Universal Design for Instruction: The Paradigm, Its Principles, and Products for Enhancing Instructional Access

Joan M. McGuire, Ph.D.

Sally S. Scott, Ph.D.

Stan F. Shaw, Ed. D.

Center on Postsecondary Education and Disability
University of Connecticut

Abstract

Universal Design for Instruction (UDI), a construct that serves as the foundation for the work of a federally funded project at the University of Connecticut,[1] offers an approach to inclusive instruction that is responsive to the diverse learning needs of a changing postsecondary population. In this article elements relating to the implementation of project activities are presented, including the participation of key stakeholders throughout the grant period. The application of the Nine Principles of UDI© to college teaching is discussed along with observations regarding project outcomes. Suggestions for future initiatives are also delineated.

In the 20 years after 1978, the first year of postsecondary disability statistics reported by the American Council on Education, the number of college students with disabilities has increased more than fourfold (Henderson, 2001). The majority of these students have nonvisible disabilities (e.g., learning disabilities, ADHD, psychiatric disorders) that often affect cognitive processes. In addition, college enrollments include increasing numbers of international students, individuals from under represented groups, and students whose first language is not English. As higher education acknowledges the educational value of diversity on our college campuses (American Council on Education, 2000; American Council on Education and American Association of University Professors, 2000), faculty must address the implications of student diversity in the design and delivery of instruction. The following observations of Wlodkowski and Ginsberg (1995) regarding diversity are provocative: "As the arc of multiculturalism radiates through higher education, it creates an exciting, unsettled, and kaleidoscopic landscape. It awakens discourse, confronting the inertia of conventional college teaching." (p. 283)

Traditionally, the primary means to ensure equal access to instruction for college students with disabilities has been to provide modifications and accommodations such as those mandated by federal law (Americans with Disabilities Act, 1990; Section 504 of the Rehabilitation Act, 1973). Although modifications and accommodations are often a necessary and appropriate means to provide access, they are based on a philosophy of retrofitted changes designed to "level the playing field." Silver, Bourke, and Strehorn (1998) introduced the notion of Universal Design (UD) in higher education as a new paradigm for making instruction accessible. Building on approaches to Universal Design originally found in the fields of architecture, interior, landscape, and product design (The Center on Universal Design, 1997), Universal Design in the context of instruction makes accessibility issues a proactive and integral focus of instructional planning (Silver et al., 1998). UD results in the creation of environments and products that are usable by a wide range of diverse individuals (Follette Story, Mueller, & Mace, 1998).

Based on this intriguing notion of applying UD to college instruction, the Center on Postsecondary

Education and Disability at the University of Connecticut has been systematically exploring and developing Universal Design for Instruction (UDI) to anticipate diverse learning needs in college classrooms and to incorporate effective instructional strategies to make learning more accessible to students with disabilities. Universal Design for Instruction is an approach to teaching that consists of the proactive design and use of inclusive instructional strategies that benefit a broad range of learners, including students with disabilities (Scott, McGuire, & Embry, 2002). By adapting the principles of UD to include instructional practices that have been acknowledged as effective for students with disabilities, this project has developed a foundation for an inclusive paradigm for faculty development grounded in research and practice (Scott, McGuire, & Foley, 2003). UDI represents an approach to pedagogy that is responsive to a broad range of diverse student learning needs.

This article will delineate the activities conducted in the development of the University of Connecticut's Demonstration Project, "Assuring Equal Access for College Students with LD by Implementing Universal Design in the Instructional Environment." The outcomes of the project will be discussed including the project web site, Facultyware® (www.facultyware.uconn.edu), a resource containing useful information about UDI and instructional products that have been reviewed and evaluated by faculty across the country. Observations emerging from the project regarding the challenges and opportunities for faculty development and instruction for college students with disabilities and the use of UDI will also be shared. We begin with a review of project implementation.

Implementing a Plan

Several guiding assumptions were influential in the development of project activities. As a project team, we believed that outcomes and innovations of the project should be grounded in the knowledge and experiences of key stakeholders (i.e., students with disabilities, disability service providers, faculty, and administrators). To ensure that project activities were addressing current needs in the field, stakeholders were involved throughout the project. Another guiding assumption was that recommendations and strategies for enhancing faculty instruction must be research-based. Using an extensive literature base compiled at the beginning of the project and periodically updated, project activities and subsequent instructional recommendations were grounded in research from multiple fields of study. A final assumption guiding the project was that faculty development must be approached through a perspective of systemic change. As a result, emphasis was placed on encouraging simultaneous administrative support (a top down perspective), and faculty initiatives (a grass roots or bottom up approach) (Baldridge & Deal, 1983; Fullan, 1991). These assumptions are reflected in the following project activities.

Identifying Barriers and Bridges to Academic Access from a Student Perspective

An important foundation for the project was to talk with students with learning and other cognitive disabilities about their experiences as learners in the college environment. Four student focus groups were conducted on three different college campuses including one four-year public institution and two community colleges in the northeastern United States. Students were asked to describe positive learning experiences such as the best course they had ever taken in college, teaching methods that positively affected their learning, and faculty attributes that promoted a supportive learning environment. Students also discussed barriers they had experienced and offered advice on how faculty could promote inclusive college coursework. Students candidly shared their experiences and suggestions for faculty to enhance the learning environment. Focus groups were audio-taped, transcribed, and analyzed across groups. A detailed report of focus group procedures and findings is presented by Madaus, Scott, and McGuire (2002b).

Listening to the Experts in College Teaching

Another important source for understanding the existing knowledge base and experiences of key stakeholders was faculty. Outstanding college teachers at the University of Connecticut who are recipients of the prestigious University Teaching Fellow award were interviewed to learn more about the strategies and approaches of excellent teachers in the classroom. Eighteen Teaching Fellows were individually

interviewed to garner insights on effective instructional practices, experiences with diverse learners, and approaches to faculty development that support improved college instruction. Interviews were audiotaped and transcribed. Madaus, Scott, and McGuire (2002a) provide a detailed report of interview methodology and findings.

Creating the Framework for Universal Design for Instruction

In the process of developing the grant proposal, an extensive review of the literature was conducted to gather existing research and practices pertaining to Universal Design in the instructional environment. Only a handful of articles could be located; among these, one pertained to UD in higher education (Silver et al., 1998). Knowing that consumers of the project activities would be college faculty with a strong value system for academic rigor and research, one of the first activities in the grant cycle was to develop a thorough literature and research base for recommended practices in implementing UD in college instruction. As a result, an extensive review of the literature was conducted in the areas of Universal Design, effective instruction in higher education, and effective instruction with students with learning disabilities in both secondary and postsecondary educational settings.

Based upon this review, the principles of UD (Center for Universal Design, 1997) were found to be quite encompassing as a framework for inclusive college instruction. Working also with the seminal principles for practice in higher education identified by Chickering and Gamson (1987), and emerging guidelines for inclusive education at the K-12 level from the Center on Applied Special Technology (CAST, 1999) and the National Center to Improve the Tools of Educators (Kameenui & Carnine, 1998), these four sources were viewed collectively with particular attention to overlaps across principles as well as gaps in the literature.

The Principles of Universal Design for Instruction were drafted from this complementary literature base. The proposed principles were reviewed and refined based upon feedback from experts in disability access, authorities in Universal Design, faculty with acknowledged teaching excellence, and individuals with expertise in instruction of diverse learners including college students with learning disabilities.

The Nine Principles of Universal Design for Instruction© (Principles of UDI©; Scott, McGuire, & Shaw, 2001) were the outcome of this rigorous process (see Table 1.) More information about the development and ongoing validation of the UDI principles may be found in Scott et al. (2003). By identifying each of the nine areas extrapolated from the literature, the principles provide a rubric for inclusive college teaching not previously available to faculty. Given the broad nature of the principles, several applications are in keeping with faculty development initiatives on college campuses and the broadly varying needs of individual faculty members interested in enhancing their teaching. For example, depending on faculty needs, the principles can be applied to the design of a new course or used to reflect upon practices in an existing class. They can inform a variety of teaching issues and approaches ranging from assessing students' learning, to broadening learning experiences, to considering how an inclusive classroom climate can be established. Although the Principles of UDI© can serve as a useful reference point for experienced faculty from diverse academic disciplines, they have particular relevance for junior faculty and graduate teaching assistants seeking support and direction as emerging teachers.

Forging Collaborations for Implementation

In order to explore and implement UDI across diverse college settings, the project established collaborative partnerships with 20 two- and four-year college campuses across the country. Each of the collaborating schools established a site-based UDI team representing, for example, campus disability services, academic administration, teaching and learning centers, and academic support offices. Across the collaborating sites, over 100 faculty in approximately 30 different disciplines were involved with project activities. Team membership and function varied depending on the identified tasks of the institution, as well as numerous individual variables such as campus mission, resources, expertise, and interest. This variation was an important consideration for establishing UDI teams that were most appropriate to promoting change on each individual campus.

Table 1

The Nine Principles of Universal Design for Instruction©

Principle	Definition
Principle 1: Equitable use	Instruction is designed to be useful to and accessible by people with diverse abilities. Provide the same means of use for all students; identical whenever possible, equivalent when not.
Principle 2: Flexibility in use	Instruction is designed to accommodate a wide range of individual abilities. Provide choice in methods of use.
Principle 3: Simple and intuitive	Instruction is designed in a straightforward and predictable manner, regardless of the student's experience, knowledge, language skills, or current concentration level. Eliminate unnecessary complexity.
Principle 4: Perceptible information	Instruction is designed so that necessary information is communicated effectively to the student, regardless of ambient conditions or the student's sensory abilities.
Principle 5: Tolerance for error	Instruction anticipates variation in individual student learning pace and prerequisite skills.
Principle 6: Low physical effort	Instruction is designed to minimize nonessential physical effort in order to allow maximum attention to learning.Note: This principle does not apply when physical effort is integral to essential requirements of a course.
Principle 7: Size and space for approach and use	Instruction is designed with consideration for appropriate size and space for approach, reach, manipulations, and use regardless of a student's body size, posture, mobility, and communication needs.
Principle 8: A community of learners	The instructional environment promotes interaction and communication among students and between students and faculty.
Principle 9: Instructional climate	Instruction is designed to be welcoming and inclusive. High expectations are espoused for all students.

Source: *Principles of Universal Design for Instruction*, by Sally S. Scott, Joan M. McGuire, and Stan F. Shaw. Storrs: University of Connecticut, Center on Postsecondary Education and Disability. Copyright 2001. Reprinted with permission.

Collaborating sites were involved with various project initiatives, including development and piloting of training materials, implementation of the Principles of UDI© in diverse college classrooms, and submitting inclusive instructional products for possible inclusion on Facultyware®, the project web site. Throughout the project, the input and feedback of collaborating sites comprised an iterative process for product development. Orientation materials were used and evaluated by personnel on campus teams, and a Likert-scale format yielded ratings on various elements. Feedback pertaining to organization of the materials, clarity of explanations, and format of individual learning units was incorporated into the final revision of materials.

Developing a Dynamic Web Site

A major product of the project was the development of an extensive and dynamic web site entitled Facultyware®: Tools for the Universal Design of In-

struction. The Facultyware site, located at www.facultyware.uconn.edu, is designed to be a comprehensive information source on inclusive college teaching available to faculty around the world with Internet access. The site is a platform for widely disseminating information on the growing resources and support materials pertaining to UDI. It also provides ongoing updates on emerging initiatives, activities, and research conducted by project personnel. In order to support faculty and other visitors to the site who are interested in pursuing specific elements of diversity in the classroom, additional resources such as annotated web site links, literature reviews, and resource materials about disabilities and related areas are also provided.

One of the most innovative and important features of the web site is the presence of an on-line process that allows faculty across the country to submit high-quality and inclusive instructional practices that they have used in the classroom for possible publication on the site. The goal of this on-line publication process is to showcase inclusive teaching strategies and methods developed by faculty from diverse academic disciplines and postsecondary settings. The instructional products that are selected for publication on the Facultyware site are made available as instructional freeware that can be used and adapted by other faculty. Instructional products are of varied formats (e.g., text, audiotape, video tape, or web based) and pertain to diverse aspects of instruction (e.g., planning a course, delivery of instruction, or assessment of student learning).

To ensure a rigorous process for selecting instructional products for publication on Facultyware, an on-line juried review process was developed. All instructional products are reviewed by a national panel of experts in UDI to determine the extent to which they reflect the Principles of UDI©. A second national panel of faculty reviewers reviews the products to provide feedback on the quality and usability of the product in the college instructional environment. Instructional products that receive positive ratings in both areas are accepted for publication on the Facultyware site.

To ensure ease and efficiency of this on-line review process, several methods were used and evaluated during the pilot phase of developing the process. UDI experts and faculty reviewers were provided a brief Likert scale to rate the training materials. To gain further feedback, several reviewers from each panel were interviewed, and debriefing provided useful insights into the process. This dynamic product development approach led to a streamlining of the review process and revision of orientation materials for on-line training of UDI experts and faculty field reviewers. As more faculty products undergo this on-line juried review process and meet the criteria for publication on the web site, faculty across the country can anticipate access to a broad range of instructional innovations for use in their teaching.

Discussion

Barriers and Bridges to Academic Access

With the exception of perceptions about the benefits of small class size that were noted only by students at the two participating community colleges, each of the remaining positive attributes were confirmed by students from all four focus groups. Notably, these positive factors all centered upon elements incorporated into the classroom environment by individual instructors. Briefly, students affirmed that a good college course was characterized by instructors who are approachable and available, clear in content delivery and course expectations, and engaging and challenging (Madaus et al., 2002b). The availability of a professor to meet with a student before and after class either in the classroom, in a lab, or in the professor's office was cited as an attribute that helped students to clarify questions about course content and affirmed faculty's interest in students' learning. Clarity was particularly valued by these students, who offered examples such as these: (a) delivery of content (e.g., detailed explanations of concepts without going off on tangents); (b) provision of lecture outlines or copies of notes in advance of class; (c) detailed syllabi with straightforward assignments; and (d) continual feedback rather than summative grades only. Clarity was also a central theme as students stated the benefits of organizational techniques used by effective professors such as reading guides, chapter outlines, and study guides.

In addition to the benefits of instructors who are engaging and present material in interesting and relevant ways, students also spoke positively about pro-

fessors who challenge them to learn. Faculty who use pause and questioning techniques during instruction to encourage individual students or an entire class to engage in problem solving were viewed as effective. Students were appreciative of faculty who recognize that not all class members bring the same level of understanding to the classroom and are willing to adjust their instruction to ensure comprehension before moving on to another topic. Also, personalized connections between students and professors were highly valued, and some students mentioned their appreciation of the positive response of instructors to their self-disclosure of their LD.

Attributes of teaching methods that restrict access to instruction were gleaned from the transcripts. Interestingly, they comprised nearly the converse of the characteristics of an effective instructor. Specifically, fast-paced instruction, a focus on quantity rather than quality, lack of clarity in course expectations, assignments, and requirements, and testing on material not taught in class were viewed as problematic. Students from the research university expressed frustration with inconsistencies in expectations and grading between professors and teaching assistants. Students were uniformly clear that skepticism on the part of faculty regarding LD and a need for accommodations constituted a barrier to access.

The themes that emerged from the focus groups from three institutions that vary widely in mission, size, and academic competitiveness were remarkably consistent. They are captured in a summary of students' responses regarding advice they would offer instructors: be clear and straightforward in expectations, become involved and engaged with classes, and be compassionate regarding student needs. (For a more detailed discussion of findings, see Madaus et al., 2002b).

Attributes of Effective Instruction as Perceived by Outstanding College Faculty

The voices of faculty, key stakeholders in this project that focused on the development of UDI as a concept for creating inclusive teaching environments, were captured through interviews with 18 distinguished Teaching Fellows at the University of Connecticut. Initial analysis of transcripts of these interviews suggests that faculty comments about their teaching strongly resonate with the Nine Principles of UDI© although faculty do not express themselves in terms that mirror the exact language of the principles (Madaus et al., 2002a). Additionally, there is a synchrony between the perceptions of students and the observations of these faculty regarding elements of effective instruction. When asked to discuss instructional strategies and techniques they incorporate in their teaching, participating faculty mentioned the following: (a) setting clear expectations and demands; (b) being approachable and available to students; (c) actively engaging students; and (d) setting high expectations.

The similarity between the observations of these outstanding teachers and the Principles of UDI© is particularly striking. For example, nearly every Teaching Fellow spoke strongly about the importance of clarity and explicitness regarding course requirements and expectations as well as the need to be organized. Components of detailed syllabi (illustrative of Principle 3, Simple and Intuitive) mentioned by several included course policies and information about assignments, labs, and exam dates. The issue of quality versus quantity was mentioned by several professors, who stated their perspective that focusing in depth on the truly important concepts of a topic was more important than covering a broad range of topics superficially.

Another technique found to be useful by several of the Fellows is the provision of course notes or outlines – to <u>all</u> students, an example of Principle 1, Equitable Use. Their comments complement those of the students in the focus groups as faculty emphasized the importance of active listening and removing the barrier of students having to compulsively take notes while missing many key concepts (Madaus et al., 2002).

In concert with the notion of Instructional Climate, Principle 9, several of these faculty offered examples of their availability to students both in and outside of the classroom and ways to set a tone of being approachable. To promote student engagement in the learning process, techniques such as comprehensive use of technology in class (e.g., building molecular structures on a computer display based upon student responses to questions) were cited as a way to make abstract concepts real and relevant. This re-

flects Principle 4, Perceptible Information. Uniformly, these faculty members underscored the importance of challenging students and holding high expectations.

It is striking to note that of the 18 Teaching Fellows, only two had participated in any type of faculty development activities relating to teaching. Nevertheless, participants expressed an obvious commitment and a high level of internal motivation to improve instruction fueled mainly by their interest in students. Consistent with observations about the dearth of faculty preparation for teaching and limited participation of faculty in teaching improvement programs (Seldin, 1995), this statement from a Teaching Fellow reflects a common and powerful theme in the interviews: "Apart from the experience that I had as a teaching assistant, we were never really trained as teachers. So when it comes to research, we're professionals. When it comes to being teachers, we're amateurs. We are really just self-taught, we pick it up in sort of a random fashion" (Madaus et al., 2002a, p. 10).

Finally, faculty were asked to consider diversity and changes in the student population. Three faculty noted that their work with students with disabilities influenced their thoughts about the way in which they deliver instruction. Changes included individualizing a strategy or accommodation, changing their pedagogical methods (e.g., being mindful of the need to monitor the pace of lecturing), implementing a variety of instructional activities within a class meeting, and using authentic assessments so that students can employ multiple methods to demonstrate their knowledge of course material.

With a broad range of disciplines represented, including engineering, biology, art history, physics, mathematics, accounting, plant science, education, psychology, and family studies, these interviews are one of several methods in progress to examine the construct validity of UDI, a process admittedly comprising what Pedhazur and Schmelkin (1991) describe as a "complex and ongoing endeavor" (p. 80). (For a more detailed discussion of findings see Madaus et al., 2002a.).

Implementation of UDI

Since UDI comprises a new framework for integrating inclusive instructional strategies into college teaching, a major project activity has been the development of orientation materials for use by collaborating institutions and the broader audience of users of Facultyware. The *UDI Orientation Materials* (Scott & McGuire, 2001) handbook includes readings and reflective questions on UDI as well as its application to college instruction. Training and technical assistance at the collaborating institutions included on-site presentations, distance training via materials available on Facultyware, hard copies of the *UDI Orientation Materials*, and opportunities for participants to provide feedback on every aspect of project activities to refine both the process and products.

As collaborating institutions became familiar with UDI, faculty participants were encouraged to submit instructional products for review and publication on Facultyware. Additionally, they were trained to use the electronic review process and were asked to review submitted products as field reviewers. To date, more than 15 products from a range of disciplines have been reviewed and are now available on the site as instructional freeware.

Several insights have emerged based upon our experiences. First, faculty do not necessarily view instructional strategies they use in teaching as novel or innovative. These are simply the tools they use to promote student learning. Yet, using the UDI framework to consider instruction has resulted in notable enthusiasm from collaborating institutions. At one site, members of the UDI team implemented one or several of the principles in their teaching and their products have been reviewed and are now posted on Facultyware. The team has become very autonomous in embracing the UDI paradigm and is implementing a campus-based mentoring project for other faculty interested in this approach to faculty development.

Another observation relates to the complexities of posting intellectual property on the World Wide Web. In what is often viewed as a moving target, ownership of material on a web site is the subject of ongoing legal discussions, particularly as it relates to material developed by faculty in the course of their work. The project continues to monitor its position that ownership of instructional products remains with the submitting faculty member by dialoging with legal counsel on a regular basis to ensure that project procedures are consistent with legal mandates.

Finally, faculty development and effective approaches to such initiatives must be viewed within the context of an institution, its mission, and its culture. For example, junior faculty at comprehensive research universities are understandably conflicted about their interest in their pedagogy in the midst of a value system that emphasizes research and scholarly publications. As Armour stated, "As long as faculty perceive that research is the key to success at their institutions and the primary criterion for recognition within their disciplines, teaching will remain in a subservient position" (p. 13. 1995). Faculty at two-year collaborating institutions noted problems with access to technology, an important tool for pedagogical innovation. Although this concern is legitimate, inclusive instruction is not dependent upon technology. It will be important to ensure that UDI is not regarded as synonymous with technology if faculty are to be encouraged to use it as a reflective tool in the ongoing process of developing and refining their teaching prowess.

Universal Design for Instruction and Its Efficacy in Promoting Inclusive Instruction

We are encouraged by the overwhelmingly positive response of various stakeholders regarding UDI and its application in college classrooms. Examples of efforts in postsecondary education to promote UDI as a method of faculty development continue to come across our desks. Yet, the intuitive appeal of UDI must not overshadow the importance of research into its validity and its effects. Simply put, there is a need for more empirical evidence that UD, and specifically UDI, results in more positive outcomes for students or for the faculty who embrace it.

The literature in the field of special education is replete with examples of the bandwagon effect, "wherein an idea or a cause suddenly becomes popular and gains momentum rapidly... to produce hastily conceived, poorly implemented innovations or programs, the failure to achieve anticipated goals, and consequent disillusionment with the original idea, or backlash" (Trachtman, as cited in Ysseldyke, Algozzine, & Thurlow, 2000, p. 181). Our goal is to continue our work in validating the construct of UDI, examining each of its principles for its attributes and applicability to instruction, and seeking the input of faculty and students regarding the outcomes of incorporating this approach in college classrooms. A variety of research methods are underway to bring rigor to these initiatives.

Conclusion

Change is in the air regarding the importance of teaching and efforts to promote innovative approaches to faculty development. College teaching is being taken more seriously as a result of pressure from diverse sources, including state legislatures, student consumers, the Carnegie Foundation for the Advancement of Teaching, and the American Association for Higher Education (Morgan, 2002; Seldin, 1995). The reward system that has historically pitted research against teaching is under scrutiny (Seldin, 1995). Diversity is reflected in a student population with more students from minority groups, more older students, more students who also work full time, more students with disabilities, and more first-generation college students (Greene, 1995; Henderson, 2001). With the convergence of such factors, the time is prime for creative endeavors that promote inclusive instruction.

As we continue our work on UDI, we enthusiastically invite the participation of all stakeholders in the process of exploring ways that <u>all</u> learners are assured instructional access. The task is daunting given its scope and complexity; yet, there are recommendations to guide us in this quest. Systemic change comes slowly and must involve administrators, faculty, graduate and undergraduate students (Ambrose, 1995). Leadership is critical to the promotion of teaching effectiveness and innovation, yet this is an era of extensive retirements and retrenchment. The effects of administrative turnover will require that change agents are responsive to institutional dynamics and campus culture.

Opportunities abound for ways to apply the concept of UD to instruction. An integral component of our recently awarded 2002 OPE grant is the creation of learning communities, groups of faculty and administrators who are committed to enhancing instruction for diverse learners (Scott & McGuire, 2003). The work of these communities is expected to contribute to the research base on UDI and its

efficacy and to expand the repertoire of faculty products available on Facultyware. The role of disability service providers warrants consideration in settings where UDI may create a context for a collaborative approach to instructional access. Although it will always be necessary to ensure that accommodations are provided, the dynamics in such settings may change from compliance to a collaborative model (Scott, Loewen, Funckes, & Kroeger, 2003). With resources on UDI available on an anytime, anywhere basis via Facultyware, mechanisms for seeking feedback from faculty users of the site are under discussion. The literature on effective faculty development programs underscores the importance of multiple approaches to meet individual preferences, schedules, and styles (Seldin, 1995; Scott & Gregg, 2000). Facultyware is designed with this in mind, and as it expands to include research on the efficacy of UDI, the potential for it to contribute to pedagogy and instructional access for students with disabilities is powerful.

References

Ambrose, S.A. (1995). Fitting programs to institutional cultures: The founding and evolution of the university teaching center. In P. Seldin and Associates, *Improving college teaching* (pp. 77-90). Bolton, MA: Anker Publishing Company, Inc.

American Council on Education. (2000). *Facts in brief: Enrollment in postsecondary education institutions increases, NCES report shows*. Washington, DC: Higher Education and National Affairs, American Council on Education. Retrieved June 12, 2000, from http://www.acenet.edu/hena/facts_in_brief/2000/02_28_00_fib.cfm

American Council on Education & American Association of University Professors. (2000). *Does diversity make a difference? Three research studies on diversity in college classrooms*. Washington, DC: Authors.

Armour, R. A. (1995). Using campus culture to foster improved teaching. In P. Seldin and Associates, *Improving college teaching* (pp. 13-25). Bolton, MA: Anker Publishing Company, Inc.

Baldridge, J., & Deal, T. (Eds.). (1983). *The dynamics of organizational change in education*. Berkeley, CA: McCutchan.

Center for Applied Special Technology. (1999). *Universal Design for Learning*. Peabody, MA: Author. Retrieved March 28, 2000, from www.cast.org.

Center for Universal Design. (1997). *The center for universal design: Environments and products for all people*. Raleigh, NC: North Carolina State University. Retrieved April 4, 2000, from http://www.ncsu.edu/ncsu/design/cud/index.html.

Chickering, A. W., & Gamson, Z. F. (1987). *Seven principles for good practice in undergraduate education*. Washington, DC: American Association for Higher Education. (ERIC Document Reproduction Service No. ED282491).

Follette Story, M., Mueller, J. L., & Mace, R. L. (1998). *The Universal Design file: Designing for people of all ages and abilities*. Raleigh, NC: North Carolina State University, The Center for Universal Design. Retrieved April 4, 2000, from http://www.ncsu.edu/ncsu/design/cud/pubs/center/books/ud_file/toc3b14.htm.

Fullan, M. (1991). *The new meaning of educational change*. New York: Teachers College Press.

Greene, J.A. (1995). Capitalizing on diversity in the classroom. In P. Seldin and Associates, *Improving college teaching* (pp. 103-113). Bolton, MA: Anker Publishing Company, Inc.

Henderson, C. (2001). *College freshmen with disabilities: A biennial statistical profile*. Washington, DC: American Council on Education.

Kameenui, E. J., & Carnine, D. (1998). *Effective teaching strategies that accommodate diverse learners*. Upper Saddle River, NJ: Prentice Hall.

Madaus, J.W., Scott, S.S., & McGuire, J.M. (2002a). *Addressing student diversity in the classroom: The approaches of outstanding university professors* (Universal Design for Instruction Project Technical Rep. No. 02). Storrs, CT: University of Connecticut, Center on Postsecondary Education and Disability.

Madaus, J.W., Scott, S.S., & McGuire, J.M. (2002b). *Barriers and bridges to learning as perceived by postsecondary students with learning disabilities* (Universal Design for Instruction Project Technical Rep. No. 01). Storrs, CT: University of Connecticut, Center on Postsecondary Education and Disability.

Pedhazur, E.J., & Schmelkin, L.P. (1991). *Measurement, design, and analysis: An integrated approach*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Scott, S.S., & Gregg, N. (2000). Meeting the evolving needs of faculty in providing access for college students with learning disabilities. *Journal of Learning Disabilities, 33*(2), 158-167.

Scott, S.S., Loewen, G., Funckes, C., & Kroeger, S. (2003). Implementing Universal Design in higher education: Moving beyond the built environment. *Journal of Postsecondary Education and Disability, 16,* 78-89.

Scott, S.S., & McGuire, J.M. (2003). *Universal Design for Instruction learning community fact sheet.* Storrs, CT: University of Connecticut, Center on Postsecondary Education and Disability.

Scott, S. S., & McGuire, J.M. (2001). *Universal Design for Instruction orientation materials.* Storrs, CT: University of Connecticut, Center on Postsecondary Education and Disability.

Scott, S.S., McGuire, J.M., & Embry P. (2002). *Universal Design for Instruction fact sheet.* Storrs, CT: University of Connecticut, Center on Postsecondary Education and Disability.

Scott, S.S., McGuire, J.M., & Foley, T. (2003). Universal Design for Instruction: A framework for anticipating and responding to disability and other diverse learning needs in the college classroom. *Equity & Excellence in Education, 36,* 40-49.

Scott, S.S., McGuire, J.M, & Shaw, S.F. (2001). *Principles of Universal Design for Instruction.* Storrs, CT: University of Connecticut, Center on Postsecondary Education and Disability.

Seldin, P. (1995). Improving college teaching. In P. Seldin and Associates, *Improving college teaching* (pp. 1-11). Bolton, MA: Anker Publishing Company, Inc.

Silver, P., Bourke, A., & Strehorn, K. (1998). Universal instructional design in higher education: An approach for inclusion. *Equity and Excellence in Education, 31*(2), 47-51.

Wlodkowski, R.J., & Ginsberg, M.B. (1995). *Diversity and motivation: Culturally responsive teaching.* San Francisco, CA: Jossey-Bass.

Ysseldyke, J.E., Algozzine, B., & Thurlow, M.L. (2000). *Critical issues in special education* (3rd ed.). Boston, MA: Houghton Mifflin.

About the Authors

Joan M. McGuire, Ph.D., is a professor of Special Education in the Department of Educational Psychology at the University of Connecticut, Co-Director of the Center on Postsecondary Education and Disability, and former director of the University's Program for College Students with Learning Disabilities. She specializes in postsecondary disability program development, administration, and evaluation; Universal Design for Instruction (UDI); professional development and training for postsecondary personnel; and assessment and documentation of learning disabilities in adults. Dr. McGuire has authored and coauthored more than 60 articles, has presented nationally and internationally at more than 100 professional meetings, and, with her colleagues, generated more than $2.9 million in grants and contractual funds. Dr. McGuire was previously the Co-Editor of the *Journal of Postsecondary Education and Disability.*

Sally S. Scott, Ph.D., is an Associate Professor in the Department of Educational Psychology at the University of Connecticut. She is the Co-Director of the Universal Design for Instruction Project, a federally funded, three-year grant from the U.S. DOE Office of Postsecondary Education. Current research interests include: college programming, services, and accommodations for individuals with learning disabilities; Universal Design for Instruction; and disability studies.

Stan F. Shaw, Ed.D., is a Professor and Coordinator of the Special Education Program in the Department of Educational Psychology at the University of Connecticut. He is also Co-Director of the Center on Postsecondary Education and Disability, and the Coordinator for the UConn's Annual Postsecondary Disability Training Institute. His primary areas of interest are professional development for postsecondary disability personnel, services for college students with disabilities, transition, disability policy and law, and teacher education.

[1] This work has been developed with support from the U.S. Department of Education, Office of Postsecondary Education (#PR333A990036). The opinions contained in this manuscript, however, do not necessarily reflect the viewpoints or policies of the USDOE.