

Cooperative Learning: Improving University Instruction By Basing Practice On Validated Theory

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Introduction

Imagine that time travel is possible and we could place individuals from the middle ages into present day life (Spence, 2001). A middle ages farmer placed in a modern farm would recognize nothing but the livestock. A physician from the 13th Century would probably faint from shock in a modern operating room. Galileo would be mystified by a tour of NASA's Johnson Space Center. Columbus would shake with fright in a nuclear submarine. But a 15th Century university professor would feel right at home in any classroom. While agriculture, medicine, science, and transportation, as well as manufacturing and communication have all been transformed and improved, teaching relatively has not. The same assumptions continue that teaching is telling, learning is absorbing what the instructor tells, and knowledge is subject matter content.

It is not that these assumptions have never been challenged. Educational history is a record of a steady cycle of failed reforms that were demonstrated to improve learning, but after a few years were abandoned. While there are many reasons why teaching is so resistant to change, Ewell (2001) believes that one reason is that instructors fail to apply the same scientific rigor (i.e., need for underlying theory and confirmatory evidence) to their teaching as they do to their research. When asked about their instructional methods, Ewell believes that university instructors respond more on folklore and knee-jerk mythology than on scientific fact, arguing that everybody knows how a class should be conducted or how material should be presented to students. Instead, university faculty should base their teaching practices directly on theory and research. Many educators, however, believe that after well over 100 years of theorizing and research psychology has not provided the guidance needed to teach effectively and efficiently (Blumenfeld & Anderson, 1996). Recommendations to university instructors on how to teach seem more based on stories and promising ideas rather than on conclusions from rigorous research. Given the importance of improving university teaching, educators should respond to issues of practice with theory and rigorous data. To do so, they have to ask the following questions:

1. Is the instructional practice derived from a clearly formulated theory?
2. Does the theory specify the conditions necessary to structure cooperation into existing situations (i.e., have clear rules of correspondence)?
3. Is the theory confirmed and validated by rigorous research that has high generalizability?
4. Has the implementation of the practical procedures resulted in field research validating the effectiveness of the procedures in ways that guide the refinement and modification of the theory?

The power of cooperative learning lies in the interrelationship among social interdependence theory, its validating research, and the practical procedures for educators derived from the theory. This chapter begins with a definition of cooperative learning and then a brief review of social interdependence theory (which focuses on cooperative, competitive, and individualistic efforts). Social interdependence theory illuminates the internal dynamics of cooperation so that they may be operationalized into a set of practical procedures that university instructors can actually use. Next, a meta-analysis of the research conducted at the university level is presented, revealing how the theory has been tested and validated. Finally, the instructional procedures of implementing cooperative learning are presented.

Definition of Cooperative Learning

Students' learning goals may be structured to promote cooperative, competitive, or individualistic efforts. In every classroom, instructional activities are aimed at accomplishing goals and are conducted under a goal structure. A **learning goal** is a desired future state of demonstrating competence or mastery in the subject area being studied (Johnson & Johnson, 1989, 1999). The **goal structure** specifies the ways in which students will interact with each other and the instructor during the instructional session. Each goal structure has its place (Johnson & Johnson, 1989, 1999). In the ideal classroom, all students would learn how to work cooperatively with others, compete for fun and enjoyment, and work autonomously on their own. The instructor decides which goal structure to implement within each lesson. The most important goal structure, and the one that should be used the majority of the time in learning situations, is cooperation.

Cooperation is working together to accomplish shared goals (Johnson & Johnson, 1989, 1999; Johnson, Johnson, & Smith, 2006). Within cooperative situations, individuals seek outcomes that are beneficial to themselves and beneficial to all other group members. **Cooperative learning** is the instructional use of small groups so that students work together to maximize their own and each other's learning. It may be contrasted with **competitive** (students work against each other to achieve an academic goal such as a grade of "A" that only one or a few students can attain) and **individualistic** (students work by themselves to accomplish learning goals unrelated to those of the other students) learning. In cooperative and individualistic learning, you evaluate student efforts on a criteria-referenced basis while in competitive learning you grade students on a norm-referenced basis. While there are limitations on when and where competitive and individualistic learning may be used appropriately, any learning task in any subject area with any curriculum may be structured cooperatively.

Theoretical Roots Of Cooperative Learning: Social Interdependence Theory

The first question is whether cooperative learning is based on a clearly formulated theory. The use of cooperative learning in university classes has its roots in the creation of social interdependence theory. Theorizing on **social interdependence** began in the early 1900s, when one of the founders of the Gestalt School of Psychology, Kurt Koffka, proposed that groups were dynamic wholes in which the interdependence among members could vary. One of his colleagues, Kurt Lewin refined

Koffka's notions in the 1920s and 1930s while stating that (a) the essence of a group is the interdependence among members (created by common goals) which results in the group being a "dynamic whole" so that a change in the state of any member or subgroup changes the state of any other member or subgroup, and (b) an intrinsic state of tension within group members motivates movement toward the accomplishment of the desired common goals. For interdependence to exist, there must be more than one person or entity involved, and the persons or entities must have impact on each other in that a change in the state of one causes a change in the state of the others. From the work of Lewin's students and colleagues, such as Ovisankian, Lissner, Mahler, and Lewis, it may be concluded that it is the drive for goal accomplishment that motivates cooperative and competitive behavior.

In the late 1940s, one of Lewin's graduate students, Morton Deutsch, extended Lewin's reasoning about social interdependence and formulated a theory of cooperation and competition (Deutsch, 1949a, 1962). Deutsch conceptualized three types of social interdependence (see Figure 1).

1. Positive interdependence (cooperation) results in **promotive interaction** as individuals encourage and facilitate each other's efforts to learn. Positive interdependence (cooperation) exists when individuals' goal achievements are positively correlated; individuals perceive that they can reach their goals if and only if the others in the group also reach their goals.
2. Negative interdependence (competition) typically results in **oppositional interaction** as individuals discourage and obstruct each other's efforts to achieve. Negative interdependence (competition) exists when individuals' goal achievements are negatively correlated; each individual perceives that when one person achieves his or her goal, all others with whom he or she is competitively linked fail to achieve their goals.
3. No interdependence (individualistic efforts) typically results in **no interaction** as individuals work independently without any interchange with each other. When a situation is structured **individualistically**, there is no correlation among participants' goal attainments; each individual perceives that he or she can reach his or her goal regardless of whether other individuals attain or do not attain their goals.

-----Insert Figure 1 About Here-----

The basic premise of social interdependence theory is that the type of interdependence structured in a situation determines how individuals interact with each other that, in turn, largely determines outcomes (Deutsch, 1949a, 1962; Johnson, 1970; Watson & Johnson, 1972). Positive interdependence tends to result in promotive interaction, negative interdependence tends to result in oppositional or contrient interaction, and no interdependence results in an absence of interaction. Depending on whether individuals promote or obstruct each other's goal accomplishments, there is substitutability (i.e., the degree to which actions of one person substitute for the actions of another person), cathexis (i.e., an investment of psychological energy in objects outside of oneself, such as friends, family, and work), and inducibility (i.e., the openness to being influenced and to influencing others) (Deutsch, 1949). In cooperative situations, collaborators' actions tend to substitute for each other, collaborators invest positive emotions in each other, and collaborators are open to being influenced by each other. In competitive situations, competitors' actions do not substitute for each other, competitors invest negative emotions in each other, and competitors are closed to being influenced by each other. In individualistic situations, there is no

substitutability, cathexis, or inducibility. The relationship between the type of social interdependence and the interaction pattern it elicits is assumed to be bidirectional. Each may cause the other. Positive interdependence, for example, tends to result in collaborators engaging in promotive interaction (i.e., helping, sharing, encouraging each other), but patterns of promotive interaction tend to result in cooperation. Social interdependence theory has served as a major conceptual structure for this area of inquiry since 1949. It has generated hundreds of research studies.

The Internal Dynamics That Make Cooperation Work

The second question is whether social interdependence theory can generate the identification of the conditions necessary for structuring cooperation in actual situations. Not all group efforts are cooperative. Simply assigning students to groups and telling them to work together does not in and of itself result in cooperative efforts. There are many ways in which group efforts may go wrong. Seating students together can result in competition at close quarters (pseudo-groups) or individualistic efforts with talking (traditional learning groups). Whenever two individuals interact, however, the potential for cooperation exists. Cooperation, though, will only develop under a certain set of conditions. These conditions, which are identified by social interdependence theory, are positive interdependence, individual accountability, promotive interaction, social skills, and group processing (Johnson & Johnson, 1989, 2005).

The heart of cooperative efforts is positive interdependence, the perception that you are linked with others in a way so that you cannot succeed unless they do (and vice versa) and that groupmates' work benefits you and your work benefits them (Johnson & Johnson, 1992). There are three major categories of interdependence: outcome interdependence, means interdependence, and boundary interdependence (Johnson & Johnson, 1989, 1992). When persons are in a cooperative or competitive situation, they are oriented toward a desired outcome, end state, goal, or reward. If there is no outcome interdependence (goal and reward interdependence), there is no cooperation or competition. In addition, the means through which the mutual goals or rewards are to be accomplished specify the actions required on the part of group members. Means interdependence includes resource, role, and task interdependence (which are overlapping and not independent from each other). Finally, the boundaries existing among individuals and groups can define who is interdependent with whom. Boundary interdependence consists of abrupt discontinuities that separate and segregate groups from each other, as well as unify the members of any one group. The discontinuity may be created by environmental factors (different parts of the room or different rooms), similarity (all seated together or wearing the same color shirt), proximity (seated together), past history together, expectations of being grouped together, and differentiation from other competing groups. Boundary interdependence thus includes outside enemy (i.e., negative interdependence with another group), identity (which binds group members together as an entity), and environmental (such as a specific work area) interdependence (which are overlapping and not independent from each other).

The second basic element is individual accountability, which exists when the performance of each individual student is assessed and the results given back to the group and the individual (Johnson & Johnson, 1989). Each group member has a personal responsibility for completing one's share of the work and facilitating the work of other group members. Group members also need to know (a)

who needs more assistance, support, and encouragement in completing the assignment and (b) that they cannot “hitch-hike” on the work of others. The purpose of cooperative learning is to make each member a stronger individual in his or her right. Students learn together so that they can subsequently perform higher as individuals. To ensure that each member is strengthened, students are held individually accountable to complete assignments, learn what is being taught, and help other group members do the same. Individual accountability may be structured by (a) giving an individual test to each student, (b) having each student explain what they have learned to a classmate, or (c) observing each group and documenting the contributions of each member.

The third basic element is promotive interaction (Johnson & Johnson, 1989). Students promote each other’s success by helping, assisting, supporting, encouraging, and praising each other’s efforts to learn. Doing so results in such cognitive processes as orally explaining how to solve problems, discussing the nature of the concepts being learned, teaching one’s knowledge to classmates, challenging each other’s reasoning and conclusions, and connecting present with past learning. It also results in such interpersonal processes as modeling appropriate use of social skills, supporting and encouraging efforts to learn, and participating in joint celebrations of success.

The fourth essential element is the appropriate use of social skills (Johnson & Johnson, 1989). Contributing to the success of a cooperative effort requires interpersonal and small group skills. Leadership, decision-making, trust-building, communication, and conflict-management skills have to be taught just as purposefully and precisely as academic skills. Procedures and strategies for teaching students social skills may be found in Johnson (2014), Johnson and F. Johnson (2013), and Johnson and R. Johnson (1997).

The fifth essential element is group processing, the examination of the process members are using to maximize their own and each other’s learning so that ways to improve the process may be identified (Johnson & Johnson, 1989). Instructors need to focus students on the continuous improvement of the quality of the processes students are using to learn by asking group members to (a) describe what member actions are helpful and unhelpful in ensuring that all group members are achieving and effective working relationships are being maintained, and (b) make decisions about what behaviors to continue or change. Group processing may result in (a) streamlining the learning process to make it simpler (reducing complexity), (b) eliminating unskilled and inappropriate actions (error-proofing the process), (c) improving continuously students’ skills in working as part of a team, and (d) celebrating hard work and success.

Understanding how to implement the five essential elements enables instructors to (a) structure any lesson in any subject area with any set of curriculum materials cooperatively, (b) fine-tune and adapt cooperative learning to their specific circumstances, needs, and students, and (c) intervene to improve the effectiveness of any group that is malfunctioning.

Validating Research: Meta-Analysis

Early History

The third question is whether there has been rigorous research with high generalizability to test and confirm social interdependence theory. The investigation of the relative impact of competitive, individualistic, and cooperative efforts is the perhaps the longest standing research tradition in

social psychology. It began with research studies in the late 1800s by Turner in England and Triplett in the United States and in the early 1900s by Mayer in Germany and Ringelmann in France. In the 1920s and 1930s, there were at least two major reviews of the research on cooperation and competition (Maller, 1929; May & Doobs, 1937). The current focus on the use of cooperative learning in university classrooms, however, has its roots primarily in (a) Deutsch's (1949a, 1949b) theory development, review of research, and research study demonstrating the power of cooperation learning in a psychology class at MIT and (b) our extensions of the theory and research and our development of practical procedures (Johnson, 1970, 2003; Johnson & Johnson, 1974, 1989, 1999, 2005, 2009; Johnson, Johnson, & Smith, 2006). Before 1970, almost all the research studies on cooperation and competition were conducted in university classrooms and in research laboratories using university students as participants. Subsequently, the research been conducted in a variety of other settings, such as pre-university education and business and industry. While the entire literature has been summarized in the past (Johnson & Johnson, 1989, 1999, 2005, 2009), a comprehensive review of only the studies conducted in universities has been done infrequently.

Meta-Analysis Of University Studies

Since the 1960s, over 305 studies have been conducted comparing the relative efficacy of cooperative, competitive, and individualistic learning on individual achievement in university and adult settings. Given the number of relevant studies, meta-analysis seems to be the most appropriate procedure for summarizing the results.

Characteristics Of Studies

Most of the research studies were conducted in the 1960s, 1970s, and 1980s (see Table 1). Sixty-one percent randomly assigned subjects or groups to conditions and 81 percent were published in journals. Eighty percent of the studies were of nine sessions or less. The studies were conducted in numerous subject areas (science, social science, computer science, English, reading, math, psychology, health, physical education) with a wide variety of tasks (verbal, mathematical, procedural). While most of the studies were conducted in North America, studies were conducted in Europe, the Middle East, and Asia. Different research methodologies were used. While numerous dependent variables were studied, they may be grouped into three categories: effort to achieve, quality of relationships, and psychological health. In addition, there are a number of studies on attitudes toward the university experience.

-----Insert Tables 1 and 2 and Figure 2About Here-----

Academic Success

One of the most important influences on the university experience is whether students achieve academically. University attrition is affected in numerous ways by academic success (Tinto, 1993). Some students are dismissed from university due to academic failure. Academic failure may create uncertainty about the relevance of university and the university curricula. Academic achievement may increase the intellectual adjustment and membership in the university as well as integration into academic life. The higher the achievement of students, the more committed they tend to be to completing university. Academic success may also mean greater eligibility for financial aid. For these and many other reasons, it is important to use the instructional methods that maximize student achievement.

Over 168 studies were conducted comparing the relative efficacy of cooperative, competitive, and individualistic learning on individual achievement of individuals 18 years or older. The results of these studies indicated that cooperative learning promoted higher individual achievement than did competitive (effect size = 0.49) or individualistic (effect size = 0.53) learning (see Table 2). These are significant and substantial increases in achievement. The achievement measures included knowledge acquisition, retention, accuracy and creativity of problem solving, and higher-level reasoning. These results held for verbal tasks (such as reading, writing, and orally presenting), mathematical tasks, and procedural tasks (such as swimming, golf, and tennis). There are also studies finding an advantage for cooperative learning in promoting meta-cognitive thought, willingness to take on difficult tasks and persist (despite difficulties) in working toward goal accomplishment, intrinsic motivation, transfer of learning from one situation to another, and greater time on task (Johnson & Johnson, 1989). These results are corroborated in a meta-analysis focusing only on university level one science, math, engineering, and technology courses (Springer, Stanne, & Donovan, 1999).

These results have important implications for the findings on university effectiveness (Astin, 1993; McKeachie, et al., 1986; Pascarella, 2001; Tinto, 1993). Astin (1993) found that student-student interaction and student-faculty interaction were the two major influences on university effectiveness (academic development, personal development, and satisfaction with the university experience). He notes that this interaction has to be cooperative, not competitive. McKeachie and his associates (1986) found that learning how to engage in critical thinking depends on student participation in class, instructor encouragement, and student-student interaction, all of which are found in cooperative, not competitive or individualistic, learning situations. Pascarella (2001) found in a three-year national (United States) longitudinal study of the influences on undergraduate student learning that a student's peer group and interaction with peers strongly affects cognitive growth. Finally, the higher achievement resulting from cooperative efforts influences the eight causes for students leaving university before they are graduated (Tinto, 1993). The higher achievement promoted by cooperative learning may be hypothesized to decrease the number of students who are dismissed from university due to academic failure and the resulting academic success may decrease the uncertainty students may feel about the relevance of their university experience. When students achieve, increases may be expected in the quality of their intellectual membership in institution, intellectual adjustment to university, integration into academic life, commitment to completing their studies at the university, and perception of the relevance of the curricula to their needs. Finally, higher achievement may mean greater eligibility for financial aid that may reduce the financial cost of university.

Quality Of Relationships

The quality of university life may largely depend on the quality of the relationships among students and between students and faculty (Astin, 1993; McKeachie, et al., 1986; Pascarella, 2001; Tinto, 1993). Positive interpersonal relationships may increase the quality of social adjustment to university life, increase the importance of social goals for continued attendance, reduce uncertainty about attending university, increase commitment to stay in university, increase integration into university life, reduce incongruences between students' interests and university curricula, and increase social membership in university (Tinto, 1993).

The results of the meta-analysis indicate that cooperative efforts promoted greater liking among students than did competing with others (effect size = 0.68) or working individually on one's own (effect size = 0.55), even among university students from different ethnic, cultural, language, social class, ability, and gender groups (see Table 2). These studies included measures of interpersonal attraction, esprit-de-corps, cohesiveness, and trust. In addition, university students learning cooperatively perceived more social support (both academically and personally) from peers and instructors than did students working competitively (effect size = 0.60) or individually (effect size = 0.51).

The positive interpersonal relationships promoted by cooperative learning are the heart of the university learning community.

Psychological Adjustment

Attending a university can require considerable personal adjustments for many students. In our meta-analysis of the research, we found cooperativeness to be highly correlated with a wide variety of indices of psychological health in a wide variety of university age populations (Johnson & Johnson, 1989). Competitiveness was related to a complex mixture of indices of health and pathology. Individualistic attitudes were related to a wide variety of indices of psychological pathology. One important aspect of psychological health is self-esteem. University level studies indicate that cooperation tends to promote higher self-esteem than competitive (effect size = 0.47) or individualistic (effect size = 0.29) efforts. Members of cooperative groups also become more socially skilled than do students working competitively or individually.

The psychological health promoted by cooperative learning has multiple effects on the university experience. First, it increases the ability of students to initiate, form, and maintain meaningful interpersonal relationships (Tinto, 1993). In addition, psychological health may increase students' academic self-concept and self-efficacy, quality of psychological adjustment to university life, ability to formulate and achieve meaningful goals including career goals, ability to deal with uncertainty, ability to commit to goals that require a university education, integration into the university community, a better understanding of one's interests and needs and the possible relevance of the university curricula, and the ability to find ways that personal goals may be met within current situations (Tinto, 1993).

Positive Attitudes Toward The University Experience

The more positive students' attitudes toward their university experience, the more likely they are to stay in the university and participate fully in university life. Thirty-nine studies have focused on attitudes. Cooperative learning tends to promote more positive attitudes toward learning, the subject area, and the university than do competitive (effect size = 0.37) or individualistic (effect size = 0.42) learning (see Table 2). There are numerous social psychological theories, furthermore, that predict students' values, attitudes, and behavioral patterns are most effectively developed and changed in cooperative groups (Johnson & F. Johnson, 2013). It is in cooperative group discussions that students learn the norms of university life, publicly commit themselves to adopt prosocial attitudes and behavior, are exposed to visible and credible social models, and advocate attitudes and behaviors to others. Cooperative groups are perhaps the most effective tool universities have in inculcating constructive and positive attitudes in students.

Reciprocal Relationships Among Outcomes

The outcomes resulting from cooperative efforts tend to be reciprocally related (Johnson & Johnson, 1989). The more effort students expend in working together to achieve, the more they tend to like each other. The more they like each other, the harder they tend to work to learn. The more individuals work together to learn, the more socially competent they become, the higher their self-esteem, and the greater their psychological health. The healthier individuals are psychologically, the more effectively they tend to work together to achieve. The more caring and committed relationships individuals are involved in, the healthier they will tend to be psychologically; the healthier individuals are psychologically, the more able they are to form caring and committed relationships. These multiple outcomes form a gestalt that is central to a high quality university experience and creating a university learning community.

The Research Is Even More Impressive Than It Looks

The research on cooperative learning is like a diamond. The more light you focus on it, the brighter and more multi-faceted it becomes. The power of cooperative learning is clearly illuminated by the magnitude of the effect sizes, but the more you read the research and the more closely you examine the studies, the better cooperative learning looks. Here are some of the reasons.

First, the research studies are a combination of theoretical and demonstration studies conducted in labs, classrooms, and universities as a whole. While the lab studies may have lasted for only one session, some of the demonstration studies lasted for the entire semester or academic year. Demonstration studies are usually (a) summative evaluations demonstrating that cooperative learning produces beneficial results or (b) comparative summative evaluations demonstrating that one cooperative learning procedure works better than others. The combination of scientific and demonstration studies strengthens the confidence university instructors can have in the effectiveness of cooperative learning procedures.

Second, the research on cooperative learning has a validity and a generalizability rarely found in the educational literature. It has been conducted over eleven decades by numerous researchers with markedly different orientations working in different universities and countries. Research participants have varied as to economic class, age, sex, nationality, and cultural background. The researchers have used a wide variety of tasks, subject areas, ways of structuring cooperative learning, and ways of measuring dependent variables. Vastly different methodologies have been used. The combination of the amount and diversity of the research is almost unparalleled.

Finally, cooperative learning is a very cost-effective instructional procedure. It affects many different instructional outcomes simultaneously.

Implementation Of Cooperative Learning

The fourth question is whether the implementation of the practical procedures resulted in field research validating the effectiveness of the procedures in ways that reveal inadequacies in the theory (i.e., see the meta-analysis) and guide the refinement and modification of the theory (see Johnson, 2003; Johnson & Johnson, 2005, 2009; Johnson, Johnson, & Holubec, 2007; Johnson, Johnson, & Smith, 2006). In the cycle of theory-research-practice, it is necessary to operationalize

the theory into a set of practical procedures that university instructors may actually use. Actually, professors have used cooperative learning throughout history. For thousands of years it has been understood that in order to understand the Talmud, one must have a learning partner. Socrates taught students in small groups, engaging them in dialogues in his famous “art of discourse.” As early as the first century, Quintillion argued that students could benefit from teaching one another and the philosopher Seneca advocated cooperative learning through such statements as, “*Qui Docet Discet*” (“*When you teach, you learn twice.*”). Johann Amos Comenius (1592-1679) believed that students would benefit both by teaching and being taught by other students. Throughout history, cooperative learning has been used. What is new is the systematic development of cooperative instructional procedures based on theory validated by research. It is only recently that the procedures for using cooperative learning have been derived from social interdependence theory and its validating research.

Cooperative learning is the instructional use of small groups so that students work together to maximize their own and each other's learning (Johnson, Johnson, & Smith, 2006). Within cooperative learning groups students discuss the material to be learned, help and assist each other to understand it, and encourage each other to work hard. Any assignment in any curriculum for any student can be done cooperatively. There are basically three ways in which cooperative learning may be structured in the university classroom (Johnson, Johnson, & Smith, 2006). Instructors may use formal cooperative learning, informal cooperative learning, and cooperative base groups.

Formal cooperative learning consists of students working together, for one class period to several weeks, to achieve shared learning goals and complete jointly specific tasks and assignments (such as decision making or problem solving, completing a curriculum unit, writing a report, conducting a survey or experiment, or reading a chapter or reference book, learning vocabulary, or answering questions at the end of the chapter) (Johnson, Johnson, & Smith, 2006). Any course requirement or assignment may be structured cooperatively. In formal cooperative learning groups instructors:

1. **Make a number of preinstructional decisions.** Instructors specify the objectives for the lesson (both academic and social skills) and decide on the size of groups, the method of assigning students to groups, the roles students will be assigned, the materials needed to conduct the lesson, and the way the room will be arranged.
2. **Explain the task and the positive interdependence.** A instructor clearly defines the assignment, teaches the required concepts and strategies, specifies the positive interdependence and individual accountability, gives the criteria for success, and explains the expected social skills to be used.
3. **Monitor students' learning and intervene within the groups to provide task assistance or to increase students' interpersonal and group skills.** A instructor systematically observes and collects data on each group as it works. When needed, the instructor intervenes to assist students in completing the task accurately and in working together effectively.
4. **Assess students' learning and helping students process how well their groups functioned.** Students' learning is carefully assessed and their performances evaluated.

Members of the learning groups then discuss how effectively they worked together and how they can improve in the future.

Informal cooperative learning consists of having students work together to achieve a joint learning goal in temporary, ad-hoc groups that last from a few minutes to one class period (Johnson, Johnson, & Smith, 2006). During a lecture, demonstration, or film, informal cooperative learning can be used to focus student attention on the material to be learned, set a mood conducive to learning, help set expectations as to what will be covered in a class session, ensure that students cognitively process and rehearse the material being taught, summarize what was learned and pre-empt the next session, and provide closure to an instructional session. During direct teaching, the instructional challenge for the instructor is to ensure that students do the intellectual work of organizing material, explaining it, summarizing it, and integrating it into existing conceptual structures. Informal cooperative learning groups are often organized so that students engage in three-to-five minute focused discussions before and after a lecture and two-to-three minute turn-to-your-partner discussions interspersed throughout a lecture.

Cooperative base groups are long-term, heterogeneous cooperative learning groups with stable membership (Johnson, Johnson, & Smith, 2006). Base groups give the support, help, encouragement, and assistance each member needs to make academic progress (attend class, complete all assignments, learn) and develop cognitively and socially in healthy ways. Base groups are permanent (lasting from one to several years) and provide the long-term, caring peer relationships necessary to influence members consistently to work hard in school. The use of base groups tends to improve attendance, personalize the work required and the school experience, and improve the quality and quantity of learning. Positive development is enhanced when base groups are given the responsibility for conducting a year-long service project to improve the school.

The three types of cooperative learning complement and support each other. A typical ninety-minute class session, for example, begins with a **base group meeting** of five to ten minutes in which members welcome each other and check each member's homework to ensure it is completed and understood. Second, the instructor gives a short lecture with **informal cooperative learning** to introduce the objectives, schedule and topic of the class session. Third, the instructor uses **formal cooperative learning** to conduct an instructional activity focused on the topic of the session. Fourth, near the end of the class the instructor summarizes (using **informal cooperative learning**) what has taken place, interesting ideas generated by the formal cooperative groups, and explains how the lesson leads into the assignment for the next class session. Fifth, the class session ends with a **base group meeting** in which students review what they have learned, what homework has been assigned, and what help each member needs to complete the homework.

What Makes Universities Successful

There is more to university life than attending classes. For many students, attending a university is the first time they have lived away from home. They leave their family, friends, and acquaintances to create a new life among strangers and become members of a new community. The experience is a success, for the student and for the institution, if the student completes a degree within three to five years and views his or her university experience fondly and positively. Correspondingly, the experience is a failure for the student and the institution if the student leaves the university before graduation or remembers his or her university experience with bitterness or indifference after

finishing. Tinto (1993) identified eight causes for leaving university before being graduated: low academic performance, poor adjustment to university life, uncertainty about personal goals, lack of commitment to completing a degree, financial hardship, lack of academic and social integration into university life, incongruence between university curricula and students' interests, and social and intellectual isolation (see Table 3).

-----Insert Table 3 About Here-----

It is reasonable to predict that the more frequently cooperative learning is used in the university, the more successful the university will be. The academic achievement promoted by cooperative learning may increase students' academic success (thus reducing failure), enhance intellectual adjustment and intellectual integration into the university, help students set academic goals and enlarge the possibilities of what they may accomplish academically, increase academic commitment, increase chances for financial aid, and increase congruence between intellectual interests and the university's curricula. The positive interpersonal relationships fostered by cooperative experiences may increase social pressure to learn and achieve, adjust to new relationships and become socially integrated into campus life, help set social goals, reduce uncertainty about goals, increase commitment to other students, and increase congruence between attending the university and relationship goals. The increased psychological health promoted by cooperative experiences may increase students' academic self-esteem and self-efficacy, psychological adjustment, clarify personal goals, increase ability to cope with uncertainty, maintain constructive relationships with diverse schoolmates, form coalitions to achieve goals, and ability to adapt personal goals to current situations.

Building A Learning Community

Retaining students depends primarily on integrating them into the social and academic university community and helping them acquire the skills and knowledge needed to become successful learners (Tinto, 1997). In addition, in programs such as engineering, medicine, and many others, students are expected to be socialized into a community of practice (Lave & Wenger, 1991). In addition, many universities try to create learning communities through learning clusters and linked courses. By definition, community rests on a foundation of cooperation. A **community** is a limited number of people who share common goals and a common culture (Johnson & Johnson, 2008). For a community to exist and sustain itself, members must share common goals and values that define appropriate behavior and increase the quality of life within the community. Within a community, everyone should know everyone else and realize that relationships are long-term (as opposed to temporary brief encounters). Creating a learning community requires emphasizing the overall positive interdependence among members. Faculty, administrators, staff, and students should believe that they are striving to achieve mutual goals, such as delivering quality education, preparing for careers, promoting the intellectual and social development of students, increasing knowledge, applying knowledge to solve social problems, and searching for truth. Such goals tend only to be accomplished through cooperative efforts.

Once the overall cooperative structure of the university is established, there is a need to make the epistemology and the pedagogy used congruent. For most universities and for most students, the primary contact among students and between students and faculty occurs in the classroom. Any attempt to create an academic and social community thus begins in the classroom. If students do

not engage with each other and with the faculty in the classroom, they tend not to engage elsewhere. The epistemology resulting from (a) a competitive context in which students are ranked from highest to lowest performer and (b) making students passive recipients of instruction (such as lectures) mitigate against the formation of a learning community. Developing a learning community requires an epistemology based on cooperation, that is, the use of formal and informal cooperative learning and cooperative base groups.

Cooperative Learning Provides Foundation For Other Forms Of Active Learning

Problem-Based Learning

Problem-based learning may be defined as giving students a problem to understand and solve with the goal of having students learn relevant information and procedures (Allen & Duch, 1998; Barrows & Tamblyn, 1980; Smith, Sheppard, Johnson, & Johnson, 2011). Solving the problem correctly is less important than participating in the process of gathering and learning the information and procedures relevant to solving such problems. Problem-based learning was developed for small groups of students to work together to ensure that the relevant information and procedures are discovered and mastered by all members of the group. It is inherently a cooperative enterprise. Problem-based learning tends to occur in small student groups where the instructor is a facilitator or guide (not a lecturer). Obviously, if the groups are structured competitively or individualistically, the resulting learning would be significantly reduced. Problem-based learning groups need to be structured cooperatively, thus making cooperative learning the foundation on which problem-based learning is built. When this connection between cooperative learning and problem-based learning is explicit, it is known as Cooperative Problem-Based Learning or Problem-Based Cooperative Learning. The influence of cooperative learning on engineering education is summarized in Smith's (2011) reflection on thirty-years of championing this research-based practice.

Team-Based Learning

Team-based learning is an instructional strategy using learning teams to enhance the quality of student learning (Michaelsen, Watson, Cragin, & Fink, 1982). The instructor assigns students with diverse skill sets and backgrounds to permanent groups of five to seven members. Students are individually accountable for homework assignments and for contributing to team efforts in class. Significant credit is given for inclass team activities and application exercises. These inclass activities are aimed at promoting both academic learning and team development and are structured to give students frequent and timely feedback on their efforts. Obviously, the teams in team-based learning have to be structured cooperatively. Competitive and individualistic goal structures will serious damage the productivity of learning teams. Team-based learning is in effect another form of cooperative learning.

Collaborative Learning

Collaborative learning has its roots in the work of Sir James Britton and others in England in the 1970s (Britton, 1990). Based on the theorizing of Vygotsky (1978), Britton notes that just as the individual mind is derived from society, a student's learning is derived from the community of learners. This community is developed by the students. Britton is quite critical of educators who provide specific definitions of the teacher's and students' roles. He recommends placing students in groups and letting them generate their own culture, community, and procedures for learning. Britton believed in **natural learning** (learning something by making intuitive responses to whatever efforts produce) rather than **training** (the application of explanations, instructions, or recipes for action). The source of learning is interpersonal; learning is derived from dialogues and interactions with other students and sometimes the teacher. He viewed structure provided by teachers as manipulation that creates training, not learning, and therefore teachers should assign students to groups, provide no guidelines or instructions, and stay out of their way until the class is over. As an educational procedure, therefore, collaborative learning has historically been much less structured and more student directed than cooperative learning, with only vague directions given to teachers about its use. Cooperative and collaborative learning both stress the centrality of interdependence; however, the vagueness in the role of the teacher and students results in a vagueness of definition of the nature of collaborative learning.

While Sir James Britton was committed to the unstructured nature of group learning, cooperative learning provides a clear conceptual structure and a set of clear procedures for instructors who wish more direction. Cooperative learning could thus be a foundation on which collaborative learning could be made more specific.

Peer-Assisted Learning

Recently, Peer-Assisted Learning (PALS) has been adopted by university instructors in the United States. It may be defined as students acquiring knowledge and skills through active helping among equal classmates (Topping & Ehly, 1998). It subsumes Reciprocal Peer Tutoring, which involves same-age student pairs of comparable ability whose responsibility is to keep each other engaged in constructive academic activity (Fantuzzo & Ginsburg-Block, 1998). Peer-Assisted Learning is different from traditional peer tutoring, which tends to involve students of different ages or different achievement levels. Clearly, peer-assisted learning is based on cooperation, as assistance and encouragement tends not to take place in competitive interaction.

Summary

What differentiates cooperative learning from these other group-based instructional methods is that it is tied directly to social psychological theory and the research conducted to validate or disconfirm the theory. It is the interrelationship between theory, research, and practice that sets cooperative learning apart. And it is this relationship among theory, research, and practice that make cooperative learning the foundation on which other forms of small group instruction are based.

Conclusions And Summary

University teaching may have not changed significantly for hundreds of years. The many attempts to reform university teaching have often demonstrated positive effects but have then been discontinued. Perhaps the last major change in university teaching is when the “the never to be forgotten” Hutcheson in Scotland in 1729 started lecturing in English rather than in Latin. While considered a scandal, eventually all other professors in the Western World started lecturing in the language of their students rather than in Latin. One explanation for the resistance of teaching to change is that instructors fail to apply the same scientific rigor to their teaching as they do to their research. Professors as scientists and intellectuals typically ask for proof when a colleague presents a scientific conclusion, yet when it comes to what constitutes good teaching, professors often accept uncontested folklore and mythology. Many of the recommendations made about teaching, furthermore, are based more on stories and promising ideas rather than conclusions from rigorous research. What is lacking is the successful application of theory and research to instructional methods. This article presents cooperative learning as one example of theory validated by research applied to instructional practice.

First, there is a rich theoretical base for cooperative learning in social interdependence theory. The theoretical base allows cooperative learning to be defined, refined, and continuously improved. From social interdependence theory and its application to cooperative learning the internal dynamics that make cooperation work have been identified. Faculty need to structure cooperative lessons so that students are positively interdependent, individually accountable, promote each other’s success, appropriately use social skills, and periodically process how they can improve the effectiveness of their efforts. Understanding these basic elements allows precise cooperative learning procedures to be engineered and gives faculty a set of tools for intervening in ineffective learning groups. It is these essential elements that differentiate cooperative learning from other groups, such as pseudo groups and traditional learning groups.

Second, there is considerable evidence (a) indicating that social interdependence theory, which underlies cooperative learning, is valid and (b) demonstrating that cooperative learning will work in university classes. Over 305 research studies have been conducted on cooperation at the university level. Cooperative learning is the instructional procedure of choice whenever faculty wish to maximize student learning, ensure highly complex or difficult material is understood and mastered, and maximize long-term retention. In addition, cooperative learning creates positive interpersonal relationships characterized by personal and academic support and promotes greater psychological health and well-being (including self-esteem and social competencies). It also creates positive attitudes toward the university experience.

Third, social interdependence theory provides the basis on which to define cooperative learning and differentiate from other instructional methods, such as competitive and individualistic learning. It gives guidance for defining the instructor’s role in using (together or separately) formal cooperative learning, informal cooperative learning, and cooperative base groups.

Fourth, the use of cooperative learning groups creates certain opportunities that do not exist when students work competitively or individually. In cooperative groups students can engage in discussions in which they construct and extend conceptual understanding of what is being learned and develop shared mental models of complex phenomena. Groupmates can hold students accountable to learn, provide feedback on how well they are doing, and give support and

encouragement for further attempts to learn. Students can observe the most outstanding group members as behavioral models to be emulated. It is through discussions in small groups that students acquire attitudes and values (such as the need for continuous improvement). Finally, it is within cooperative groups that students establish a shared identity as members of the university. These, and many other opportunities, are lacking when students learn competitively or individualistically.

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Figure 1 Overview Of Social Interdependence Theory

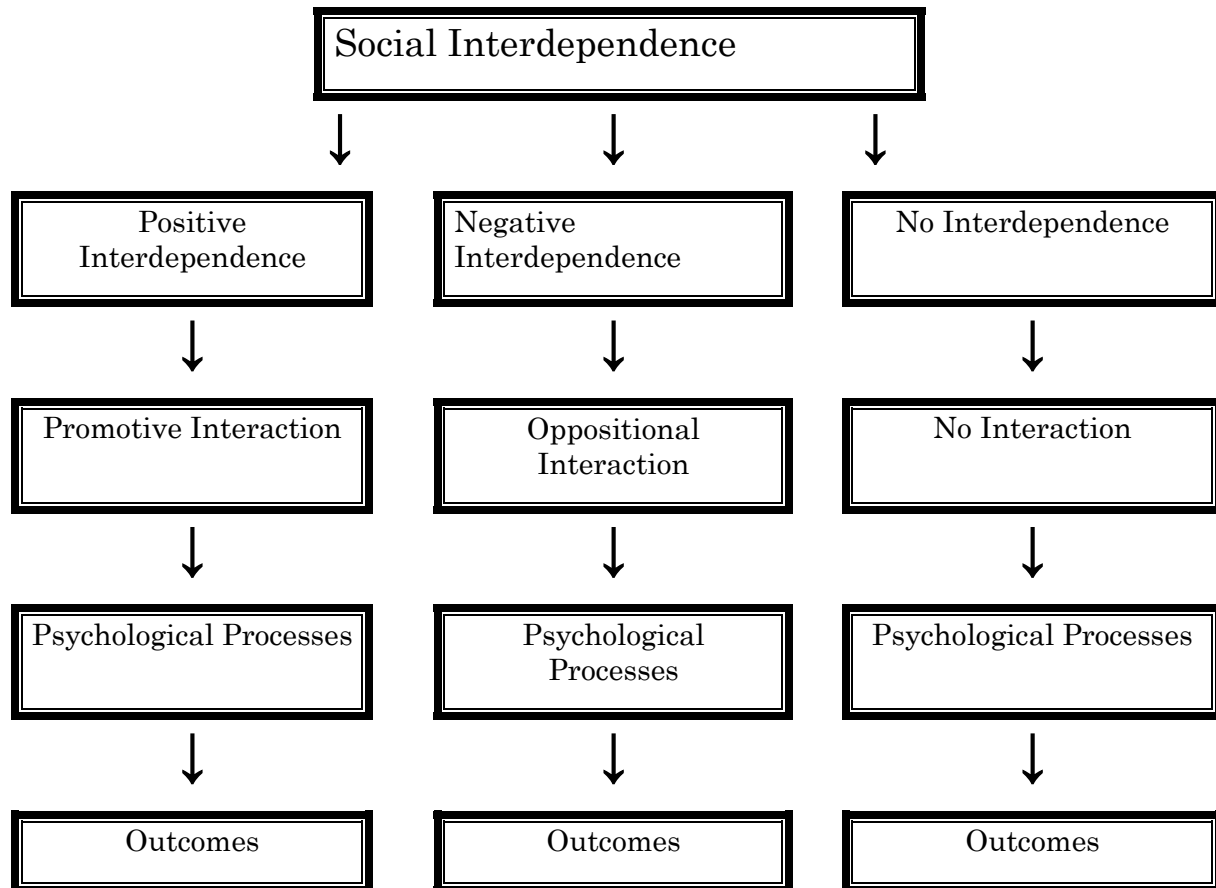
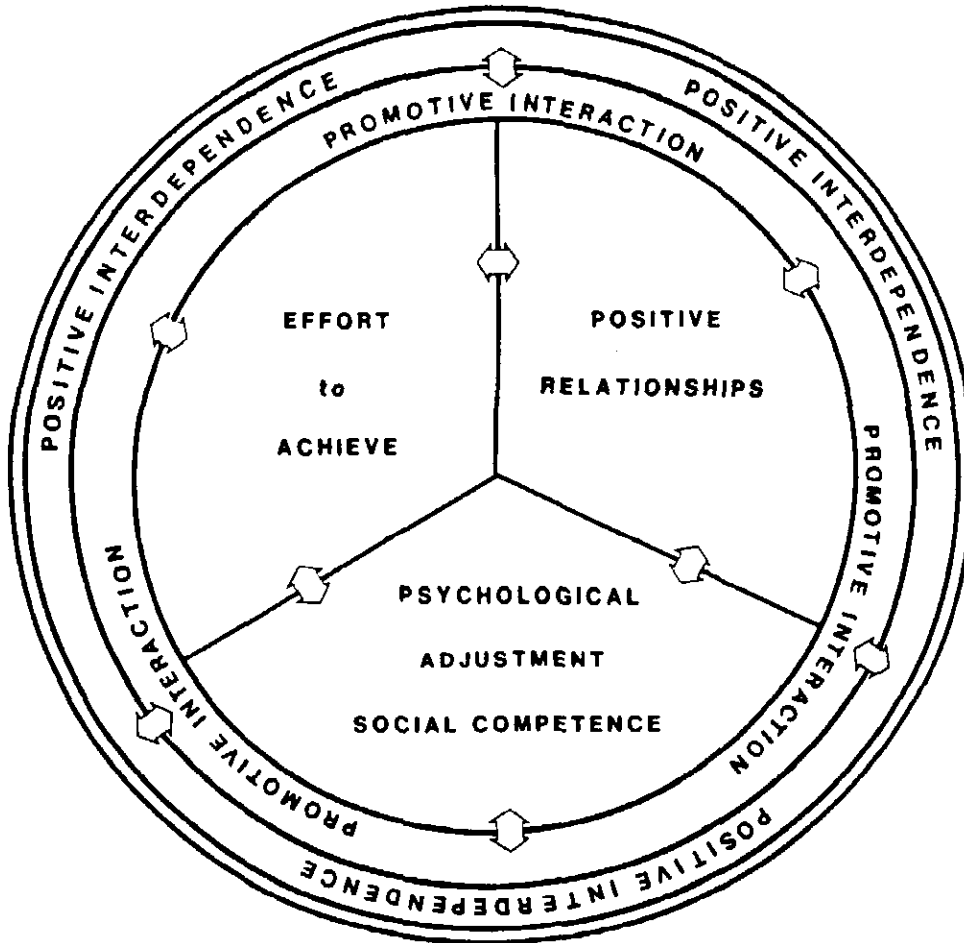


Figure 2

Outcomes Of Cooperative Learning



Source: Johnson, D. W., & Johnson, R. (1989). Cooperation and competition: Theory and research. Edina, MN: Interaction Book Company. Reprinted with permission.

Table 1
Characteristics Of University Studies

Characteristic	Number	Percentage
Decade		
1910-19	1	0.3
1920-29	5	1.6
1930-39	5	1.6
1940-49	2	0.6
1950-59	17	5.4
1960-69	61	19.6
1970-79	63	20.2
1980-89	94	30.1
1990-99	56	17.9
2000-09	8	2.6
Assignment		
Random By Individual	150	48.1
Random By Group	41	13.2
Nonrandom	121	38.8
Mode Of Publication		
Journal Article	253	81.1
Book	2	0.6
Masters Thesis	3	1.0
PhD Dissertation	27	8.7
Technical Report	17	5.4
Unpublished	10	3.2

Duration

1 - 9	249	79.8
10 - 19	15	4.8
20 - 29	13	4.2
30 - 39	10	3.2
40 - 49	14	4.5
50 - 99	11	3.4
Total	312	100

Table 2

Mean Weighted Effect Sizes For Impact Of Social Interdependence On Dependent Variables

Variable	Cooperation vs. Competition	Cooperation vs. Individualistic
Achievement	0.54	0.51
Interpersonal Attraction	0.68	0.55
Social Support	0.60	0.51
Self-Esteem	0.47	0.29
Positive Attitudes	0.37	0.42

Table 3

Outcomes Of Cooperative Learning And Factors Influencing Continued Attendance

Factors (Tinto, 1993)	Achievement	Interpersonal Relationships	Psychological Health
Academic Failure	Academic Success	Social Pressure To Achieve	Self-Concept, Self-Efficacy
Adjustment	Intellectual Adjustment	Social Adjustment	Psychological Adjustment
Relevance Of University To Goals	Academic Goal Setting	Social Goal Setting	Setting & Achieving Meaningful Goals
Uncertainty About Life Goals	Academic Success Creates Possibilities	Friends Create Possibilities	Ability To Deal With Uncertainty
Commitment To University Education	Academic Commitment	Social Commitment To Be With Friends	Ability To Commit To Goals
Finances	Increases Eligibility For Financial Aid		
Integration Into University Life	Intellectual Integration	Social Integration	Develop & Maintain Relationships
University Life & Needs Incongruent	Intellectual Interests & Curricula Congruent	Relationship Goals & Attending University Congruent	Ability To Adapt Personal Goals To Current Situations
Academic & Social Isolation	Intellectual Integration	Social Integration	Form Coalitions To Achieve Goals