspective on the evolution of cooperative thinking", in Davidson & Worsham (Eds.), *Enhancing Thinking Through Cooperative Learning*, NY, NY: College teachers Press

Resnick, L.B.(1987), " *Education and Learning To Think* ", Washignton, DC: National Academy Press

Ritchie, W.C. ed. (1978), "Second language Acquisition research: Issues and Implications"

NY,NY: Academic Press

Rosenshine, B., R. Stevens, "Teaching Functions" in "Handbook of Research on Teaching" Wittrock ed. 3rd ed. pp376-391, NY, NY: Macmillan Publishing

Sandberg, K.E., (1995) "Affective and cognitive features of collaborative learning" in " *Review of research and developmental education*" Gene Kierstons (Ed.) vol 6 #4, Appalachian State Univ, Boone, NC

Schunk, D., Hanson,A., (1985), "Peer models: Influence on children's self-efficacy and achievement", *Journal of Educational Psychology* 77(3) p313

Schwartz, D.L., Black, J.B., Strange, J., (1991), " Dyads have fourfold advantage over individuals inducing abstract rules", Paper presented at the annual meeting of the American Educational Research Assn. Chicago, IL

Sharan, S., (1994), "Handbook of Cooperative Learning Methods", Westport, CN: Greenwood Press

Sharan, Y., Sharan, C., (1976), " Small Group Teaching", Englewood Cliffs,NJ: Prentice Hall

Sharan, S., Hertz-Lazarowitz, R., (1980), "Academic achievement of elementary school children in small group vs whole class discussion", *Journal of Experimental Education* 489 pp125-129

Sherman, L.W., (1991) revised 1996, "Cooperative learning in post secondary education: Implications from social psychology for active learning experiences", Presented at the annual meeting of the American Educational Research Association, Chicago, IL, April 1991

Slavin, R.E., (1978), "Student Teams Achievement Divisions" *Journal of Research and Development in Education*, 12 (June) 1978, pp39-49

_____. (1980), "Cooperative learning", *Review of Educational Research* 50 pp315-342

_____. (1983a), " Cooperative Learning", New York, NY Longman

_____. (1983b), "When does cooperative learning increase student achievement?", *Psychological Bulletin*, 94 pp429-445

_____. (1987), " Cooperative Learning: Student Teams" 2nd Ed. Washington, DC: National Education Association

_____. (1990), " Cooperative Learning-Theory, Research and Practice", Englewood Cliffs, NJ: Prentice Hall

_____. (1991), "Educational Psychology: Theory Into Practice", 3rd ed. Englewood Cliffs, NJ: Prentice Hall

_____. (1992), "When and why does cooperative learning increase Achievement? Theoretical and empirical perspectives", ppm145-173 in Hertz-Lazarowitz and Miller (Eds.) *Interaction in Cooperative Groups*, NY,NY: Cambridge University Press

Slavin, R.E., Karweit, N., (1981) "Cognitive and affective outcomes of an intensive student team learning experience", *Journal of Experimental Education* 50 pp29-35

Slavin, R.E., Leavey, M.B., Madden, N.A., (1984), Combining cooperative learning and individualized instructions: Effects of student mathematics achievement, attitudes and behaviors",*Elementary School Journal*, v84, pp409-22

Slavin, R.E., & Tanner, A.M., (1979), "Effects of cooperative reward structures and individual accountability in productivity and learning", *Journal of Educational Research* v72 n5 p294-298

Smith, K., Johnson, D.W., Johnson, R.T., (1981), "Can conflict be constructive: Controversy versus concurrence seeking in learning groups", *Journal of Educational Psychology*, 73(5) 651-663

Stahle, R.J., (1986), "From "academic strangers" to successful members of a cooperative learning group: An inside the learner perspective", in Stahle and VanSickle (Eds.) " Cooperative Learning In the Social Studies Classroom", Washington, DC: National Council for the Social Studies.

Stevens, R.J., Madden, N.A., Slavin, R.E., & Farnish, A.M., (1987), "Cooperative Integrated Reading and Composition: Two field experiments", Reading Research Quarterly,

v22 pp433-454

Stahle, R.J., VanSickle, R.L., (1986), " Cooperative learning as Effective social study within the social studies classroom", in Stahl and VanSickle (Eds.)

Swing, S., Peterson, P., (1982), "The relationship of student ability and small group interaction to student achievement", American Educational Research Journal, 19 pp259-274

Tannenberg, Josh, (1995), "Using Cooperative Learning in the Undergraduate Computer Science Classroom" Proceedings of the Midwest Small College Computing Conference, 1995, Available on the internet WWW at

<http://phoenix.isub.edu/josh/coop/papers/mwsc95.html>

Tinto, V., (1997) "Enhancing learning via community", Thought and Action, the NEA Higher Education Journal, V6 n1 Spring 1997 pp53-54

Treisman, P.U. (1985), "A study of mathematics performance of black students at the university of California, Berkeley", Doctoral dissertation, Dissertation Abstracts 47, 1641-a

Turnure, J., Ziegler (1958), "Outer-directedness in the problem solving of normal and retarded students", Journal of Abnormal and Social Psychology , 57 pp379-388

Van Oudenhoven, J.P., Van Berkum, G., Swen-Koopmans, J., (1987), "Effect of cooperation and shared feedback on spelling achievement", Journal of Educational Psychology, v79, p92-94

Van Oudenhoven, J.P., Wiesma, B., Van Yperen, N., (1987), "Effects of cooperation and feedback by fellow pupils on spelling achievement", European Journal of Psychology of Education, v2, pp83-91

Veeder, P. (1985), Cooperative Learning: A Study on Processes and Effects of Cooperation Between Primary School Children, Westerhaven Groningen, Netherlands: Rijkuniversiteit Gronigen

Vygotsky, L.S. (1978), "Mind in society: The development of higher psychological processes", Cambridge: MIT Press

Weaver, R.L., Cottrell, H.W., (1985), "Mental Aerobics: The half-sheet response", Innovative Higher Education 10 pp23-31

Webb, N.M., (1980), "An analysis of group interaction and mathematical errors in heterogeneous ability groups", British Journal of Educational Psychology 50 pp266-276

_____, (1982), "Group composition, group interaction and achievement in small groups", J 74(4) pp475-484
Journal of Educational Psychology

_____. (1983), "Predicting learning from student interaction: Defining the interaction variable", *Educational Psychologist*, v18 pp33-41

_____. (1985), "Interaction and learning in small groups", *Review of Educational Research*, v52 pp421-445

_____. (1991), "Task-related verbal interaction and mathematics learning in small groups", *Journal of Research In Mathematics Education*, v22 pp366-389

_____. (1992), "Testing a theoretical model of student interaction and learning in small groups", pp102-119, in Hertz-Lazarowitz & Miller (Eds.) *Interaction in Cooperative Groups* NY,NY: Cambridge University Press

Webb, N., Ender, P. & Lewis, S., (1986), "Problem solving strategies and group process in small groups learning computer programming", *American Education Research Journal* 23(2) pp243-262

Weinstein, C., Ridley, D., Dahn, R., Weber, S., (1989), "Helping students develop strategies for effective learning", *Educational Leadership*, 46(4), pp17-19

Wilson, R.C. (1986 March/April). "Improving faculty teaching: Effective use of the student evaluations and consultations." *Journal of Higher Education* 57(2), 196-211

Wlodkowski, R.J., (1985), "Enhancing Motivation to Learn" San Francisco: Josey-Bass

Wittrock, M.C., (1978), "The cognitive movement in instruction", *Educational Psychologist*, v13, pp15-29

Yager, S., Johnson, D.W., Johnson, R., (1985), "Oral discussion groups-to-individual transfer and achievement in cooperative learning groups", *Journal of Educational Psychology*, 77(1) pp60-66

Yager, S., Johnson, R., Johnson, D.W., Snider, B. (1985), "The effect of cooperative and individualistic learning experiences on positive and negative cross-handicap relations" *Contemporary Educational Psychology* 10 pp127-138

_____. (1986), "The impact of group processing on achievement in cooperative learning groups", *The Journal of Social Psychology*, 126(30) pp369-397

BENEFITS OF COLLABORATIVE LEARNING

1. DEVELOPS HIGHER LEVEL THINKING SKILLS
2. PROMOTES STUDENT-FACULTY INTERACTION AND FAMILIARITY
3. INCREASES STUDENT RETENTION
4. BUILDS SELF ESTEEM IN STUDENT
5. ENHANCES STUDENT SATISFACTION WITH THE LEARNING EXPERIENCE

6. PROMOTES A POSITIVE ATTITUDE TOWARD THE SUBJECT MATTER
7. DEVELOPS ORAL COMMUNICATION SKILLS
8. DEVELOPS SOCIAL INTERACTION SKILLS
9. HELPS MAJORITY AND MINORITY POPULATIONS IN A CLASS LEARN TO WORK WITH EACH OTHER (DIFFERENT ETHNIC GROUPS, MEN AND WOMEN, TRADITIONAL AND NON- TRADITIONAL STUDENTS)
10. CREATES AN ENVIRONMENT OF ACTIVE, INVOLVED, EXPLORATORY LEARNING
- 11 USES A TEAM APPROACH TO PROBLEM SOLVING WHILE MAINTAINING INDIVIDUAL ACCOUNTABILITY
12. ENCOURAGES DIVERSITY UNDERSTANDING
13. ENCOURAGES STUDENT RESPONSIBILITY FOR LEARNING
14. INVOLVES STUDENTS IN DEVELOPING CURRICULUM AND CLASS PROCEDURES
15. STUDENTS EXPLORE ALTERNATE PROBLEM SOLUTIONS IN A SAFE ENVIRONMENT
16. STIMULATES CRITICAL THINKING AND HELPS STUDENTS CLARIFY IDEAS THROUGH DISCUSSION AND DEBATE
17. ENHANCES SELF MANAGEMENT SKILLS
18. FITS IN WELL WITH THE CONSTRUCTIVIST APPROACH
19. ESTABLISHES AN ATMOSPHERE OF COOPERATION AND HELPING SCHOOLWIDE
20. STUDENTS DEVELOP RESPONSIBILITY FOR EACH OTHER
21. BUILDS MORE POSITIVE HETEROGENEOUS RELATIONSHIPS
22. PROVIDES A BASIS FOR ALTERNATE FORMS OF ASSESSMENT SUCH AS OBSERVATION OF GROUPS , GROUP SELF ASSESSMENT, AND SHORT INDIVIDUAL WRITING ASSESSMENTS
23. FOSTERS AND DEVELOPS INTERPERSONAL RELATIONSHIPS
24. MODELLING PROBLEM SOLVING TECHNIQUES BY STUDENTS' PEERS
25. STUDENTS ARE TAUGHT HOW TO CRITICIZE IDEAS, NOT PEOPLE
26. SETS HIGH EXPECTATIONS FOR STUDENTS AND TEACHERS
27. PROMOTES HIGHER ACHIEVEMENT AND CLASS ATTENDANCE .
28. STUDENTS STAY ON TASK MORE AND ARE LESS DISRUPTIVE

29. GREATER ABILITY OF STUDENTS TO VIEW SITUATIONS FROM OTHERS' PERSPECTIVES (DEVELOPMENT OF EMPATHY)
30. CREATES A STRONGER SOCIAL SUPPORT SYSTEM
31. CREATES A MORE POSITIVE ATTITUDE TOWARD TEACHERS, PRINCIPALS AND OTHER SCHOOL PERSONNEL BY STUDENTS AND CREATES A MORE POSITIVE ATTITUDE BY TEACHERS TOWARD THEIR STUDENTS
32. ADDRESSES LEARNING STYLE DIFFERENCES AMONG STUDENTS
33. PROMOTES INNOVATION IN TEACHING AND CLASSROOM TECHNIQUES .
34. CLASSROOM ANXIETY IS SIGNIFICANTLY REDUCED
35. TEST ANXIETY IS SIGNIFICANTLY REDUCED
36. CL CLASSROOMS MAY BE USED TO MODEL DESIREABLE SOCIAL BEHAVIORS NECESSARY FOR EMPLOYMENT SITUATIONS WHICH UTILIZE TEAMS AND GROUPS .
37. STUDENTS PRACTICE MODELLING SOCIETAL AND WORK RELATED ROLES
38. CL IS SYNERGYSTIC WITH WRITING ACROSS THE CURRICULUM (WAC)
39. CL ACTIVITIES CAN BE USED TO PERSONALIZE LARGE LECTURE CLASSES
40. SKILL BUILDING AND PRACTICE CAN BE ENHANCED AND MADE LESS TEDIOUS THROUGH CL ACTIVITIES IN AND OUT OF CLASS.
41. CL ACTIVITIES PROMOTE SOCIAL AND ACADEMIC RELATIONSHIPS WELL BEYOND THE CLASSROOM AND INDIVIDUAL COURSE
42. CL PROCESSES CREATE ENVIRONMENTS WHERE STUDENTS CAN PRACTICE BUILDING LEADERSHIP SKILLS.
43. CL INCREASES LEADERSHIP SKILLS OF FEMALE STUDENTS
44. IN COLLEGES WHERE STUDENTS COMMUTE TO SCHOOL AND DO NOT REMAIN ON CAMPUS TO PARTICIPATE IN CAMPUS LIFE ACTIVITIES, CL CREATES A COMMUNITY ENVIRONMENT WITHIN THE CLASSROOM.
45. CL IS ESPECIALLY USEFUL IN FOREIGN LANGUAGE AND ESL COURSES WHERE INTERACTIONS INVOLVING USE OF THE LANGUAGE THROUGH SPEAKING ARE IMPORTANT.
46. ALLOWS ASSIGNMENT OF MORE CHALLENGING TASKS WITHOUT MAKING THE WORKLOAD UNREASONABLE
47. WEAKER STUDENTS IMPROVE THEIR PERFORMNCE WHEN GROUPED WITH HIGHER ACHIEVING STUDENTS
48. PROVIDES STRONGER STUDENTS WITH THE DEEPER UNDERSTANDING THAT COMES ONLY FROM

TEACHING MATERIAL (COGNITIVE REHEARSAL)

49. LEADS TO THE GENERATION OF MORE AND BETTER QUESTIONS
50. JIGSAW IS AN IDEAL STRUCTURE FOR LABORATORY AND DESIGN PROJECTS
51. CL INCREASES STUDENTS' PERSISTENCE IN THE COMPLETION OF ASSIGNMENTS AND THE LIKLIHOOD OF SUCCESSFUL COMPLETION OF ASSIGNMENTS
52. PROVIDES TRAINING IN EFFECTIVE TEACHING STRATEGIES TO THE NEXT GENERATION OF TEACHERS
53. HELPS STUDENTS WEAN THEMSELVES AWAY FROM CONSIDERING TEACHERS THE SOLE SOURCES OF KNOWLEDGE AND UNDERSTANDING
54. CL FITS IN WELL WITH THE TQM AND CQI MODELS OF EFFECTIVE MANAGEMENT
55. PROMOTES LEARNING GOALS RATHER THAN PERFORMANCE GOALS
56. PROMOTES A PATTERN OF MASTERY ATTRIBUTION RATHER THAN A HELPLESS ATTRIBUTION PATTERN)
57. ALLOWS STUDENTS TO EXERCISE A SENSE OF CONTROL ON TASK
58. CL PROMOTES POSITIVE SOCIETAL RESPONSES TO PROBLEMS AND FOSTERS A SUPPORTIVE ENVIRONMENT WITHIN WHICH TO MANAGE CONFLICT RESOLUTION
59. CL IS ESPECIALLY BENEFICIAL IN MATHEMATICS COURSES
60. CL PROVIDES THE FOUNDATION FOR DEVELOPING LEARNING COMMUNITIES WITHIN INSTITUTIONS AND IN COURSES
 - 61. CL PROVIDES INSTANTANEOUS FEEDBACK TO STUDENTS AND THE TEACHER ON THE EFFECTIVENESS OF EACH CLASS AND THE PROGRESS STUDENTS ARE MAKING BY OBSERVING STUDENTS WORKING IN GROUPS AND INDIVIDUALLY
62. GROUPS ARE EASIER TO SUPERVISE THAN INDIVIDUAL STUDENTS
63. CL CAN BE ADAPTED TO LARGE LECTURES, INVOLVING STUDENTS IN INTERACTIVE, CRITICAL THINKING ACTIVITIES DURING CLASS
64. CL ENCOURAGES STUDENTS TO SEEK HELP AND ACCEPT TUTORING FROM THEIR PEERS
65. CL FOSTERS METACOGNITION IN STUDENTS
66. COOPERATIVE DISCUSSIONS IMPROVE STUDENTS' RECALL OF TEXT CONTENT
 - ○ 67. CI HELPS TEACHERS CHANGE THEIR ROLES FROM THEIR BEING THE FOCUS OF THE TEACHING PROCESS TO BECOMING FACILITATORS OF THE LEARNING PROCESS. THEY MOVE FROM TEACHER-CENTERED TO STUDENT-CENTERED LEARNING

BENEFITS OF COLLABORATIVE LEARNING

1. DEVELOPS HIGHER LEVEL THINKING SKILLS (Webb 1982).

Students working together are engaged in the learning process instead of passively listening to the teacher present information. Pairs of students working together represent the most effective form of interaction, followed by threesomes and larger groups (Schwartz, Black, Strange 1991). When students work in pairs one person is listening while the other partner is discussing the question under investigation. Both are developing valuable problem solving skills by formulating their ideas, discussing them, receiving immediate feedback and responding to questions and comments by their partner (Johnson, D.W. 1971). The interaction is continuous and both students are engaged during the session. Compare this situation to the lecture class where students may or may not be involved by listening to the teacher or by taking notes (Cooper, et al 1984). In collaborative learning the teacher is able to observe and assess individual student's thinking skills and approach to learning.

According to Roberta Dees (1991) "Although it is not clear which components of cooperative learning are responsible for improvement in higher-level thinking, attempts have been made to identify the components. One conjecture is that dealing with controversy may be such an element." (p410) Smith, Johnson, and Johnson (1981) studied sixth grade students who worked on controversial issues. They found that for students engaged in controversy, "the cognitive rehearsal of their own position and the attempts to understand their opponents position result in a high level of mastery and retention of the materials being learned." (p652). The Johnsons have developed a cooperative method called structured controversy where students study and defend one position and then switch with another group which has taken the opposite position. Slavin(1992) emphasizes that "Students will learn from one another because in their discussions of the content, cognitive conflicts will arise, inadequate reasoning will be exposed, disequilibrium will occur, and higher quality understandings will emerge". (p162)

O'Connell et al (1988) found that the initial benefits that accrued from a brief cooperative training experience persisted over relatively long intervals and that students trained in the dyadic cooperative approach successfully transferred their skills to individually performed tasks.

2. PROMOTES STUDENT-FACULTY INTERACTION AND FAMILIARITY

The collaborative process enables the teacher to move around the class in order to observe students interacting (Cooper 1984). An opportunity is created whereby the teacher can talk to the students directly or in small groups. Teachers may raise questions to help direct students or explain concepts. In addition, a natural tendency to socialize with the students on a professional level is created by approaches to problem solving and about activities and attitudes which influence performance in class. Students often

mention offhandedly that they are having difficulties outside of class related to work, family, friends, etc. Openings like this can lead to a discussion of those problems by the teacher and student in a non-threatening way because of the informality of the situation.

3. INCREASES STUDENT RETENTION

Students who are actively involved in the learning process are much more likely to become interested in learning and make more of an effort to attend school (Astin 1977). A class where students interact fosters an environment conducive to high student motivation and participation and student attendance (Garibaldi 1976; Treisman 1985).

4. BUILDS SELF ESTEEM IN STUDENTS (Johnson & Johnson 1989)

Collaborative efforts among students result in a higher degree of accomplishment by all participants as opposed to individual, competitive systems in which many students are left behind (Slavin 1967). Competition fosters a win-lose situation where superior students reap all rewards and recognition and mediocre or low-achieving students reap none. In contrast everyone benefits from a CL environment. Students help each other and in doing so build a supportive community which raises the performance level of each member (Kagan 1986). This in turn leads to higher self esteem in all students (Webb 1982).

5. ENHANCES STUDENT SATISFACTION WITH THE LEARNING EXPERIENCE

By their very nature people find satisfaction with activities which value their abilities and include them in the process. Effective teams or groups assume ownership of a process and its results when individuals are encouraged to work together toward a common goal, often defined by the group. This aspect is especially helpful for individuals who have a history of failure (Turnure & Zeigler 1958) Passive educational experiences where the student is the receptacle for information presented by the expert teacher are inherently dissatisfying.

6. PROMOTES A POSITIVE ATTITUDE TOWARD THE SUBJECT MATTER

Collaborative learning fosters a higher level of performance by students (Bligh 1972). Their critical thinking skills increase and their retention of information and interest in the subject matter improves (Kulick & Kulick 1979). When students are successful they view the subject matter with a very positive attitude because their self esteem is enhanced. This creates a positive cycle of good performance building higher self esteem which in turn leads to more interest in the subject and higher performance yet. Students share their success with their groups, thus enhancing both the individual's and the group's self esteem. Some cooperative learning structures formalize this effect by awarding certificates of achievement or improvement to students, or extra credit to groups for an individual's or group's improvement.

7. DEVELOPS ORAL COMMUNICATION SKILLS (Yager 1985)

When students are working in pairs one partner verbalizes his/her answer while the other listens, asks questions or comments upon what he/she has heard. Clarification and explanation of one's answer is a very important part of the collaborative process and represents a higher order thinking skill (Johnson, Johnson, Roy, Zaidman 1985). Students who tutor each other must develop a clear idea of the concept they are presenting and orally communicate it to their partner (Neer 1987).

Tannenbergs (1995) describes the benefit of developing oral skills which are discipline specific. "As in other disciplines, computer scientists use specialized language to economically and precisely communicate with one another. This involves not only mathematical symbols and programming languages, but additional terms and special uses of natural language. A consequence of having students work together in small groups is that they speak with one another and directly engage in discipline-specific language use. In trying to explain their ideas relating to the problems that they are solving, whether it be about a graph, program, algorithm, or proof, they will of necessity acquire the terms that describe these objects."

"The additional benefit in having our students be fluent language users is that they can then enter into the culture of our disciplines. They will be able to understand specialized publications and talk with more knowledgeable practitioners. That is, acquiring the language of the discipline opens the portal to the vast store of knowledge within the discipline. We should therefore not minimize the value of having our students be able to talk with one another about their work in the disciplines that we teach. The social setting of CL provides this opportunity. And this is where it may be better that the students are interacting with one another rather than with experts, because they are less concerned about looking foolish, about being novices, about not being fluent in the new language and discipline, about being tourists in this foreign land -- how easy it is to chat with other tourists! "

Bershon (1992) points out the role of speech in children's development as identified by Vygotsky. Bershon states "In his research Vygotsky(1978) reports that children's egocentric speech not only accomplished the task but also played a specific role in task solution. In this regard, he explained that children's speech and action were part of one and the same complex psychological function, directed toward the solution of the problem at hand. In fact, Vygotsky believes that the more complex the action demanded by the situation, and the less direct the solution, the greater the importance played by speech in the solution." (p39)

When students work in groups and express themselves orally three benefits occur. First, the more advanced students demonstrate appropriate ways of approaching a problem, how they analyze content material and formulate arguments and justifications for their approaches. Through the process of questioning by peers these students becomes more aware of the thinking processes they are using. Second, instead of an individual thinking about a problem in small increments, in isolation, a group will often look at a problem from a wider perspective and consider many more options as

possible solutions than one person thinking alone would. Third, by discussing various aspects of a problem solution and questioning the more advanced students, the novices in the group can participate in actually solving the problem and eventually learn how to solve problems without the help of their peers. Nelson LeGall points out that "Through encouragement from the group to try new, more active approaches and through social support and social reward for even partially successful efforts, individual students in a group come to think of themselves as capable of engaging in interpretatio". (LeGall 1992 p63)

8. DEVELOPS SOCIAL INTERACTION SKILLS

A major component of cooperative learning elaborated by Johnson, Johnson and Holubec (1984) includes training students in the social skills needed to work collaboratively. Students do not come by these skills naturally. Quite the contrary, in our society and current educational framework competition is valued over cooperation. By asking group members to identify what behaviors help them work together and by asking individuals to reflect on their contribution to the group's success or failure, students are made aware of the need for healthy, positive, helping interactions when they work in groups (Cohen & Cohen 1991).

9. Helps majority and minority populations in a class learn to work with each other (different ethnic groups, men and women, traditional and non-traditional students (Felder 1997, Johnson & Johnson 1972)

Research into the effect of using cooperative learning with students of varied racial or ethnic backgrounds has shown that many benefits accrue from this method (Slavin 1980). Because students are actively involved in exploring issues and interacting with each other on a regular basis in a guided fashion, they are able to understand their differences and learn how to resolve social problems which may arise (Johnson & Johnson 1985b). Training students in conflict resolution is a major component of cooperative learning training (Aronson 1978; Slavin 1993).

10. CREATES AN ENVIRONMENT OF ACTIVE, INVOLVED, EXPLORATORY LEARNING (Slavin 1990)

The entire focus of collaborative learning is to actively involve students in the learning process. Whenever two or more students attempt to solve a problem or answer a question they become involved in the process of exploratory learning. They interact with each other, share ideas and information, seek additional information, make decisions about the results of their deliberations and present their findings to the entire class. They may tutor their peers or receive tutoring. Students have the opportunity to help structure the class experience through suggestions regarding class format and procedures. This is a level of student empowerment which is unattainable with a lecture format or even with a teacher-led whole class discussion.

11. FOSTERS TEAM BUILDING AND A TEAM APPROACH TO PROBLEM SOLVING WHILE

MAINTAINING INDIVIDUAL ACCOUNTABILITY (Cooper et al 1984; Johnson, Johnson & Holubec 1984)

A major function of collaborative learning is team building. This is accomplished through a variety of techniques used throughout the duration of the semester. During the first few weeks of a collaborative class, warmup activities, getting to know class members' names, and practice exercises help acclimate students to cooperative learning. As the semester progresses, group building exercises and group processing are important techniques for helping students understand how they are functioning in their groups and what they can do to improve. Regarding individual accountability, at the end of each content section an exam or paper or other assessment mechanism is used to determine how well individual students have mastered the material (Slavin 1983b). Group projects or group tests may be given in addition.. Quizzes during the semester may also be given individually, thus maintaining a strong element of accountability by each group member. Numerous grading schemes exist which bring both elements together such as providing bonus points for group members when the group exceeds its previous group average on a test by a specified amount.

12. ENCOURAGES DIVERSITY UNDERSTANDING (Burnstein & McRae 1962)

Understanding the diversity that exists among students of different learning styles and abilities is a major benefit of collaborative learning. Lower level students benefit by modelling higher level students and they benefit by forming explanations and tutoring other students (Swing, Peterson 1982; Hooper & Hannafin 1988). Higher level students benefit by explaining their approaches. Students observe their peers in a learning environment, discuss problem solving strategies and evaluate the learning approaches of other students. Often behaviors which might appear odd when taken out of context become understandable when the opportunity is presented to students to explain and defend their reasoning. For example, Americans signal agreement by nodding vertically while students from India nod horizontally. Very little opportunity exists for students to explain their behavior in a lecture class, whereas in a CL environment discussions of this nature occur continuously. Warmup and group building activities play an important role in helping students understand their differences and learn how to capitalize on them rather than use them as a basis for creating antagonism.

13. ENCOURAGES STUDENT RESPONSIBILITY FOR LEARNING (Baird & White 1984)

Promotive interaction, a foundation principle of cooperative learning, builds students' responsibility for themselves and their group members through a reliance upon each other's talents, and an assessment process which rewards both individuals and groups. Students assist each other and take different roles within their groups (such as reader, recorder, time keeper etc.). An emphasis on student involvement is created in the development of the processes which the group follows. The empowerment of students produces an environment which fosters maturity and responsibility in students for their learning. The teacher becomes a facilitator instead of a director and the student becomes a willing participant instead of a passive follower.

14. INVOLVES STUDENTS IN DEVELOPING CURRICULUM AND CLASS PROCEDURES (Kort 1992)

During the collaborative process students are asked to assess themselves, and their groups as well as class procedures. Teachers who are confident in themselves can take advantage of this student input to modify the makeup of groups or class assignments and alter the mix of lecture and group work according to immediate student feedback. The teacher does not have to wait until the results of the section exam are returned to make alterations which will help the students understand the material. Students who participate in structuring the class assume ownership of the process because they are treated like adults, and their opinions and observations are respected by the authority figure in the class (Meier, M. & Panitz, T., 1996).

Marzano (1992) identifies four specific ways in which students become involved in developing class procedures when cooperative learning is the basis for class processes. The class can identify desired features of the physical environment, such as the arrangement of desks, number and type of breaks that will be taken, the display of classroom accessories to name a few. Students can analyse the affective tone of their groups and suggest activities which will promote positive interactions or deal with conflicts or personality problems within each group. The class may be given responsibility for developing and implementing classroom rules and procedures. Students can help establish and implement rules for physical and psychological safety of their peers, such as a code of conduct which encourages students to respect each other, listen and respond attentively and generally care for their fellow students.

15. STUDENTS EXPLORE ALTERNATE PROBLEM SOLUTIONS IN A SAFE ENVIRONMENT (Sandberg 1995)

Many students are hesitant to speak out and offer opinions publicly in a traditional classroom setting for fear of appearing foolish. When students work in groups, solutions come from the group rather than from the individual. In essence, the focus is removed from the individual, thus diffusing the effects of criticism, even constructive criticism, from any one student. Students can propose ideas and theories to their peers prior to formulating a final response, and then rehearse their presentation in an informal setting. If a group response is the end product, then the entire team becomes responsible for the answer. CI creates a safe, nurturing environment, where students can express themselves and explore their ideas without the fear of failure or criticism. In a lecture format an individual student responds to a question before the entire class without much time to think about his/her answer; such a situation creates a threatening environment.

16. STIMULATES CRITICAL THINKING AND HELPS STUDENTS CLARIFY IDEAS THROUGH DISCUSSION AND DEBATE (Johnson 1973a, 1974a)

The level of discussion and debate within groups of three or more and between pairs is substantially greater than when an entire class participates in a teacher led discussion.

Students receive immediate feedback or questions about their ideas and formulate responses without having to wait for long intervals to participate in the discussion (Peterson & Swing 1985). This aspect of collaborative learning does not preclude whole class discussion. In fact whole class discussion is enhanced by having students think out and discuss ideas thoroughly before the entire class discusses an idea or concept. The level of discussion becomes much more sophisticated. In addition, the teacher may temporarily join a group's discussion to question ideas or statements made by group members or to clarify concepts or questions raised by students. Nelson-LeGall (1992) comments on the value of debate in enhancing critical thinking skills in students. She states, "An awareness of conflicting viewpoints appears to be necessary in collaborative groups to engender the type of peer transactions (e.g.) arguments, justifications, explanations, counterarguments) that foster cognitive growth (Brown & Palinscar, 1989)"(p55)

Another aspect of the benefits of cooperative discussion is the effect it has on students who peer edit written work. According to McCarthey and McMahan(1992) "Research focusing specifically on revision when peers respond to and edit writing has revealed that students can help one another improve their writing through response. Nystand (1986) found that students who responded to each other's writing tended to reconceptualize revision, not as editing, but as a more substantive rethinking of text, whereas students who did not work in groups viewed the task as editing only." (p19) Combining discussion with peer editing results in an important aspect of developing critical thinking skills in students.

17. ENHANCES SELF MANAGEMENT SKILLS (Resnick 1987)

Collaborative learning inherently calls for self management by students. In order to function within their groups they need to come prepared with assignments completed and they must understand the material which they are going to contribute to their group. Students are given training about their responsibilities toward the group and how to be an effective group member. They are also given time to process group behaviors, such as checking with each other to make sure homework assignments are not only completed but understood by each group member. These promotive interactions help students learn self management techniques. Gentile (1997) points out that from a psychological view CL fosters self efficacy among students. Student self direction is generated in part by the high expectations by the teacher and the high degree of responsibility placed upon the students for their learning.

18. FITS IN WELL WITH THE CONSTRUCTIVIST APPROACH (Davis, Mahler & Noddings 1990)

Only when students formulate their own constructs and solutions are they truly thinking critically. Collaborative techniques create a constructivist approach when students become actively involved in defining questions in their own language and working out answers together instead of reproducing material presented by the teacher or the textbook (Wooley et al 1990).

19. ESTABLISHES AN ATMOSPHERE OF COOPERATION AND HELPING SCHOOLWIDE (Deutsch 1975, 1985)

Most schools celebrate individual student performance through athletics,

clubs or extra curricular activities even when these accomplishments are the result of team efforts. In contrast, CL focuses attention on the accomplishments of the group. Students are trained how to interact positively, resolve disputes through compromise and/or mediation and encourage the best performance of each member for the benefit of the group. Teamwork is the modus operandi and intergroup cooperation is encouraged. Even when group competitions are used such as in STAD (Slavin 1987), the intent is to create a positive helping environment for all participants.

20. STUDENTS DEVELOP RESPONSIBILITY FOR EACH OTHER

In a traditional competitive classroom students are concerned with their individual grades and where they fit into the grade curve (Stahl 1992). Emphasis is placed on doing better than everyone else (Bonoma et al 1974). In the collaborative class the opposite is true. Mechanisms are in place which create interdependence among students and reliance upon others for the group's success. A nurturing atmosphere is created whereby students help each other and take responsibility for their entire group's progress. Group celebration of individual and group performances promote a supportive atmosphere and highlight each student's responsibility to the entire group.

21. BUILDS MORE POSITIVE HETEROGENEOUS RELATIONSHIPS

The current educational system rewards students achievement by separating students of differing abilities rather than encouraging students to utilize their abilities to help each other. Collaborative learning fosters student interaction at all levels (Webb 1980). Research has shown that when students of high ability work with students of lower ability both benefit. The former benefits by explaining or demonstrating difficult concepts which he/she must understand thoroughly in order to do so, and the latter benefits by seeing a concept modelled by a peer. Both observe each other's approaches to problem solving and begin to appreciate their differences (Johnson & Johnson 1985c)

22. PROVIDES A BASIS FOR ALTERNATE FORMS OF ASSESSMENT (Rosenshine & Stevens 1986) SUCH AS OBSERVATION OF GROUPS (PANITZ AND PANITZ (1997), GROUP SELF ASSESSMENT (JOHNSON & JOHNSON 1987), AND SHORT INDIVIDUAL WRITING ASSESSMENTS (ANGELO AND CROSS 1993)

Collaborative learning provides the teacher with many opportunities to observe students interacting, explaining their reasoning, asking questions and discussing their ideas and concepts (Cooper 1984). These are far more inclusive assessment methods than relying on written exams only (Cross & Angelo 1993). In addition, group projects provide an alternative for those students who are not as proficient in taking written tests based upon content reproduction. Also, group tests give students an alternate way of

expressing their knowledge, by first verbalizing their solution to their partner or group prior to formalizing a written response.

During cooperative learning activities teachers observe students interacting, explaining their theories, arguing for a particular point of view, helping their peers and being helped. Only a few minutes of observation during a class period can provide significant insights into a student's ability and performance level. 1. Do they know the basics-definitions, formulas, vocabulary, rules, and procedures needed to analyse and solve problems? 2. Can they apply their knowledge to similar problems or questions? 3. Are they able to extend their reasoning and analysis to new situations or problems? 4. Can they create their own problem statements or questions based upon the underlying concepts being studied? 5. Can they explain their reasoning in writing or verbally to their peers? By asking each of these questions one can identify the stage of development the student has reached and make recommendations as to what material and procedures the student might apply to help him/her understand the concepts better.

There are many benefits to observing students at work in groups with their peers.

1. You can observe a student working through a complete problem or assignment versus seeing only the final product (exam or paper). 2. You can observe their reasoning techniques, level of basic knowledge, and concept attainment. 3. You can identify their dominant learning style by observing whether their presentation in pairs or groups

is oral, visual or kinesthetic. This information can be invaluable if you help tutor the student in or out of class. (As an aside, cooperative learning lends itself to using multiple learning style presentations throughout each class). 4. Brief, specific interventions are possible by the teacher or other students to provide help and/or guidance for students having difficulties. 5. Informal conversations take place between individuals, groups and the teacher which help highlight problem areas the entire class may be having. These discussions also help create class environment which is more personal, as students get to know the teacher and the teacher learns about the students. 6. Shy students will participate more with their peers in small groups than in a large class and they too can be observed. It is very helpful to identify students who are shy in order to encourage their participation in non-threatening ways.

Standardized tests using multiple choice, true false, fill in the blanks or essay questions provide a limited basis for understanding and evaluating student performance. These methods deal primarily with factual information, rote memory and perhaps some critical thinking through an essay. What is needed in addition to these historic assessment techniques are methods for understanding students' affective learning skills and a variety of student learning styles. The "One Minute Paper", developed by Weaver and Cottrell(1985), modified by Wilson(1986), and popularized by Cross and Angelo (1988) provide an excellent addition to our repertoire of assessment techniques.

Johnson and Johnson (1987) have developed a series of worksheets which may be used to record the number and quality of each group members interactions. They also

have devised formal procedures for groups to analyse their behavior with an eye toward improvement. At the end of an activity the group answers questions such as "What three things did we do well today?" and "What one thing could we do better next time?". This type of questioning helps students learn to reflect upon their groups' social interactions as well as activity content.

23. FOSTERS AND DEVELOPS INTERPERSONAL RELATIONSHIPS (Johnson & Johnson 1987)
The reliance on base groups to help individuals keep track of each other's performance, the interdependence created by self and group assessment and improvement techniques, and the social nature of collaborative learning processes all combine to improve interpersonal relationships among students. Collaborative learning encourages out of class work by the groups, bringing them together in a combined academic and social experience which continues over long periods of time.

24. MODELLING PROBLEM SOLVING TECHNIQUES BY STUDENTS' PEERS (Schunk & Hanson 1985)

Students often learn more by listening to their peers than they do by listening to an authority figure like a teacher (Levin, Glass & Meister 1984). Peers often have a better understanding of what other students don't know or causes them difficulty than the teacher does. The focus is on the student, not the teacher. In addition to shifting responsibility for learning onto students, CI provides an opportunity for students to demonstrate their knowledge by helping their peers (Bargh & Schul 1980), an especially important advantage over the lecture method or class discussion form of teaching.

25. STUDENTS ARE TAUGHT HOW TO CRITICIZE IDEAS, NOT PEOPLE (Johnson, Johnson & Holubec 1984)

A function of collaborative learning is to help students resolve differences amicably. They need to be taught how to challenge ideas and advocate for their positions without personalizing their statements. They are also taught conflict resolution methods, which are important for real life situations as well as being useful for academic endeavors.

26. SETS HIGH EXPECTATIONS FOR STUDENTS AND TEACHERS

Being made responsible for one's learning and for one's peers presumes that each student has that capability. Inherently high expectations are established for students. By setting obtainable goals for groups and by facilitating group interaction teachers establish high expectations which become self fulfilling as the students master the collaborative approach, learn how to work well together in teams and demonstrate their abilities through individual tests and a variety of other methods. Higher self esteem and higher expectations are the outcomes.

27. PROMOTES HIGHER ACHIEVEMENT AND CLASS ATTENDANCE (Hagman & Hayes 1986)

Students who develop personal professional relations with teachers by getting to know them, and who work on projects outside of class, achieve better results and tend to stay in school (Cooper 1984). Teachers who get to know their students and understand their problems can often find ways of dealing with those problems. They have a great advantage in formulating ways of assisting their students. Students are often inspired by the teacher who takes the time to get to know them and encourage them to aspire to better performance (Janke 1980). According to (Felder1997) additional benefits occur in that student grades are improved, they show longer retention of information, transfer information better to other courses and disciplines and have better class attendance. There is a strong positive correlation between class attendance and success in courses (Johnson and Johnson 1994) which may help account for the improved performance.

According to Lotan and Benton (1990) "Evaluations of the implementation of the curriculum consistently show that, on average, students in Finding Out/Descubrimiento classrooms (a CL method developed by Elizabeth Cohen for use in California schools where ESL is an important factor) demonstrate significantly better learning gains on standardized tests in reading and math, as compared with the normed student population (Cohen and Intili, 1981, 1982; Cohen and DeAvila, 1983; Cohan and Lotan, 1987). Additional studies of the CL methodology known as STAD (Student Teams Achievement Divisions) found that students in this program gained significantly more in mathematics than did control students (Huber, Bogatzki, and Winter, 1982; Madden and Slavin, 1983, Slavin and Karweit, 1984). Three studies in TGT (Teams Games Tournaments) also found significantly higher achievements in TGT than in control classes (Edwards, DeVries and Snyder, 1972; Edwards and DeVries, 1974; Hulten and DeVries, 1976). Slavin (1990) reports the largest effects of Student Team Learning methods have been found in studies of TAI (Team Assisted Instruction). Five studies found substantially greater learning of mathematics computation in TAI than in control classes (Slavin, Leavey and Madden, 1984; Slavin, Madden, and Leavey 1984; Slavin and Karweit 1985).

28. STUDENTS STAY ON TASK MORE AND ARE LESS DISRUPTIVE

An enormous hidden benefit of CL is one most attractive to teachers: it negates many forms of student disruptive behavior. As any teacher knows, it is extremely easy for only one (or more) member(s) of an entire class to disrupt class proceeding when the lecture method is employed. In contrast, when students are working in groups, the stage is removed from those who try to act out (Stahl & VanSickle 1992). It is very difficult for an individual to gain the entire class's attention when the class is working in many smaller groups. Within groups intense working is being carried on because more students are involved actively in the process. The CL activities are very focused and often create a high degree of concentration by group members. Thus they will not be distracted by an individual acting out in another group or trying to gain the class's attention.

Hertz-Lazarowitz (1992) studied student behaviors in traditional teacher-centered classrooms. She found that the second most frequent behavior after on-task, noninteractive behavior was off-task, interactive behavior and that this increased with the

age of the student. She concluded that "It appears that students engage in such behavior because they need peer interaction in the learning process for their own cognitive and social development. If the context is highly noninteractive, students will look for legitimized and nonlegitimized avenues for interactions.... This off-task interaction is perceived by teachers as an indication of growing discipline problems. For the students, however, it helps fulfill their need for interaction. If interaction is not channeled into legitimate processes, it emerges as social events". (p89-90) Small group cooperative learning structures are mechanisms which provide academic student interactions within social contexts.

29. GREATER ABILITY OF STUDENTS TO VIEW SITUATIONS FROM OTHERS' PERSPECTIVES (DEVELOPMENT OF EMPATHY)

Students using collaborative learning methods are encouraged to question each other, debate issues and discuss each other's ideas and approaches to answering questions and solving problems. A much deeper understanding of individual differences and cultural differences among students is developed (Yager 1985b). Because students work in a supportive environment where group processing skills are taught, they are much more inclined to accept different approaches than if they work in a competitive, non-interactive system which credits individual effort above team effort (Johnson 1975a, 1975b). Additionally, students are exposed to many more methodologies with CL than those presented by the teacher using a lecture.

30. CREATES A STRONGER SOCIAL SUPPORT SYSTEM (Cohen & Willis 1985)

Collaborative learning uses students' social experiences to encourage their involvement in the learning process. Warmup exercises and group building activities used throughout the course build a social support. The teacher plays a very active role in facilitating the process and interacting with each student. Administrators, school staff and parents become integral parts of the collaboration process, thus building into it many possibilities for support for any individual who develops problems, both academic and social (Kessler & McCleod 1985).

31. CREATES A MORE POSITIVE ATTITUDE TOWARD TEACHERS, PRINCIPALS AND OTHER SCHOOL PERSONNEL BY STUDENTS AND CREATES A MORE POSITIVE ATTITUDE BY TEACHERS TOWARD THEIR STUDENTS

The level of involvement of all the participants in a collaborative system is

very intense and personal. Students get to know teachers personally. Teachers learn about student behaviors because students have many opportunities to explain themselves to the teacher. Lines of communication are opened and actively encouraged. Teachers have more opportunities to explain why policies are established and the system allows students to have more input into establishing policies and class procedures. The empowerment created by the many interpersonal interactions leads to a very positive attitude by all parties involved.

32. ADDRESSES LEARNING STYLE DIFFERENCES AMONG STUDENTS (Midkiff & Thomasson 1993)

Students working in collaborative classes utilize each of the three main learning styles: kinesthetic, auditory and visual. For example, material presented by the teacher is both auditory and visual. Students working together use their kinesthetic abilities when working with hands on activities. Verbal and auditory skills are enhanced as students discuss their answers together. Visual and auditory modalities are employed when students present their results to the whole class. Each of these learning styles are addressed many times throughout a class in contrast to the lecture format which is mainly auditory and occasionally visual.

33. PROMOTES INNOVATION IN TEACHING AND CLASSROOM TECHNIQUES (Slavin 1980, 1990)

Collaborative learning processes include class warmup activities, name recognition games and group building activities, and group processing. Students work in pairs or larger groups depending upon the task at hand. Group work on content takes many forms, including pairs or groups working on individual questions, problem assignments, projects, study activities, group tests etc. Classes are interesting and enjoyable because of the variety of activities available for use by the teacher. In fact, collaborative learning effectively addresses the "Sesame Street" syndrome in which modern students are used to being exposed to information in short, entertaining sessions. These same students are also used to high tech computer systems which deliver material in a variety of ways including video, text, graphical illustrations, and interactive systems. Collaborative learning effectively matches or exceeds the above approaches to learning by actively involving every student. Bean (1996) points out that CL techniques can be easily integrated with other teaching strategies.

34. CLASSROOM ANXIETY IS SIGNIFICANTLY REDUCED (Kessler, Price & Wortman 1985)

In a traditional classroom when a teacher calls upon a student, he/she becomes the focus of attention of the entire class. Any mistakes or incorrect answers become subject to scrutiny by the whole class. Such experiences produce embarrassment and anxiety in many students. In contrast, in a CL situation, when students work in a group, the focus of attention is diffused among the group. When an answer is presented to the class it represents the work of the entire group; therefore no single individual can be held up to criticism. In addition, the group produces a product which its members can review prior to presenting it to the whole class, thus diminishing prospects that mistakes will occur at all (Slavin & Karweit 1981). When a mistake is made, it becomes a teaching tool instead of a public criticism of an individual student. Coincidentally, the general class attitude is one of cooperation and nurturing, not criticism.

35. TEST ANXIETY IS SIGNIFICANTLY REDUCED (Johnson & Johnson 1989)

Competition increases anxiety and makes people feel less able to perform. CL creates

the opposite response from students. It provides many opportunities for alternate forms of student assessment as described above. This situation leads to a reduction in test anxiety because the students see that the teacher is able to evaluate how they think as well as what they know. Students are not locked into a testing format which requires memorization and reproduction of basic skills. Through the interactions with students during each class, the teacher gains a better understanding of each student's learning style and how he/she performs. An opportunity is thus afforded to provide extra guidance and counseling for the students or to establish alternate forms of assessment. This type of interaction is completely lacking in a lecture class.

36. CL CLASSROOMS MAY BE USED TO MODEL DESIREABLE SOCIAL BEHAVIORS NECESSARY FOR EMPLOYMENT SITUATIONS WHICH UTILIZE TEAMS AND GROUPS.

Students socialize with family members and friends and work in situations which require team work and group work. Training in collaborative learning followed by group activities and processes provide an environment in which students can practice building good social skills, process beneficial group behavior, and generally observe each other's actions and reactions to their behaviors (Breen 1981).

37. STUDENTS PRACTICE MODELLING SOCIETAL AND WORK RELATED ROLES

In collaborative classes students may be assigned roles in order to build interdependence within the groups. Roles such as reader, recorder, reporter, materials handler, time keeper, skeptic/challenger and others are rotated among group members for each new assignment or project (Johnson, Johnson and Holubec 1984). Students are thus encouraged to develop and practice the skills which will be needed to function in society and the work world (Houston 1992). These skills include leadership, information recording, communication of results orally and in writing, challenging ideas in a constructive manner, obtaining and distributing materials and information to group members, encouraging member participation, brainstorming, meeting deadlines, etc (Sandberg 1995). Wlodowski (1985) observes that, "If students realize the direct applicability of classroom small group problem-solving to their own lives, motivation to learn will show a marked increase." Building strong social characteristics within students can be practiced in a risk free environment with support and training from the teacher.

38. CL IS SYNERGYSTIC WITH WRITING ACROSS THE CURRICULUM (WAC)

Considered individually CL and WAC increase students critical thinking skills and provide numerous other benefits. When combined the benefits are enhanced well beyond the effect of each paradigm. According to Brufee (1993) "Writing enters the collaborative process at several points. In the first place, conversation in consensus groups prepares students to write better on the topic at hand by giving them an opportunity to rehearse and internalize appropriate language. Recorders write reports, and the groups they represent help edit them. Teachers can ask students to write their own essays or reports on the basis of consensus group conversation, or revise what they have already written based upon it." Bean (1996) suggests that "one of the best ways to coach critical

thinking- and to promote the kind of talk that leads to thoughtful and elaborated writing- is goal directed use of small groups. Bean also states "What our students need to understand is that for expert writing, the actual act of writing causes further discovery, development and modification of ideas." Collaborative learning expands the discovery process, represented in writing activities, by extending it to verbal communication as well.

There occurs a subtle advantage when students peer edit their work in that they can relate to each other better than a teacher can. Gere and Stevens (1985) found that response groups could stay on task and that students attended to the writer's meaning in a way that was more specific than the teacher's comments. (McCarthy & McMahon (1992 p19). Daiute (1989) found that students' individual writing improved as measured by increased elaboration of characters, plot segments, and images. Improvement occurred when there was a balance between playful talk (e.g. role playing, trying out concepts, and using imagery) and controlled talk (e.g. planning, evaluating, labeling, or controlling the writing process) within the collaboration (McCarthy and McMahon (1992)).

When students work on a group writing assignment Saunders (1989) found that co-writers engage in spontaneous, fast-paced, and wide ranging discussions during the planning phase and that interaction during composition involves discussion, conflict and debate focused on reaching consensus.

Cooperative learning is especially useful when writing process models are used as basis for cognitive elaboration by students (Graves 1983). Such models such as CIRC- Cooperative Integrated Reading and Composition (Stevens et al 1987) have been found to be effective in improving creative writing (Hillocks (1984). The variation on cognitive elaboration occurs when students learn how to evaluate others' writing they will become better writer themselves because they more fully understand the criteria for evaluating their writing.

39. CL ACTIVITIES CAN BE USED TO PERSONALIZE LARGE LECTURE CLASSES

Bean(1995) makes a strong case for the adaptability of WAC exercises and collaborative writing assignments to large lecture classes. By having students work in pairs teachers can overcome some of the limitations created by lecture hall seating arrangements with fixed desks. Even in a large lecture students can be asked to turn to a neighbor and discuss a question posed by the professor, write a consensus summary of the lecture materials, share lecture notes or participate in any number of short collaborative activities. This approach has several benefits. It personalizes the class by creating an interaction among students- It breaks the lecture into more manageable and understandable segments. It places some of the responsibility for the class content with the students instead of it being exclusively with the professor. It helps students reflect upon what they are learning and creates an opportunity for students to ask questions or clarify difficult concepts.

40. SKILL BUILDING AND PRACTICE CAN BE ENHANCED AND MADE LESS TEDIOUS THROUGH CL ACTIVITIES IN AND OUT OF CLASS. (Tannenberg 1995)

Foundational aspects of education, the acquiring of information and operational skills, can be facilitated through the use of collaborative activities. In order to develop critical thinking skills students need a base of information to work from. Acquiring this skills base often requires some degree of repetition and memory work. When this is accomplished individually the process can be tedious, boring or overwhelming. When students work together the learning process becomes interesting and fun despite the repetitive nature of the learning process.

Tannenberg(1995) states "The most significant benefit that I have observed using CL has been for students to engage in the skills and practices of the computing discipline within the classroom. These practices include reading and understanding programs, designing and writing programs, complexity analysis, problem solving, writing proofs, scholarly debate, teaching one another, negotiating meaning, using alternate forms of representation (e.g., drawings of trees, graphs, and other data structures), and building collegial relationships. In a lecture based setting, we are limited to the extent to which we can convey skills and practices -- many of these do not lend themselves well to verbal description. And even for those that do, students appropriate such skills through active engagement, not by watching and listening. By working within a small group setting, students can be encouraged and helped by their peers and the instructor, and they learn from one another by watching and imitating." This idea can be extended to out of class activities as well.

Male (1990) reinforces the idea of skill building through CL in her article on cooperative learning and computers. She states "Initial studies have documented the positive impact of cooperative learning in drill-and-practice computer use as well as in higher order thinking skills(Johnson, Johnson and Stanne, 1986; Webb, Ender and Lewis, 1986)." Slavin (1992) emphasizes that practice explanations make sense when students are learning information or skills with high memory demands but few concepts, such as spelling or math. Two studies found positive effects from cooperative learning forms when pairs were used to study spelling. (Van Oudenhoven et al (1987), Van Oudenhoven et al (1987).

41. CL ACTIVITIES PROMOTE SOCIAL AND ACADEMIC RELATIONSHIPS WELL BEYOND THE CLASSROOM AND INDIVIDUAL COURSE (Bean 1995)

There is a significant benefit to CI which is not always apparent because it takes place outside of the classroom. If groups are continued long enough during a course they will get to know each other and extend their activities outside of class. This includes meeting on campus for meals or coffee, forming study groups, getting together at each others homes in the evening and weekends to work on projects or study for exams. Students exchange phone numbers and contact each other to get help with questions or problems thjey are having. Students will often sign up together for classes in later terms (Bean 1995) and seek out teachers who use CL methods. Students are able to make

new friends and establish study groups easier within a collaborative learning environment (Felder1997).

42. CL PROCESSES CREATE ENVIRONMENTS WHERE STUDENTS CAN PRACTICE BUILDING LEADERSHIP SKILLS. (Johnson & Johnson 1990, Bean 1995)

In order to help students learn how to function effectively in groups specific activities need to be employed. One method involves assigning students roles within groups such as reader, recorder, prober, timer, to name a few. The roles are rotated among the group members in order to have each person practice all the roles. The reader is generally considered to be the primary leadership role with responsibility for initially reading the material, ascertaining whether all the group members understand their charge and overseeing the progress of the group, including participation by all members. The recorder also has a leadership role in insuring that the material written represents the groups' thorough analysis of the problem including consensus conclusions and minority reports or dissenting views.

43. CL INCREASES LEADERSHIP SKILLS OF FEMALE STUDENTS (Bean 1995)

Bean (1995) states that "Collaborative learning is particularly effective at increasing the leadership skills of female students and for getting male students used to turning to women for help in pressure situations." This benefit is especially important in mathematics classes where men generally try to dominate class discussions and presentations. The Johnsons (1990) point out that "Within cooperative learning situations (compared with competitive and individualistic ones) students tend to like and enjoy math more and be more intrinsically motivated to learn more about it continually. Students are more apt to like and enjoy math and want to take advanced courses when math is taught cooperatively. This is especially important for female and minority students. If large numbers of female and minority students are going to take advanced math courses and enter math-related careers, class mates must encourage and support their doing so."

CL activities tend to equalize interactions between students during class activities and remove the focus on individual students, thus reducing the opportunity for any individual student to dominate a discussion. CL enables the teacher to observe group dynamics and intervene where necessary to encourage participation by all students. If a gender problem does arise the teacher may create an opportunity to address it through group activities followed by a plenary class discussion. Many students are unaware of their behavior when it comes

to gender related issues and class behavior.

44. IN COLLEGES WHERE STUDENTS COMMUTE TO SCHOOL AND DO NOT REMAIN ON CAMPUS TO PARTICIPATE IN CAMPUS LIFE ACTIVITIES, CL CREATES A COMMUNITY ENVIRONMENT WITHIN THE CLASSROOM.

Community colleges and many four year colleges are primarily commuter schools. Students do not remain on campus for extracurricular or social activities. Many students have jobs and/or family pressures which also limit their ability to participate in a campus life. Thus it falls to the classroom teacher to create an atmosphere of community through interactions between students. Based upon the previous discussions of the social benefits of CL it is clear that creating a community of learners is easily accomplished using CL techniques. The traditional lecture method does not provide opportunities for students to socialize in an academic setting. Quite the contrary, lecturing creates a passive, solitary atmosphere where competition is the rule and collaboration is discouraged. Some professors consider collaboration among students cheating or plagiarism. CL brings students together to develop support mechanisms similar to self help groups in their local communities.

45. CL IS ESPECIALLY USEFUL IN FOREIGN LANGUAGE AND ESL COURSES WHERE INTERACTIONS INVOLVING THE USE OF LANGUAGE ARE IMPORTANT

Brufee(1993) emphasizes the idea that learning takes place when individuals move from the society which they are familiar with to the society which they wish to join by learning the vocabulary, language structure, and customs unique to that society. This is true in academic societies which all have their own vocabulary and customs. Working collaboratively is an ideal way to facilitate the acquisition of language and to practice the customs of debate and discussion which occur in a particular academic field such as mathematics or psychology or history. Interacting collaboratively with the professor in and out of class also facilitates the reacclturation process defined by Brufee.

Research conducted using a CL approach (Lotan and Benton, 1990) called Finding Out/Descubrimiento developed by Elizabeth Cohen for use in ESL classes shows significant development in the acquisition of English-language skills by students using the curriculum (DeAvila, 1981; Neves, 1983). Lotan and Benton (1990) further point out that the Finding Out environment for learning language is different from and preferable to the drill and practice of formal language constructions traditionally associated with established ESL training. Researchers (Hatch, 1978, Richie, 1978, Neves, 1983) agree that peer interaction in natural settings is the optimal use of language necessary for successful acquisition of a second language.

46. ALLOWS ASSIGNMENT OF MORE CHALLENGING TASKS WITHOUT MAKING THE WORKLOAD UNREASONABLE. (FELDER 1997)

A premiss of CL is the creation of interdependence among group members. This is accomplished by creating mechanisms where students become responsible for each other and for the groups success, as in a Jigsaw procedure. This approach results in group members pooling their knowledge and resources. Under these conditions it becomes feasible to develop more challenging and advanced activities than would otherwise be possible if students were required to work alone. Longer assignments become attainable when students realize that they may divide responsibility for different aspects of a project.

Davidson (1990) points out that "Students in groups can often handle challenging situations that are well beyond the capabilities of individuals at that developmental stage. Individuals attempting to explore those same situations often make little progress and experience severe and unnecessary frustration". Helping groups function well in order to accomplish given tasks is a major component of CL and one of the responsibilities of the professor as facilitator. Once students have been trained to work collaboratively their performance and output increases dramatically.

47. WEAKER STUDENTS IMPROVE THEIR PERFORMANCE WHEN GROUPED WITH HIGHER ACHIEVING STUDENTS (COHEN 1994)

"In studies of collaborative seatwork, Swing and Peterson (1982) found that students of low achievement benefitted from participation in groups heterogeneously composed on achievement in comparison to participation in homogeneously low-achieving groups. Students of average achievement were the only ones not to benefit from their interaction with others of higher or lower achievement." (Cohen 1994) Hooper and Hannafin(1988) reported that low-achieving eighth-grade math students benefitted from working with high-achieving students on a delayed posttest with questions covering factual recall, application and problem solving.

One reason for the improvement may be explained by the intense one on one tutoring which is possible with CL (Felder 1997). Burns (1990) also suggests that with CL there is no waiting for help because it is available from other students or the teacher who circulates among the groups. In addition students are directed to seek help from each other before asking the teacher, relieving the teacher of the tedium of having to give the same directions or information over and over again. Another explanation offered by the Johnsons (1990) is that weaker students are given the opportunity to model the reasoning

processes of stronger students as well as preparing each other for tests, checking and correcting homework and helping each other see alternatives.

Vygotsky (1978) found that students were able to solve certain problems, when working cooperatively, prior to being able to solve those problems individually. He hypothesised that the social interaction extended the student's zone of proximal development, the difference between a student's understanding and potential to understand more difficult concepts. The opportunity of students to work with experts increases their ability to solve problems. Thus, when students work cooperatively in groups the more knowledgeable students may lead the less knowledgeable students in the appropriate direction required to understand new concepts.

48. PROVIDES STRONGER STUDENTS WITH THE DEEPER UNDERSTANDING THAT COMES ONLY FROM TEACHING MATERIAL (COGNITIVE REHEARSAL). (FELDER 1997)

The process of explaining one's reasoning creates a higher level of conceptual

understanding and promotes critical thinking skills. Favorable effects of giving explanations may stem from what Feltcher (1985) calls cognitive facilitation. In studies on the nature of interactions in CL and regular classes Cohen (1994) reports that "The most consistent, positive predictor of achievement in these studies is the giving of detailed, elaborate explanations (Webb 1983, 1991). In other words, the student who does the explaining is the student who benefits, controlling for how well he or she would have done based on past achievement/ability. Swing and Peterson (1982) also found that high achievers benefitted from participation in heterogeneous groups, especially by giving explanations to others.

49. LEADS TO THE GENERATION OF MORE AND BETTER QUESTIONS IN CLASS. (FELDER 1997)

The use of group brainstorming techniques in CL classes create an environment which stimulates questioning by students during class. Felder suggests a procedure where teams of three are asked to take one minute to come up with three good questions about what was just discussed during the class. Groups might be asked to summarize what they have learned and what they still feel they need to work on to gain a better understanding of specific concepts. By sharing this information in a plenary class session the professor and students gain a much better understanding of what they learned and what material needs to be covered in future classes or reviewed through study groups outside of class.

50. JIGSAW IS AN IDEAL STRUCTURE FOR LABORATORY AND DESIGN PROJECTS (FELDER 1997)

In the Jigsaw method individual students develop and share expertise in different aspects of the work. This approach is especially useful in modelling engineering, science, business or other technical careers where the expertise of a variety of individuals may be needed to complete a project using a collaborative approach. In design projects students may develop an expertise in one aspect of the project and teach those concepts and skills to the team. This process benefits all the group members by providing them with an opportunity to teach and learn from their peers. The Jigsaw approach is certainly not limited to technical areas but may be applied to any subject where pieces of information need to be combined to complete the whole project, report or paper etc.

Clarke (1994) identifies an important philosophical basis for the Jigsaw approach.

She states "Across the world, there is a growing use of heterogeneous work teams, usually through cross-role representation, to draw upon resources of varied specialists within the workplace. Such cross-role teams can create "break the mold" solutions because of the synergy that comes from combining a diversity of thinking and perspectives. All employees, board members, owners, and perhaps clients are acknowledged as valued participants in the ongoing organizational tasks of finding and solving problems."

"The use of the reconstituted work groups in classrooms, such as in the Jigsaw approach, is based on the same principles of interdependence that operate in the cross-team roles in the workplace. Class members bring their personal abilities and ways of thinking and working, as well as specialized knowledge, to analogous cross-role groups. The Jigsaw approach was developed as one way to help build a classroom as a community of learners where all students are valued." (Clarke, 1994)

51. CL INCREASES STUDENTS' PERSISTENCE IN THE COMPLETION OF ASSIGNMENTS AND THE LIKELIHOOD OF SUCCESSFUL COMPLETION OF ASSIGNMENTS (FELDER 1997).

When individuals get stuck they are more likely to give up; groups are much more likely to find ways to keep going. This is reinforced by the Johnsons (1990) who state "In a cooperative learning situation, students' goal achievements are positively correlated; students perceive that they can reach learning goals if and only if the other students in the learning group also reach their goals. Thus, students seek outcomes that are beneficial to all those with whom they are cooperatively linked. Students who work together discuss the material with the other group members, explain how to complete the work, listen to each other's explanations, encourage each other to try to understand the solutions, and provide academic help and assistance." All of these activities provide a support mechanism for individual students and encourage the completion of assignments because the potential for success is increased dramatically through the use of CL methods.

Group norms create a powerful dynamic within cooperative behavior (Deutsch 1949). Having norms established by a group instead of being imposed by an outside agent, such as a teacher, increases the likelihood that the norms will be adhered to (Marzano 1992). This in turn leads to a more positive mental climate within the class and increased student persistence in task completion. When students work together to establish group norms they develop feelings of responsibility for their peers and a sense of camaraderie. Students who might be reluctant to work on a difficult problem alone devote much more energy and time when they do it with others (Costa & O'Leary 1992).

52. PROVIDES TRAINING IN EFFECTIVE TEACHING STRATEGIES TO THE NEXT GENERATION OF TEACHERS (FELDER 1997).

As discussed earlier, new teachers are likely to teach using the teaching style they have been exposed to during their education. The primary paradigm at universities is the lecture method combined with a competitive assessment process involving individual exams graded on a curve. If teachers had more exposure and practice using CL methods and were able to observe the significant benefits and student reactions they would be more inclined to obtain additional training and to try these techniques in their classes.

53. HELPS STUDENTS WEAN THEMSELVES AWAY FROM CONSIDERING TEACHERS THE SOLE SOURCES OF KNOWLEDGE AND UNDERSTANDING (FELDER 1997)

One reason cited earlier for teacher reticence in adopting CL methods is the fact that professors have spend a lifetime developing their expertise in a subject leading them to feel that their primary function is to impart that knowledge to their students. This after all is how they perceive they learned the subject material when doing their undergraduate studies. In reality teachers become experts in their field when they teach the concepts to others and undertake research activities where they attempt to communicate their findings with their peers. Informal discussion and debate often yields more productive research break throughs than attending lectures.

CL approaches learning from a student centered philosophy by encouraging students to take responsibility for their learning by involving students throughout the class and encouraging their collaboration in group efforts outside of class. The teacher serves as a resource and facilitator rather than as an expert. It is not a passive role for the teacher. CL requires a great deal of planning and preparation on the part of the teacher to develop activities which will help guide students through the curriculum. The effect is to begin to elevate students to the teachers level and create a high expectation that they have the ability to obtain understand knowledge themselves.

54. CL FITS IN WELL WITH THE TQM AND CQI MODELS OF EFFECTIVE MANAGEMENT (WALKER 1997)

Another benefit to the CL approach is it is close relationship to the TQM model. Emphasis in this approach is towards learning how to cooperate in order to achieve the best possible answer or method of approach to a problem. The key is helping learners see the difference between dialogue and discussion. Where dialogue seeks for the best possible information available and discussion tends to focus on who rather than what. Too often learners enter into the job market and then have to relearn how to work together.

55. PROMOTES A LEARNING GOAL RATHER THAN A PERFORMANCE GOAL (GENTILE 1997)

Typical teaching paradigms consist of individual student efforts characterized by competitive testing to assess student competence and create and evaluation heirarchy based upon grades. This approach leads to a performance goal as the desired outcome of the educational experience. With CL the primary focus is on the process of learning and how individuals function within groups and independently, but not necessarily competitively.

The high level of interaction and interdependence among group members leads to a learning goal instead of a performance goal. CL is student centered versus teacher centered

leading to a stronger emphasis on the goal of learning. CL encourages teachers to use alternate assessment techniques further reducing the emphasis on competitive

examinations.

56. PROMOTES A MASTERY ATTRIBUTION PATTERN RATHER THAN HELPLESS ATTRIBUTION PATTERN (GENTILE 1997)

In a typical college class students attend lectures, complete assignments outside of class, and take an exam to demonstrate their knowledge retention of the subject matter. The exams are returned and new material is covered, repeating the process over and over. There is little time for reflection and discussion of students' errors or misconceptions. With the CL paradigm students are continuously discussing, debating and clarifying their understanding of the concepts and materials being considered during the class. They are constructing their own knowledge base. Assessment may vary from individual activities such as tests or oral reports to group tests or projects. The emphasis is on understanding the material as evidenced by the student's ability to explain ideas to their peers. This leads to a sense of mastery of content versus a passive acceptance of information from an outside expert which promotes a sense of helplessness and reliance upon others to attain concepts.

57. ALLOWS STUDENTS TO EXERCISE A SENSE OF CONTROL ON TASK (Sharan and Sharan, Gentile 1997)

The interactive, hands on nature of CL exercises places the students in a position of control over the process and encourages them to take full responsibility for the outcome of particular assignments. Students receive training in social skill building, conflict resolution and team management. The locus of control is with the student because the teacher serves as facilitator not director. Students are given a great deal of leeway to decide how they will function and what their group's product will be. CL empowers students to take control over their education.

58. CL PROMOTES POSITIVE SOCIETAL RESPONSES TO PROBLEMS AND FOSTERS A SUPPORTIVE ENVIRONMENT WITHIN WHICH TO MANAGE CONFLICT RESOLUTION (DAVIS 1997)

Research from at least four groups shows that CL reduces violence in any setting. CL is mentioned in Agression studies but not promoted heavily because non-coercive pure CL models non-violence, eliminates fear and blame, increases honor, friendliness, quality, and concensus. Process is as important as content and goal. CL takes time, time, time and

facilitators who have done the personal work that allows sharing of power, service to the learners, and natural learning, find CL a joy. Community building is perceived as a threat to those in the control paradigm.

Sherman (1991) makes the following observations from the perspective of psychology. "Most social psychology text books contain considerable discussions about conflict, sometimes instigated by individual or inter-group competition, and its resolution and/or

reduction through the use of cooperative techniques. Social Psychologists' interests in intergroup relations are beginning to acknowledge the applications and effectiveness of cooperative learning (Messick & Mackie, 1989). Almost all introductory educational psychology text books (Dembo, 1994; Good & Brophy, 1990; Slavin, 1991; Glover & Bruning, 1990) now contain extended discussions of cooperative pedagogics and their effectiveness with regard to improved racial relations, self- esteem, internal locus of control and academic achievement."

59. CL IS ESPECIALLY BENEFICIAL IN MATHEMATICS COURSES (DAVIDSON 1990)

Davidson (1990) points out the following benefits of CL as they apply to mathematics. Math problems can often be solved by several different approaches. Students in groups can discuss the merits of different proposed solutions and perhaps learn several strategies for solving the same problem. Students in groups can help one another master basic facts and necessary computational procedures. These can often be dealt with in the context of the more exciting aspects of mathematics learning through games, puzzles or discussion of meaningful problems. The field of mathematics is filled with exciting and challenging ideas that merit discussion. One learns by talking, listening, explaining, and thinking with others, as well as by oneself. Mathematics offers many opportunities for creative thinking, for exploring open-ended situations, for making conjectures and testing them with data, for imposing intriguing problems and for solving nonroutine problems. Small groups provide a social support mechanism for the learning of mathematics and an opportunity for success for all students in mathematics (and in general). Unlike many other types of problems in life, school mathematics problems can actually be solved in reasonable lengths of time, such as a class period. Mathematics problems are ideally suited for group discussion in that they have solutions that can be objectively demonstrated, Students can persuade one another by the logic of their arguments.

Johnson and Johnson (1990) identify the following attitudinal objectives of CL in mathematics. 1. Positive attitudes toward math, 2. Confidence in one's ability to reason mathematically. 3. Willingness to try various strategies and risk being wrong. 4. Ability to accept frustrations that come from not knowing and willingness to persevere when solutions are not immediate. 5. Attributing failure to not using the right strategy yet, rather than to not being competent. They conclude that "Confidence in one's ability to reason mathematically is considered prerequisite for learning. Once lost, it is difficult to restore."

60. CL PROVIDES THE FOUNDATION FOR DEVELOPING LEARNING COMMUNITIES WITHIN INSTITUTIONS AND IN COURSES (TINTO 1997)

In his article "Enhancing Learning Via Community", Vincent Tinto makes the following case for using CL to build learning communities. "If universities were serious about enhancing student learning, we would explore other ways of organizing our work. Among several possibilities three spring immediately To mind: First, we should reorganize our our curriculum into learning communities which enable student learning to span disciplines. Second, we should reorganize our classrooms to promote collaborative

learning experiences within the classroom so that students learn together rather than apart, Third, we should employ forms of classroom assessment that encourage students to engage in a shared discourse with us about their learning and provide them immediate information that they can use to improve their learning. In their most basic form, learning communities are a kind of block scheduling that enables students to take courses together."

The advantages of having students take several courses together combined with CL are found in the benefits listed above and reiterated by Tinto (1997) as follows: "First, students become more actively involved in classroom learning- and as they spend more time learning, they learn more. Second, the new students spend more time learning together. This raises the quality of their learning and everyone's understanding and knowledge is enriched by their working together. Third, these students form social groups outside their classrooms, bonding in ways which increase their persistence in college. Fourth, learning communities enable students to bridge the large divide between social conduct that frequently characterizes student life. They tend to learn and make close friends at the same time. Another advantage: The structure of learning communities for first-year students encourages the two separate fiefdoms of faculty and student services to work closely together with one another in constructing a first-semester curriculum tailored for new students."

61. CL PROVIDES INSTANTANEOUS FEEDBACK TO STUDENTS AND THE TEACHER ON THE EFFECTIVENESS OF EACH CLASS AND THE PROGRESS STUDENTS ARE MAKING BY OBSERVING STUDENTS WORKING IN GROUPS AND INDIVIDUALLY

Cooperative learning activities present teachers with unique opportunities to observe students interacting, explaining their theories, arguing for a particular point of view, helping their peers and being helped. Only a few minutes of observation during a class period can provide significant insights into a student's ability and performance level. The feedback provided is immediate as it is made during each class at the time the observation is made or shortly thereafter.

In using observations it is possible to look for a hierarchy of abilities similar to Bloom's taxonomy by asking the following questions about the students: 1. Do they know the basics- definitions, formulas, vocabulary, rules, and procedures needed to analyse and solve problems? 2. Can they apply their knowledge to similar problems or questions? 3. Are they able to extend their reasoning and analysis to new situations or problems? 4. Can they create their own problem statements or questions based upon the underlying concepts being studied? 5. Can they explain their reasoning in writing or verbally to their peers? By asking each of these questions one can identify the stage of development the student has reached and make recommendations as to what material and procedures the student might apply to help him/her understand the concepts better. .

There are many benefits to observing students at work in groups with their peers. 1. You can observe a student working through a complete problem or assignment versus seeing only the final product (exam or paper). 2. You can observe their reasoning

techniques, level of basic knowledge, and concept attainment. 3. You can identify their dominant

learning style by observing whether their presentation in pairs or groups is oral, visual or kinesthetic. This information can be invaluable if you help tutor the student in or out of class. 4. Brief, specific interventions are possible by the teacher or other students to provide help and/or guidance for students having difficulties. These may be in the form of guiding questions versus statements of fact or direction. This is very effective but can lead to frustration on the students' part until they get used to a questioning response from the teacher instead of a mini-lecture. 5. Informal conversations take place between individuals, groups and the teacher which help highlight problem areas the entire class may be having. These discussions also help create class environment which is more personal, as students get to know the teacher and the teacher learns about the students. 6. Shy students will participate more with their peers in small groups than in a large class and they too can be observed. It is very helpful to identify students who are shy in order to encourage their participation in non-threatening ways.

The benefits of using observations as an assessment tool to help students understand when they have mastered course material are numerous. This approach reduces anxiety markedly, raises students' self esteem, puts them in control of their own destiny and emphasizes that they are responsible for their own learning. The results they obtain are based upon their efforts, not the teacher's.

62. GROUPS ARE EASIER TO SUPERVISE THAN INDIVIDUAL STUDENTS

Denis Lander(1995) points out that an obvious advantage of CL is that six groups are easier for a staff member to supervise than thirty individual students. Groups may be monitored for their progress through the use of worksheets or exercises which require an end product. Teachers can observe students working on assignments together and individually within their groups. When students work alone it is very difficult for the teacher to observe most of the students during a class. This is especially true in large classes. Quite the contrary, when students are working collaboratively on an assignment it is easy for the teacher to watch individual students perform. Teacher intervention is also possible when CL is the favored paradigm. Teachers may raise questions, make observations, or suggestions based upon the group's interactions and progress. With the lecture format there is little opportunity for these types of student-teacher interactions and student-student interactions.

Slavin (1992) looks at the classroom perspective of cooperative learning and points out that when students take responsibility for managing themselves in cooperative groups the teacher is freed up to attend to more essential tasks such as working with small groups or individual students. This is especially helpful in writing classes. By having students respond to each other's writing and do peer editing the teacher does not have to evaluate several drafts from each student. The teacher can focus on helping students develop the criteria used to evaluate each other's work, present the criteria to the students that the teacher wishes to be met and work with individual students if necessary.

63. CL CAN BE ADAPTED TO LARGE LECTURES INVOLVING STUDENTS IN INTERACTIVE, CRITICAL THINKING ACTIVITIES DURING CLASS

According to Bean (1996) an advantage of CL is that it can be adapted to large classes. In lecture halls students may be asked to form pairs or small groups by turning around in their seats or working with the student seated next to them. It is nearly impossible to lead a whole class discussion in large lecture classrooms, however it is possible to give students a critical thinking task by having them work with a neighbor for ten minutes or so and then asking representative groups to present and justify their solutions. This technique helps focus student attention on a particular concept or topic, it creates an active learning environment and involves students directly in their own learning, helping them take some responsibility for their learning and that of their peers. Compare this to a lecture where students listen to the instructor, takes notes and then leave the class to decipher what was said on their own. This approach also gives the instructor immediate feedback on whether the students have understood the material presented in the lecture.

64. CL ENCOURAGES STUDENTS TO SEEK HELP AND ACCEPT TUTORING FROM THEIR PEERS

Students are often reluctant to seek out extra help or tutoring from their peers because help-seeking is interpreted negatively as an indicator of dependency (Hertz-Lazarowitz et al 1992). Beller(1955) points out that help-seeking may lead to self-perceptions of low ability, embarrassment, or feeling of indebtedness. Hertz-Lazarowitz et al(1992) identify additional research in social psychology which indicates that students show a decreased liking toward helpers; negative feelings are generated when students do not see opportunities to reciprocate the help; helping activities reflect adversely upon an person's intelligence.

Hertz-Lazarowitz(1992) point out that "It is important to note, however, that Cook and Pelfrey (1985) found that a person who received help when working as a member of a cooperative group expressed more liking for a teammate who provided help." Cook and Pelfrey surmise that this effect occurs because group settings create norms of responsibility toward teammates which minimizes the negative effects that ordinarily occur when one is unable to reciprocate help that is received . In addition group members often have opportunities to help each other thus reducing the perception of one way help. Members of groups recognize their importance to the group and contributions they may to their peers. Nelson-LeGall (1992) states that "Help-seeking, particularly the seeking of information, is valued more positively than volunteering information in cooperative work conditions; these evaluations are reversed, however, in competitive work conditions." Further "In small cooperative learning groups, students may consult, question, explain, and monitor one another, multiplying the number of helpers and learning opportunities available." Leikin et al (1992) found that students in cooperative math classes in middle schools requested help from their peers frequently, as reported in a self report questionnaire, despite their normal reluctance to do so and

they received more help than they actually requested from their peers. This was attributed to the experimental learning environment which encouraged them to ask for help and give help to their peers.

Nelson-LeGall (1992) states "When children are able and willing to take the initiative to gain assistance of more mature and expert others, they can participate, in a supportive social context, in the interrogatory process that mature learners employ to construct the relevant contextual knowledge for task solution" (p52) Compare this to the lecture class where the teacher is the only legitimate helper. Students seeking help during the delivery of a lecture might appear to be inattentive or worse yet ignorant of the lecture content. Students will generally wait passively for a more opportune time to raise questions about lecture material. Nelson-LeGall observed students in mathematics classes and noted that students spent most of their time in whole-class or individual seatwork activities which precluded their seeking help from other students. He states, "However, students in need of help were most likely to seek help by asking questions and requesting explanations when in small cooperative learning groups. In small cooperative learning groups, students may consult, question, explain, and monitor one another, multiplying the number of helpers and learning opportunities available". (p64)

Webb (1992) points out that students who do not seek help, even though they do need help, may still benefit from group interactions and learn the material by observing the group and seeing the strategies used by their peers as helping occurs within the group. Students can compare their learning strategies and work habits with other students and make changes simply by observing the questioning and answering process which occurs as students help each other. This in turn may encourage students to seek help if they observe a non-threatening, supportive environment within their group.

Veeder (1985) identified five variables which are important for determining whether students will benefit from the help they receive. Each item is supported by cooperative learning structures. First is the timeliness of the help offered. When students are working in groups they have an opportunity to ask questions and seek help immediately, either from their peers or from the teacher. Their questions will be directly related to the content being studied. Second is the relevance of the help to a student's need for help. During cooperative activities students are focused upon a specific concepts or information. Students tend to seek help which is directly related to answering questions or solving problems being studied. They may redefine and re-ask their questions depending upon the response they receive from the helper. Third is the amount of detail or elaboration in the help given. As students learn how to work together in groups the amount of explanation grows as members question each other, discuss and debate concepts, and work toward a consensus on how to approach a problem or learn content material. There are many more opportunities to ask questions and answers each other's questions than could occur in a lecture or whole class discussion. Fourth is whether the help is understood by the person receiving it. In cooperative groups students observe each other and can respond to each other immediately. If they see that a student has not understood a concept they may try explaining it again or try a different approach. The students being helped can help the tutor in this process by verbalizing their

misunderstandings or rephrasing their questions. Students are more likely to understand the nature of their fellow students' misunderstandings because they are able to relate to them better than the teacher might. Fifth is whether the student who receives help has an opportunity to solve the problem and uses that opportunity. Cooperative structures call for students to work on problems or answer questions during class. The feedback is immediate and all students in the group work on solving problems, answering each other's questions and developing strategies for future problem solving. The teacher may observe groups and make suggestions in order to insure that all students are participating in the activity.

65. CL FOSTERS METACOGNITION IN STUDENTS

Metacognition involves student recognition and analysis of how they learn. (O'Donnell & Dansereau 1992) Metacognition activities enable students to monitor their performance in a course and their comprehension of the content material. This includes detecting errors and learning how to make corrections while monitoring one's performance. Cooperative learning approaches create learning strategies which are independent of content and thus are transferable to different content areas. Cooperative learning structures encourage the development of metacognitive learning because they focus on the process of learning, which includes the evaluation of the group's work by individual group members, assessment and improvement of the social interactions which take place during cooperative activities, and efforts to make corrections in each individual's performance. The content matter is almost secondary to the learning process.

For example, Scripted Cooperation, a cooperative structure developed by O'Donnell and Dansereau (1992) includes five generic components which are helpful in the metacognition process: 1. dividing the text into discrete and meaningful sections, 2. having both members of a dyad read the text a section at a time, 3. requiring one partner to recall the pertinent details and information, 4. requiring the other partner to monitor this oral recall to detect errors and omissions (these two roles are evenly interchanged throughout the text), and 5. having both members of the dyad elaborate on this information with methods that may include developing analogies and generating images (Hertz-Lazarowitz, Kirkus and Miller (1992) (p7).

Metacognition is reinforced through cooperative activities which ask students to reflect on their group's performance and make suggestions for improvement and likewise asks students to reflect upon their individual contributions and performance and make corrections which will improve future group actions and results. Students act as mediators of their fellow students' thinking because group discussions call for elaboration and analysis of the initial interpretations made by their peers followed by students modifying their initial approaches (Pressels 1992). Students come to understand the strategic aspects of metacognition and appreciate the value accrued from teaching themselves how to think. Pressel (1992) makes the analogy; "Like debaters and trial lawyers, cooperative thinkers are benefitted by a vital exchange with their colleagues, but they are usually spared the anxiety of competitive risk-taking and

embarrassment of ultimate failure". (p3)

Costa and O'Leary (1992) identify several studies which show that students can learn metacognitive skills better when working in cooperative groups (Webb 1985, Weinstein et al 1989, Yager, et al 1985, 1986). They point out that "As students develop group criteria for their own performance of intelligent behaviors, they will develop operational indicators of what they should be doing or saying if they were persisting, listening, restraining impulsiveness, and so forth. These indicators serve as criteria with which to evaluate their own and other's performance". (p52)

Johnson and Johnson (1992) identify several practical reasons why cooperative learning, especially using their constructive controversy approach, enhances student metacognition. The fact that students will be required to explain their strategies or teach other students changes the learning strategies they use compared to how they organize material when they are learning independently. Discussions within cooperative groups require more frequent oral summarizing, explaining and elaboration of what one knows, which in turn consolidates and strengthens what is known through the rehearsal process. The heterogeneity of cooperative groups encourages students to accommodate themselves to their peer's perspectives, strategies, and approaches, to completing assignments. This stimulates divergent and creative thinking and a review of one's own thinking. Students often bring incomplete information to a task and by interacting with other students learn how to share their information and obtain insights on how other students obtain and use information, thus expanding their understanding of their own thinking processes. By sharing their work within cooperative groups, students externalize their ideas and reasoning for critical examination which in turn results in peer monitoring and regulation or members thinking and reasoning. Students give each other feedback regarding the quality and relevance of their contributions and make suggestions on how to improve their performance.

66. COOPERATIVE DISCUSSIONS IMPROVE STUDENTS' RECALL OF TEXT CONTENT (DANSEREAU (1985); SLAVIN & TANNER (1979))

When students read a text together and explain the concepts to each other and evaluate each other's explanations they engage in a high level of critical thinking. They frame the new concepts by using their own vocabulary and by basing their comments upon their previous knowledge. Thus they construct a new knowledge base on top of their existing base. This process leads to a deeper understanding and greater likelihood they will retain the material longer than if they worked alone and simply read and reread the text (Wittrock 1978). Johnson & Johnson (1979) found that engaging in discussion over controversial issues improves recall of important concepts. Ames and Murray (1982) found that discussion of controversial ideas among pairs of nonconservers on Piagetian conservation tasks improves their recall of content material. Dansereau (1985) has developed a structure called "cooperative scripts" where dyads (pairs of students) read a section of text and then one serves as recaller and summarizes the information while the other student listens for any errors, fills in omitted information and thinks of ways both can remember the main ideas. He found that while both

students learned more and were able to recall the information longer than students working alone, the recaller learned the most.

O'Donnell and Dansereau (1992) report that cooperating dyads performed better than individuals in their acquisition of descriptive (Spurlin et. al 1984) and technical information (Hall et al 1988; Larsen et al 1986). In addition dyads wrote more communicative instructions than individuals (O'Donnell et al 1985) and outperformed individuals on the immediate and delayed performance of a procedure (O'Donnell et al 1988).

67. CI HELPS TEACHERS CHANGE THEIR ROLES FROM THEIR BEING THE FOCUS OF THE TEACHING PROCESS TO BECOMING FACILITATORS OF THE LEARNING PROCESS. THEY MOVE FROM TEACHER-CENTERED TO STUDENT-CENTERED LEARNING (Hertz-Lazarowitz 1992)

Cooperative learning paradigms represent a philosophy of life as well as a learning strategy. It says that whenever people get together in groups their purposes are best served when they work together collaboratively to reach their goals versus using competition among group members to address problems. Cooperative learning paradigms embody the learning community philosophies. Our current educational system, however, is based upon competition among students for grades, scholarships, admissions to top schools and social recognition, etc. In order to change this paradigm, cooperative learning structures will need to be introduced at the earliest learning situations and used throughout each student's learning career starting in preschool and continuing through Kindergarten and higher education. In order to accomplish this change in student behavioral attitudes teachers will need to adopt a new role. They will need to step down from the podium and switch from lecturing to facilitating student interactions in class. There are many varieties of cooperative learning structures including Problem or Project Based Learning, collaborative learning, cooperative structures, to name a few. Teachers need not be locked into one approach, which may or may not suit their particular personality type. In addition, lecturing is not ruled out entirely in the cooperative philosophy. It is used sparingly, however, to emphasize a point of clarify a concept, and is generally used in response to student initiated inquires, versus teacher initiated lectures. Training in cooperative learning approaches includes the development of support structures among teachers and ongoing faculty development by experts in the field and eventually teacher's peers. A well developed system will become self sustaining over time. Finally, cooperative approaches are never static. Just as the cooperative approach benefits students in so many ways so does it benefit teachers through the sharing of ideas, brainstorming and critical thinking about problems which arise with the cooperative approach. Effective cooperative teachers are continually modifying their activities and adopting new structures to deal with different classroom situations and populations. This is an aspect of cooperative learning which can be especially rewarding to teachers.

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