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This chapter reviews the current status of university teaching and provides an overview for the need for evidence-based teaching. It describes problems with defining evidence as well as distinctions among systems of teaching and specific teaching actions.

Need for Evidence-Based Teaching

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> Teaching is just too damned difficult to get right. It is always possible to improve.
>
> —Petty, 2006, p. ix

Petty's words send a clarion message to college and university teachers around the world. However, we believe that rather than being a mere possibility to improve as teachers, it is always *necessary* to improve. One way of improving our teaching is to adopt teaching methods that are based on or supported by evidence of success in enhancing student learning.

Current Status of Higher Education: Critics and Supporters

Most teachers base their instructional practices on tradition, the opinion of experienced practitioners, ideology, faddism, marketing, politics, or personal experience gained through trial and error (Beder and Medina, 2001; Slavin, 2008). This volume presents several of what we call evidence-based systems of teaching. We encourage readers to look at the evidence supporting each system and consider if one or more of these instructional approaches would help them achieve their teaching and student learning objectives. We hope that this volume will help develop a new tradition of teaching—one based on evidence and research-supported practice.

Some faculty may see evidence-based teaching (EBT) as the latest fad in education, but we believe that it is more than a new trendy fashion. It refers to an approach that holds that practice should be capable of being

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justified in terms of sound evidence about its likely outcomes. As Robert Cole (1999) stated: "Education may not be an exact science, but it is too important to allow it to be determined by unfounded opinion, whether of politicians, teachers, researchers, or anyone else" (p. 1). Yet it is ironic that within higher education institutions dedicated to the discovery, transformation, and dissemination of knowledge, the choice of teaching strategies is based largely on experiential, commonsense, or anecdotal evidence.

In recent years, there have been calls for education to follow the fields of medicine and agriculture and embrace evidence as a foundation for practice. These calls have resulted in several national efforts in the United States, such as No Child Left Behind, What Works Clearinghouse, Comprehensive School Reform Quality Center, and the Best Evidence Encyclopedia; the Evidence for Policy and Practice Information and Co-ordination Centre in the United Kingdom; and the Campbell Collaboration in Norway (Slavin, 2008). However, these efforts have focused on primary and secondary (K–12) education, not higher or tertiary education.

As the world continues to shrink, or become "flatter," in Thomas Friedman's (2007) terms, the quality of higher education and the need to facilitate high-level learning has never been more important. The new world economy is highly knowledge intensive, and to succeed, one must be good at constantly learning—if one stands still, one falls back (Rischard, 2002). What goes on inside the world's higher-education classrooms has a profound impact on more than an individual student's grades: Global economic and social success, and even worldwide survival, may rest in the balance (Groccia, 2010). Higher education stands at a crossroads; millions of students are entering a higher-education system that requires a recalibration of teaching methods and learning outcomes (American Association of Colleges and Universities, 2007). To be maximally relevant to this emerging new world reality, everyone involved with college and university teaching, regardless of discipline, must recognize the need to use the most effective teaching and learning methods.

Higher education, specifically its focus on quality teaching, has experienced much criticism in the past two decades. Under the general term "accountability," legislative and governing bodies as well as public interest groups increasingly ask for evidence of higher education's impact. Rightly or wrongly, parents and students appear to believe that colleges are expensive and wasteful. The public seems to be increasingly dissatisfied with higher education's perceived lack of interest in teaching due to increasing emphasis on research, publication, and disciplinary specialization, all of which seem to be largely unrelated to students' academic welfare (Bok, 2006; Boyer Commission on Educating Undergraduates in the Research University, 1998; Kline, 1977).

Despite increased curricular offerings, expansion of educational services and resources, the use of powerful educational technology, and development of innovative new curricula to meet the challenges of the

twenty-first century, there is little hard evidence that our students learn more than they did fifty years ago (Bok, 2006). As a result, Bok has called for increased attention to improved teaching, more student engagement in learning, and higher quality faculty development to revitalize U.S. higher education.

The National Center for Public Policy and Higher Education (NCPPHE, 2006), in its review of worldwide educational statistics, provided evidence that U.S. higher education, when compared with educational outcomes in other countries, is not doing so well by its students. For example, in the report, the United States ranked sixteenth of twenty-seven developed countries in the percentage of students who complete their first undergraduate degree. This report clearly indicates that American higher education is underperforming relative to many other countries (NCPPHE, 2006).

The ever-increasing price of attending America's colleges and universities has also drawn increased attention with respect to whether students and their parents are getting what they paid for. According to the National Center for Educational Statistics (2007), for the 2006–2007 academic year, the net cost of attending college grew at a faster rate than both median income and disposable per capita income during the 1980s and 1990s at all types of U.S. higher-education institutions. Adding to the problem of rising costs is the added debt burden that students and parents must shoulder as they try to finance college education. According to data published by the Project on Student Debt (2010), in 2008, 67 percent of students graduating from four-year colleges and universities had student loan debt, and the average debt for a graduating senior rose to $23,200 from $18,650 in 2004 (a 24 percent increase). An even more important impact for the future is the resulting reduction in access to higher education for students with limited financial means due to increasing costs and debt.

Thus, given that college and university education is expensive and at many institutions the quality of education students receive may be questionable, it seems reasonable to ask, if not demand, that teachers modify their approaches to instruction and use the most effective teaching methods currently available. Using proven effective teaching techniques would enhance the quality of student learning and perhaps quiet critics who lament the poor preparation of students for living and working in the "real world."

Nature of Evidence-Based Teaching and Its Implications for Teaching and Learning

EBT has its roots in the clinical fields of medicine, nursing, psychology, and social work. Sackett, Rosenberg, Gray, Haynes, and Richardson (1996) defined evidence-based medicine as "integrating individual clinical expertise with the best available external clinical evidence from systematic research" (pp. 71–72). The American Psychological Association (2005)

defined evidence-based practice as the "integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences" (p. 1). Kazdin (2008) defined evidence-based treatment as "the interventions or techniques . . . that have produced therapeutic change in controlled trials" (p. 147). Based on these definitions, Metz, Espiritu, and Moore (2007) developed this definition of evidence-based practice for out-of-school educational settings: "The integration of the best available research with out-of-school time expertise within the context of child, teen, family, and community characteristics, culture, and preferences" (p. 1). Adapting these definitions to settings in higher education, we define EBT as

> the conscientious, explicit, and judicious integration of best available research on teaching technique and expertise within the context of student, teacher, department, college, university, and community characteristics.

EBT is not without controversy. Researchers and educators disagree about several critical issues, including definitions of what constitutes evidence, appropriateness of adopting medical or agricultural models for use in educational settings, the managerial agenda of evidence-based education, the role of values in educational research and practice, and the amount of accumulated knowledge necessary on which to base practice (Biesta, 2007). We do not attempt to resolve these issues here but instead take a more pragmatic, applied approach and focus on general systems of teaching that link research to practice in ways that might also be labeled evidence suggested, evidence informed, or evidence influenced.

One does not need to use a meta-analysis of all relevant randomized controlled trials to establish a definition and basis of evidence for good practice. Rating systems to assess the hierarchy of levels of evidence as espoused by others (e.g., LoBiondo-Wood and Haber, 2006) go far beyond the typical college classroom instructor's expertise and time availability. In the face of current realities of how college faculty teach and the process by which they choose their instructional approaches, any decision to adopt a particular system of teaching that considers evidence from reviews of systematic descriptive, quantitative, and qualitative studies would be a clear improvement. The teaching systems presented in this volume rest on accessible and useful evidence. Teachers can be secure in their choice of any or all of these approaches, as each has been clearly documented to be effective in enhancing student learning.

In addition to what we know about teaching, we also know a lot about how people learn (Bransford, Brown, and Cocking, 2000). Ambrose and others (2010) described seven principles of learning that underpin academic practice and form the building blocks in the construction of integrated, holistic systems of teaching. These seven principles are:

1. Prior knowledge influences current and future learning.
2. How students organize knowledge influences how they learn and how they apply what they know.
3. Motivation determines, directs, and sustains learning.
4. Students develop learning mastery by acquiring component skills and practicing combining and integrating them.
5. Goal-directed practice coupled with targeted feedback facilitates learning.
6. Emotional, social, and intellectual climate factors influence learning.
7. Metacognitive monitoring of learning facilitates further learning.

These seven evidence-based principles identify specific behaviors or conditions that influence learning, either of which in turn influence specific faculty teaching skills and techniques that can be then combined into integrated systems of teaching. However, our focus on systems of teaching does not describe the empirical evidence behind these principles of how people learn or the specific components of teaching and learning (e.g., feedback, active learning, testing effects, dual code channels) or other teaching techniques that are not part of a formalized, highly developed instructional system approach. Instead, our focus is on the integrated systems of teaching per se and their overall effectiveness in (a) producing changes in students' learning and (b) the extent to which students enjoy the process of learning. Indeed, the importance of investigating specific components of these integrated systems is a strong impetus for future research on these systems, a topic we take up in the final article in this volume.

Before we suggest that faculty members adopt EBT methods, it is useful to get a sense of current teaching approaches used in U.S. college classrooms. The most recent data reported by the Higher Education Research Institute at the University of California Los Angeles (DeAngelo and others, 2009, p. 10) on faculty approaches to teaching are presented in Table 1.

The teaching techniques highlighted in the DeAngelo et al. report, with the exception of cooperative learning and lecturing, are specific pedagogic actions, not integrated systems of teaching. According to these data, there has been a marked reduction in the use of extensive lecturing from 2005 to 2008 coupled with small increases in student-centered teaching approaches. In light of this information on how faculty members currently teach, there seems to be much room for the adoption of evidence-based teaching methods. Access to models of teaching systems based on evidence, such as those presented in this volume, should lead to higher-quality teaching and higher-quality student learning.

Will individual faculty members who have chosen to apply EBT be able to sustain these practices without fundamental changes in departmental, college, or institutional structures? We believe so. The concept and application of academic freedom ensures that individual faculty members

Table 1. Faculty Approaches to Teaching

Methods Used in "All" or "Most" Courses Taught	*2005*	*2008*	*Percent Change*
Cooperative learning (small groups)	47.8	59.1	11.3
Using real-life problems	n/a	55.7	n/a
Group projects	33.3	35.8	2.5
Multiple drafts of written work	24.8	24.9	0.1
Student evaluations of each other's work	16.0	23.5	7.5
Reflective writing/journaling	18.1	21.7	3.6
Electronic quizzes with immediate feedback in class	n/a	6.8	n/a
Extensive lecturing (not student centered)	55.2	46.4	–8.8

Source: Adapted from DeAngelo et al., 2009. p. 10.

have the authority to use instructional methods that they deem, based on their own professional judgments, effective in achieving their teaching and learning objectives. Use of teaching practices that are supported by evidence, although they may be nontraditional and uncommon, should be more justifiable to deans and department heads (and also to students who may have developed a degree of comfort with traditional teaching approaches) than practices based on tradition and common sense. To be sure, the primary purpose of this volume is to heighten faculty members' awareness of EBT in an effort to help them improve their teaching practices and thereby enhance their students' learning, thinking, and analytical skills as well as their motivation for, and enjoyment of, learning.

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