

6

The expansion of small-group learning approaches in large classes depends on both institutional initiatives and grassroots efforts. Here we provide a list of resources for further information about small-group learning and learning communities.

Making Small-Group Learning and Learning Communities a Widespread Reality

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As we rethink what it will take to change the learning environment of large classes, we need to think about the changing functions of classes themselves. Since the development and proliferation of books (and college students are the largest consumers of textbooks) and more recently computer-based media and the World Wide Web, students have access to floods of information in ways the professorate of the past could not have imagined. Suddenly we have an opportunity to rethink the goals of classes, especially the large introductory ones, and to reflect about how students access information and might best make meaning from it.

What special opportunities arise when students are asked to gather in one meeting place at the same time? One of the best reasons for bringing people together is to give them chances to learn from and with one another, to practice communicating and working together to accomplish a common task, and to find out more about one another as people. We need to reconceive classes as the unique social spaces that they can be—where students and teachers interact in personally and intellectually stimulating ways.

In this chapter we discuss some of the pressures to expand this kind of innovative work, the pressures holding it back, and the larger prospects for a growing movement toward small-group learning approaches. We also provide a list of some key resources available in print and on the Web.

Pressures to Change

We all know that voices are pressing in on us to do better in undergraduate education (Marchese, 1998; Boyer Commission, 1998; National Science Foundation, 1996; National Research Council, 1999; Potter, 1999). What continues to emerge from a rising tide of reports and recommendations is the value of

- Active construction of knowledge
- Learning by direct experience and inquiry
- Engaging activities, problems, tasks, and projects
- Focused interaction with faculty
- Active, interactive, and cooperative involvement among students
- Development of team work skills
- Development of abilities to communicate with diverse people
- A sense of belonging and community
- Carefully planned and researched uses of technology

Many of the pressures for change are summarized by Barr and Tagg in their article “From Teaching to Learning: A New Paradigm for Undergraduate Education” (1995) and by Johnson, Johnson, and Smith in *Active Learning: Cooperation in the College Classroom* (1991). A comparison of old and new teaching paradigms appeared in Campbell and Smith’s *New Paradigms for College Teaching* (1997) and is shown in Table 6.1.

Although faculty members’ theories and practices are not nearly as “either/or” as the table indicates, the trends on the new paradigm side of the table seem to be strengthening. The most profound changes seem to be occurring among individual teachers, like those we interviewed. Many faculty members are changing the way they teach out of a deep concern for students and a sense that “there has to be a better way to do this.”

Yet at the same time there are pressures not to change—or not to change very dramatically. There are few structural incentives for reducing enrollments in large classes. There are limited resources for the hiring of teaching assistants or undergraduate facilitators, or for their extensive training and support. On some campuses, limited resources means that many lecture halls remain unsuitable for (and even hostile to) small-group activity. Despite some small efforts to the contrary, reward systems at large research institutions still favor published research over teaching innovation. Just recently, two important articles that appeared in *Change* magazine and *About Campus* candidly discuss how difficult change is and how serious we need to get about taking deeper and more cumulative responsibility for students’ learning (Barr, 1998; Schneider and Schoenberg, 1999).

Still, even under these difficult conditions, inspiring reforms of large classes are inching forward. In the science, math, and engineering arena, the National Science Foundation is funding major reform projects. In addition,

Table 6.1. Comparison of Old and New Paradigms for College Teaching

	<i>Old Paradigm</i>	<i>New Paradigm</i>
Knowledge	Transferred from faculty to students	Jointly constructed by students and faculty
Students	Passive vessel to be filled by faculty's knowledge	Active constructor, discoverer, transformer of knowledge
Mode of learning	Memorizing	Relating
Faculty purpose	Classify and sort students	Develop students' competencies and talents
Student goals	Complete requirements, achieve certification within a discipline	Grow, focus on continual lifelong learning within a broader system
Relationships	Impersonal relationship among students and between faculty and students	Personal transaction among students and between faculty and students
Context	Competitive individualistic	Cooperative learning in classrooms and cooperative teams among faculty
Climate	Conformity/cultural uniformity	Diversity and personal esteem/cultural diversity and commonality
Power	Faculty holds and exercises power, authority, and control	Students are empowered; power is shared among students and between students and faculty
Assessment	Norm-referenced (i.e., graded "on the curve"); typically multiple choice items; student rating of instruction at end of course	Criterion-referenced; typically performances and portfolios; continual assessment of instruction
Ways of knowing	Logicoscientific	Narrative
Epistemology	Reductionist; facts and memorization	Constructivist; inquiry and invention
Technology use	Drill and practice; textbook substitute; chalk and talk substitute	Problem solving, communication, collaboration, information access, expression
Teaching assumption	Any expert can teach	Teaching is complex and requires considerable training

Source: Adapted from Campbell and Smith, 1997.

with or without grant funding, many campuses are undertaking learning-community curricular offerings that require significant cross-departmental coordination and impressive faculty–student affairs partnerships.

Making Lasting Change

What is the nature of change in higher education and how does it relate to the change to more active, interactive, and cooperative learning environments? The two types of change we see are, first, the more visible, institutional initiatives—some of which are top-down in nature—and second, the less visible individual and grassroots efforts. We think that more of both kinds is needed.

Institutional Initiatives. In our outreach to the faculty members around the country who became the informants for this book, we came upon several systemic, campuswide projects directed to improving large-class teaching.

University of Texas-Austin Small Group Learning Initiatives. Two projects are under way right now at UT-Austin, both involving large-class learning. The graduate school and the Center for Teaching Effectiveness are involved in a Hewlett Foundation–funded project (described in Chapter Five) with the goal of fostering a greater sense of community and tolerance among students early in their college years, primarily through small-group learning activities in large classes. Discovery Learning, a second grant-supported project—this one funded by the Education Advancement Foundation—focuses on supporting faculty members as they develop a variety of active-learning strategies, quite frequently in large introductory classes. Minigrants support faculty and teaching assistants as they develop new approaches, and monthly luncheons provide a venue for gathering new ideas as well as for forming a community of shared practice.

University of Maryland Large Classes Project. A project specifically directed toward improvement of large-class teaching has been under way at the University of Maryland for several years. It began as a continuous quality improvement (CQI) effort charged by the vice president for academic affairs and provost to research and then address the challenges associated with large-class teaching. In a unique move, the vice president created a “cross-functional” team to tackle this problem. The team worked through a careful stepwise data-gathering exercise involving department leaders, faculty members, representatives of the physical plant, and students to understand more fully the problems and root causes with widespread dissatisfaction associated with large classes (see Chapter One for a discussion of this). Their recommendations involved everything from providing ideas and resources to teachers of large classes, to furthering study of the reward structure in large classes, to creating a facilities team to take action on the improvement of physical classroom settings. Ideas distilled from the Center for Teaching Effectiveness’s workshops and *The Large Classes*

Newsletter are now available in Elisa Carbone's *Teaching Large Classes: Tools and Strategies* (1998) and a journal article she coauthored (Carbone and Greenberg, 1998).

Michigan State University Active Learning Initiative. Michigan State University has been involved in extensive faculty development work in cooperative learning for the past ten years. The seeds were planted during cooperative learning workshops that were held as part of their Lilly Endowment Teaching Fellows program. Hundreds of faculty members in tens of departments are engaging their students in active, interactive, and cooperative learning during class time. Recently, several faculty members have asked for even more intensive work, and in response advanced cooperative learning and cooperative learning leadership workshops have been added. MSU leaders have persistently encouraged and supported implementation of the university's "six guiding principles," developed under the stewardship of President Peter McPherson in 1994. In 1999, they developed a series of implementation points, including "the support of additional experimentation with real-world learning strategies such as problem-based learning, cooperative learning, case-based learning, and service learning."

University of Delaware Problem-Based Learning Initiative. The University of Delaware has implemented problem-based learning (PBL) in many introductory courses (described in detail in Chapter Three) and provides weeklong faculty development workshops, teaching assistant training, consultation, and lots of additional follow-up and support. The initiative began in the sciences, physics, and biology, and is spreading across the university. The initiative received extensive external grant support, which helped get it started, but has involved a wide number of faculty members and their teaching assistants.

University of Texas-El Paso: The Model Institutions for Excellence Project. In the border metropolis of El Paso, Texas, and Juarez, Mexico, UTEP is investing a multimillion dollar National Science Foundation grant in major reform of undergraduate science classes. The explicit intention is to enable more Latino students to be successful in entering majors and graduate programs in the sciences and engineering. This very large institution-wide initiative is creating learning-community curricula (described in Chapter Four), a commitment to peer-facilitated small-group learning, a student study center, and opportunities for faculty development and special student internships.

Large-scale changes are hard to sustain at very large institutions such as these. They usually do not occur without a group of colleagues who sustain a vision and then provide continuing support and encouragement for one another. These five institutional stories have common features (put forward in Johnson, Johnson, and Smith, 1998) found to be vitally important in strengthening personal and organizational change:

- These projects identify a clear focus or clear goals. Meaningful change requires teams pulling together to achieve a common goal.

- These projects promote an attitude of experimentation. Change requires an atmosphere in which there is a willingness to try things and learn from what is attempted.
- Finally, these projects create collegial support networks of faculty, students, staff, and administrators.

Grassroots Efforts. Although the institutional efforts are very promising, the more prevalent pattern for change is at the grass roots. A growing community of faculty members scattered in institutions throughout the country are implementing changes on their own or with their teaching assistants in a single course or department. Often this work remains unknown and unheralded on the campuses where it is occurring. We can think of these efforts spreading among users as described in Everett Rogers's now-classic theories about diffusion of innovations, or we might think of these efforts as something a bit more transformative, as Parker Palmer might.

Rogers's diffusion of innovation model is based on an S-curve adoption of innovation as a function of time (Rogers, 1995). It starts with the innovators, progresses to the early adopters (about 14 percent), next to the early majority (about 34 percent), then to the late majority (about 34 percent), and finally to the laggards (about 16 percent). Through a truly modest level of publication, but more frequently through conferences and word of mouth, these approaches have quietly spread around the country among both innovators and early adopters. Overall, the implementation of small-group learning in higher education appears to be well established among the early adopters and perhaps even used by some in the early majority. In very large classes, it is probably more likely the case that only the innovators and some early adopters are using small-group approaches.

Some of these innovative teachers see small-group strategies simply as techniques they practice occasionally, along with an array of other tools. Others see the move into small-group and problem-centered teaching and learning as more transformative. These teachers believe that cooperative and collaborative learning forces us to conceive of student learning in a way that has implications for the very structure of our classes, the training of teaching assistants, and the design of curricula. They see their work as part of a social movement—perhaps even a transformation of education.

The social movement level of change implies that the innovation does not simply spread quietly and get picked up here and there. Rather, it becomes the center of teachers' philosophies of student learning and their practice of teaching. As educational leader Patricia Cross has observed, the biggest and most long-lasting reforms in undergraduate education will come when individual faculty or small groups of instructors adopt a view of themselves as reformers in their immediate sphere of influence: the classes they teach every day (Patricia Cross, personal interview with the authors, July 1999).

Parker Palmer (1997a, 1997b, 1998) pushes us to think even more ambitiously. He recently posed the following question about educational

reform: “Is it possible to embody our best insights about teaching and learning in a social movement that might revitalize learning?” (1998, p. 166). From his study of several social justice movements, he observes that movements usually develop in four sequential steps:

- *Stage 1:* Isolated individuals make an inward decision to live “divided no more,” finding a center for their lives outside of institutions.
- *Stage 2:* These individuals begin to discover one another and form communities of congruence that offer mutual support and opportunities to develop a shared vision.
- *Stage 3:* These communities of congruence start going public, learning to convert their private concerns into the public issues they are and receiving vital critiques in the process.
- *Stage 4:* A system of alternative rewards emerges to sustain the movement’s vision and to put pressure for change on the standard institutional reward system.

A large majority of the individuals we interviewed for this volume spoke as if they truly have made personal decisions to live “divided no more” and to throw themselves into teaching in a new way—even though they teach in some of the most demanding settings in undergraduate education. Admittedly, many we interviewed are pursuing these teaching approaches on their own and report feeling lonely in their departments without the support of or even interest from colleagues. However, numbers of others have indeed found “communities of congruence” to which to turn for ideas, support, and understanding about what works and what needs to be changed. Approaches are being shared through Web sites alone in inspiring and remarkable ways. And without question, many of these teachers are already having a profound influence on their teaching assistants, and this in turn may produce a different new generation of teachers.

So with small-group learning and curricular learning communities, we sense that a small social movement is beginning to emerge. It is somewhere around Palmer’s Stage 2 in our estimation, and glimpses of Stage 3 are already on the horizon. As people gravitate to what it takes to foster active learning on the part of students, they begin to go public not just with the innovation they’ve adopted but with its implications for existing curricular structures and for changing the existing reality. They are becoming more vocal about the need for better classroom architecture that is more conducive to small groups and for “smart” classroom technology. They are restructuring entire courses to reduce lecture and increase discussion and laboratory work, and in so doing are rethinking the training of teaching assistants. They are becoming more vocal about reward systems and structures that honor the work of teaching effectively in these settings, and research and scholarship on student learning as well.

As we reflect on our year of collaborative research on small-group learning in large classes, we are filled with optimism. This inspiring group

of faculty innovators are on the leading edge of a new way of conceiving large-class learning. Although the institutional initiatives we discovered are important, it is the growing interest and activity of teachers at the grass roots that lead us to believe that lasting change may really come about. The power of these individuals' energy, vision, and commitment to student learning reminds us of Margaret Mead's often quoted insight: "Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has" (Frank, 1999, p. 510).

Additional Resources for Small-Group Learning and Learning Communities

This section includes many of the most common sources on small-group learning in print and on the World Wide Web. A Web site is being developed to provide access to the materials cited; visit Karl Smith's site [www.ce.umn.edu/~smith] to access these resources. Also, we want to hear your feedback! Please e-mail one of the authors with your success stories, comments, or questions: jeanmacg@thurston.com, jcooper@dhvx20.csudh.edu, ksmith@tc.umn.edu, or probinson@dhvx20.csudh.edu.

Theory and Rationales for Small-Group Learning

- Bonwell, C. C., and Eison, J. A. "Active Learning: Creating Excitement in the Classroom." ASHE-ERIC Higher Education Report No. 1. Washington, D.C.: George Washington University, 1991.
- Belenky, M. F., Clinchy, B. M., Goldberger, N. R., and Tarule, J. M. *Women's Ways of Knowing: The Development of Self, Voice, and Mind*. New York: Basic Books, 1986.
- Brooks, J., and Brooks, M. G. *In Search of Understanding: The Case for Constructivist Teaching*. Alexandria, Va.: Association for Supervision and Curriculum Development, 1993.
- Bruffee, K. *Collaborative Learning: Higher Education, Interdependence and the Authority of Knowledge*. Baltimore: Johns Hopkins University Press, 1993.
- Campbell, W. E., and Smith, K. A. (eds). *New Paradigms for College Teaching*. Edina, Minn.: Interaction Books, 1997.
- Derek Bok Center for Teaching and Learning. *Thinking Together Collaborative Learning in the Sciences*. Cambridge, Mass.: Derek Bok Center for Teaching and Learning, Harvard University, 1991. Videocassette.
- Gardiner, L. F. "Redesigning Higher Education: Producing Dramatic Gains in Student Learning." ASHE-ERIC Higher Education Report No. 7. Washington, D.C.: The George Washington University, 1994.
- Johnson, D. W., and Johnson, R. T. *Cooperation and Competition: Theory and Research*. Edina, Minn.: Interaction Books, 1989.
- Johnson, D. W., Johnson, R. T., and Smith, K. A. "Cooperative Learning: Increasing College Faculty Instructional Productivity." ASHE-ERIC Higher Education Report No. 4. Washington, D.C.: The George Washington University, 1991.
- Johnson, D. W., Johnson, R. T., and Smith, K. A. "Cooperative Learning Returns to College: What Evidence Is There That It Works?" *Change*, 1998, 30(4), 26–35.
- Katzenbach, J. R., and Smith, D. K. *The Wisdom of Teams: Creating the High Performance Organization*. Cambridge, Mass.: Harvard Business School, 1993.
- Kohn, A. *No Contest: The Case Against Competition*. Boston: Houghton-Mifflin, 1986.
- Kohn, A. *What to Look for in a Classroom*. San Francisco: Jossey-Bass, 1998.

- MacGregor, J. "Collaborative Learning: Shared Inquiry as a Process of Reform." In M. Svinicki (ed.), *The Changing Face of College Teaching*. New Directions for Teaching and Learning, no. 42. San Francisco, Jossey-Bass, 1990.
- Matthews, R. S., Cooper, J. L., Davidson, N., and Hawkes, P. "Building Bridges Between Cooperative and Collaborative Learning." *Change*, 1995, 27(4), 35–39.
- Springer, L., Stanne, M. E., and Donovan, S. "Effects of Small-Group Learning on Undergraduates in Science, Mathematics, Engineering, and Technology: A Meta-Analysis." *Review of Educational Research*, 1999, 69(1), 50–80.
- Stage, F. K., Muller, P. A., Kinzie, J., and Simmons, A. "Creating Learning-Centered Classrooms: What Does Learning Theory Have to Say?" ASHE-ERIC Higher Education Report No. 4. Washington, D.C.: George Washington University, 1998.
- Tinto, V. "Classrooms as Communities Exploring the Educational Character of Student Persistence." *Journal of Higher Education*, 1997, 68(6), 599–623.

General Resources on Cooperative and Small-Group Learning

- Abrami, P. C., Chambers, B., d'Apollonia, S., De Simone, C., Wagner, D., Poulsen, C., Glashan, A., and Farrell, M. *Using Cooperative Learning*. Montreal, Quebec: Centre for the Study of Classroom Processes, Concordia University, 1990.
- Carbone, E., and Greenberg, J. "Teaching Large Classes: Unpacking the Problem and Responding Creatively." In M. Kaplan (ed.), *To Improve the Academy*. Vol. 17. Stillwater, Okla.: New Forums Press and the Professional and Organizational Development Network in Higher Education, 1998.
- Cooper, J. L. *Cooperative Learning and College Teaching*. Stillwater, Okla.: New Forums Press, 1999.
- Goodsell, A., Maher, M., and Tinto, V. *Collaborative Learning: A Sourcebook for Higher Education*. University Park, Pa.: National Center for Postsecondary Teaching, Learning, and Assessment, 1992.
- Johnson, D. W., Johnson, R. T., and Smith, K. A. *Active Learning: Cooperation in the College Classroom* (2nd ed.). Edina, Minn: Interaction Books, 1998a.
- Johnson, D. W., Johnson, R. T., and Smith, K. A. "Maximizing Instruction Through Cooperative Learning." *ASEE Prism*, 1998b, 7(6), 24–29.
- Kadel, S., and Keehner, J. A. *Collaborative Learning: A Sourcebook for Higher Education*. Vol. II. University Park, Pa.: National Center for Postsecondary Teaching, Learning, and Assessment, 1994.
- Millis, B. J., and Cottell, P. G. Jr. *Cooperative Learning for Higher Education Faculty*. Phoenix: Oryx Press, 1998.
- Nevin, A., Smith, K. A., and Udvari-Solner, A. "Cooperative Group Learning and Higher Education." In J. Thousand, R. Villa, and A. Nevin (eds), *Creativity and Collaborative Learning: A Practical Guide to Empowering Students and Teachers*. Baltimore: Paul H. Brookes, 1994.
- Smith, K. A. "Cooperative Base Groups: Building Community and Involvement." *Faculty Development*, 1997, 11(1), 6.
- Smith, K. A., Johnson, D. W., and Johnson, R. T. "Structuring Learning Goals to Meet the Goals of Engineering Education." *Engineering Education*, 1981, 70, 221–226.
- Sutherland, T. E., and Bonwell, C. C. (eds.). *Using Active Learning in College Classes: A Range of Options for Faculty*. New Directions for Teaching and Learning, no. 67. San Francisco: Jossey-Bass, 1996.
- Tiberius, R. G. *Small Group Teaching: A Trouble-shooting Guide*. Toronto: OISE Press, 1990.

General Resources on Large Classes

- Carbone, E. *Teaching Large Classes: Tools and Strategies*. Thousand Oaks, Calif.: Sage, 1998.

Gedalof, A. J. *Teaching Large Classes*. Halifax, Nova Scotia: Dalhousie University, 1998.
 Mazur, E. *Peer Instruction: A User's Manual*. Englewood Cliffs, N.J.: Prentice-Hall, 1997.
 Weimer, M. G. (ed.). *Teaching Large Classes Well*. New Directions for Teaching and Learning, no. 32. San Francisco: Jossey-Bass, 1987.

Cooperative Learning Web Sites

Calculus, Concepts, Computers, and Cooperative Learning at Purdue University

[<http://www.math.purdue.edu/~ccc/>]

Collaborative Learning: Small Group Home Page—National Institute for Science Education, University of Wisconsin-Madison

[<http://www.wcer.wisc.edu/nise/cl1/CL/clhome.asp>]

The Cooperative Learning Center at the University of Minnesota

[<http://www.clcrc.com/> or <http://www.cooperation.org/>]

Cooperative Learning: Response to Diversity

[<http://www.cde.ca.gov/iasa/cooplrng.html>]

Kagan Cooperative Learning Web site

[<http://www.kagancooplearn.com/>]

Richard Felder's Cooperative Learning Web site at North Carolina State University

[<http://www2.ncsu.edu/unity/lockers/users/f/felder/public/RMF.html>]

Listserves on Collaborative Learning and Learning Communities

Temple University hosts two listservs, one on collaborative learning and one on learning communities. To subscribe to the collaborative learning listserv, send a message to collabor@listserv.temple.edu. Leave the subject line blank and in the body of the message, type "subscribe collabor" and then your name. To subscribe to the learning communities list, send a message to learncom@listserv.temple.edu. Leave the subject line blank and in the body of the message, type "subscribe learncom" and your name.

Resources on Specific Approaches

Case Method

Barnes, L. B., Christensen, C. R., and Hansen, A. J. *Teaching and the Case Method: Text, Cases, and Readings* (3rd ed.). Cambridge, Mass.: Harvard Business School, 1994.

Christensen, C. R. *Teaching by the Case Method*. Cambridge, Mass: Harvard Business School, 1981.

Christensen, C. R., Garvin, D. A., and Sweet, A. *Education for Judgment: The Artistry of Discussion Leadership*. Cambridge, Mass.: Harvard Business School, 1991.

Classroom Assessment

Angelo, T. A. *Classroom Assessment and Research: An Update on Uses, Approaches, and Research Findings*. New Directions for Teaching and Learning, no. 75. San Francisco: Jossey-Bass, 1998.

Angelo, T. A., and Cross, K. P. *Classroom Assessment Techniques: A Handbook for College Teachers* (2nd ed.). San Francisco: Jossey-Bass, 1993.

Controversy

Johnson, D. W., and Johnson, R. T. *Creative Controversy: Intellectual Challenge in the Classroom*. Edina, Minn: Interaction Books, 1995.

Johnson, D. W., Johnson, R. T., and Smith, K. A. "Academic Controversy: Enriching College Instruction Through Intellectual Conflict." ASHE-ERIC Higher Education Report No. 3. Washington, D.C.: The George Washington University, 1996.

Jigsaw

Aronson, E., Blaney, N., Stephan, C., Sikes, J., and Snapp, M. *The Jigsaw Classroom*. Thousand Oaks, Calif.: Sage, 1978.

Learning Communities

Gabelnick, F., MacGregor, J., Matthews, R., and Smith, B. L. *Learning Communities: Creating Connections Among Students, Faculty, and Disciplines*. New Directions for Teaching and Learning, no. 41. San Francisco: Jossey-Bass, 1990. (Note: An expanded version of this book will be published by Jossey-Bass early in 2001.)

Levine, J. H. (ed.). *Learning Communities: New Structures, New Partnerships for Learning*. Columbia: University of South Carolina, National Resource Center for the First-Year Experience and Students in Transition, 1999.

Shapiro, N., and J. H. Levine. *Creating Learning Communities: A Practical Guide to Winning Support, Organizing for Change, and Implementing Programs*. San Francisco: Jossey-Bass, 1999.

Washington Center for Undergraduate Education, Evergreen State College Web site [<http://www.evergreen.edu/washcenter/>]

Problem-Based Learning

Boud, D., and Feletti, G. E. *The Challenge of Problem-Based Learning* (2nd ed.). London: Kogan Page, 1997.

Delisle, R. *How to Use Problem-Based Learning in the Classroom*. Alexandria, Va.: Association for Supervision and Curriculum Development, 1997.

Rhem, J. "Problem-Based Learning: An Introduction." *National Teaching and Learning Forum*, 1998, 8(1), 1–3.

Wilkerson, L., and Gijsselaers, W. H. (eds.). *Bringing Problem-Based Learning to Higher Education: Theory and Practice*. New Directions for Teaching and Learning, no. 68. San Francisco: Jossey-Bass, 1996.

Woods, D. R. *Problem-Based Learning: How to Gain the Most from PBL*. Waterdown, Ontario: Donald R. Woods, 1994.

Problem-Based Learning Web Sites

Illinois Math and Science Academy
[<http://www.imsa.edu/team/cpbl/cpbl.html>]

McMaster University Chemical Engineering
[<http://chemeng.mcmaster.ca/pbl/pbl.htm>]

Samford University
[<http://L.R.Samford.edu/PBL/>]

Southern Illinois School of Medicine
[<http://edaff.siumed.edu/PBLI/pblisui.htm>]

University of Delaware
[<http://www.udel.edu/pbl/>]

Supplemental Instruction

Martin, D., and Arendale, D. R. (eds.). *Supplemental Instruction Increasing Achievement and Retention*. New Directions for Teaching and Learning, no. 60. San Francisco, Jossey-Bass, 1994.

University of Missouri-Kansas City Web site
[www.umkc.edu/cad/]

References

Barr, R. B. "Obstacles to Implementing the Learning Paradigm—What It Takes to Overcome Them." *About Campus*, 1998, 3(4), 18–25.

- Barr, R. B., and Tagg, J. "From Teaching to Learning: A New Paradigm for Undergraduate Education." *Change*, 1995, 27(6), 13–25.
- Boyer Commission. "Reinventing Undergraduate Education: A Blueprint for America's Research Universities." [http://notes.cc.sunysb.edu/Pres/boyer.nsf]. 1998.
- Campbell, W. E., and Smith, K. A. (eds.). *New Paradigms for College Teaching*. Edina, Minn.: Interaction Books, 1997.
- Carbone, E. *Teaching Large Classes: Tools and Strategies*. Thousand Oaks, Calif.: Sage, 1998.
- Carbone, E., and Greenberg, J. "Teaching Large Classes: Unpacking the Problem and Responding Creatively." In M. Kaplan (ed.), *To Improve the Academy*. Vol. 17. Stillwater, Okla.: New Forums Press and the Professional and Organizational Development Network in Higher Education, 1998.
- Frank, L. R. (ed.). *Random House Webster's Quotationary*. New York: Random House, 1999.
- Johnson, D., Johnson, R. T., and Smith, K. A. *Active Learning: Cooperation in the College Classroom* (1st ed.). Edina, Minn.: Interaction Books, 1991.
- Johnson, D., Johnson, R. T., and Smith, K. A. *Active Learning: Cooperation in the College Classroom* (2nd ed.). Edina, Minn.: Interaction Books, 1998.
- Marchese, T. "Not-So-Distant Competitors: How New Providers Are Remaking the Post-secondary Marketplace." *American Association for Higher Education Bulletin*, 1998, 50(9), 3–7.
- National Research Council. *Transforming Undergraduate Education in Science, Mathematics, Engineering and Technology*. Washington, D.C.: National Academy Press, 1999.
- National Science Foundation. "Shaping the Future: New Expectations for Undergraduate Education in Science, Mathematics, Engineering, and Technology." A report by the advisory committee on its review of undergraduate education (NSF 96–139). Arlington, Va.: National Science Foundation, 1996.
- Palmer, P. J. "Teaching and Learning in Community." *About Campus*, 1997a, 2(5), 4–13.
- Palmer, P. J. "The Heart of a Teacher: Identity and Integrity in Teaching." *Change*, 1997b, 29(6), 14–22.
- Palmer, P. J. *The Courage to Teach: Exploring the Inner Landscape of a Teacher's Life*. San Francisco: Jossey-Bass, 1998.
- Potter, D. L. "Where Powerful Partnerships Begin." *About Campus*, 1999, 4(2), 11–16.
- Rogers, E. M. *Diffusion of Innovations* (4th ed.). New York: Free Press, 1995.
- Schneider, C. G., and Shoenberg, R. "Habits Hard to Break: How Persistent Features of Campus Life Frustrate Curricular Reform." *Change*, 1999, 31(2), 30–35.