An Educational Psychology Success Story: Social Interdependence Theory and Cooperative Learning

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The widespread and increasing use of cooperative learning is one of the great success stories of social and educational psychology. Its success largely rests on the relationships among theory, research, and practice. Social interdependence theory provides a foundation on which cooperative learning is built. More than 1,200 research studies have been conducted in the past 11 decades on cooperative, competitive, and individualistic efforts. Findings from these studies have validated, modified, refined, and extended the theory. From the theory, procedures for the teacher's role in using formal and informal cooperative learning and cooperative base groups have been operationalized. Those procedures are widely used by educators throughout the world. The applications have resulted in revisions of the theory and the generation of new research.

Keywords: collaboration; cooperative learning; instructional practices

Few instructional practices have been more successfully implemented in the past 60 years than cooperative learning. Cooperative learning was relatively unknown and unused in the 1940s, 1950s, 1960s, and 1970s. During this time, there was considerable cultural resistance to the use of cooperative learning, based first on the social Darwinism that promoted interpersonal competition with slogans such as, "It's a dog-eat-dog world" and "survival of the fittest." In the late 1960s, after competition began to be criticized (e.g., Sexton, 1961), the cultural resistance switched to *rugged individualism*, that is, the view that strong individuals were built by isolating each student and having students learn by themselves without interacting with classmates. Individualistic procedures were recommended, such as programmed learning, which was aimed at allowing students to go through the curriculum at their own pace independent of classmates' rates of learning, and operant conditioning, which included behavioral modification (Skinner, 1968). Individualistic learning was then challenged by social scientists who pointed out the essential role of peer interaction and relationships in socialization and learning (Hartup, 1976; D. W. Johnson, 1980; D. W. Johnson & R. Johnson, 1981d; Ladd, 1999; Lewis & Rosenblum, 1975). It was not until the 1980s that cooperative learning began to be widely accepted.

The application of social interdependence theory to education has become one of the most successful and widespread applications of social and educational psychology to practice. Although small-group learning has been used since the beginning of human existence, the modern use of cooperative learning primarily began in 1966 with the training of teachers at the University of Minnesota in the effective instructional use of small groups (D. W. Johnson, 1970; D. W. Johnson & R. Johnson, 1974). Other ways of structuring cooperative learning include Teams-Games-Tournament (DeVries & Edwards, 1973), Student Teams Achievement Divisions (Slavin, 1978), group investigation (Sharan & Sharan, 1976), academic controversy (D. W. Johnson & R. Johnson, 1979, 2007), jigsaw (Aronson, Blaney, Stephan, Sikes, & Snapp, 1978), Team Assisted Individualization (Slavin, Leavey, & Madden, 1984), complex instruction (Cohen, 1994), the structural approach (Kagan, 1985), Cooperative Integrated Reading and Composition Program (Stevens, Madden, Slavin, & Farnish, 1987), and many more.

The success of cooperative learning is unusual. Many instructional practices have been recommended during the past 60 years. The vast majority of instructional practices were never widely adopted (e.g., Richard DeCharms's [1976] program of pawns and origins), and of the few that were adopted, most were abandoned after a few years (e.g., programmed learning, Skinner, 1968; the National Science Foundation–funded science and social studies programs of the 1960s, the Magic Circle and other values clarification procedures, multiple learning styles procedures, and Madelyn Hunter's steps of teaching). Cooperative learning has been different. From being discounted and ignored, cooperative learning has steadily progressed to being one of the dominant instructional practices throughout the world. Cooperative learning is now utilized in schools and universities throughout most of the world in every subject area and from preschool through graduate school and adult training programs. Its use so pervades education that, almost anywhere in the world, it is difficult to find a textbook on instructional methods, teachers' journals, or instructional materials that does not discuss

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cooperative learning. Materials on cooperative learning have been translated into dozens of languages. Our writings on cooperative learning, for example, have been translated into 17 languages (i.e., Chinese, Japanese, Korean, Thai, Arabic, French, Spanish, Italian, Greek, German, Dutch, Norwegian, Danish, Finnish, Russian, Ukrainian, and Polish), and the writings of other scholars on cooperative learning have been translated into many more languages. The success of cooperative learning is largely based on its having a clear theoretical foundation and hundreds of validating research studies that point the way for operational procedures for practitioners such as teachers.

The purpose of this article is to describe how social and educational psychology has contributed to educational practice by summarizing social interdependence theory, giving an overview of the relevant research, and discussing the application of the theory to education.

Social Interdependence Theory

Social interdependence exists when the outcomes of individuals are affected by their own and others' actions (D. W. Johnson & R. Johnson, 1989). There are two types of social interdependence: positive (when the actions of individuals promote the achievement of joint goals) and negative (when the actions of individuals obstruct the achievement of each other's goals). Social interdependence may be differentiated from social dependence, independence, and helplessness. *Social dependence* exists when the goal achievement of Person A is affected by Person B's actions, but the reverse is not true. *Social independence* exists when the goal achievement of Person A is unaffected by Person B's actions and vice versa. *Social helplessness* exists when neither the person nor others can influence goal achievement.

Historical Roots

The historical roots of social interdependence theory can be traced to the emerging school of gestalt psychology at the University of Berlin in the early 1900s. Gestalt psychology was part of the shift from mechanistic to field theories (Deutsch, 1968). As the *field* became the unit of analysis in physics, so did the *whole* or *gestalt* become the focus of the study of perception and behavior for gestalt psychologists. They posited that humans develop organized and meaningful views of their world by perceiving events as integrated wholes rather than as a summation of parts or properties. One of the founders of the gestalt school of psychology, Kurt Koffka, proposed that, similar to psychological fields, groups were dynamic wholes in which the interdependence among members could vary (Deutsch, 1968; Deutsch & Krauss, 1965).

Building on the principles of gestalt psychology, Kurt Lewin (1935, 1948) proposed that the essence of a group is the interdependence among members that 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. Group members are made interdependent through common goals. As members perceive their common goals, a state of tension arises that motivates movement toward the accomplishment of the goals.

Original Theory

Morton Deutsch (1949, 1962) extended Lewin's notions by examining how the tension systems of different people may be interrelated. He conceptualized two types of social interdependence—positive and negative. *Positive interdependence* exists when there is a positive correlation among individuals' goal attainments; individuals perceive that they can attain their goals if and only if the other individuals with whom they are cooperatively linked attain their goals. Positive interdependence results in promotive interaction (i.e., individuals encouraging and facilitating each other's efforts to complete tasks in order to reach the group's goals). *Negative interdependence* exists when there is a negative correlation among individuals' goal achievements; individuals perceive that they can obtain their goals if and only if the other individuals with whom they are competitively linked fail to obtain their goals. Negative interdependence results in oppositional or contrient interaction (i.e., individuals discouraging and obstructing each other's efforts to complete tasks in order to reach their goals). *No interdependence* exists when there is no correlation among individuals' goal achievements; individuals perceive that the achievement of their goals is unrelated to the goal achievement of others. The basic premise of social interdependence theory is that how participants' goals are structured determines the ways they interact and the interaction pattern determines the outcomes of the situation (Deutsch, 1949, 1962).

Deutsch (1949, 1962) posited that positive interdependence creates the psychological processes of substitutability (i.e., the degree to which actions of one person substitute for the actions of another person), positive cathexis (i.e., the investment of positive psychological energy in objects outside of oneself, such as friends, family, and work), and inducibility (i.e., the openness to being influenced by and to influencing others). Negative interdependence tends to create nonsubstitutability, negative cathexis, and resistance to influence. No interdependence may be characterized by the absence of these three psychological processes.

We have modified and extended social interdependence theory in two major ways (D. W. Johnson, 1970; D. W. Johnson & R. Johnson, 1974, 1978, 1989, 2005a; D. W. Johnson, R. Johnson, & Maruyama, 1983; D. W. Johnson, Maruyama, R. Johnson, Nelson, & Skon, 1981). First, we have identified and validated the variables that mediate the effectiveness of cooperation and competition. Second, we have expanded the scope of the theory by investigating numerous additional dependent variables, such as psychological health, social support, self-esteem, perspective taking, bullying, and moral development.

Essential Elements of Cooperation

Deutsch (1949, 1962) focused on three variables: interdependence, interaction pattern, and outcomes. As a result of our research on and implementation of cooperation, we posited that five variables mediate the effectiveness of cooperation: positive interdependence, individual accountability, promotive interaction, the appropriate use of social skills, and group processing.

Positive Interdependence

Positive and negative interdependence were defined by Lewin and Deutsch as resulting from mutual goals. Other researchers soon added other types of interdependence. Positive and negative interdependence have been structured through complementary roles (Thomas, 1957), group contingencies (Skinner, 1968), and dividing information (or other resources) into separate pieces

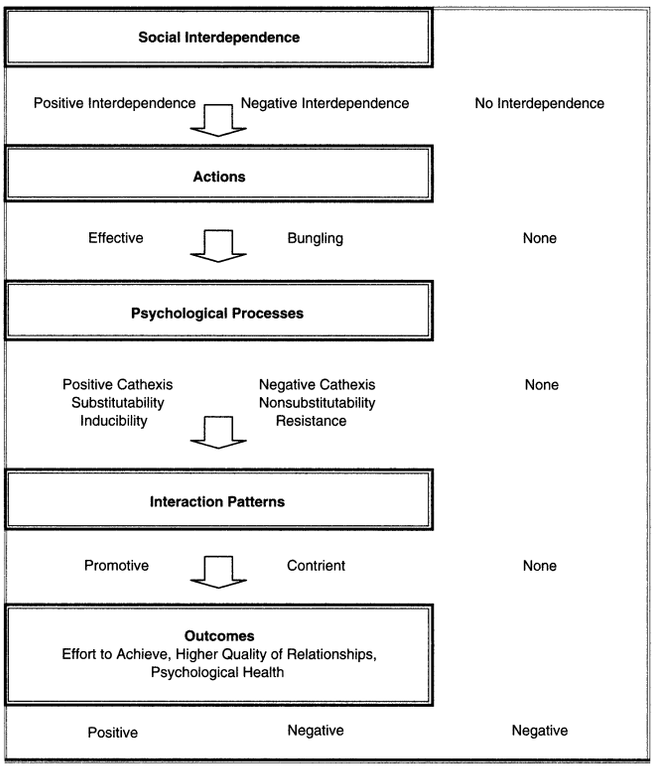

FIGURE 1. *Overview of social interdependence theory.*

(Aronson et al., 1978). Various researchers have structured interdependence through divisions of labor, mutual identity, environmental spaces, and simulations involving fantasy situations (D. W. Johnson & R. Johnson, 1992). These ways of structuring interdependence may be subsumed into three categories: outcome, means, and boundary (D. W. Johnson & R. Johnson, 1989, 2005a). Outcome interdependence includes goals and rewards. Goals can be real or fantasized (such as being wrecked on the moon). Regardless of how it is undertaken, structuring positive outcome interdependence into a situation tends to result in increased achievement and productivity (Hagman & Hayes, 1986; Jensen, 1996; Jensen, D. W. Johnson, & R. Johnson, 2002; Matsui, Kakuyama, & Onglatco, 1987; Scott & Cherrington, 1974; Slavin & Tanner, 1979; Wodarski, Hamblin, Buckholdt, & Ferritor, 1973).

Means interdependence includes resource, role, and task interdependence. These methods are overlapping and not independent from each other. Resources can be divided among group members like a jigsaw puzzle. Roles such as reader, recorder, summarizer, and encourager of participation can be assigned to group members. The assigned task can be divided so that each group member is responsible for doing one aspect of the assignment.

The boundaries between individuals and groups can define who is interdependent with whom. Koffka (1935) pointed out that abrupt discontinuity produces segregating forces between the parts of a visual field that it separates, as well as unifying forces within the separated parts. Based on this principle of perceptual organization (Koffka, 1935; Wertheimer, 1923), boundary interdependence may exist based on abrupt discontinuities among individuals that segregate individuals into separate groups. 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 groups. Boundary interdependence thus includes outside enemy (i.e., negative interdependence with another group), identity (which binds members together as an entity), and environmental (such as a specific work area) interdependence. These types of interdependence are overlapping and not independent from each other.

A series of research studies was conducted to clarify the impact of positive interdependence on productivity and achievement (see D. W. Johnson & R. Johnson, 2005a). First, it is necessary to demonstrate that positive interdependence has effects greater than group membership or interpersonal interaction. There is evidence that group membership in and of itself is not sufficient to produce higher achievement and productivity—positive interdependence is also required (Hwong, Caswell, D. W. Johnson, & R. Johnson, 1993). Knowing that one's performance affects the success of group mates seems to create *responsibility forces* that increase one's efforts to achieve. There is also evidence that interpersonal interaction is insufficient to increase productivity—positive interdependence is also required (Lew, Mesch, D. W. Johnson, & R. Johnson, 1986a, 1986b; Mesch, D. W. Johnson, & R. Johnson, 1988; Mesch, Lew, D. W. Johnson, & R. Johnson, 1986). Individuals achieved higher with positive goal interdependence than when they worked individualistically but had the opportunity to interact with classmates. Given the impact of positive interdependence above and beyond group membership and interpersonal interaction, a number of studies have been conducted contrasting the impact of various ways of inducing positive interdependence. Researchers have concluded the following:

1. Positive goal interdependence promotes higher achievement and greater productivity than does resource interdependence (D. W. Johnson, R. Johnson, Ortiz, & Stanne, 1991).
2. Positive goal and reward interdependence tends to be additive; although positive goal interdependence is sufficient to produce higher achievement and productivity than do individualistic efforts, the combination of goal and reward interdependence tends to increase achievement more than does goal interdependence alone or individualistic efforts (D. W. Johnson, R. Johnson, Stanne, & Garibaldi, 1990; Lew et al., 1986a, 1986b; Mesch et al., 1988; Mesch et al., 1986; Ortiz, D. W. Johnson, & R. Johnson, 1996).
3. Resource interdependence by itself may decrease achievement and productivity, compared with individualistic efforts (D. W. Johnson et al., 1990; Ortiz et al., 1996). That is, when individuals need the resources of other group members but do not share common goals, the emphasis tends to be on obtaining resources from others without sharing one's own resources with them. The result tends to be an interference with each other's productivity.
4. Both working to achieve a reward and working to avoid the loss of a reward produces higher achievement than does individualistic effort (Frank, 1984). There is no significant difference between working to achieve a reward and working to avoid a loss.

5. Positive interdependence does more than simply motivate individuals to try harder; it facilitates the development of new insights and discoveries and the more frequent use of higher level reasoning strategies (Gabbert, D. W. Johnson, & R. Johnson, 1986; D. W. Johnson & R. Johnson, 1981b; D. W. Johnson, Skon, & R. Johnson, 1980; Skon, D. W. Johnson, & R. Johnson, 1981).
6. The more complex the procedures involved in interdependence, the longer it will take group members to reach their full levels of productivity (Ortiz et al., 1996). The more complex the teamwork procedures, the more members have to attend to teamwork and the less time they have to attend to task work. Once the teamwork procedures are mastered, however, members concentrate on task work and outperform individuals working alone.
7. Studies on identity interdependence involving social dilemmas have found that when individuals define themselves in terms of their group membership, they are more willing to take less from common resources and to contribute more toward the public good (Brewer & Kramer, 1986; De Cremer & Van Vjugt, 1999; Kramer & Brewer, 1984).
8. The stronger the interdependence (e.g., common goals, common outcomes, interpersonal bonds, promotive interaction, behavioral influence, communication), the greater the perceived entitativity of a group (Gaertner & Schopler, 1998; Lickel et al., 2000; Welbourne, 1999). *Entitativity* is the perception that a group is a unified and coherent whole in which the members are bonded together (Campbell, 1958).

Individual Accountability and Personal Responsibility

Positive interdependence is posited to create *responsibility forces* that add the concept of *ought* to group members' motivation—one ought to do one's part, pull one's weight, contribute, and satisfy peer norms (Deutsch, 1949, 1962; D. W. Johnson & R. Johnson, 1989, 2005a). The positive interdependence that binds group members together is posited to result in feelings of responsibility for (a) completing one's share of the work and (b) facilitating the work of other group members. Furthermore, when a person's performance affects the outcomes of collaborators, the person feels responsible for the collaborators' welfare as well as for his or her own (Matsui et al., 1987). Failing oneself is bad, but failing others as well as oneself is worse. The more a person is liked and respected by group mates, furthermore, the more responsibility he or she will feel toward group mates (Wentzel, 1994).

Responsibility forces are increased when there is group and individual accountability. *Group accountability* exists when the overall performance of the group is assessed and the results are given back to all group members to compare against a standard of performance. *Individual accountability* exists when the performance of each individual member is assessed and the results are given back to the individual and the group to compare against a standard of performance. Hooper, Ward, Hannafin, and Clark (1989) noted that cooperation resulted in higher achievement when individual accountability was structured than when it was not. Archer-Kath, D. W. Johnson, and R. Johnson (1994) found that by increasing individual accountability, perceived interdependence among group members was also increased.

The lack of individual accountability may reduce feelings of personal responsibility. Members may reduce their contributions to goal achievement when the group works on tasks where it is difficult to identify members' contributions, when there is an increased likelihood of redundant efforts, when there is a lack of group cohesiveness, and when there is lessened responsibility for the final outcome (Harkins & Petty, 1982; Ingham, Levinger, Graves, & Peckham, 1974; Kerr & Bruun, 1981; Latane, Williams, & Harkins, 1979; Moede, 1927; Petty, Harkins, Williams, & Latane, 1977; Williams, 1981; Williams, Harkins, & Latane, 1981). If, however, there is high individual accountability and it is clear how much effort each member is contributing, if redundant efforts are avoided, if every member is responsible for the final outcome, and if the group is cohesive, then the social loafing effect vanishes.

Generally, as the group gets larger and larger, members are less likely to see their own personal contribution to the group as being important to the group's chances of success (Kerr, 2001). As group size increases, individual members tend to communicate less frequently, which may reduce the amount of information utilized in arriving at a decision (Gerard, Wilhelmy, & Conolley, 1965; Indik, 1965), and the communication may be less truthful, as members may alter their statements to conform to the perceived beliefs of the overall group (Gerard et al., 1965; Rosenberg, 1961). Social loafing, therefore, increases as the size of the group increases. The smaller the size of the group, therefore, the greater tends to be the individual accountability (Messick & Brewer, 1983). Morgan, Coates, and Rebbin (1970) found that group performance actually improved when one member was missing from five-person groups, perhaps because members believed that their contributions were more necessary.

Promotive Interaction

Positive interdependence is posited to result in promotive interaction, and negative interdependence is posited to result in oppositional or contrient interaction. *Promotive interaction* occurs as individuals encourage and facilitate each other's efforts to accomplish the group's goals. Unlike oppositional interaction and no interaction, promotive interaction is characterized by individuals

1. acting in trusting and trustworthy ways (e.g., Deutsch, 1962; D. W. Johnson, 1974; D. W. Johnson & Noonan, 1972);
2. exchanging needed resources, such as information and materials, and processing information more efficiently and effectively (e.g., Crawford & Haaland, 1972; D. W. Johnson, 1974; Laughlin & McGlynn, 1967);
3. providing efficient and effective help and assistance to group mates (e.g., D. W. Johnson & R. Johnson, 1989; Rosenbaum et al., 1980; Webb & Cullian, 1983);
4. being motivated to strive for mutual benefit (Deutsch, 1949; D. W. Johnson & R. Johnson, 1989);
5. advocating exerting effort to achieve mutual goals (e.g., Pallak, Cook, & Sullivan, 1980; Wicklund & Brehm, 1976);
6. having a moderate level of arousal, characterized by low anxiety and stress (e.g., Blau, 1954; Haines & McKeachie, 1967; Naught & Newman, 1966);

7. influencing each other's efforts to achieve the group's goals (e.g., Crombag, 1966; Deutsch, 1949; D. W. Johnson, R. Johnson, Roy, & Zaidman, 1985; Raven & Eachus, 1963);
8. providing group mates with feedback in order to improve their subsequent performance of assigned tasks and responsibilities (Pittman, Davey, Alafat, Wetherill, & Kramer, 1980; Ryan, 1982);
9. challenging each other's reasoning and conclusions in order to promote higher quality decision making and greater creativity (e.g., D. W. Johnson & R. Johnson, 1979, 2007); and
10. taking the perspectives of others more accurately and thus being better able to explore different points of view (D. W. Johnson & R. Johnson, 1989).

Oppositional interaction occurs as individuals discourage, block, and obstruct each other's efforts to achieve their goals; individuals focus both on being productive and on preventing any other person from being more productive than they are. *No interaction* occurs when individuals work independently, without any interchange with each other; individuals focus only on being productive and ignore as irrelevant the efforts of others.

Appropriate Use of Social Skills

Unskilled group members cannot cooperate effectively. Effective cooperation is based on skilled teamwork as well as on task work. Students, therefore, must be taught the interpersonal and small-group skills needed for high-quality cooperation and be motivated to use them. To coordinate efforts to achieve mutual goals, participants must (a) get to know and trust each other, (b) communicate accurately and unambiguously, (c) accept and support each other, and (d) resolve conflicts constructively (D. W. Johnson, 2009; D. W. Johnson & F. Johnson, 2009). Interpersonal and small-group skills form the basic nexus among individuals, and if individuals are to work together productively and cope with the stresses and strains of doing so, they must have a modicum of these skills.

In their studies on the long-term implementation of cooperative teams, Marvin Lew, Debra Mesch, and colleagues (Lew et al., 1986a, 1986b; Mesch et al., 1988; Mesch et al., 1986) found that the combination of positive goal interdependence, a contingency for high performance by all group members, and a social skills contingency promoted the highest achievement and productivity. Archer-Kath et al. (1994) noted that giving participants individual feedback on how frequently they engaged in targeted social skills was more effective in increasing participants' achievement than was group feedback.

Not only do social skills promote higher achievement, but they contribute to building more positive relationships among group members. Putnam, Rynders, R. Johnson, and D. W. Johnson (1989) demonstrated that, when participants were taught social skills, observed, and given individual feedback as to how frequently they engaged in the skills, their relationships became more positive.

Group Processing

Group processing occurs when group members (a) reflect on which member actions were helpful and unhelpful and (b) make decisions about which actions to continue or change. The purpose of group processing is to clarify and improve the effectiveness with which members carry out the processes necessary to achieve the group's goals. Yager, R. Johnson, D. W. Johnson, and Snider (1986) found that high-, medium-, and low-achieving participants rated higher on daily achievement, postinstructional achievement, and retention measures in the cooperation-with-group-processing condition than did participants who engaged in cooperation without any group processing or individualistic efforts. Participants in the cooperation-without-group-processing condition, furthermore, achieved higher on all three measures than did the participants in the individualistic condition. Putnam et al. (1989) found that more positive relationships developed between participants who were disabled and those who were nondisabled when they were taught social skills and were engaged in group processing, as compared with participants who worked cooperatively without social skills training or group processing. These positive relationships tended to carry over to postinstructional free-time situations. Archer-Kath et al. (1994) discovered that group processing with individual feedback was more effective than was group processing with whole-group feedback in increasing participants' (a) achievement motivation, actual achievement, uniformity of achievement among group members, and influence toward higher achievement within cooperative groups, (b) positive relationships among group members and between participants and the teacher, and (c) participants' self-esteem and positive attitudes toward the subject area. Finally, D. W. Johnson et al. (1990) discovered that participants performed higher on problem-solving tasks when they worked cooperatively with both instructor processing (the instructor specified cooperative skills to use, observed, and gave whole-class feedback as to how well participants were using the skills) and participant processing (the instructor specified cooperative skills to use, observed, and gave-whole class feedback as to how well participants were using the skills, and had groups discuss how well they interacted as a group) compared with cooperation with instructor processing only, cooperative with group processing only, and individualistic efforts. All three cooperative conditions performed higher than did the individualistic condition.

Reflecting on the actions of group members that enhance or hinder the group's success may result in the *compensation effect* (i.e., an increase in performance occurring when group members work harder to compensate for the real or imagined shortcomings of other group members; Williams & Karau, 1991). It may also reduce social loafing through highlighting the unique and indispensable contributions of each group member (Kerr & Bruun, 1981). Group processing can clarify the nature of the group's goals (Weldon & Weingart, 1993) and their importance (Karau & Williams, 1993). Group processing can increase members' awareness that the group has the resources needed to succeed and thereby increase collective efficacy (Guzzo, Yost, Campbell, & Shea, 1993; Little & Madigan, 1997; Spink, 1990). Finally, group processing can increase members' involvement in the group's efforts (Brickner, Harkins, & Ostrom, 1986).

During group processing, members are expected to express respect for each other's contributions to the group efforts and for each other as persons. The expression of respect toward a group

member by group leaders tends to increase the group member's self-esteem (Smith, Tyler, Huo, Ortiz, & Lind, 1998). The expression of respect among group members tends to increase members' efforts to achieve group goals when the group is devalued by an outgroup (Branscombe, Spears, Ellemers, & Doosje, 2002). Respect among group members also increases members' belief that they are valued as group members (Emler & Hopkins, 1990; Tyler & Smith, 1999). It increases members' commitment to the group, adherence to ingroup norms, and group-serving behavior (Smith & Tyler, 1997; Tyler, Degoey, & Smith, 1996). Finally, respect among group members tends to increase members' collective identification (Simon & Sturmer, 2003).

Conditions for Constructive Competition

There are many reasons why competitors tend to achieve less than they would if they were working cooperatively (D. W. Johnson & R. Johnson, 1978, 1989). One reason is that when working toward competitive goals, individuals tend to engage in self-protective strategies such as self-worth protection, self-handicapping behaviors, and defensive pessimism. *Self-worth protection* involves withholding effort so that failure can be attributed to not trying rather than to incompetency (Mayerson & Rhodewalt, 1988; Rhodewalt, Morf, Hazlett, & Fairfield, 1991; Thompson, Davidson, & Barber, 1995). *Self-handicapping* involves creating an impediment to one's performance (e.g., procrastination and unrealistically high expectations) so that an excuse is ready if one fails (Covington, 1992; McCown & Johnson, 1991). *Defensive pessimism* involves unrealistically low (a) expectations for succeeding and (b) valuing of the task, so that anxiety about succeeding is minimized (Cantor & Harlow, 1994; Cantor & Norem, 1989; Norem & Illingworth, 1993). Strategies such as these tend to lower achievement in competitive situations. Many of the discussions of competition, furthermore, portray it as so destructive that its elimination is recommended, especially from the school and the workplace (Kohn, 1992, 1993; Maehr & Midgley, 1991).

Other social scientists, however, have argued that competition can be constructive and should be encouraged when it is appropriately structured (D. W. Johnson & R. Johnson, 1978; Sherif, 1978). Social interdependence theory has been expanded in the past few decades to include the conditions under which competition may be constructive (D. W. Johnson & R. Johnson, 1974, 1978, 1989, 1999, 2005a; R. Johnson & D. W. Johnson, 1979; Stanne, D. W. Johnson, & R. Johnson, 1999). Indicators of constructive competition include completing the task effectively, perceiving one's participation in the competition as being personally worthwhile (due to increasing self-confidence, social support, and achievement) above and beyond winning, becoming more willing to take on more challenging tasks, strengthening the relationship with other competitors, improving morale, improving the ability of competitors to work together cooperatively in the future, insisting on participating in the competition, and enjoying the competition. The few attempts to identify the factors contributing to the potential constructiveness of competition have theorized that competition tends to be more constructive when the following occur (D. W. Johnson & R. Johnson, 1974, 1978, 1989, 1999, 2005a):

1. Winning is relatively unimportant. If winning is too important, high levels of anxiety result that interfere with performance, especially on motor tasks (Blau, 1954; Deutsch, 1949; Haines & McKeachie, 1967; Naught & Newman, 1966; Tseng, 1969). When winning is too important, most individuals are likely to perceive their performance as a failure (Fait & Billings, 1978; Sherif, 1978). If winning is too important, losing promotes the development of *competition-learned helplessness*, whereas winning can promote the development of *psychological burnout* (Roberts, 1980).
2. All participants have a reasonable chance to win. Motivation to achieve is based on the perceived likelihood of being able to achieve a challenging goal (Atkinson, 1964). Those who believe they cannot win will not try, will cheat, will avoid challenge, will use superficial and effort-minimizing strategies, will engage in impaired problem solving, will use other self-handicapping strategies, and will have less interest in and enjoyment of the experience (Anderman, Griesinger, & Westerfield, 1998; Butler, 1987; Deci & Ryan, 1985; Graham & Golan, 1991; Halisch & Heckhauser, 1977; Hurlock, 1927; Lepley, 1937; Matthews, 1979; Meece, Blumenfeld, & Hoyle, 1988; Nolen, 1988; Pintrich, 1989; Utman, 1997).
3. There are clear and specific rules, procedures, and criteria for winning. Ambiguity in competition interferes with achievement, as energy is directed toward worrying about what is fair and unfair (D. W. Johnson & R. Johnson, 1974, 1989).

In two field studies in business and industry, Tjosvold, D. W. Johnson, R. Johnson, and Sun (2003, 2006) found that variables related to constructive competition included the fairness of the rules, the motivation to compete and win, the perception that one's chances of winning are good, a strong positive relationship among competitors, competitors acting fairly during the competition, and a history of confirming each other's competence. By controlling these factors, the constructiveness of competition may be enhanced.

Conditions for Constructive Individualistic Efforts

Individualistic efforts may be most appropriate when the following occur (D. W. Johnson & R. Johnson, 1974, 1978, 1989, 1999, 2005a):

1. Cooperation is too costly, difficult, or cumbersome because of the unavailability of skilled potential cooperators or the unavailability of the resources needed for cooperation to take place.
2. The goal is perceived as important, relevant, and worthwhile.
3. Participants expect to be successful in achieving their goals.
4. Unitary, nondivisible, simple tasks need to be completed, such as the learning of specific facts or the acquisition or the performance of simple skills.
5. The directions for completing the tasks are clear and specific, so participants do not need further clarification on how to proceed and how to evaluate their work.
6. What is accomplished will be used subsequently in a cooperative effort. Individualistic efforts can supplement

cooperative efforts through a division of labor in which each person learns material or skills to be subsequently used in cooperative activities. Learning facts and simple skills to be used in subsequent cooperative efforts increases the perceived relevance and importance of individualistic tasks. It is the overall cooperative effort that provides the meaning to individualistic work. It is contributing to the cooperative effort that makes individualistic goals important.

Research on Social Interdependence

Amount and Characteristics of Research

The study of cooperative, competitive, and individualistic efforts is commonly recognized as the oldest field of research in U.S. social psychology. In the late 1800s, Triplett (1898) conducted a study on the factors associated with competitive performance. Since then, more than 1,200 studies have been conducted on the relative merits of cooperative, competitive, and individualistic efforts and the conditions under which each is appropriate. Many of the research studies have yielded findings with high internal validity, being carefully conducted by skilled investigators under highly controlled laboratory (31%) and field (65%) settings. When rated on the variables of random assignment to conditions, clarity of control conditions, control of the experimenter effect, control of the curriculum effect (same materials used in all conditions), and verification of the successful implementation of the independent variable, 51% of the studies met these criteria. This is one of the largest bodies of research within psychology, and it provides sufficient empirical research to test social interdependence theory's propositions.

Findings from the research on social interdependence have an external validity and a generalizability rarely found in the social sciences. The more variations in places, people, and procedures the research can withstand and still yield the same findings, the more externally valid the conclusions. The research has been conducted over 11 decades by many different researchers with markedly different theoretical and practical orientations working in different settings. Participants in the studies varied from age 3 to older adults and have come from different economic classes and cultural backgrounds. Widely different research tasks, ways of structuring social interdependence, and measures of the dependent variables have been used. The duration of studies ranged from 1 session to more than 100 sessions. The research has been conducted in numerous cultures in North America (Caucasian, Black American, Native American, and Hispanic populations) and countries from North, Central, and South America, Europe, the Middle East, Africa, Asia, and the Pacific Rim. The research on social interdependence includes both theoretical and demonstration studies conducted in educational, business, and social service organizations. The diversity of the research gives social interdependence theory wide generalizability and considerable external validity.

The many diverse dependent variables examined in studies on social interdependence over the past 110 years may be subsumed within three broad categories (D. W. Johnson & R. Johnson, 1989, 2005a): effort to achieve, positive interpersonal relationships, and psychological health (see Table 1).

Table 1
Mean Effect Sizes for Impact of Social Interdependence on Dependent Variables

Dependent Variable	Cooperative vs. Competitive	Cooperative vs. Individualistic	Competitive vs. Individualistic
Achievement	0.67	0.64	0.30
Interpersonal attraction	0.67	0.60	0.08
Social support	0.62	0.70	−0.13
Self-esteem	0.58	0.44	−0.23
Time on task	0.76	1.17	0.64
Attitudes toward task	0.57	0.42	0.15
Quality of reasoning	0.93	0.97	0.13
Perspective taking	0.61	0.44	−0.13
High-quality studies			
Achievement	0.88	0.61	0.07
Interpersonal attraction	0.82	0.62	0.27
Social support	0.83	0.72	−0.13
Self-esteem	0.67	0.45	−0.25

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

Effort to Achieve

The average person cooperating was found to achieve at about two thirds of a standard deviation above the average person performing within a competitive (effect size = 0.67) or individualistic (effect size = 0.64) situation (D. W. Johnson & R. Johnson, 1989). All effect sizes were computed using Cohen's *d* and adjusted for sample size utilizing the procedure recommended by Hedges and Olkin (1985). When only studies yielding findings with high internal validity were included in the analysis, the effect sizes were 0.88 and 0.61, respectively. Cooperative experiences promote more frequent insight into and use of higher level cognitive and moral reasoning strategies than do competitive (effect size = 0.93) or individualistic (effect size = 0.97) efforts. Cooperators tend to spend more time on task than do competitors (effect size = 0.76) or participants working individualistically (effect size = 1.17). Competitors tended to spend more time on task than did participants working individualistically (effect size = 0.64). Cooperation, when compared with competitive and individualistic efforts, tends to promote greater long-term retention, higher intrinsic motivation and expectations for success, more creative thinking (i.e., process gain), greater transfer of learning, and more positive attitudes toward the task and school.

Positive Relationships and Social Support

More than 180 studies have compared the impact of cooperative, competitive, and individualistic efforts on interpersonal attraction. Cooperative efforts, when compared with competitive

(effect size = 0.67) and individualistic (effect size = 0.60) experiences, promoted considerably greater interpersonal attraction among individuals (D. W. Johnson & R. Johnson, 1989). This remains true when only the methodologically high-quality studies are examined (effect sizes = 0.82 and 0.62, respectively) and when the studies focusing on relationships between White and minority participants (effect sizes = 0.52 and 0.44, respectively) and relationships between participants who were disabled and nondisabled (effect sizes = 0.70 and 0.64, respectively) are examined. These results validate *social judgment theory* (D. W. Johnson & R. Johnson, 1989), an extension of social interdependence theory. The social judgments individuals make about each other result in either a process of acceptance, resulting in mutual liking and respect, or a process of rejection, resulting in mutual dislike and lack of respect. Since the 1940s, furthermore, more than 106 studies comparing the relative impact of cooperative, competitive, and individualistic efforts on social support have been conducted. Cooperative experiences promoted greater task-oriented and personal social support than did competitive (effect size = 0.62) or individualistic (effect size = 0.70) experiences. This was still true when only the methodologically high-quality studies are examined (effect sizes = 0.83 and 0.72, respectively).

An important question is whether the relationships formed within cooperative groups will continue voluntarily in subsequent nontask situations. A number of studies have demonstrated that when individuals were placed in postinstructional, free-choice situations there was more cross-ethnic interaction (D. W. Johnson & R. Johnson, 1981b, 1982a; D. W. Johnson, R. Johnson, Tiffany, & Zaidman, 1983) and more cross-handicap interaction (D. W. Johnson & R. Johnson, 1981a, 1981b, 1981c, 1982b, 1982c; R. Johnson & D. W. Johnson, 1981, 1982; R. Johnson, D. W. Johnson, DeWeerdt, Lyons, & Zaidman, 1983; R. Johnson, D. W. Johnson, Scott, & Ramolae, 1985; Martino & Johnson, 1979) when individuals had been in a cooperative rather than a competitive or individualistic situation. In other words, the relationships formed within cooperative groups among heterogeneous peers do seem to generalize to post-task situations.

Another question is whether the quality of interpersonal relationships among students is related to academic achievement. Roseth, D. W. Johnson, and R. Johnson (2008) conducted a meta-analysis on 148 studies involving more than 17,000 early adolescents. The studies were conducted in 11 different countries. They found that positive peer relationships explained 33% of the variation in academic achievement, and when only the moderate- and high-quality studies were included, positive peer relationships explained 40% of the variation in achievement. It seems that if teachers want to increase early adolescents' achievement, teachers should facilitate the development of friendships.

Another question is whether there is a relationship among cooperative experiences, social interdependence dispositions, and harm-intended aggression, victimization, and prosocial behavior (Choi, D. W. Johnson, & R. Johnson, 2009). Two hundred and seventeen students from third to fifth grades completed a series of questionnaires. A path analysis was conducted among the variables. The results indicate that cooperative experiences predicted cooperative predispositions, the absence of individualistic predispositions, and engagement in prosocial behavior. Cooperative predispositions predicted the engagement in prosocial behavior and the absence of engaging in harm-intended aggression. Competitive predispositions predicted engaging in harm-intended aggression. Individualistic predispositions predicted none of the measured behaviors. If schools wish to prevent bullying and increase prosocial behaviors, the use of cooperative learning and efforts to help students become more predisposed to engage in cooperation seem to be important strategies.

Psychological Health and Self-Esteem

We have conducted eight studies directly measuring the relationship between social interdependence and psychological health (see D. W. Johnson & R. Johnson, 1989, 2005a). The samples included university individuals, older adults, suburban high school seniors, juvenile and adult prisoners, step-couples, Olympic hockey players, and Chinese business managers. The results indicate that working cooperatively with peers and valuing cooperation result in greater psychological health than do competing with peers or working independently. Cooperative attitudes were highly correlated with a wide variety of indices of psychological health. More specifically, cooperativeness is positively related to emotional maturity, well-adjusted social relations, strong personal identity, ability to cope with adversity, social competencies, basic trust and optimism about people, self-confidence, independence and autonomy, higher self-esteem, and increased perspective taking skills.

Competitiveness was in some cases positively and in some cases negatively related to psychological health, including conditional self-esteem and egocentrism. Individualistic attitudes were negatively related to a wide variety of indices of psychological health, especially a wide variety of pathology, basic self-rejection, and egocentrism.

An important aspect of psychological health is self-esteem. There have been more than 80 studies comparing the relative impact of cooperative, competitive, and individualistic experiences on self-esteem. Cooperative experiences promote higher self-esteem than do competitive (effect size = 0.58) or individualistic (effect size = 0.44) experiences, even when only the methodologically high-quality studies are examined (effect sizes = 0.67 and 0.45, respectively). Norem-Hebeisen and D. W. Johnson (1981) studied 821 White, middle-class, high school seniors in a Midwestern suburban community. They found that cooperative experiences tend to be related to beliefs that one is intrinsically worthwhile, others see one in positive ways, one's attributes compare favorably with those of one's peers, and one is a capable, competent, and successful person. Competitive experiences tend to be related to conditional self-esteem based on whether one wins or loses. Individualistic experiences tend to be related to basic self-rejection.

Psychological health includes internalizing constructive values. There are values inherent in social interdependence. Cooperative, competitive, and individualistic efforts have inherent value systems that are taught by the flow of day-to-day life within schools (D. W. Johnson & R. Johnson, 2000). The values inherently taught by *cooperative efforts* include commitment to one's own and others' success and well-being, commitment to the common good, and the view that facilitating and promoting the success of others is a natural way of life. Engaging in *competitive*

efforts inherently teaches the values of getting more than others, beating and defeating others, seeing winning as important, and believing that opposing and obstructing the success of others is a natural way of life. The values inherently taught by *individualistic experiences* are commitment to one's own self-interest and the view that others' well-being is irrelevant. Schools inculcate numerous values in students and the instructional methods used influence the values that students develop.

Finally, social interdependence theorists note that both positive and negative interdependence create conflicts among individuals (Deutsch, 1973; D. W. Johnson & R. Johnson, 2005b, 2007; Tjosvold, 1991). In cooperative situations, conflicts occur over how best to achieve mutual goals. In competitive situations, conflicts occur over who will win and who will lose. Two of the conflict resolution programs implemented in schools to teach students how to manage conflicts constructively are (a) the Teaching Students to Be Peacemakers program in which students are taught how to resolve conflicts of interests constructively by engaging in integrative negotiations and peer mediation (D. W. Johnson & R. Johnson, 2005b) and (b) the Academic Controversy program in which students are taught how to challenge intellectually each other's ideas, reasoning, and conclusions (D. W. Johnson & R. Johnson, 2007). The research on both programs indicates that conflicts that occur within the context of positive (as opposed to negative) interdependence might result in a wide variety of positive outcomes (such as higher achievement, more frequent use of higher level reasoning, more accurate perspective taking, more integrative agreements, greater liking for each other, and more positive attitudes toward conflict).

Application of Social Interdependence Theory

There is a two-way relationship between theory and practice. Practice is guided by validated theory. Operationalizing the theory in practical situations can reveal inadequacies in the theory that lead to its modification and refinement (which requires new research studies to validate the changes). Having a validated theory does not mean that it will direct or even influence practice. Effective practices can be derived from sound theories, but they can also be validly derived from unsound theories or from no theory at all (i.e., through trial and error or luck). Effective practice can be derived from validated theory only if the theory is stated with sufficient precision that effective procedures can be deduced for practitioners to use. Social interdependence theory has such precision. Once practical procedures are deduced, they must be implemented in a wide range of settings and then evaluated. A number of conditions, such as inertia, resistance to change, economic conditions, prejudice, and cultural resistance, can result in effective practices not being implemented or institutionalized. At the University of Minnesota, the Cooperative Learning Center has worked with school districts and universities throughout the world in implementing cooperative learning (D. W. Johnson & R. Johnson, 1994). The widespread and diverse use of cooperative learning has resulted in modifications and extensions of social interdependence theory and numerous new research studies.

Operationalizing Teaching Procedures

In the history of the use of cooperative learning, there are practitioners who were known for using cooperative learning procedures, but they did not clearly specify the teacher's role in doing so. Frances Parker in the last half of the 19th century and John Dewey in the first half of the 20th century promoted the widescale use of cooperative learning in the United States. Yet their method of teacher training was basically, "Watch me and do likewise." When Parker and Dewey died, their cooperative learning procedures basically disappeared. We have, therefore, tried to operationalize the teacher's role with enough specificity that educators can learn how to use cooperative learning without having to watch a master teacher's use of cooperative learning.

Teacher training, furthermore, should emphasize conceptual understanding of the nature of cooperative learning and the basic elements that make it work. Although many teachers like take-and-use sessions, developing a mental model of the cause-and-effect relationships inherent in the use of cooperative learning increases retention of what is learned, improves transfer to the classroom, and supports long-term maintenance of the use of cooperative learning (Farr, 1987). Conceptual understanding provides teachers with a framework to organize what they know about cooperative learning, to guide their practices, and to integrate their new knowledge. Seeing the internal cohesion of cooperative learning procedures, where each step in conducting a cooperative lesson cues the next, increases the likelihood of teachers using it with high fidelity year after year (Horton & Mills, 1984). Operational procedures were formulated for three types of cooperative learning: formal, informal, and base groups (D. W. Johnson, R. Johnson, & Holubec, 2008).

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 problem solving, completing a curriculum unit, writing a report, conducting an experiment, or having a dialogue about assigned text material). Any course requirement or assignment may be structured to be cooperative. In formal cooperative learning, teachers do the following (Johnson et al., 2008):

1. *Make a number of preinstructional decisions.* A teacher has to decide on the objectives of the lesson (both academic and social skills objectives), 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 positive interdependence.* A teacher 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 in which to be engaged.
3. *Monitor students' learning and intervene in the groups to provide task assistance or to increase students' interpersonal and group skills.* A teacher systematically observes and collects data on each group as it works. When needed, the teacher intervenes to assist students in completing the task accurately and in working together effectively.
4. *Evaluate students' learning and help students process how well their groups functioned.* Students' learning is carefully assessed, and their performances are evaluated. Members of the learning groups then process how effectively they have been working together.

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 et al., 2008). Students engage in quick dialogues or activities in temporary, ad hoc groups in response to a limited number of questions about what is being learned. The brief dialogues or activities may 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 the material being taught, and provide closure to an instructional session. Informal cooperative learning groups are often organized so that students engage in 3- to 5-minute *focused discussions* before and after a lecture and 2- to 3-minute *turn-to-your-partner* discussions interspersed every 10 to 15 minutes throughout a lecture.

Cooperative base groups are long-term, heterogeneous cooperative learning groups with stable membership whose primary responsibilities are to provide support, encouragement, and assistance to make academic progress and develop cognitively and socially in healthy ways as well as holding each other accountable for striving to learn (Johnson et al., 2008). Typically, cooperative base groups (a) are heterogeneous in membership, (b) meet regularly (e.g., daily or biweekly), and (c) last for the duration of the semester, year, or until all members are graduated. Students are assigned to base groups of three to four members and meet at the beginning and end of each class session (or week) to complete academic tasks such as checking each member's homework, doing routine tasks such as taking attendance, and engaging in personal support tasks such as listening sympathetically to personal problems or providing guidance for writing a paper.

These three types of cooperative learning form a gestalt for teacher practice. A typical class session may begin with a base group meeting that is followed by a short lecture in which informal cooperative learning is used. The lecture is followed by a formal cooperative learning lesson. Near the end of the class session, another short lecture may be delivered with the use of informal cooperative learning. The class ends with a base group meeting.

Cooperative School

Just as operational procedures must be derived from social interdependence for teachers, operational procedures for creating a cooperative school must be created for administrators, school staff, staff development personnel, and school leaders (D. W. Johnson & R. Johnson, 1994). The heart of the school is the collegial teaching team. *Collegial teaching teams* are small cooperative groups whose purpose is to increase teachers' instructional expertise and success. The focus is on improving instruction generally and increasing members' expertise in using cooperative learning specifically. Collegial teaching teams meet once a week for approximately 60 minutes. The principal is a member of each collegial teaching team, moving from one meeting to another as time allows. A school governing council consists of the principal and one member of each collegial teaching team. Information is shared in this meeting to be passed on to each collegial teaching team. Most decisions are made in this group. In addition, there are *school task forces*, each of which focuses on a different issue and which are made up of one member of each collegial support group. The task forces meet periodically to achieve specific tasks. Information about each task force is passed back to the collegial teaching team. A full faculty meeting is held once a month and when special issues needing active participation of all faculty arise. Finally, cooperative learning procedures are used and modeled during faculty meetings to ensure that all staff members are involved and participating. It should be noted that the evidence supporting the use of cooperative teams at the adult level is just as strong as it is for the use of cooperative learning at the K–12 level (D. W. Johnson & R. Johnson, 2003).

Field Evaluations and Institutionalization

Cooperative learning has been used by so many different teachers, in so many different subject areas and settings, in preschool through adult education, with so many varied tasks and students, and in so many different countries and cultures that its effectiveness is almost taken for granted. Cooperative procedures have also been operationalized for teams in business and industry, health care, and other organizational settings (D. W. Johnson & R. Johnson, 2003). They have also been used in therapy, marriage counseling, and family counseling settings. This widespread and diverse use validates not only the operational definitions of the teacher's role and the instructional procedures, but also social interdependence theory and the clarity of the conceptual definitions.

In addition to this widespread use, however, approximately 65% of the research that has been conducted on cooperative learning represents field studies demonstrating its effectiveness in a wide range of classes, subject areas, grade levels, and students. The use of cooperative learning procedures by so many different teachers, in so many different subject areas and settings, in preschool through adult education, with so many varied tasks and students, and in so many different countries and cultures, validates the theory and the clarity of the conceptual definitions.

After cooperative learning procedures have been demonstrated to be effective in actual field settings, educators must be persuaded to adopt and implement them and eventually institutionalize them into schools and teacher preparation programs. The Cooperative Learning Center at the University of Minnesota, therefore, has created and maintains an international network of schools and universities that are implementing cooperative learning.

Expansion of the Scope of Social Interdependence Theory

The implementation of cooperative learning has expanded the outcomes considered by social interdependence theory and thereby extended its scope (D. W. Johnson & R. Johnson, 1989, 2005a). Issues of school integration, inclusion of students with disabilities, and the increased diversity of immigrants have focused the school on the use of cooperative learning to create positive relationships among diverse students. The emphasis on solving social problems has expanded the dependent variables to the use of positive peer pressure to increase prosocial and decrease antisocial behaviors (e.g., prevention of drug abuse, inculcating academic values in at-risk students, enhancing self-esteem, preventing violence). These and other factors have resulted in the expansion of the theory to include new dependent variables and have fermented considerable new research.

Conclusion

Cooperative learning is an unusually strong psychological success story. From being discounted and ignored in the 1940s through

the 1970s, cooperative learning is now a standard and widespread teaching procedure. The lineage of social interdependence theory can be traced from Kurt Koffka, through Kurt Lewin, to Morton Deutsch, and, subsequently, to David Johnson and Roger Johnson. However, many other researchers have contributed to the overall theoretical framework. The theory provides a conceptual framework to organize thinking about cooperation and competition, summarize what is known, and generate research studies. The research has focused on numerous outcomes, which may be loosely structured into three categories: effort to achieve, quality of interpersonal relationships, and psychological health. This is one of the largest bodies of knowledge in education or social psychology. From the validated theory, a number of operational procedures have been derived in many different areas. In education, procedures for cooperative formal, informal, and base groups have been operationalized from the theory and applied throughout much of the world. Although many teaching procedures have been recommended over the past 60 years, very few are still around. Almost none are as widespread and institutionalized into instructional practices as is cooperative learning.

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