Chapter 2

The Case for Collaborative Learning

Ten years have passed since we first reviewed the literature on interactive group learning. In that intervening decade, researchers have continued their examination, producing a substantial number of studies. Indeed, the number of items listed in the Educational Resources Information Center (ERIC) under the descriptors *cooperative learning* or *collaborative learning* has more than doubled since our first edition.[1] This extensive research has generated so many positive reports about the benefits of intentionally designed group learning that we once again find making the case for it almost too easy. Educators can feel confident that there is ample evidence supporting group learning as an effective- even essential- instructional approach in today's onsite and online college classrooms.

In this chapter, using the broad, integrated definition of collaborative learning we established in Chapter One, we provide an updated review of the literature on interactive group learning. Our goal is to share useful and relevant information with college teachers who are evaluating whether this pedagogical approach will be effective in accomplishing their particular teaching goals. In making our case, we address the following questions for both the onsite and online environments:

- What is the theoretical and pedagogical rationale for collaborative learning?
- What is the evidence (and how credible is the evidence) that collaborative learning promotes and improves learning?

Thus, while Chapter One provided a definitional framework, here we update the theoretical and research bases for collaborative learning.

What Is the Theoretical, Pedagogical Rationale for Collaborative Learning?

The question of what knowledge is and how it is acquired has occupied philosophers' attention for centuries. More recently, scholars operating in many different disciplines, fields, and specialty areas have developed theories of learning that offer explanations of how and why individuals learn. Knowing about these various perspectives can provide teachers with their own frameworks for understanding whether or how collaborative learning could work for them and their students. Following is a brief description of some of these perspectives as well as suggestions on how they justify collaborative learning.

Students Learn by Integrating New Information into Their Existing Understandings

Much instruction is erroneously based on the old image of the mind as an empty vessel, in which the teacher opens the heads of students and pours in new information that adds to their knowledge. Paulo Freire (1970) refers to the banking model of education, in which the teacher deposits information that students store to withdraw later. Much as we would like to think that we as teachers can tell students what we have learned, thus transferring our knowledge ready-made into their minds, the evidence from cognitive science is clear that this is simply not possible.

Research by neuroscientists suggests that we do not come into the world with a brain that is hard-wired like a computer. Rather, throughout life, our brains grow by constantly making circuitry connections through experience and learning. Alternatively, "through a process that resembles Darwinian competition, the brain eliminates connections or synapses that are seldom or never used" (Nash, 1997, p. 50). *Use it or lose it* appears to be quite true when applied to the brain work of learning. Researchers find that children who are deprived of sensory stimulation develop brains that are 20- 30 percent smaller than normal for their age. Although much remains to be learned about the neurological growth of the brain, some scholars believe that people quite literally build their own minds throughout life by actively constructing the mental structures that connect and organize isolated bits of information.

Cognitive theory suggests that students learn by actively making connections and organizing them into meaningful concepts. Furthermore, what

students have the ability to learn depends, to a larger extent than previously assumed, on what they already know. It is easier to learn something when we already have some background than it is to learn something completely new and unfamiliar. If a learner's knowledge of a subject is very sparse, the learner finds that connections are hard to find and make, whereas if the learner already has a dense network of vocabulary, terms, and concepts, it is easier to make the connections that constitute learning. Thus, we have come to understand that students are not empty vessels waiting to be filled; instead, they learn best when they actively integrate new information and experiences into their existing understandings. Instructional methods such as lecturing tend to constrain students as passive observers, which may result in surface learning that is easily forgotten. Well-crafted collaborative learning activities challenge students to be active participants in the acquiring and organizing of knowledge that results in reformatted neuronal networks, thereby promoting deeper learning.

Students Learn Through Scaffolded Activities

Vygotsky created the term *zone of proximal development* to indicate "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). In short, the zone of proximal development is the difference between what a learner cannot do and what the learner can do with help. For students to learn, teachers must develop meaningful activities that are within students' zones of proximal development. Well-designed collaborative learning activities expose students to concepts and understandings that are within their ability to grasp but are not yet part of their personal understanding. Then, by working within their zone of proximal development with their more capable peers (which, at least in theory, may vary from assignment to assignment), individual students may learn concepts that are just beyond their current level of development.

Students Learn Through Imitating Others

Albert Bandura's (1977) notion of social learning provides another interesting perspective on learning as well as a rationale for collaborative learning. He conceived of learning as a social act and believed that individuals learn behaviors and attitudes through direct or indirect observation. Learners watch another person who acts as a model and then imitate

what they are watching. It is through watching others that one adopts attitudes or forms an idea about how to perform new behaviors, and thus learning occurs by way of interaction between behavioral, cognitive, and environmental influences. Collaborative learning activities provide students with opportunities to take turns modeling and imitating different knowledge and skills as they observe and learn from each other.

Students Learn Through Interacting with Others

Some scholars believe that knowledge is developed through interactions with others. Social constructivistsbelieve that groups construct knowledge, collaboratively creating a culture of shared meanings. Rather than knowledge being held by individuals, it is socially held and is a socially based phenomenon. Students come to group learning with diverse backgrounds, but their knowledge overlaps enough to allow for a common base for communication. Thus, theoretically at least, students can pool and share knowledge such that they know more as a group than they do as individuals. It is in a sense a form of collective intelligence. Because of this, such scholars believe that individuals best acquire knowledge through social or group interactions in which peers collectively engage in knowledge construction (Palinscar et al., 1989). That is, through negotiation of meaning with others, individuals may build knowledge and deepen their own comprehension as they work in the group toward a common understanding.

Social constructionists, who extend the constructivist perspective, propose that individuals learn better when they create or construct something to share it with others. Students may learn about sand castles, for example, but it is through construction of the sand castle, which also communicates what they have learned with others, that they come to own knowledge in new ways. In other words, through constructing knowledge from practical experience and from sharing it with others, they deepen their own understandings of what they know.

At least in theory, students who work collaboratively have more opportunities to articulate and thus to own their individual learning. Some argue that better students are wasting their time explaining things that they already know; however,evidence suggests that peer tutors gain a great deal fromformulating and explaining their ideas to others. Thus, from the perspective of social constructionists and constructivists, instructional approaches that support collaborative learning may be the only effective way to teach because it is only through social interaction that we learn (Topping, 1996,pp. 32.1-345).

Students Learn When They Seek Understanding

Some researchers refer to *deep* and *surface* learning to distinguish between learning that makes the connections that lead to deeper *understanding* versus *information*, which rests lightly on the surface, inert and unassimilated (Ramsden, 1992). Saljo (1979) made a finer distinction and asked adult learners what they understood by *learning* (cited in Ramsden, 1992, pp. 26-27). Saljo categorized their answers in a hierarchical pattern, observing that each higher conception implied all that preceded it:

- Learning is acquiring information or knowing a lot.
- Learning is memorizing or storing information.
- Learning is acquiring facts and skills that can be used.
- Learning is making sense or making meaning of the various parts of information.
- Learning involves comprehending or understanding the world by reinterpreting knowledge.

Collaborative learning activities that challenge students to interact with peers as they make meaning of information and reinterpret knowledge they have acquired can help students move to deeper levels of understanding.

To conclude, the last several decades have been exceptionally rich in producing theories about how individuals learn. This brief review of the most significant models provides insights into how and why collaborative learning is an appropriate and effective method for promoting learning in today's college classroom. That said, collaborative learning is not an educational panacea. In most cases, we see collaborative learning not as a replacement for other instructional methods but rather as a useful complement. Please see Exhibit 2.1 for an overview of how these theoretical perspectives are demonstrated in online learning.

EXHIBIT 2.1

The Theoretical Rationale for Online Collaborative Learning?

As with collaborative learning in onsite courses, we can draw consistent principles from across various theories of learning to provide a strong rationale for collaboration in the online environment.

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Online Students Learn by Integrating New Information into Their Existing Understandings

Students come to any activity with prior knowledge and prior experiences, and when they learn they add to their existing knowledge bases. During an online collaborative process, learners rely on each other as they

do in onsite classes, but online classes potentially add technological tools that hold their collective knowledge. Thus, in online classes students not only build knowledge stores internally but also have opportunities to build knowledge externally.

Online Students Learn from Observing and Imitating Others

When online, individuals develop new knowledge and skills such as learning how to evaluate online sources for credibility or how to communicate effectively online with their peers. Students may find guidance on how to do activities such as these by observing and imitating others who are online. Indeed, lurking is a common practice in online communities in which newcomers spend time observing others before joining in discussions and activities. (See Lave and Wenger's 1991 discussion of legitimate peripheral participation.)

Online Students Learn Through Intentionally Scaffolded Activities When Supported by Others

Learners in an online environment, particularly novices, can benefit from scaffolding, in which learners are provided with support until they are able to complete an activity on their own. Instructors who have participated in interviews about their experiences teaching online have found scaffolding to be especially important in online environments (Major, 2010, 2015). Collaborative learning is one way to provide such scaffolding. For example, online reciprocal peer tutoring activities provide mechanisms for students with high academic achievement to partner with those with lower achievement to provide them with additional support.

Online Students Learn Through Pooling Knowledge and Creating New Knowledge

Online environments are rich with opportunities for students to pool knowledge and produce new knowledge. Groups of students may, for example, pool information through the online implementation of Collaborative Learning Technique 28 Collaborative Writing (WIKI), which allows them to contribute individually in a central location to a collaborative writing assignment. The product created through this activity may be shared to contribute to the entire class's knowledge base, and it can also be retained in subsequent semesters so that new students add to the existing store of knowledge rather than starting from the beginning.

Online Students Learn When They Seek Understanding

The Internet is an extensive, global information network consisting of interlinked information and resources that provide learners with many opportunities for seeking understanding. Furthermore, Thomas and Brown (2011) argue that learning involves a process called *situated learning*, in which students seek to learn course, disciplinary, and institutional norms to situate themselves within a group. Because it is a vast network, online learning is often associated with situated learning.

Online Students Learn in a Situated, Social Process in Which Knowledge Is Co-Constructed

People work together in communities, sharing interests, ideas, information, and experiences. It is through this process of interaction that people learn. Furthermore, knowledge is built and held by the group. Lave

and Wenger's (1991) and Wenger's (1998) notions of communities of practice have been particularly influential in discussions of online learning, as advocates of this perspective see the potential for online learners to form such communities.

Online Students Learn Through a Distributed Process of Human Agents Interacting Dynamically with Artifacts

Learning is a process in which people interact with each other and with technological agents and tools in communities of common interest, social networks, and group tasks (Siemens, 2005). Online courses provide the context for learners to be active agents in a sociocultural and sociotechnological environment that creates learning distributed among humans and technological tools (Major, 2014).

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In summary, online collaborative learning, like onsite learning, enjoys strong theoretical grounding from the varied perspectives on individual learning. Moreover, it also can be well situated within many of the new social theories of learning.

What Is the Evidence That Collaborative Learning Promotes and Improves Learning?

To answer this question, we looked at a wide range of research. Unlike much research in higher education, which is often reported in unrelated studies, scholars studying interactive group learning, particularly cooperative learning, have conducted helpful meta-analyses and systematic research reviews that synthesize findings across topics and institutions. These studies are exceptionally useful in providing evidence of the effectiveness of this approach in higher education classrooms, so wherever possible we looked for evidence from these large studies. We have grouped our findings into five broad areas: (1) cognitive learning outcomes; (2) outcomes related to student engagement, persistence, attitudes, and personal development; (3) good educational practice; (4) impact on different types of students; and (5) teacher and student opinions about collaborative learning. Given that researchers often use collaborative and cooperative learning interchangeably without making hard, fast distinctions between the two, in most instances we report the results of such studies together under the name we have selected: collaborative learning. In studies in which the authors used distinctively cooperative approaches, we use that term instead.

Collaborative Learning Correlates Positively with Cognitive Learning Outcomes

Springer, Stanne, and Donovan (1999) conducted an impressive meta-analysis of the effects of cooperative learning. The researchers examined the

effects of small-group learning on student achievement, persistence, and attitudes in classes in undergraduate science, mathematics, engineering, and technology (STEM). They located 383 reports related to small-group learning in postsecondary STEM from 1980 or later. Thirty-nine of the studies met their requirements for providing adequate research data. Their first major conclusion about student achievement is that SMET students who learned in small groups demonstrated greater achievement than students in traditional instruction ($d = .51$, which is roughly equivalent to moving a student from the 50th to the 70th percentile on a standardized test). Second, the effects of small-group learning on achievement were significantly greater when measured on instructor-made exams or grades than on standardized instruments. In addition, out-of-class meetings (typically study sessions) have greater effects on achievement than in-class collaboration. In a succinct summary of their meta-analysis, the researchers offer this conclusion: "Students who learn in small groups generally demonstrate greater academic achievement ... than their more traditionally taught counterparts. The reported effects are relatively large in research on educational innovation and have a great deal of practical significance" (Springer et al., 1999, p. 42).

A more recent meta-analysis supports the findings of Springer et al. (1999). Romero (2009) conducted a systematic review of 2,506 published and unpublished citations of cooperative learning in secondary (the last years of high school) and early postsecondary science classrooms (community colleges and the first two years of college and university instruction) published between 1995 and 2007. Thirty of these studies met the criteria for inclusion in a meta-analysis. The author found that cooperative learning improves student achievement in science, with an overall mean effect size of .308 (a medium effect). The structure of the learning task influenced the effect size, with more structured interventions having a greater effect (Romero, 2009).

Three research syntheses that collectively examine studies spanning several decades also have shown that interactive group learning is effective in improving student learning outcomes. In 1969, Feldman and Newcomb synthesized the findings of more than 1,500 studies in their now classic book, *The Impact of College on Students*. In 1991, Pascarella and Terenzini set for themselves the ambitious task of updating the research that had accumulated since Feldman and Newcomb. In a nearly one thousand-page treatise titled *How College Affects Students*, they reviewed more than 2,500 publications, deducing basically that "students not only make statistically significant gains in factual knowledge and in a range of general cognitive and intellectual skills, they also change on a broad array of values,

attitudinal, psycho-social, and moral dimensions" (p. 557). A large part of this documented change, Pascarella and Terenzini conclude, is determined by the extent to which students interact with faculty members and student peers in and out of the classroom (p. 620). In Pascarella and Terenzini's follow-up volume, *How College Affects Students: A Third Decade of Research,* they synthesize research conducted in the 1990s. Commenting on the broad spectrum of research on group learning, they state that "the weight of evidence from this research is reasonably consistent in suggesting that collaborative learning approaches can significantly enhance learning" (2005, p. 103).

While cognitive gains are important, in higher education we have seen increasing emphasis on the development of higher-order thinking skills. Research suggests that there is a correlation between participation in collaborative learning and gains in these skills. In an intensive study of a special program for ethnically diverse calculus students at the University of Wisconsin, Millar (1999) reported positive findings on the effectiveness of learning in groups. The Wisconsin learning groups emphasized three factors: intensive group work, carefully chosen and very difficult problems, and instructors who function as guides. Students learning under these conditions were about twice as likely as other students to receive a B or above in calculus, and they "showed higher levels of confidence in their mathematical ability and greater comfort in performing calculus problems; learned to value multiple and creative ways of problem solving; and developed the interest and ability to acquire a deeper, more conceptual understanding of calculus" (pp. 8-9). Similarly, Karabenick and Collins-Eaglin (1996) gathered data from over one thousand students in fifty-four classes and found that the greater the class emphasis on group learning and the lower the emphasis on grades, the more likely students were to use higher-order learning strategies of elaboration, comprehension monitoring, and critical thinking.

Collaborative Learning Correlates Positively with Student Engagement, Attitudes, Persistence, and Personal Development

The effect of the social impact of college has stimulated sophisticated theory building on student development as well as further research on learning in the classroom, including the effect of cooperative and collaborative learning. Many institutions are collecting data using instruments such as the National Survey of Student Engagement (NSSE) and the Community College Survey of Student Engagement (CCSSE) (Community

College Leadership Program, 2003; Kuh, 2000). These surveys ask students to report the frequency with which they have participated in group activities, with the assumption that the larger the number, the more engaged they are.

These assumptions appear to have some credibility, as research has intimated a relationship between group learning and student engagement. In a forthcoming meta-analysis of 305 studies, Johnson, Johnson, and Smith (2014) found that cooperative learning improves a range of outcomes including knowledge acquisition, retention, accuracy and creativity of problem-solving, and higher-level reasoning. The authors found three factors that may contribute to these impressive results: quality of relationships (cooperative learning promotes increased liking among students); psychological adjustment (cooperative learning improves, for example, self-efficacy, self-concept, integration into the environment, and ability to manage difficulties); and positive attitudes toward the university experience (cooperative learning tends to promote more positive attitudes toward learning, the subject area, and the university). The authors conclude that:

> *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 to 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.*

Alexander Astin conducted one of the larger individual statistical studies of the effectiveness of interactive group learning. In data collected across hundreds of colleges and thousands of students using twenty-two measures of student learning outcomes, Astin concluded that two factors had a special potency in academic achievement, personal development, and student satisfaction with college: interactions with fellow students and interactions with faculty members. "Research has consistently shown that cooperative-learning approaches produce outcomes that are superior to those obtained through traditional competitive approaches, and it may

well be that our findings concerning the power of the peer group offer a possible explanation: Cooperative learning may be more poten t than traditional methods of pedagogy because it motivates students to become more active and more involved participants in the learning process" (1993, p. 427).

In a substantive qualitative study, Light and his colleagues (2001) interviewed more than two thousand Harvard students to see what learning experiences they valued most in their college years. One of their key findings was that interactive relationships organized around academic work are vital. In particular, they need to be more than social: they need to also inclu de focus on content. Light found that students who study ou tside of class in small groups composed of four to six students benefit enor mously. These group participants, and their discussions of classwor k and of h ome - w or k, were more engaged, were better prepared for class, and learned more (Light, 2001).

The evidence is strong and quite consistent across a broad array of the se educational research studies that students who study under various forms of peer interaction, includin g class discussion (versus lecture), have more positive attitudes toward the subject matter, have increased motivation to learn more about the subject, and are better satisfied with their experience than students who have less opportunity to interact with fellow students and teachers (Astin, 1993; Light, 2001; Spr inger, Stanne, & Donovan, 1998). Data also indicate that students working in learning groups like the instructor better and perceive the instructor as more supportive and accepting academicalJy and p e rson ally (Fiechtner & Davis, 1992).Data suggest that in-class collaborations have more favorable effec ts on st u den t a ttitu des than out-of-class meetings (Springer et al., 1998.)

In ad d ition to these other learning outcomes, cooperative lea rn - ing is corre lated with student persistence. In the Springer et al. (1998) meta-analysis , student persistence was significantly higher in small-group learning classes than in traditional classes (d = .46, which is enough to red uce attrition from STEM classes by 22 percent). This finding supports an earlier study by Lan and Repman (1995) that documented interaction effects between collabora tive learning and student persistence following failures. Simila rly, Treisman (1985) found that the five-year retention rate for African American studen ts ma jor ing in m athematic s or scien c e a t Ber kel ey was 65 percent for those who were involved in collaborative learn ing groups compared with 41 percent for those not involved.

Finally, in teractiv e g roup learn ing ap pea rs to supp ort ou tcomes such as per sonal develop men t. In a stud y of more than 2,000 st ud en ts comp leti n g

their second year of study at twenty-three campuses, for example, Cabrera (1998) established that participation in cooperative learning groups was positively related to perceived gains in personal development, appreciation for fine arts, analytical skills, and understanding of science and technology as measured by the College Student Experiences Questionnaire (CSEQ).

Collaborative Learning Is Good Educational Practice

Research studies of good practice in college and university teaching point to collaborative learning as an effective method of instruction. A widely cited and important synthesis of research on learning in college is the *Seven Principles for Good Practice in Undergraduate Education*. The principles "rest on 50 years of research on the way teachers teach and students learn, how students work and play with one another, and how students and faculty talk to each other" (Chickering & Gamson, 1987). The first three principles are (1) good practice encourages student-faculty contact; (2) good practice encourages cooperation among students; and (3) good practice encourages activelearning. These three principlesapply to both the college environment and the classroom, and they are the backbone of collaborative learning.

Similarly, in *How Learning Works: Seven Research-Based Principles for Smart Teaching* (Ambrose et al., 2010), the authors distill research and draw on their combined twenty-seven years of experience working one-on-one with college faculty to provide instructors with an understanding of student learning that can help them see why certain teaching approaches are or are not supporting student learning. They do not specify any particular pedagogical approach, but instruction that encourages collaborative learning may support at least two of their principles.

Principle Three, for example, is, "Students' motivation determines, directs, and sustains what they do to learn" (Ambrose et al., 2010).Stressing that the "importance of motivation, in the context of learning, cannot be overstated," Ambrose et al. identify "subjective value of a goal" as the first of two concepts central to understanding student motivation (p. 69). Studies by goal theorists and other motivational researchers have contributed a great deal of information about thesituational characteristics that predict students' tendencies to adopt different goals. Brophy (2004), who synthesizes the research on motivation in the classroom, proposes that to apply goals theory to the classroom, teachers establish supportive relationships and cooperative/ collaborative learning arrangements that encourage students to adopt learning goals as opposed to performance goals (p. 9).

Principle Six is "Students' current level of development interacts with the social, emotional, and intellectual climate of the course to impact learning" (Ambrose et al., 2010). Educational research studies have generated strong evidence that students feel more positively about the subject matter, are more satisfied by their experience, and perceive the instructor as more supportive in classes that use various forms of cooperative and collaborative work (Fiechtner & Davis, 1992; Johnson, Johnson, & Smith, 1991; Light, 1992; Springer et al., 1998). Comments by students in one of the author's ownclasses offer direct, personal evidence: following participation in various collaborative learning activities, one student shared, " the more people you get to know in a class, the more comfortable you feel and the more willing you are to speak up," while another commented, "[these collaborative learning activities] help me overcome my own shyness" and yet another that the collaborative activities "make learning fun" (Barkley, 2004).

Collaborative Learning Is Beneficial for a Wide Range of Students

While the evidence is strong that interactive group learning can indeed improve a wide range of student learning outcomes, the question remains as to whether it does so for all kinds of students to the same degree. Researchers have considered this question, and the resulting research follows two streams: academic preparation and demographics.

One concern about collaborative learning has been that students who are less well prepared may benefit whereas well-prepared students may be harmed by their participation. Ample research and experien tial evidence suggest, however, that in peer tutoring students *doing* the teaching learn more, especially at a conceptual level, than students receiving the tutoring (Annis, 1983; McKeachie, Pintrich, Lin, & Smith, 1986). Teachers who have spent many hours preparing a lecture or designing a learning exercise know firsthand that organizing knowledge to explain it to others is a powerful learning experience. Thus, there should be considerable value to good students in having to organize and articulate their own learning to make it understandable to others. Indeed, Slavin found in his review across hundreds of research studies that "students who give each other elaborated explanations (and, less consistently, those who receive such explanations) are the students who learn the most in cooperative learning" (1996, p. 53). Taken as a whole, then, the research appears to substantiate the claim that both underprepared and well-prepared students benefit from group learning, but perhaps for different reasons. Good students may benefit from having to formulate

their thoughts and knowledge into concepts understandable to others, while academically poorer students may benefit from the explanations of their peers.

In addition, there is high interest in any group that has been underrepresented in higher education in the past. Obtaining diversity in student populations is appealing to colleges for pedagogical as well as social reasons. The evidence is strong-for a variety of reasons- that students who might be considered nontraditional college students prefer cooperative group learning and stand to gain more from it than traditional students. Women, members of underrepresented racial and ethnic groups, adult and reentry students, commuters, and international students have been identified as students for whom peer and group learning seem especially valued and valuable.

Research documents that group work enhances and enriches the goal of learning from diversity. Cuseo notes, "Cooperative learning has the potential to capitalize on the contemporary wave of student diversity-converting it from a pedagogical liability (which instructors must somehow adapt to or accommodate) into a pedagogical asset-by capitalizing on the multiple, socio-cultural perspectives that can be experienced when students from diverse backgrounds are placed in heterogeneously-formed cooperative learning groups" (1996, p. 24). The Springer et al. (1999) meta-analysis supports this perspective and further suggests that underrepresented students may benefit from their participation in collaborative learning. The findings of increased academic performance based on participation in collaborative groups were equally positive for women and men, STEM majors and nonmajors, first-year and other students, and underrepresented minorities (African American and Latino).

In short, almost everyone seems to benefit from group learning situations.

Collaborative Learning Is Valued by Both Students and Teachers

Some researchers have investigated student and teacher opinions about collaborative learning. In general, these opinions seem to be positive. Teachers over the generations have searched for the best method of teaching, and a considerable amount of literature has compared the various approaches. Psychologists at the University of Michigan reviewed more than five hundred research studies pertaining to teaching and learning in college classrooms. When asked what is the most effective teaching method, McKeachie and his colleagues answered that it depends on the

goal, the student, the content, and the teacher- but the next best answer is, "Students teaching other students" (McKeachie et al., 1986, p. 63).

Fiechtner and Davis (1992) sought student reactions to cooperative learning experiences in upper-division classes at two universities. Asking students to rate the effectiveness of their group experiences on an eighteen-item survey, they found, in four different administrations of the survey, that 74-81 percent of respondents rated their cooperative learning experience significantly or somewhat more effective than traditional college instruction in general academic achievement; 70-82 percent felt that their group experience was superior in promoting higher-level thinking skills; and 75-86 percent claimed it promoted greater interest in the subject matter. A striking 83-90 percent claimed better class morale under conditions of group learning. Some students may prefer collaborative learning more than others. Cabrera's study of 2,051 students at twenty-three institutions revealed that minority students expressed a greater preference for learning in groups than did majority students (1998). (See Exhibit 2.2, "What Is the Evidence for Online Collaborative Learning," for an overview of research findings regarding collaborative learning in online classes.)

The Quality of the Evidence

As we have noted, the research on collaborative learning is extensive. It also has a long history,which documents the effectiveness of collaborative learning over time. But just how good is this evidence? Our review indicates that this body of work has strengths as well as weaknesses. The sheer number of studies on collaborative learning that have produced positive reports, especially the syntheses and meta-analyses, provides us with some confidence that the evidence is valid.

Research on instructional methods is sometimes criticized, however, for comparing carefully designed experimental methods with average, across-the-board, traditionally taught classes. This is, in a sense, stacking the cards in favor of the experimental method. It may be that the reason for the generally positive findings in the published reports of the contributions of group learning to achievement is that the groups studied are usually carefully structured to accomplish student learning. Research on lectures that were carefully planned to raise questions and involve students in actively thinking about what was being said would also show more positive results than across-the-board studies of the efficacy of active lecturing.

EXHIBIT 2.2

What Is the Evidence for Online Collaborative Learning ?

Scholars have now conducted hundreds of studies on whether online instruction is as effective as onsite instruction. Some studies have found that online learning is less effective, others that it is more effective,and still others that it isthe same.Clearly there isvariation among the ways on linecourses are designed and taught , and just as there are less effective onsite courses, there are also lesseffective online courses. Meta-analyses, wh ich compile the results from several published studies, can perhaps provide a clearer answer. Taken together, these studies suggest that online courses are as effective as or slightly more effective than onsite courses (see, e.g., Bernard et al., 2009;Means et al., 2009).

What conditions improve the quality of learning in onlinecourses? There is solid and growing evidence that collaborative learning does.In Chickering and Ehrmann's (1996) adaptation for the online environment of Chickering and Gamson's seven principles of good practice,t heir second principle suggests that collaborative learning is essential for goodpract ice, and this principle has been broadly construed as also applying to online distance learning.

Does empirical evidence support this position? The short answer is: yes, it does. Many quantitative studies point to the fact that interaction and meaningful work among peers is an important component of an effective online learning environment and that it has the potential to influence student learning in online courses. Additional qualitative studies that address student experience in online courses also highlight several important ways collaborative learning can help online learning. A summary of some of these findings follows.

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Collaborative Learning Can Improve Student Learning in Online Courses

In a 2009 meta-analysis of more than two hundred studies, Means et al. (2009) found that effect sizes of learning gains were larger for studies in which the online instruction was collaborative or instructor directed than in those where online learners worked independently. Similarly, in their meta-analysis of 74 studies, Bernard et al. (2009) found that student-to-student interactions and student-to -content interactions were more effective than student-to-instructor interactions at producing positive learning outcomes. In short, instructional methods are more important than technological affordance, and working and talking with other students through either discussions or collaborative work improves student learning outcomes in online courses (Bernard et al., 2004; c;:avu , Uzonboylu, & Ibrahim, 2007).

Collaborative Learning Can Help to Eliminate Feelings of Isolation Students May Feel in an Online Course

Several qualitative studies have indicated that some students can feel isolated in online courses (see, e.g., Lyall & McNamara, 2000; Zembylas, Theodorou, & Pavlakis, 2008). These feelings of isolation can stem from the fact that students are working independently, separated from each other by both time and space. Feelings of isolation have the potential to lead to poor attitudes and course performance. Collaborative learning requires students to work with each other, which can help reduce these feelings. Indeed, one student interviewed in Melrose and Bergeron's (2007) study, suggested the following remedy to the isolation problem: "Maybe the instructor could pull people together in the groups. Newer students don't have the background,

help us share some little personal thing and then we can build on it to get to know each other" (p. 7). Online collaborative learning can help students feel as though they are valued members of a learning community.

Collaborative Learning Can Help Students Forge Relationships with Their Peers

Online students appear to value interacting and forming relationships with peers. Several studies have found that getting to know other students in an online environment can improve their overall experiences (see Blackmon & Major, 2012; Motteram & Forrester, 2005). Moreover, students in some studies have suggested that their relationships with students in online courses were stronger than those in onsite courses (Zembylas et al., 2008). These relationships form the basis of positive student experiences, and online collaborative learning provides a solid foundation on which such relationships may be founded.

Collaborative Learning Improves Outcomes in Online Courses

One well-known model of collaboration in online learning is Anderson et al.'s (2001) model of community of inquiry. The authors describe such a community as a group of individuals who engage in a purposeful discourse and reflection collaboratively. The goal of a community of inquiry is to construct personal meaning and confirm mutual understanding. The model is made of three interdependent and overlapping elements: teacher, cognitive, and social presence. Teacher presence involves the design, facilitation, and direction of course processes (Anderson et al., 2001). Cognitive presence involves learner ability to construct and confirm meaning through sustained reflection and discourse (Garrison, Anderson, & Archer, 2001). Social presence is "the ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop inter-personal relationships by way of projecting their individual personalities" (Garrison, 2009). All three of these elements are essential for a community of inquiry, and clearly collaborative learning supports the achievement of social presence in an online course.

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To conclude, just as is the case with onsite classes, there is ample evidence that collaborative learning is effective in promoting learning in online classes. In Part Two of this text, we turn to a more practical discussion of how online collaborative learning may be done, and in Part Three we provide specific online collaborative learning techniques that instructors may use in online courses.

To answer the criticism of comparing well-designed collaborative learning methods with average, across-the-board traditional teaching, Wright and colleagues (1998) conducted an interesting and powerful comparison of the best lecture/discussion classes with the best cooperative learning classes in analytical chemistry at the University of Wisconsin. They placed considerable emphasis on careful assessment of the learning that was taking place. In their words, their assessment strategy "emerged from an ad hoc committee of skeptical chemistry faculty who met prior to the 1995 course. They concluded that the only type of assessment data they would find credible would be faculty-conducted oral examinations of all students. It was important that

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the assessment be done orally in order to probe student understanding and problem-solving ability. It was also important that the assessment involve external faculty who are independent of the course faculty" (p. 987).

Wright et al.'s findings left little doubt that students in the cooperative learning classes "had quantifiably better reasoning and communication skills" than students taught in lecture/ discussion classes. Moreover, both student and faculty questionnaires showed "very significant differences in the perception of the students' preparation for future science courses" (1998, p. 989). This study, published in the *Journal of Chemical Education*, is one of the most carefully designed research studies of instructional methods that we found in our search of the research on collaborative learning in higher education.

Moreover, research support for the relationship between learning with peers and positive outcomes in student learning is extensive, and it comes from broad-scale studies of college environments as well as from studies directed more specifically to the effects of collaborative learning in the classroom. To date, then, there is an impressive amount of research, and it comes from highly credible sources.

Issues Needing Further Investigation

The aggregated evidence from the literature appears highly positive, but we found student criticism or dissatisfaction with group work strangely lacking in the research reports. The research just did not seem to report on or take cognizance of the student criticisms that every instructor who has tried group work hears. Instead, we found that criticisms of learning groups were enumerated primarily in the work of practitioners. For example, Miller and her colleagues reported their experiences in teaching a biology class: "Some groups literally crackle with excitement and creativity. All members seem to live, breathe, eat, and sleep the current project and are ecstatic with their working arrangements. . . . At the opposite end of the spectrum, there are groups in which one or more members cannot be reached by telephone, do not show up for meetings, break commitments to their group and in the worst case disappear for several weeks with the entire group's work in their possession" (Miller, Trimbur, & Wilkes, 1994, p. 34).

Cathy Middlecamp (1997) reported on negative as well as positive student reactions by asking two hundred students in a chemistry class for nonmajors at the University of Wisconsin to give advantages and disadvantages of the group work she had used from time to time in the class. While she disavows a systematic research approach to the collection of data, her

posting on the Web of a sample of student comments regarding cooperative learning groups will ring true to many practitioners. The advantages listed by students consist of those that appear commonly in the literature of cooperative and collaborative learning. They include recognition that different members of the group bring different knowledge and talents to bear, that deeper learning results from the discussion, that students are less hesitant to speak or raise questions in small peer groups than in a large class or with the instructor, and that working in groups is more fun and gives students an opportunity to know their fellow students better. Some students, especially business majors, were also likely to mention the career value of learning to work on teams.

The disadvantages listed by students included recognition that people need to go at different speeds, that some students dominate the group while others are slackers who fail to pull their fair share, that discussion gets off the topic and wastes time, and that some groups just don't get along. The advantages listed by students appear to represent the outcomes of groups that are productive, well planned, and carefully monitored. The disadvantages represent groups that are dysfunctional for one or more reasons, most of which are probably correctable. The purpose of this handbook is to help faculty capitalize on the advantages and defuse the disadvantages inherent in group work in both the onsite and online environments (see "Avoiding and Resolving Common Problems").

While there are a substantial number of articles on student attitudes toward group work (which includes negative perceptions) and the problems students identify with group work (e.g., inequitable participation and social loafers), there is almost no research on groups that fail. Thus, more research could be conducted on whether collaborative learning carries risks if done poorly. We assume so, but we just don't know what students learn from a poorly run group. The evidence, however, is so strong that interactive group learning has multiple advantages if done well that it would be folly not to learn how to operate collaborative learning groups productively.

We also found no attempt to systematically study the impact of collaborative learning on teachers. Does it take more time? Does it sacrifice coverage of material? Does it result in greater satisfaction in the profession of teaching? What are the intrinsic and extrinsic rewards? We just don't know the answers to these questions via systematic research. There are scattered testimonials to the satisfaction of working closely with colleagues, and many college professors offer anecdotes on their increased interest in teaching via collaborative learning. Certainly centers established on campuses to improve teaching and learning are increasingly using