Great Lakes Colleges Association
GLCA Lattice for Educational Research and Practice
Selective Annotations of Research on Learning and Pedagogy

Note: These summaries of research literature on learning and the application of research principles to undergraduate pedagogy seek to inform considerations of effective teaching and learning among faculty members of our GLCA member colleges. The compilation includes an index of keywords, and the reviews reflect the individual styles of the faculty members who contributed entries to this selective bibliography. Each entry includes the name, academic affiliation, and home institution of the author, as well as the author's e-mail address. If you have an interest in the topic described in a given annotation, we encourage you to contact the author of the summary directly to learn more. A central goal of the GLCA Lattice for Educational Research and Practice is to build and extend communities of interest and practice centered on effective liberal arts pedagogy across our member colleges.

If you are interested in contributing a brief annotation of a research article or book on learning and pedagogy to this compilation, please contact Gregory Wegner at the GLCA: Wegner@glca.org.

Index of Keywords

Fink, L. Dee (2003). *Creating Significant Learning Experiences: An Integrated Approach to Designing College Courses*. San Francisco, CA: Jossey-Bass, 2003.:

Keywords: Learning-centered approaches to education

A seminal resource informed by the view that a shift from a content-centered, teacher-centered approach to a student-centered, learning-centered approach is essential to the drive to create global citizens who will be responsible in large part for their own educational results. In addition to a review of important, existing ideas on college teaching including active learning and educative assessment, Fink introduces new concepts and teaching strategies, including a taxonomy of interactive teaching and learning, demonstrating how traditional pedagogies can be enriched by new learner-centered approaches. The book includes a lengthy chapter for administrators on how to improve organizational support for faculty, as well as numerous charts and concrete pedagogical resources. Extensive index and bibliography.

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Finkel, Donald L. (2000). *Teaching with Your Mouth Shut*. Foreword by Peter Elbow. Portsmouth, NH: Heinemann, 2000.

Key words: Student responsibility for learning; Learning community; Active learning

By an author convinced that the model of the "great teacher" as one who teaches almost exclusively by telling, inspiring students through eloquence and imparting knowledge from a central place in the classroom, is very limiting, because it essentially tells students that they should receive knowledge in primarily passive ways. Finkel proposes an alternative, more democratic pedagogical vision which gives students responsibility for their own learning. Although not a teaching manual per se, *Teaching with Your Mouth Shut* provides concrete examples in each chapter of how to run a seminar, a group project, or exploratory asignments so that students take much more responsibility for creating their own learning and opinions than is found in traditional, lecture-centered approaches. Like many resources on alternative pedagogies, especially those based on learning-community models, Finkel's book is informed by principles of neurocognitive research which propose that learners must be actively engaged in learning, that people "literally 'build' their own minds throughout life by actively constructing the mental structures that connect and organize isolated bits of information" (Barkley et al, 2005, 10-11).

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Barkley, Elizabeth F., K. Patricia Cross and Claire Howell Major (2005). *Collaborative Learning Techniques: A Handbook for College Faculty*. San Francisco, CA: Jossey-Bass, 2005.

Keywords: Collaborative learning; Long-term retention; Discussion as a pedagogical method

Collaborative learning is a broad pedagogical approach predicated upon basic tenets of modern cognitive and neurological theory that "students must build their own minds through a process of assimilating information into their own understandings," and that "teachers cannot simply transfer knowledge to students" since "meaningful and lasting learning occurs through personal, active engagement" (p. 6). The advantages of collaborative learning are numerous including one of the most important goals of more traditional methods – that of long-term retention. Collaborative learning approaches can be used in more traditional classrooms where the lines of authority are more teacher-centered and the goals are teacher-generated to more non-traditional classrooms where students and teachers share responsibility for the questions raised and the direction the class takes – or in any setting in between those two ends of the spectrum, that is, from lecture classes that occasionally involve small group projects to fully developed interdisciplinary learning community settings. Chapter topics include techniques for discussion, reciprocal teaching, problem solving, the use of graphic information organizers, and writing-focused approaches. Extensive bibliography and appendices.

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Numerous resources for learner-centered approaches can also be found at the Washington Center for Improving Undergraduate Education at http://www.evergreen.edu/washcenter/home.asp.
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Wiggins, G., & McTighe, J. (2001). What is Backward Design? In G. Wiggins & J. McTighe's *Understanding by design (p. 7 – 19). Upper Saddle River, NJ: Prentice Hall.*

Keywords: Backward design; Transfer of learning

Often, when faculty design their courses, they begin the process with the selection of readings and lessons, only later considering how student learning will be assessed and demonstrated. In the first chapter of their book Understanding by Design, Wiggins and McTighe suggest an alternative approach to course design, called backward design, which encourages faculty to use the desired student learning results as the beginning point for course design. Employing a backward design approach, therefore, requires the up-front and explicit statement of the types of skills and understandings we expect students to attain by the end of the course. In the setting of goals for understanding, we must identify and prioritize the core concepts (ideas, processes, skills) that we most value or want our students to take away from our classes. Wiggins and

McTighe suggest that when identifying key concepts as goals for student learning, several considerations may inform this selection, such as whether the material is an "enduring concept" that generalizes from the class to larger ideas or principles, whether the material is challenging for students to understand and therefore requires instructor support and clarification, and whether the material is likely to actively engage students in the learning process.

Following the backward design model, once the ultimate goals for student understanding have been identified, the next step in the process is deciding what evidence would meaningfully inform the assessment of how well these goals have been met. A rich understanding of student learning typically requires the collection of a variety of evidence types (e.g., informal quizzes, traditional exams, class performances or projects) collected across the semester. Finally, after goals have been set and evidence identified, only then should learning experiences and activities be designed, and these activities should be structured in such a way as to support students in their attainment of the course learning objectives. In this final phase of backward design, it is helpful to consider the background knowledge and skills that students will need to develop across the semester, on the way toward the development of more advanced, enduring understandings. In this way, teaching becomes a means to an end, and through the use of a backward design model, faculty may be more able to accurately evaluate how well their goals for student understanding have been met.

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Collins, A., Brown, J.S., & Holum, A. (1991). Cognitive apprenticeship: Making thinking visible. *American Educator*, 1-18.

Keywords: Cognitive apprenticeship; Scaffolding of skills

Collins, Brown, and Holum (1991) discuss the history of traditional apprenticeship, how the traditional apprenticeship of behaviors and skills can also be applied to cognitive behaviors in a scholarly context, and finally they present three successful examples of the application of a cognitive apprenticeship approach to teaching across the disciplines. In traditional apprenticeship, the to-be-learned skills (e.g., gardening, cabinet-making), and the requisite developmental steps to attain such skills, are visibly modeled for the learner. As the learner becomes more competent, the role of the expert changes, so that the learner's responsibility in the process increases. Further, the success of traditional apprenticeship relies on two more features of the learning environment: 1) Learners should observe other students of the trade who are at varying levels of expertise, in order to inform their own understanding of the field, and 2) Learning should be situated in meaningful and realistic contexts, where the development of a new skill is prompted by a real-time problem that is encountered on the path toward completing the task.

The authors argue that the same explicit modeling and scaffolding of skills can and should be applied to cognitive behaviors, to help students develop expert-like thinking in a discipline. In

order to implement cognitive apprenticeship, the teacher must make the process of thinking and problem solving visible to the learner, through strategies such as modeling and think-alouds. By being public with the act of expert thinking, students are able to observe and engage with these cognitive moves in a class context, in a setting in which they are able to interact with other students during the practice and development of these skills. Additionally, a cognitive apprenticeship model of classroom pedagogy may modify the way in which students encounter material in a course. In particular, instructors who implement this approach in their classes may present students with a real-world, complex problem. The skills and knowledge that are required to move through each step of the problem are then explored and uncovered in real time as part of the problem solving process. In this way, instructors serve as models of thinking in their respective disciplines, and students are fostered in their development of the types of cognitive moves that differentiate expert thinking from novice understanding.

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Bass, R. (1999). The scholarship of teaching: What's the problem? Invention, 1(*1*). Located at http://www.doit.gmu.edu/inventio/issues/Spring_1999/Bass_print.html

Keywords: Problem-based learning; Teaching as a public act

In Randy Bass's essay, he challenges faculty to treat teaching as a form of scholarly inquiry. He begins with the observation that the identification of a problem to be solved is at the core of traditional research and scholarship, and the investigation of this problem is openly discussed and supported. Conversely, having a problem in your teaching is often viewed quite negatively and as something to be quietly resolved or avoided. However, Bass argues, the practice of teaching is improved when faculty engage in reflective and public inquiry about their teaching. Indeed, it is only in the problematization of teaching that we can begin to clearly investigate the factors that contribute to student learning outcomes and the impact of our teaching practices on learning in our courses.

Bass also describes the evolution of his own thinking about his teaching, and how investigating the process of student learning in his classes revealed that his students held some surprising misconceptions about his goals for their learning and the reasons behind the class design. Prompted by these observations, he engaged in the process of making his goals transparent to students, while systematically examining the impact of different teaching approaches and pedagogies on student learning in his classes. Further, he discusses the impact of being public about the results of your teaching inquiries on your own teaching and more broadly, on the types of questions about teaching and learning that are investigated. Importantly, he argues, sharing the results of your teaching inquiries elevates the practice of teaching to a process that parallels other forms of research scholarship.

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Brewer, Elizabeth & Kiran Cunningham (2010). *Integrating Study Abroad Into the Curriculum: Theory and Practice across the Disciplines*. Sterling, VA: Stylus Publishing.

Keywords: Integration of study abroad into the curriculum

The central question of this book is how to use the curriculum to prepare study abroad for what so many students call their most transformative learning experience, and how to bring the experience – personal and intellectual – into their on-going studies and lives so that it does not remain an isolate experience. This is a critical question, not only for individual students, but for the institutions investing resources in study abroad. The book raises questions about how study abroad can benefit not only study abroad students themselves but also the institutions, the faculty who teach in them, and the students who do not study abroad. The chapters, written by faculty from Kalamazoo College and Beloit College, offer different theoretical perspectives on the integration of study abroad into the curriculum, as well as examples of practice from a variety of disciplines – from anthropology and religious studies, to literature, urban studies, biology, classics, and public health – and within such contexts as distance learning, service learning, and the senior thesis. The book successfully shows how transformative learning theory can be applied to study abroad, and offers a tool-kit for student success in study abroad. A final chapter discusses the importance of faculty development in enabling institutions to integrate study abroad into the curriculum, offering examples of how this can be done.

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Kegan, R. (1994). *In over our heads: the mental demands of modern life.* Cambridge, MA: Harvard University Press.

Keywords: Epistemological dimensions of learning

Grounded in the literature on epistemological development, this book examines how individuals construct meaning, and his focus is on relationship between the self and the social environment. Kegan argues that there are three phases or systems of epistemological development that are particularly relevant to college-age students: the socialized self, the self-authored self, and the self-transformed self. For the socialized self, meaning is constructed and shaped by the values and expectations of others in one's social environment; it is received and accepted. The self-authored self, by contrast, is capable of generating and authoring meaning that is informed by one's own values and beliefs. Finally, the self-transformed self is capable of understanding the structural systems that underlie meaning making. Most students enter college, according to Kegan, in the socialized self phase. However, most college-level desired learning outcomes require students to be in the self-authored self phase. This book is very useful in helping educators understand epistemological development, the nature of the key phases in that development, and the challenges of teaching and learning with in that context.

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Kiely, R. (2005). A transformative learning model for service-learning: A longitudinal case study. *Michigan Journal of Community Service Learning, 12*, p. 5-22.

Keywords: Transformative learning; Dissonance and disorientation as learning tools

Drawing on the work of Jack Mezirow, Kiely lays out a useful model of transformative learning in this article. He begins with Mezirow's finding that transformative learning is typically initiated by a disorienting dilemma: "a critical incident or event that acts as a trigger that can, *under certain conditions* (i.e. opportunities for reflection and dialogue, openness to change, etc.), lead people to engage in a transformative learning process whereby previously taken-for-granted assumptions, values, beliefs, and lifestyle habits are assessed and, in some cases, radically transformed" (p.7). Kiely then adds the concept of dissonance to Mezirow's concept of disorienting dilemmas. Disorienting dilemmas create dissonance when what students are seeing, hearing, and feeling is unfamiliar and incongruent with their present frame of reference. In his research with several cohorts of students who accompanied him on service-learning trips to Nicaragua, Kiely found that distinguishing between low-intensity and high-intensity dissonance was important for identifying situations that led to transformative change. Whereas low-intensity dissonance results in adaptation but not in transformative learning, it is high-intensity dissonance that under the right conditions leads to transformative learning. When encountering high-intensity dissonance, according to Kiely, one's existing knowledge is not sufficient to make sense of the contradictions one is experiencing. As he says, "High-intensity dissonance often causes powerful emotions and confusions and leads [students] to reexamine their existing knowledge and assumptions regarding the causes and solutions to ambiguous and ill-structured problems such as extreme forms of persistent poverty" (p.11). Kiely's research suggests that whereas effects of low-intensity dissonance fade and/or are resolved, effects of high-intensity dissonance do not go away; they "create permanent markers in students' frame of reference" (p.11). Kiely's findings are particularly useful for pointing to the potential of experiential learning for creating the highly dissonant conditions under which transformative learning occurs.

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Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.). (1999). *How people learn: Brain, Mind, Experience, and School.* Washington, DC: National Academy Press

Keywords: Transfer of learning; Metacognition

How People Learn: Brain, Mind, Experience, and School, is a compendium of the science of teaching and learning resulting from a two year project commissioned by the National Research Council and authored by the most distinguished scholars in the field. The book contains chapters focused on different types of learners, learning and transfer, metacognition, mind and brain, learning environments, and technology to support learning. Other chapters contain a distillation of the principles of learning and how they can be best applied in our classroom through the presentation of concrete examples and clear recommendations. Anyone interested in the

scholarship of teaching and learning or looking for clear recommendations for how to translate decades of research into practice will be well served by this book.

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deWinstanley, P. A., & Bjork, R. A., (2002) Successful lecturing: Presenting information in ways that engage effective processing. In D. F. Halpern & M. D. Hakel (Ed.), *Applying the science of learning to university teaching and beyond: New directions for teaching and learning* (Vol. 89, pp. 19 - 31). San Francisco: Jossey-Bass.

Keywords: Lecture as a pedagogical method; Active learning

The lecture is still the most commonly used method of teaching and learning in colleges and universities and for practical reasons is likely to remain so in the foreseeable future. For this reason, *Successful lecturing: Presenting information in ways that engage effective processing*, which represents a distillation of fundamental memory principles, has the goal of applying these principles to enhancing students' learning during lectures. The basic thesis is that active learning requiring deep and effective information processing can be incorporated into the confines of a typical classroom lecture. The chapter begins with a review of the application of memory phenomenon to classroom learning and ends with concrete suggestions for enhancing learning during lectures.

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McCabe, J. (2011) Metacognitive awareness of learning strategies in undergraduates. *Memory & Cognition, 39*, 462 – 476. doi: 10.3758/s13421-010-0035-2

Keywords: Long-term retention; Metacognition; Student learning strategies

Across two experiments, McCabe (2011) demonstrates that undergraduates have very little understanding of basic memory phenomenon as applied to learning, posing a serious concern regarding our students' ability to choose strategies that will enable them to learn most effectively. McCabe presented scenarios describing robust memory phenomenon verified repeatedly to improve student learning, and then asked participants to predict whether the scenarios described a situation that would result in higher test scores. Participants failed to predict the benefits of the learning situations described. On the bright side, in a follow-up study, McCabe demonstrated that with explicit instruction about memory and learning strategies, students showed greater metacognitive awareness than without the instruction. Beyond demonstrating a lack of metacognitive understanding, McCabe's article is of interest for three additional reasons: First, she provides an excellent overview of the basic memory phenomenon known to improve classroom learning with a rich reference section that includes many of the most important recent studies in the area. Second, she presents six scenarios which could be incorporated easily into our classroom instruction. And third, her studies represent best practices

in the assessment of classroom learning, and thus, could be used as a model for anyone interested in measuring their students' learning.

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Reference 1: "The impending revolution in undergraduate science education", Robert L. DeHaan, Journal of Science Education and Technology, 2005, Vol. 14(2), pp. 253-269, Springer.

Keywords: Science teaching and learning; Technology-based teaching and learning

Abstract: There is substantial evidence that scientific teaching in the sciences, i.e. teaching that employs instructional strategies that encourage undergraduates to become actively engaged in their own learning, can produce levels of understanding, retention and transfer of knowledge that are greater than those resulting from traditional lecture/lab classes. But widespread acceptance by university faculty of new pedagogies and curricular materials still lies in the future. In this essay we review recent literature that sheds light on the following questions:
• What has evidence from education research and the cognitive sciences told us about undergraduate instruction and student learning in the sciences?
• What role can undergraduate student research play in a science curriculum?
• What benefits does information technology have to offer?
• What changes are needed in institutions of higher learning to improve science teaching?
We conclude that widespread promotion and adoption of the elements of scientific teaching by university science departments could have profound effects in promoting a scientifically literate society and a reinvigorated research enterprise.

Commentary:
In the paper, "The impending revolution in undergraduate science education", DeHaan presents a significant review of the processes that are at play in the world of science teaching and learning. In this review, the reader is introduced to three different writers' principles of learning, and the evidence in support of these principles; individual case studies, classroom studies and neuro-cognitive research on learning.
In the second section, DeHaan reviews the role of undergraduate student research in science curriculum and student engagement and learning. It is widely felt that student participation in research opportunities increases student learning about scientific inquiry. DeHaan reports that student perception and attitude about science are improved, as well, and provides a review of the studies that indicate this. A summary of the benefits and opportunities of information technology in science education is presented including advances in IT-based software, hardware, classroom innovations, database access, on-line instruction, and assessment.
Finally, DeHaan reviews the changes needed to encourage faculty to improve science teaching. Although substantiated by numerous studies, DeHaan presents reasons why changes to scientific teaching have not been readily adopted and discusses group behavior to explore why resistance to changes in teaching pedagogy are slow going. Blame for this is shared among students who resist learning in new ways, even in the face of data that suggests new ways are more effective; faculty who are unaware or mistrust data in support of innovation due to unfamiliarity of the

research methods, and administrations who fail to recognize, support, and reward faculty for their efforts at tenure or promotion.

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Reference 2: "Technology and Learning-Centered Education: Research-Based Support for How the Tablet PC Embodies the Seven Principles of Good Practice in Undergraduate Education",
38th ASEE/IEEE Frontiers in Education Conference, ©2008 IEEE October 22 – 25, 2008, Saratoga Springs, NY, Session T2A-1
Jamie Cromack
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Keywords: Technology-based teaching and learning

Abstract: Student learning improves when faculty use learning-centered teaching practices, and a symbiotic relationship exists between technology and learning centered education. One technological tool, the Tablet PC, offers university faculty a powerful way to enhance student learning. The Seven Principles for Good Practice in Undergraduate Education offer a framework for learning-centered education, and this paper illustrates the Seven Principles through research data focused on innovative and pedagogically appropriate uses of Tablet PCs. Examples include assessment research data from MIT, DePauw, Rose-Hulman Institute of Technology, University of Washington, Pace University, University of Michigan and Virginia Tech.

Commentary: The use of technology in the classroom has exploded over the last decade, and in the last 8 years tablet PCs, and classroom management software that supports them, have markedly changed the landscape of education. Jamie Cromack presents in this paper, research data that suggests that this technology aids learning-centered pedagogies. Her article presents previously described "Seven Principles of Good Practice in Undergraduate Education":

"1. encourages student-faculty contact;
2. encourages cooperation among students;
3. encourages active learning;
4. gives prompt feedback;
5. emphasizes time on task;
6. communicates high expectations;
7. and respects diverse talents and ways of learning"

Her article then takes each principle separately and provides examples of studies at a number of different academic institutions that use Tablet PCs that support 'Good Practices". This is a really outstanding summation, as of 2008, of scholarship in learning and teaching using this technology.

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Reference 3:

Ajda Kahveci, Penny J. Gilmer* and Sherry A. Southeriand ; "Understanding Chemistry Professors' Use of Educational Technologies: An activity theoretical approach", *International Journal of Science Education, Vol. 30,* No.3, 26 **February 2008**, pp. 325- 351.

Keywords: Beliefs and conceptions about teaching and learning – faculty

Abstract: The aim of this study is to understand the influences on chemistry professors' use of educational technology. For this, we use activity theory to focus on two university chemistry professors and the broader activity system in which they work. We analyze their beliefs and past experiences related to teaching, learning, and technology as well as other components of the activity system of teaching chemistry with understanding. We employ a qualitative methodology with phenomenological and symbolic interactionist perspectives. Our findings illustrate various contradictions within and between the components of the activity system. Those include the insufficient level of collaboration, reflection, and communication among faculty members, constraints for reform-based chemistry teaching, limitations of large class sizes, and "poor" design of technology-enhanced classrooms. We propose several possible resolutions to transform undergraduate chemistry education, including the effective utilization of technology-enhanced teaching strategies and building a more uniform culture of teaching within science content departments.

Commentary: The authors present an extensive case study of two chemistry professors at a large research university. They wished to understand the ways in which the subjects utilize technology in teaching undergraduate chemistry. They used three qualitative research methods for their study; participant observation, in-depth interviewing, and artifact analysis. Their two subjects used pointed to the importance of "subject"; the professor, their beliefs about teaching, and learning, their own experience with learning, and their perceptions about using technology in their classroom. Their findings resulted in a number of recommendations being made to help the department move from a teacher-focused approach to a student-centered approach of teaching. The abstract above really speaks well for itself.

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The Art of Changing the Brain.

James E. Zull
Sterling, VA.: Stylus Publications, 2002
ISBN 1-57922-054-1

Keywords: Neurological dimensions of learning; Emotional (affective) dimensions of learning

As Professor of Biology and Director of the University Center for Innovation in Teaching and Education at Case Western Reserve, the author maintains that the more we understand the brain

and the fact that learning is about biology, the more successful we can be when we teach, in whatever circumstance and to whomever. Although much research has been done in neuroscience, educators have been left to interpret it on their own; the book attempts to fill this gap, while not abandoning the practices that cognitive science and education research have provided. With a foundation in cognitive science, cognitive neuroscience, and neuroscience, the author provides explanations of key concepts, while providing specific suggestions (see chapters 6 and 7) as to what teachers should do in order to "change the brain." Endnotes and references to specific articles might satisfy readers who long for "the science details," but the book is pitched to non-specialists. Zull recognizes that our greatest challenge is to move from understanding how we learn to understanding how to teach. The author aims to help the reader to understand conditions, environments, and practices that make learning work better. He begins by explaining –admittedly over-simplifying—the way different parts of the brain are involved in learning, as well as the interaction of emotion structures with cognition structures. Each of the major parts of the cerebral cortex gives us ideas about different aspects of learning: "the value of experience, why we need to reflect, how learners come to own their knowledge, how learning is confirmed and extended through action, and how the effective teacher can make use of knowledge about emotion" (8). Part II of the book attempts to explain the physical form of knowledge in the brain, how it changes during learning, and how we can help learners to change their neuronal networks. Part III suggests models of teaching that can provide optimal learning.

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How Learning Works. Seven Research-Based Principles for Smart Teaching.

Susan A. Ambrose, Michael W. Bridges, Michele DiPietro, Marsha C. Lovett, Marie K. Korman
San Francisco: Jossey-Bass, 2010
ISBN 978-0-470-48410-4

Keywords: Linking research (theory) to educational practice

This book is designed as a bridge between research and practice in the fields of teaching and learning. The authors approach their task in an effort to address recurring problems that span not only disciplines, course types, and student skill levels but also institution types and cultures. In so doing, they extract from research on student learning seven foundational principles that help instructors understand why certain teaching approaches lead to student learning and why others do not. As a result, instructors can refine their approaches and strategies, and can apply these principles to their courses. The seven principles derive from recognition that learning is a developmental process, and that it is not the only developmental process in students' lives. Taking a holistic approach, the authors stress that while they address each principle individually, all seven are at work in any learning situation and are "functionally inseparable" (4). The seven principles presented are: 1) Students' prior knowledge can help or hinder learning; 2) How

students organize knowledge influences how they learn and apply what they know; 3) Students' motivation determines, directs, and sustains what they do to learn; 4) To develop mastery, students must acquire component skills, practice integrating them, and know when to apply what they have learned; 5) Goal-directed practice coupled with targeted feedback enhances the quality of students' learning; 6) Students' current level of development interacts with the social, emotional, and intellectual climate of the course to impact learning; and 7) To become self-directed learners, students must learn to monitor and adjust their approaches to learning. The book is organized in such a way that each of the seven principles is addressed in a separate chapter, which begins with fictional scenarios that represent real problems the authors have encountered over the many years they have consulted with faculty. The stories are analyzed to identify the problems, principles, or issues of learning at play. Then the authors discuss the research relevant to the problem, and provide the reader with "a set of strategies to help instructors design instruction with that principle in mind" (9). The chapters can be read in any order and in conjunction with a web site from Carnegie Mellon University (http://www.cmu.edu/teaching) , which provides additional strategies, applications, sample materials, and resources.

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Learner-Centered Teaching. Five Key Changes to Practice.

Maryellen Weimer
San Francisco: Jossey-Bass, 2002
ISBN 0-7879-5646-5

Keywords: Learning-centered approaches to education

The author of this book seeks to connect knowledge and understanding of learning gained through research to concrete instructional practice, to a definitive set of policies and practices (ideas and examples) that promote learning and maximize learning outcomes for students. The author hopes to challenge assumptions and traditional ways of thinking about instructional roles and responsibilities. She presents techniques in the context of the process "by and through which they can be transformed to fit the content configurations of different disciplines […] as working parts of a coherent, integrated approach to teaching" (xiv), based on a positive and productive paradigm. Distinguishing between student-centered and learner-centered education, the author focuses attention on what and how the student is learning, whether or not the student is retaining and applying the learning, and how current learning positions the student for future learning. The attention has shifted from what the teacher is doing to what the student is doing, and to the responsibility the student has for learning. The goal is to create "climates in classes and on campus that advance learning outcomes" (xvii). What changes when teaching is learner-centered? Beginning with a chapter on the literature on learning, the author lays out five areas of instructional practice that need to change in order to become learner-centered, devoting a chapter to each: 1) the balance of power, 2) the function of content, 3) the role of the teacher, 4) the responsibility for learning, and 5) the purpose and processes of evaluation. The last three

chapters of the book provide details of implementation: responding to resistance, taking a developmental approach, and making learner-centered teaching work. The author provides three appendices that cover syllabus and learning logs, handouts that develop learning skills, and reading lists.

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Hidi, S. & Renninger, K.A. (2006). The four-phase model of interest development. *Educational Psychologist, 41*(2), 111-127.

Keywords: Student motivation and interest to learn

Hidi and Renninger propose a model based on their research on motivation. The four phases of interest development that Hidi and Renninger discuss are:

- *triggered situational interest*, an externally driven spark that can capture a person's interest in the short term
- *maintained situational interest*, where the spark is still external, but interest is maintained due to meaningfulness or personal relevance of the material
- *emerging individual interest*, where the spark of interest begins to be internalized
- and finally, if interest is really captured, people reach phase four, *well-developed individual interest*, where the spark is internally motivated and endures for a long time

This model can be used as a metric against which to measure the success of SoTL implementations.

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Teaching of Psychology (TOP)

Keywords: Teaching in the disciplines

This is a psychological SoTL journal. Many of the articles seem somewhat post-hoc: I made a cool change in my class, now I'm going to write it up. A few TOP articles are more rigorous, in that the studies reported were planned out ahead of time, so there are good controls or baselines against which to measure any improvement due to the pedagogical implementation. Despite the lack of scientific rigor in some of the articles, they do present interesting methodologies. Although the journal is Teaching of Psychology, it is Teaching of Psychology, so people from other disciplines may also find relevant techniques to use in their own classes.

Topics can include be the use of movie clips, MythBusters segments, novels, clickers, teaching science vs. pseudoscience, etc.

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The Journal of Undergraduate Neuroscience Education (JUNE)
Free-access journal: http://www.funjournal.org/ published by the Faculty for Undergraduate Neuroscience (FUN)

Keywords: Teaching in the disciplines

Although this journal is discipline-specific, it contains articles that could provide inspiration for people from other disciplines. Article topics include interdisciplinary issues, fostering better relations across departments (within the natural sciences, or natural sciences with humanities), the use of case studies as assigned readings, specific laboratory exercises and classroom demonstrations, career preparation, experimental design, team teaching, etc. I find the articles in *JUNE* to be more academically rigorous than in *Teaching of Psychology*, but perhaps less translatable to other disciplines.

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Herbert, M. B. & Burt, J. S. (2004). What do students remember? Episodic memory and the development of schematization. *Applied Cognitive Psychology, 18,* 77-88.

Keywords: Memory and its components

In this empirical investigation, the authors examine the importance of episodic memory in the development of long-term memory for classroom material. Episodic memory is a type of long-term memory that is associated with distinctive, time-based events. In contrast, semantic memory is our more generalized, abstract knowledge of the world. For example, while a student's semantic memory for *change blindness* might be similar to the key word definition she could find in a textbook, an episodic memory might involve her memory of participating in an in-class demonstration of the concept. While episodic memories tend to be associated with a conscious remembering of the event, semantic memories stimulate more general feelings of simply "knowing" the information. The authors argue that a shift from remembering material to knowing material is a key part in developing organized knowledge (i.e., schematization). Furthermore, they argue that having a sufficient number of episodic learning events can increase the success of this remember-to-know shift. They tested this idea by having students study statistics materials that were either episodically rich (i.e., had more distinctive features) or

materials that were episodically poor. Afterwards, students answered questions about the material and rated their answers along a remember-to-know continuum. Results showed that students who studied the episodically rich materials reported "remembering" their answers more on the first test and showed a greater remember-to-know shift on a follow-up test given five weeks later. They also remembered more details about the materials at that time. The authors conclude that using detail-rich or real-world examples in the classroom (or having students generate their own examples) would increase the likelihood that students will create episodic memories and, consequently, facilitate the development of conceptual knowledge of the material. The results also empirically support the use of active learning experiences since these would provide the opportunity for students to develop more distinctive, time-based (episodic) memories of the material as well.

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Karpicke, J. D. & Blunt, J. R. (2011). Retrieval practice produces more learning than elaborative studying with concept mapping. *Science, 331,* 772-775.

Keywords: Concept (knowledge) maps;Memory and its components; Testing effect

Previous research has established that retrieval practice (e.g., quizzing) leads to significantly better long-term retention of material than repeated studying (i.e., the *testing effect*). However, while research on the testing effect shows that it is quite robust, one criticism has been that the testing effect may only enhance memory for simplistic materials (i.e., word lists) and not more complex, educationally relevant material. This two-experiment brief report is one of the first to compare the testing effect with a popular educational tool (concept mapping) thought to engage more meaningful learning. Specifically, participants studied a science text using repeated study, concept mapping, or retrieval practice. A short-answer final test (given one week later) assessed information stated directly in the text as well as inferences that students would have to make by connecting ideas from across the text. Results showed that, compared to the concept mapping condition, retrieval practice led to a significant (50%) improvement in long-term retention scores across both types of questions. A second experiment verified and extended this finding, showing that repeated retrieval led to better performance than concept mapping across a variety of materials, with final questions that required short answers as well as the creation of concept maps, and for the overwhelming majority of students tested. The authors conclude that the act of retrieval itself provides an opportunity for students to deepen their understanding of material and to find connections among the concepts presented. They emphasize the importance of encouraging students and educators to view testing as a learning event and not just as an assessment tool. Additional research from this field suggests that applying testing opportunities in the classroom will significantly enhance the long-term memories students develop for material and could be particularly helpful in disciplines that require the development of cumulative knowledge bases *across* courses. In fact, the testing effect has been found with open or closed book tests, with visual and verbal stimuli, with educationally relevant materials, on a variety of measures (e.g., multiple choice and short answer), with items not successfully retrieved on an initial test, with questions different from those on an initial test, and across a 10 month interval.

Finally, instructor feedback can enhance the testing effect, especially for tests that use multiple choice questions.

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O'Donnell, A. M., Dansereau, D. F., & Hall, R. H. (2002). Knowledge maps as scaffolds for cognitive processing. *Educational Psychology Review, 14,* 71-86.

Keywords: Concept (knowledge) maps; Student aptitude and teaching strategy; Student motivation and interest to learn

In this review of the literature, the authors explore the educational benefits of knowledge maps. Knowledge maps are visual aids that can be used to help novices organize key concepts in the material they are learning. Knowledge maps consist of *nodes* (i.e., circles or boxes) that represent key concepts and *links* (i.e., directional, often-labeled lines) that connect the nodes. A completed knowledge map presents an organized overview of the concepts to-be-learned and the similarities and differences among them. Research has shown that the use of knowledge maps (often derived from experts) can facilitate the acquisition and retention of material across a variety of disciplines including mathematics, physics, aviation, and even counseling. The authors present evidence that knowledge maps enhance learning by helping students identify the main ideas in material as well as by increasing student motivation and concentration. Previous research has also shown that the use of knowledge maps in the classroom can enhance student collaboration. Moreover, knowledge maps decrease the cognitive load students often face when attending to lectures (especially those using multimedia) or when reading and can provide effective retrieval cues for long-term recall. The authors also point out that knowledge maps are particularly useful to students with low verbal ability or with low prior knowledge in a subject. In addition, students perform better with knowledge maps when they are trained in their use. The authors conclude by emphasizing the need for a closer examination of the differences among the types of knowledge maps that are most beneficial to lower versus higher aptitude students as well as for investigations into the effectiveness of knowledge maps across different disciplines. While a more extensive use of knowledge maps in the classroom could be time consuming, there are simpler ways to incorporate them. For example, educators can preview the overall structure for upcoming material with a knowledge map and then highlight the location of key concepts when they are introduced. In addition to helping students identify the overall organization of the material to be learned, these practices can clarify for the instructor the key points she wants to convey and, consequently, enhance student-instructor communication. Finally, educators could also encourage students to develop their own knowledge maps using key concepts from a unit of material as a way to study for exams.

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Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2009). Learning Styles: Concepts and evidence. *Psychological Science in the Public Interest, 9,* 105-119.

Keywords: Learning styles; Student aptitude and teaching strategy

In this review article, the authors examine empirical evidence for the application of learning styles assessments and practices. The learning styles literature suggests that the instructional or assessment methods educators use will be more or less effective depending upon a student's learning style. For example, if a student is a visual learner, she would perform better with visual presentations of information. However, the authors point out that very few studies have met the conditions necessary to test this idea. In their review, the authors first discuss a variety of learning style inventories and then consider why the learning styles approach has received wide-spread support among students, parents, and educators. Next, they make their case for the kind of evidence that would support the learning styles approach and examine any relevant psychological or educational studies that could provide this evidence. The results of their review show support for the idea that individuals have strong preferences for the how they like to learn. However, they find no evidence that these *preferences* are in any way predictive of actual *performance*. Instead, they find evidence for differences in performance of students with high and low aptitude across various types of instruction. For example, high aptitude students seem to perform better with less structure while low aptitude students perform better with more structure. On the other hand, high aptitude students seem to perform better with lecture than with more active learning experiences whereas low aptitude students show the reverse pattern. The authors conclude that the cost of incorporating learning styles based instruction is not justified until empirical support for its use is obtained. However, they argue instead for more research examining best practices for teaching different disciplines and for considering the interactions between student aptitude and instructional methods since these questions seem to show more promise for improving student learning. Finally, they emphasize research demonstrating a disconnect between our belief about how we learn best and our actual performance, which coincides with findings that students often misjudge how much they will learn using various study strategies. Educators can make an impact by highlighting these mistaken beliefs and by utilizing or developing empirically supported best practices.

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Ambrose, S. A., Bridges, M. W., DiPietro, M., Lovett, M. C., & Norman, M. K. (2010). *How learning works: Seven research-based principles for smart teaching.* San Francisco: Wiley.

Keywords: Linking research (theory) to educational practice; Learning principles

This book distills the insights gained through three decades of research at the Eberly Center for Teaching Excellence at Carnegie-Mellon, combined with a review of the research in psychology and education on the topic of undergraduate learning. The book describes seven general principles of learning, and then connects those principles to practical advice about designing courses, structuring assignments, and providing feedback. The principles are:

Students' prior knowledge can help or hinder learning.

How students organize knowledge influences how they learn and apply what they know.
Students' motivation determines, directs, and sustains what they do to learn.
To develop mastery, students must acquire component skills, practice integrating them, and know when to apply what they have learned.
Goal-directed practice coupled with targeted feedback enhances the quality of students' learning.
Students' current level of development interacts with the social, emotional, and intellectual climate of the course to impact learning.
To become self-directed learners, students must learn to monitor and adjust their approaches to learning.

Stated this baldly, the principles seem like common sense to experienced instructors. The chief value of this book is providing practical classroom strategies that leverage these research-based principles to enhance learning.

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Barkley, E. F. (2010). *Student engagement techniques: A handbook for college faculty*. San Francisco: Jossey-Bass.

Keywords: Linking research (theory) to educational practice;; Student motivation and interest in learning; Engagement in learning

Since 1998, the National Survey of Student Engagement (NSSE) has demonstrated that large numbers of students are not really engaged in their coursework, and this undermines the value of their college experience. This book attempts to remedy the situation, by providing an encyclopedia of teaching tips and techniques, with a focus on those techniques that boost student engagement and motivation. The first portion of the book describes the research on student motivation to learn and lays out a conceptual framework for understanding student engagement. Part 2 provides 50 brief tips and strategies (T/S) based on this framework, divided into these categories:

Fostering motivation
Promoting active learning
Building community
Ensuring that students are appropriately challenged
Promoting holistic learning

Part 3 provides 50 more extended Student Engagement Techniques (SETS), each with step-by-step directions for implementing the technique in class or online. These SETS are organized in two groups:

Techniques to engage students in learning course-related knowledge and skills
Techniques for developing learner attitudes, values, and self-awareness

A final section of the book provides tables correlating the NSSE survey items with the 50 T/S items and the 50 SETS. This makes the book highly useful for instructors seeking practical guidance for improving their institution's scores on specific NSSE items.

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Mayer, R. E. (Ed.) (2005). *The Cambridge handbook of multimedia learning*. New York: Cambridge University Press.

Keywords: Linking research (theory) to educational practice; Multimedia approaches to learning

This edited volume (with 46 distinguished contributors) should be the starting point for any instructor interested in incorporating media materials in classroom or online instruction. Richard Mayer's 40 years of research on student learning and 20 years of research on multimedia learning makes him the recognized expert in this field. Multimedia materials are becoming more and more important in every academic discipline, and this book provides the most comprehensive, research-based introduction to the principles that are relevant to the design of effective learning tasks based on multimedia. After an introductory section laying out the theoretical foundations for multimedia learning, Part 2 provides an extended treatment of each of the basic principles of multimedia learning, including*: the multimedia principle, the split-attention principle, the modality principle, the redundancy principle, the segmenting principle, the pre-training principle, the coherence principle, the contiguity principle, and the personalization principle.* Part 3 explores the research evidence for some advanced principles, including: *the guided-discovery principle, the worked-examples principle, the collaboration principle, and the self-explanation principle*. Part 4 discusses research on how best to design multimedia materials for specific academic disciplines, and Part 5 focuses on multimedia learning using games, simulations, and virtual reality environments. This book deserves a place in every college library and every faculty development center for effective teaching.

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Clark, R. C., & Mayer, R. E. (2008). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning.* San Francisco: Pfeiffer.

Keywords: Linking research (theory) to educational practice; Multimedia approaches to learning

This book is based on research conducted by Richard E. Mayer, his colleagues, and graduate students. In that sense it reviews some of the principles described in the *Cambridge Handbook of Multimedia Learning*, but in a much more superficial way. The focus of this book is on practical tips for designing e-learning materials based on Mayer's research principles. The book is oriented toward e-learning in business and industry rather than higher education, but the same principles apply in both settings. An instructor who is serious about developing effective

multimedia instructional materials should start with the *Cambridge Handbook* to acquire the background information, then turn to this book for guidance in applying those principles to classroom or online instruction.

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Duch, B. J., Groh, S. E., & Allen, D. E. (Eds.) (2001). *The power of problem-based learning: A practical "how to" for teaching undergraduate courses in any discipline*. Stirling, VA: Stylus Publishing.

Keywords: Problem-based learning

Since the early 1990s, problem-based learning (PBL) has been hailed as an innovative way to increase student engagement while simultaneously teaching critical thinking skills needed for professional work. While PBL has not revolutionized college teaching and learning in the past 20 years, it has had a significant positive impact, especially in introductory lab science courses. This book attempts to extend the range of PBL techniques to all academic disciplines by providing general tips and strategies for getting started with PBL, using PBL in large courses and online environments, and monitoring the performance of multiple groups on the same PBL assignment. Case studies describe the successes and challenges of implementing PBL across several disciplines, including political science, nursing, teacher education, biology, chemistry, physics, and law.

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How People Learn: Brain, Mind, Experience and School, expanded edition. 2000. Commission on Behavioral and Social Sciences and Education.

Keywords: Linking research (theory) to educational practice; Transfer of learning; Expert/novice – differences in approaches to learning

Although now dated, this text continues to be invaluable. It is the product of a 2-year study carried out by the Committee on the Developments in the Science of Learning and the Committee on Learning Research and Educational Practice. Both of these are committees of the National Research Council. The power of the book is in its comprehensive review of the research in how learning occurs, coupled with discussions of how to translate those findings into more effective teaching practices. Although most of the studies used K-12 students, much of the content is nevertheless relevant to the college classroom. Particularly useful are the 1) discussions of faculty knowing the knowledge (including misconceptions) that students bring with them regarding a subject; 2) explanations of how expert knowledge differs from the knowledge of a novice; 3) explorations of the particular learning conditions that promote higher order thinking, including transfer of knowledge to new situations; 4) emphasis on the importance of feedback to the learning process; 5) discussion of the roles that community play in learning; 6)

the explanation of the changes that occur in the brain when learning occurs and 7) discussion of the role that metacognition has in learning. One way of organizing the content as you are reading is to use the four categories identified in the first chapter as characteristic of excellent learning environments: student-centered, knowledge-centered, assessment-centered and community centered. Even excellent teachers with decades of experience are likely to find new perspectives on teaching and learning. It is not an easy read and will require several times through it to grasp the major concepts. The terminology is often too specialized to be easily understood and there are not enough examples to illustrate points in meaningful ways for a diverse audience. Still anyone with an interest in the science of learning must read this book. Even on a first read, you will find yourself thinking about how to modify what you do in the classroom to be more effective. A favorite aspect of the text is that it requires most college teachers (who lack formal training in education) to remember what it is like to learn something new, to have their misconceptions exposed, to play with ideas and make the content personally meaningful. Hard as it was at times, the book is also invigorating.

It is now free at the website for the National Academies Press.

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How Learning Works: Seven Research Based Principles for Smart Teaching. 2010. S. A. Ambrose, M. W. Bridges, M. DiPietro, M. C. Lovett, M. K. Norman. Josey-Bass.

Keywords: Linking research (theory) to educational practice; Learning principles; Metacognition

How Learning Works is another text based on the emerging research-based theory of how people learn. The authors take an evidenced-based approach to college teaching. It is organized around seven principles of learning, some of which overlap with the major themes in How People Learn, including that students have prior knowledge that can help or hinder learning and that reflection on one's learning process (metacognition) is important to becoming a self-directed learner. Several other principles are closely tied to the themes in How People Learn, including that knowledge has an organization and that organization in students is less well connected than in experts; that student motivation is key in what is learned; that mastery of material involves practicing integration and application of the material; that the developmental stages of students in combination with course climate impacts learning and that that quality of learning is improved by practice coupled to feedback. Chapters, most organized around the seven principles, begin with vignettes to illustrate the major points, then discuss the principle, examine the relevant evidence, and provide suggestions for how to apply the research findings to improve learning in the college classroom. Specific suggestions are provided in ways that allow the reader to make connections to their own experiences and classroom practices. The text is very well-written; it is easy to pick up the book, find a relevant section and understand it even isolated from the rest of the book. The index is also handy. The appendices are terrific, again providing multiple tools for how to improve learning.

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Innovations in Teaching Undergraduate Biology and Why We Need Them. W. B. Wood. Ann. Rev. Cell Devel. Biol. 2009. 25:93-112.

Keywords: Linking research (theory) to educational practice; Teaching in the disciplines

Don't let the title scare you off. Although focused on biology, there is much general information that is applicable to a variety of disciplines. The major findings in learning science are well summarized and quite readable. The jargon of the educational field is mostly absent and when it is used, terms are typically defined in the margins. In addition to summarizing the major findings, Wood discusses ways in which the accumulating evidence can be applied in the college classroom. Table 2, which compares a traditional teaching practice with a practice informed by research is especially useful. There is also a clear and persuasive discussion of how to alter the focus of a teacher's activity from covering content to accomplishing learning goals. There are discussions of how various tools (group work, active engagement strategies, teaching assistants, enhanced communication with students) can be used to maximize effectiveness. One take home message is that even minor changes in classroom practice can have dramatic effects on learning. Another is that traditional classroom practices in which faculty have information that is passed to students largely through lecture are substantially less effective than the emerging alternative practices.

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Beane, J. (1997). *Curriculum Integration: designing the core of democratic education*. New York: Teachers College Press.

Keywords: Curriculum integration

This is an excellent overview on the topic of integrated thematic curriculum—an approach that is gaining more support and credibility as we learn more about the connections between the brain and learning. Beane approaches the topic as a convert attempting to convince the skeptic and in doing so answers many of the common complaints about this approach. Concerns about integrated curriculum approaches include "depth over breadth" issues, worries about lack of disciplinary coherence, and the belief that these approaches lack intellectual rigor. The author tackles each of these (and other) concerns and, in doing so, makes an impassioned case for curriculum integration. Beane also explains how true curriculum integration is not simply a multiple disciplinary approach but rather an entirely new way of constructing knowledge, learning, and problem solving. Faculty engaged in current debates in higher education around interdisciplinary learning will see many areas of resonance here. In the end, whether or not you agree with Beane and his missionary zeal for this approach, *Curriculum Integration* pushes the envelope of how we organize content for our students and invites one to think more creatively and expansively about the nature of knowledge and learning.

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Bransford, J., Brown, A., and Cocking, R. eds. (2000). *How People Learn: brain, mind, experience, and school.* Washington, D.C.: National Academy Press.

Keywords: Linking research (theory) to educational practice;Transfer of learning; Informal learning

If you are looking for the definitive survey of brain research and its impact on teaching and learning, this is it. *How People Learn* is an excellent overview of the literature and comes with the gravitas of the National Research Council. The book is divided into four parts. Part 1 moves quickly through what we currently understand about how the brain functions in learning environments. Part 2 focuses on learners while Part 3 moves on to teachers and teaching. Part 4 discusses main conclusions and future directions of research. Interestingly, while the authors do note areas where the research maps on very well to current progressive ideologies in education, they are also quick to note where existing dogma is not supported by the research. A particularly fascinating chapter is the one on learning and transfer—well worth a read for those wrestling with questions of knowledge retention in the college or university classroom. As a side note, a related volume put out by National Academy Press, *Learning Science in Informal Environments: people, places, and pursuits* (2009), is a fascinating take on the power of informal learning environments. As many faculty realize, our students are learning a lot more out of the classroom on our campuses and this book explores this phenomenon with interesting takes on how to harness this power in all educational contexts.

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Wolfe, P. (2001). *Brain Matters: translating research into classroom practice.* Alexandria, VA: Association for Supervision and Curriculum Development.

Keywords: Linking research (theory) to educational practice; Neurological dimensions of learning

While somewhat dated, Wolfe's short review of brain research and discussion of possible applications in the classroom is still one of the best. She is cautious about making too many generalized leaps and conclusions from what we are learning in neuroscience and expresses these concerns throughout the book. Nevertheless, Wolfe gets the big ideas right and, while many of her examples target K-12, college and university faculty will find many useful and thought-provoking ideas here. If you want a short book that covers the basics around what we have learned from recent neuroscience research and gives suggestions for how to apply these findings in the classroom, you can't go wrong with *Brain Matters*.

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The three following works have all been helpful in my Scholarship of Teaching and Learning work. As a student of literature, and a non social scientist, I wanted to find a methodology that

was more conducive to my field of inquiry than the quantitative model that has dominated the field. I learned from my colleagues in teacher education that qualitative research was being widely practiced, and that, specifically, narrative inquiry might be an approach I would find appropriate to my study and, in fact, directly related to the kind of work done in my discipline of English. Analyzing texts is, after all, the central practice of literary studies. Narrative Inquiry is also an approach that I see as reflective of liberal arts teaching broadly conceived, in that it attempts to present a holistic view of learning as derived from student and teacher generated stories.

The first work, *Narrative Inquiry*, is a respected and oft referenced overview of the field. The second, *Knowing and Reasoning in College*, is a study that relies on narrative inquiry as its central methodology. The third, *Voice in Qualitative Theory*, is a useful critique of one key aspect of the method—the reliance on individual voices as evidence.

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Clandinin, Jean and Michael Connelly. *Narrative Inquiry: Experience and Story in Qualitative Research*. San Francisco: Jossey-Bass, 2000.

Keywords: Narrative inquiry as a pedagogical method

The authors, two educational researchers, and thus social scientists, were frustrated by the emphasis on quantification in educational assessment, and decided to follow John Dewey, Clifford Geertz, Mary Bateson, Donald Polkinghorn (whose *Narrative Knowing and the Human Sciences* I have also found very helpful), and others in basing their research on the lived experience of teachers and learners as reflected in the stories they tell. The book gives a good overview of the field's history and varied sources, presents several case studies of narrative inquiries, grapples with the theoretical implications of the approach, and provides concrete suggestions for how to conduct a number of different kinds of narrative inquiry. In laying out the field, the authors help the reader learn to use and evaluate it through their own practice of relating various research stories and analyzing them from multiple perspectives. The book very effectively shows that the complexity of making meaning from the stories told by teachers and learners reflects the complexity of the learning process itself, one that cannot be captured by using numbers alone. The book refutes a "grand narrative" of learning, positing instead that the teacher researcher must always take into account the following "tensions" that result from trying to make meaning out of experience: "temporality" (learning occurs over time), "people" (always undergoing personal change), "action" (performance "signs" need to be interpreted based on individual histories), "certainty" (the tentativeness of any interpretation must be assumed), and "context" (the time, space, and social space within which learning occurs). The Narrative Inquiry approach, in its attempt to capture and assess learning in a deeper, more experiential way, clearly has major implications for improving pedagogy in liberal arts colleges. The "field notes" and "field texts" generated can give teachers insights into how and if their goals for learning are

actually being realized. Finally, the book is readable, inviting, and engaging for those not in the field of educational research.

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Magolda, Marcia B. Baxter. *Knowing and Reasoning in College: Gender-Related Patterns in Students' Intellectual Development*. San Francisco: Jossey-Bass, 1992.

Keywords: Narrative inquiry as a pedagogical method; Gender – its role in cognitive/intellectual development

While this study predates Clandinin and Connelly's by eight years, it employs narrative inquiry, basing its conclusions on interviews with roughly 100 college students followed over time from their freshman year to a year after graduation. Magolda used this longitudinal interview methodology in a number of subsequent studies, but this early one appeals to me as it makes gender distinctions in terms of how students learn, and my SoTL work has been concerned with gender. The study was a response to critics who believed that undergraduate education was not adequately preparing students to think critically, appreciate diversity, or act responsibly to others in an increasingly "interdependent world." (Her phrasing here is almost identical to my college's, and I'm sure many other's, mission statements). The bulk of the book employs fairly substantial quotations from the student interviews, framed by four "ways of knowing" that Magolda developed from previous "epistemological reflection models." These are "Absolute," "Transitional," "Independent," and "Contextual." Clearly these are presented as developmental and hierarchical, and as "patterns" operating throughout a student's years in college. She draws out the significance of these patterns as they operate in different "domains" related to the learner him or herself, peers, and the instructor. Useful to teacher researchers are the mostly unmediated voices of students commenting on many aspects of their own learning, the ways Magolda shapes those responses, many suggestions made by the author designed to enhance a teacher's ability to move students toward more complex ways of knowing, and the interview questions collected at the back of the book, which could be used in similar kinds of research projects. Overall, the study seems to refute the critique mentioned above about the outcomes of undergraduate education—many students do achieve our educational goals, or at least seem to be able to articulate them in Magolda's excerpts. As for the gender implications of the study, Magolda is very careful not to make reductive generalizations, but does find significant variations between genders in the type of knowing practiced and in the degree of openness to change.

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Jackson, Alecia y. and Lisa A. Mazzei, eds. *Voice in Qualitative Inquiry: Challenging conventional, interpretive, and critical conceptions in qualitative research*. London and New York: Routledge, 2009.

Keywords: Narrative inquiry as a pedagogical method; Voice in qualitative inquiry

This intentionally provocative collection of essays applies post-structuralist, post-modern, and post-colonial approaches to question the easy reliance much narrative inquiry places on voice. The problem the editors initially posit is that current qualitative practices privilege voice and assume it is "present, stable, authentic, and self-reflective" in order to fulfill research agendas in an environment that constantly seeks verifiable evidence. The purpose of this collection is to "strain" notions of voice, to listen for the voice "that escapes easy classification and does not make easy sense." The book is separated into two parts, "Straining notions of voice" and "Transgressive voices: Productive practices." I cannot do justice to the range of subjects covered, but one example of a critique made of Clandinin and Connolly's book, described above and called "authoritative" by the author, will capture part of this book's overall flavor and intention. After quoting a set-up paragraph by Clandinin and then the directly quoted voice of one of the teachers the authors worked with, Maggie MacLure, the essay's author concludes that Clandinin's voice represents the "textual politics of good intentions," using Karen's voice in a "colonialist" manner to frame her, too reductively, as the "morally engaged teacher." MacLure sees this apparently unmediated use of the teacher's voice as part of a problematic "humanist" project that represents a "redemptive culture," one that puts teacher and student in the role of "objects to be rescued." One might see this critical reading of *Narrative Inquiry* as going too far, which of course is a characterization that deconstructionists anticipate and even welcome. But I find it a useful corrective, in my work at least, provoking me to examine my own stance as both teacher and researcher in relation to my student/subjects. Am I relying too heavily on their voices? Am I, in fact, manipulating them in the service of a research agenda that I have not sufficiently thought through? Questions like this are engendered on almost every page of this collection.

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Moll, L. & Greenberg, J. (1990). Creating zones of possibilities: Combining social contexts for instruction. In L. C. Moll (Ed.), *Vygotsky and education* (pp. 319 -348). Cambridge, UK: Cambridge University Press.

Keywords: Social dimensions of learning; Systems of meaning that inform the learning process

Using ethnographic methods with case study, Luis Moll and Jim Greenberg described in detail the labor and language related activities that occurred within and among families' households in a predominantly Mexican-heritage, working-class community in Tucson, Arizona. Their aim to derive potential instructional innovations from such analysis was motivated by the persistent low-achievement Mexican-heritage children and youth experienced in school. They assumed, like Lev Vygotsky and Alexander Luria, that human thinking needed to be understood differently—in its concrete social and historical circumstances—rather than looking for

understanding in the mechanisms of the brain. So, they looked for human understanding in human being's actual relationship(s) with reality (e.g., home and school), in their social history, tied specifically to their labor and language.

Luis Moll's and James Greenberg's analyses identified pervasive and significant sociocultural practice outside of school which they called *confianza*. This involved the development of reciprocal exchange relations, through labor and language activity, in which individuals transmitted knowledge, skills, and information as well as cultural values and norms. Such activity was comprised of densely knit sociocultural networks which were structurally suited for teaching and learning very differently than activity in classrooms and schools. Further they asserted the most important function of these clustered relationships, and the reason why they were the object of their analysis, is that families used these to exchange *funds of knowledge*—reservoirs of essential information and strategies needed to maintain their well-being. In particular, Moll and Greenberg pointed out a stark contrast between families' multiple relationships in and across households and the singular and narrow teacher-student relationship common in classrooms.

As a result, Moll and Greenberg worked with families and teachers to experiment with how to reiterate *confianza* in classrooms. They came to think of both the content and process of exchange of *funds of knowledge* as enormously useful in mediating teaching and learning. They concluded that teachers can mobilize *funds of knowledge* by developing social networks that connect their classrooms to their students' cultural contexts, and thereby transform classrooms into more advanced contexts for teaching and learning.

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Anagnostopoulos, D., Smith, E. R., & Martin Nystrand. (2008). Creating dialogic spaces to support teachers' discussion practices: An introduction. *English Education*, 41(1), 4 – 12.

Keywords: Discussion as a pedagogical method

This essay synthesizes related investigations by researchers, working closely with K-12 classroom teachers, to apply Bahktin's theory of dialogue and sociocultural activity theory with an aim to examine and explore discussion practices in the classroom. They begin by asking, "Why discussion in the classroom?" Despite the fact that an extensive body of research documents the value of discussion to student learning, and that many teachers believe—even argue—discussion is an important tool for teaching and learning, few teachers provide significant class time for this activity. Moreover, there is little research on how new and experienced teachers learn to plan for and implement discussion practices in their classroom teaching. The existing research highlights two principal challenges: (1) that because of its open-ended character, discussion can become unwieldy—veering far from focus and goals—and unappealing; and, (2) discussion is synchronous activity with nearly immediate responding, usually affording little time for reflection and revision.

Then they ask, "Why a dialogic approach to working with teachers?" Dialogue requires the use of boundary objects, or some kind of tangible evidence that reifies lived experience—including practice and thought, so that experience can be examined through reflection and re-examined through revision, all the while maintaining a more particular focus for the trajectory of talk. This synthesis of recent investigations into creating dialogic spaces with teachers points to the importance of crossing boundaries in order to clarify perspective, understand differences, exchange resources, share common goals and develop new practice, although recognizing that such honest engagement is indeed seriously challenging activity. Through boundary crossings, teachers develop horizontal expertise—a commitment and capacity to move between contexts and interact with each other to reflect on and revise practice.

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Roskelly, H. (2005). Still bridges to build: English education's pragmatic agenda. *English Education*,
37(4), 288 – 295.

Keywords: Linking research (theory) to educational practice; Language – its role in teaching and learning; Systems of meaning that inform the learning process

Like the childhood practice of figuring out with her mother what clothes she had and didn't have, every year before school began in the fall, Hephzibah Roskelly suggests it's useful to look into our own teaching closets every so often to more clearly recognize what we have and what we need. Using Freire's idea of *praxis*, Roskelly argues that *closet cleaning* is crucial for teachers as they try to nurture their students to experience, understand experience, and use understanding to change and improve experience. All of this requires both the time and space to speculate, explore and theorize how to apply reflection to action. There is quite a lot of research from teachers at all levels on the value of establishing personal connection, drawing on home culture, time for reflection, social talk, making space for practice and performance to nurture learning. For Roskelly, however, how teachers act; how they reflect; how they change matters more. Those practices are the sites for research that can help build a bridge between what we believe and what we do, between our theory and practice.

Borrowing I.A. Richards's definition of rhetoric—misunderstandings and their remedies—Roskelly stresses the importance of language in teaching and learning and the inevitability of finding misunderstanding and remedies by looking at language use in teaching and learning. She argues that there is a consequent need for continual *audits of meaning* which demand communication and connection between conversational partners—teacher and student. Her research question is "How can teachers conduct their own audits of meaning that can remedy some of the misunderstandings between students and teachers?" Moreover she applies pragmatism to her inquiry because she is interested in how meanings of things (i.e., language) reside not so much in definitions—or differences in definitions—as in the consequences of using such language. In other words, "What difference does it make that it was said like this or like

that?" She contends that pragmatism offers teachers and learners real possibilities for negotiating the complexities of language, meaning, and the institutional systems that structure teaching and learning. She concludes that if Freire and the pragmatists are right, then research and inquiry inevitably lead to consequences. And, one possible consequence of looking at language in teaching and learning is that we continue to learn more about language, teaching and learning and the systems (e.g., class, culture, economics, gender and race) that structure these endeavors.

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Annotations for three articles related to Metacognitive Approaches to Teaching and Learning:

Dunning, D., Johnson, K., Ehrlinger, J., & Kruger, J. (2003). Why people fail to recognize their own incompetence. *Current Directions in Psychological Science*, *12*, 83 – 87.

Keywords: Metacognitive approaches to teaching and learning; Beliefs and conceptions about learning – students

Metacognition has many definitions, among them the ability to reflect on and control one's own mental processes. In the context of studying and learning, metacognition is a process that allows the learner to monitor how much has been learned and how well it has been mastered. Dunning et al. review research that shows that people are not very good in general about identifying the limits of their knowledge, and that people who are actually performing rather poorly are especially likely to overestimate their expertise, demonstrating that they are "unskilled and unaware of it." Studies involving college sophomores, college debating teams, and medical residents, for example, have consistently demonstrated that those with the lowest performance levels seriously overestimate their performance among peers who are actually outperforming them, even in situations where the low-level performers are promised monetary rewards for accurate assessments of their performance. Top achievers, on the other hand, often underestimate their own performance relative to that of their peers. Dunning et al.'s findings provide a good starting point for discussions about how to increase students' metacognitive skills, to allow them to make better estimates of the depth and extent of their own learning, and to help them establish and monitor successful studying routines.

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Clark, R. E. (2010). Cognitive and neuroscience research on learning and instruction: Recent insights about the impact of non-conscious knowledge on problem solving, higher order thinking skills and interactive cyber-learning environments. *Published Proceedings of the 11th International Conference on Education Research: New Educational Paradigm for Learningand Instruction*, September 29 – October 1, 2010.

Keywords: Metacognitive approaches to teaching and learning; Beliefs and conceptions about learning – students

Although the difference between conscious, so-called *implicit (declarative) knowledge* and non-conscious implicit (*procedural) knowledge* has been recognized for more than 50 years in psychological

research, it is only relatively recently that research on automated, non-conscious processes that influence problem solving, thinking, complex learning, and self-regulation has been undertaken in the field of instructional theory and practice. Clark reviews some recent findings and directions for research in teaching and learning. Whereas most people are convinced that their goals for learning and performance are based on conscious and volitional processes, Clark claims that unconscious processes are controlling much of what our conscious minds attribute to our will. When one's conscious effort to learn new information is highly constrained by the limitations of working memory, automated processes may introduce "different, unwelcome, and unintended behavior" that can actually interfere with successful and efficient learning. Even when automated processes are beneficial to learning, they are difficult to access for conscious inspection. For example, research has shown that highly knowledgeable teachers find it difficult to describe what they know or how they acquired their expertise. Clark further argues that complex learning often demands a change in previously learned routines, and that learning difficulties may in part result from the "change-resistant qualities" of automated processes. He reviews three research-based strategies for modifying automatic learning routines: 1)*overlearning,* 2) *goal substitution,* and 3) *replacement of maladalptive processes.* Clark's work has relevance to metacognitive approaches to teaching and learning, because one's awareness of and reflection about learning processes is already difficult for *conscious* processes. Instruction about *non-conscious* processes that affect learning and self-regulation augment a metacognitive approach to improve strategies of teaching and learning.

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Pintrich, P. (2004). A conceptual framework for assessing motivation and self- regulated learning in college students. *Educational Psychology Review, 16,* 385 – 407.

Keywords: Metacognitive approaches to teaching and learning; Self-regulated learning in students; Student responsibility for learning

Pintrich was a strong voice in the development of self-regulated learning (SRL) research, arguing that learners can develop skills to monitor and control the cognitive strategies they use to learn efficiently and thoroughly. Such regulation of learning strategies is obviously related to the concept of metacognition. But Pintrich's model includes not just *cognitive* aspects of learning, but also the self-regulation of *emotional states, motivation, behavior,* and *context* in learning. Thus, self-regulation in learning includes control of cognitive strategies (e.g., setting goals, monitoring understanding, evaluating whether goals are being met, etc.); emotional strategies (e.g., recognizing frustration and anxiety, monitoring boredom and distractions); motivational strategies (e.g., assigning positive value to learning, finding intrinsic goals to master complex information); behavioral strategies (e.g, observing one's study habits, monitoring one's effort, seeking help); and strategies to control the learning context (e.g., awareness of demands and resources related to the learning task, modifying context to facilitate learning, monitoring changes in the context that affect learning). Pintrich elaborates on four *processes* (*phases)* that are involved in self-regulated learning: *planning, monitoring, exercising control, and reflecting on the success of self-regulation.* All four processes can be applied to each of the domains of learning (cognition, affect, motivation, behavior, and context). Assessing the strength of this model is

addressed by Pintrich's discussion of the *Motivated Strategies for Learning Questionnaire (MSLQ)*, a measure he developed that continues to be used widely in empirical research on self-regulated learning. Pintrich notes that his model of SRL is based on a scientific, psychological approach to studying student motivation and learning, and may not appeal to those who prefer a qualitative and phenomenological approach. Whatever the approach, the study of self-regulation in learning, and the concept that students are responsible for their own learning (at least to some extent), are clearly part of a discussion about metacognition in learning, and Pintrich's work remains highly influential in both research and practice (see, for example, VanderStoep & Pintrich, 2007;Svinicki, 2010).

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Clydesdale, T. (2007). *The first year out: Understanding American teens after high school*, Chicago: University of Chicago Press.

Keywords: Cognitive development of college students

Extensive interviews with students during their senior year in high school and first year of college identifies several themes. Young adults at this age are far less engaged in the life of the mind than what would be hoped by many. And the transformational influence that many in the liberal arts setting claim applies to a very small minority of college students. Students are focused on managing the gratifications of sexual relationships and alcohol use; and the study shows that students do this quite well with only isolated instances of poor decision making about sex or alcohol. Students also focus on the cost of education as well as the cost of living a lifestyle of someone this age; many students feel they need money for college and for the discretionary consumables so popular among this cohort. With respect to cognitive development, students do show cognitive gains but do not engage in long-range intellectual and career planning. Finally, students put many of their identities—religious, political, and racial—in what Clydesdale called a "lockbox" and do not engage in addressing these issues as much as what might be expected.

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VanderStoep, S.W., Wise, K.S., & Blaich, C. (2010). Student engagement in liberal arts colleges: Academic rigor, quality teaching, diversity, and institutional change. In H.E. Fitzgerald, C. Burack, & S.D. Seifer (Eds.) *Handbook of engaged scholarship: Contemporary landscapes, future directions* (pp. 131 – 147), East Lansing, MI: MSU Press.

Keywords: Engagement in learning; Academic rigor

This chapter explores findings from the Wabash National Study of Liberal Arts Education as well as a case study of an effective institutional intervention that increased academic rigor on a liberal arts campus. Overall, the Wabash National Study demonstrated small to moderate growth on a variety of cognitive and affective outcomes. The good news is that the effect sizes were the largest under certain educational conditions that are often found in liberal arts settings. Specifically, positive change occurred when students were exposed to: 1) high quality teaching

and interaction with faculty, 2) high academic challenge and expectations, and 3) frequent diversity experiences. The case study illustrated that the best institutional change in response to assessment data involve engaging faculty and departments. Leadership from academic administrators is important, but the authors argue that responding to academic assessment data is most effective when departments identify the ways they can customize the changes to meet their students' needs and are consistent with departmental culture and goals.

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Anderman, E.M., & Wolters, C.A. (). Goals, values, and affect: Influences on student motivation. In P.A. Alexander & P.H. Winne (Eds.) *Handbook of educational psychology*, 2nd edition (pp. 369 – 390), New York: LEA.

Keywords: Student motivation and interest to learn

This chapter provides an excellent and thorough review of the role that goals, values, and affective variables play on student motivation. The authors describe various ways in which goals have been theorized and investigated in the educational psychology literature. The authors define goal orientation by the purposes that people have for engaging in certain behaviors. Such goals have been described as mastery vs. performance goals, approach vs. avoidance goals, and distal vs. proximal goals. The role of values in motivating student behavior has been framed in the theoretical approach known as expectancy-value model. From this model researchers have studied constructs such as intrinsic motivation, task value, and student interests, all of which have been shown to predict student achievement. Finally, the role of affect (emotion) has been less well researched, particularly with the emergence of cognitive psychology in the last 50 years. Still, educational psychologists understand the importance of affect in student achievement. Among the researched areas are personality variables, positive emotions (e.g., joy of learning), and negative emotions (e.g., test anxiety). Much of the second part of the chapter is dedicated to theoretical integration of the goals, values, and affect constructs.

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O.L. Davis, Jr., Elizabeth Anne Yeager, and Stuart J. Foster, eds., *Historical Empathy and Perspective Taking in the Social Sciences* (Lanham, MD: Rowman & Littlefield), 2001.

Keywords: Empathy as an educational quality/goal

The role of *empathy* in teaching and learning has been the subject of substantial controversy, both because the term calls up different meanings when applied to different disciplines (e.g. psychology, morals, history) and because more often than not, its detractors deploy it as synonymous with a homophonic concept, *sympathy*. Educators, for their part, have found in the concept of empathy a key facet of understanding, seeing it as the "ability to find value in what others might find odd, alien, or implausible," [McTighe and Wiggins 1999] or as an element of significant learning missing from Bloom's original taxonomy [Fink 2003]. Within the discipline

of history, empathy is not seen (primarily) as an act of imagination, but rather as a broadly inferential method of evidential reconstruction. At its heart is the challenging task of helping students appreciate that the past is different from their present, and that historical outcomes are both specific and contextual. The authors address many of the objections of those opposed to the use of *empathy* in education, both from conservatives (who see it as fact-free acts of sympathy with the underdog) to postmodernists (who suggest the impossibility of "occupying" subject positions not one's own). Yet they conclude that empathetic understandings and approaches are not only rigorous in what they demand of students, but are ultimately highly useful in helping students appreciate historical context, examine their own perspectives, and reach well-formed but tentative conclusions about the past. The chapters are alternatively theoretical, empirical (drawing from classroom studies in the UK, New Zealand, the US, and elsewhere), and methodological. While they explore various ways in which historical empathy, also known as "perspective taking" is highly useful for history faculty, they can also provide guidance for any teacher trying to help students grapple with unknown lives, unfamiliar experiences, and seemingly irrational actions.

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Robert Grossman, "Structures for Facilitating Student Reflection," *College Teaching* 57:1 (Winter 2009): 15-22.

Keywords: Student reflection – its cognitive value

A substantial literature exists on the cognitive value of student reflection. Helping students to reflect (and apply course concepts to their own lives) has been shown to be a significant method of enhancing learning. Grossman's article addresses specific pedagogical question of how teachers can design the most useful reflective assignments in their courses. The article is informed by a significant literature exploring the cognitive value of reflection, which is then applied to the design of assignments for the author's own courses. Grossman discusses four different kinds of reflection which researchers have identified and uses them to help design assignments that can lead to more productive reflective papers: content-based; metacognitive; "self-authorship"; and transformative. Each of these reflection practices requires a different approach (and can be applicable to different types of teaching situations), but, as the author argues persuasively, student reflective practice of any depth is not easily produced. Assignments designed to encourage student reflection therefore need to have strong scaffolding and to be structured so as to provide for significant feedback and the opportunity to rewrite. A short article, Grossman's study provides a useful summary of some of the most important literature in the field of student reflection and can help teachers think more productively about how to encourage reflection as an important approach to enhancing learning.

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Jean Lave & Etienne Wenger, *Situated Learning. Legitimate Peripheral Participation* (New York: Cambridge University Press), 1991.

Keywords: Communities of practice; Social dimensions of learning

More than 20 years old now, Lave and Wenger's influential study is still a good starting point for faculty considering fundamental questions about how one creates an environment in which significant learning can take place. Conventional explanations have long argued that learning is largely an internal, cerebral practice that takes place in the individual learner and that constructs the individual as a non-problematic unit of analysis. The authors counter that learning occurs by increasing participation of learners in "communities of practice." Rather than an individual or dyatic process, learning concerns the whole person acting in the world; there is an interdependency of activity, meaning, cognition, learning, and knowing. Social practice, therefore, is privileged as the source of learning. The authors dissolve the dichotomy between intellectual and embodied learning by focusing on the "person-in-the-world" as a member of a sociocultural community. Lave and Wenger call our attention to the fact that there is a continuum of actors in the learning community between "newcomers" (novices) and "old timers" (experts), including those who are old-timers vis-à-vis new newcomers. Each plays a different role in this community of practice. As the authors point out, legitimate peripheral participation – the way by which newcomers to any particular learning community are brought into engagement with (learning in) a community of practice – is not a pedagogical strategy or a teaching technique, but rather a way to think about learning itself and how it occurs. *Situated Learning* is both broadly analytic and empirically located, including studies of five different apprenticeship situations (midwives, tailors, etc.) which the authors examine to understand how learning occurs in a context of practice. The authors' conclusions have become part of a movement to decenter the educational process, shaped around the notion that "mastery" doesn't lie in the teacher but "in the organization of the community of practice" of which the teacher is one part.

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Howard Gardner. *Intelligence Reframed: Multiple Intelligences for the 21st Century*. New York: Basic Books, 1999.

Keywords: Learning styles

In this book, Howard Gardner updates his research and thinking about Multiple Intelligences (MI), from his earlier 1983 on the subject. Gardner argues that intelligence, or learning capability, is multi-faceted, with diverse sensory forces at work in the learning process. He identifies seven modalities: linguistic, logical-mathematical, musical, bodily-kinesthetic, spatial, interpersonal, and intrapersonal. This research has been foundational in learning theory, so it is likely that many teachers have heard of, say, "visual learners." Reading Gardner's books can help us think more about the implications of this for our classrooms, to help us more intentionally consider the abilities and challenges of our students.

In terms of the usefulness for our own pedagogical practice, an understanding of the different "intelligences" can be helpful. Most importantly, we know that individual students learn differently. For example, some perform better on multiple choice tests than in writing essays. A class that designs activities to engage a variety of intelligences will reach a wider variety of

students. For example, a class that relies only on the lecture mode will reach students well who are linguistic learners, while group work would benefit those with strong interpersonal intelligences. If we utilize a variety of learning activities that appeal to different intelligences, students (and instructors!) will also have an opportunity to improve their less developed intelligences.

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Ina Claire Gabler and Michael Schroeder, *Constructivist Methods for the Secondary Classroom: Engaged Minds*. Boston: Allyn and Bacon, 2003.

Keywords: Learning styles; Constructivism – active learning techniques

Constructivism has been a strong force in the field of Education for the last couple of decades especially, though as a theory the concept dates back a little further to the work of Jean Piaget. Through accommodation and assimilation, learners internalize new knowledge. At base, the theory also owes something to the work of John Dewey, who stressed the element of experience in the educational process. Constructivist teachers attempt to involve students as active collaborators in the learning process as much as possible. As with much of the more influential Education literature, the book by Gabler and Schroeder is targeted toward the secondary classroom, but college teachers can make good use of the many insights and activities explored here.

Grounded in constructivist theory, the book recognizes different learning styles (Gardner's intelligences) and levels of analytical ability. Interactive pedagogy can hasten the movement between understanding information as "facts," toward higher levels of analysis of process, as students discover their own tools in the specific discipline. The book begins with a description of the relevant educational research, which should inspire college teachers in our work to teach students to think critically. A subsequent section uses these ideas to suggest principles in lesson planning. The authors toggle between some theoretical discussion, for example of Bloom's taxonomy, and (to a greater degree) practical suggestions for the imposition of these ideas in the secondary classroom. Much of this does apply to college classrooms as well, especially the sections on discussion techniques and peer-group learning processes. The book returns to more intentional discussion of the reasons behind teaching methods in Part C, identifying the distinctive features of various class methods. Assessment suggestions round out the last section, which may or may not be of interest.

Most of us will quickly object that while interactive methods might work well in the secondary environment, the college curriculum does not leave enough time to "cover" the material that is required. This book might cause us to rethink that position somewhat. Traditional teaching methods might reach some of the students some of the time, but diversifying our approach may benefit the outcomes that we desire, in much the same way that our retirement accounts ought to be diversified! Constructivist methods can be integrated slowly into the course to complement

traditional pedagogy. The present book does not speak to that challenge for the college classroom, but may provide some tools for professors to investigate changes in their practice to activate student learning.

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John C. Nesbit and Olusola O. Adesope. "Learning with Concept and Knowledge Maps: A Meta-Analysis. In *Review of Educational Research*, 76:3 (Fall 2006), 413-448.

Keywords: Concept (knowledge) maps

Nesbit and Adesope review a wide variety of the literature on "concept" or "knowledge" maps. These are diagrams that represent ideas as "node-link assemblies," graphic representations of the relationships between ideas. They have been used in science classrooms for a few decades, most often devised by the instructor and presented in whole-class situations. Some educators have taken to having students create their own concept maps (or in groups) to represent the interrelated aspects of complex concepts. The article analyzes the educational research on these learning diagrams, hence the piece is a "meta-analysis" of relevant classroom based research.

The article serves as a good introduction to the technique of concept mapping, demonstrating that the method can be used for all age groups and disciplines. Non-science practitioners have been slow to adopt the practice, and this article might help those of us in the humanities understand the possibilities. A wealth of relevant literature is cited, beyond the research studies per se and including works on learning psychology that support the practice. The middle section on the research studies themselves is rather dense and may not benefit all interested teachers as much as the introductory, reference, and concluding material. In the end the researches conclude that the use of concept maps provides a slight benefit over narrative devices in teaching, but that for students with certain learning styles or ability levels concept maps seem to accelerate the learning process considerably.

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