

Note Taking and University Students With Learning Difficulties: What Supports Are Needed?

Ann Maydosz and Sharon A. Raver
Old Dominion University

Despite advances in electronic course delivery, most university content is still conveyed through class lecture, which necessitates note taking by students. At the same time, students with learning difficulties are entering universities in unprecedented numbers (Stodden, Conway, & Chang, 2003; Wilhelm, 2003). These students encounter high expectations for autonomous learning and may struggle when they attempt to quickly prioritize and record lecture information. Research on students with learning difficulties and note taking at the university level is limited but worthy of review. This article examines the literature on the utility of providing copies of instructors' notes to all students and the effect of instructor-provided notes on the academic performance of students with learning difficulties. Practical implications for current university teaching practice are offered.

Keywords: note taking, university students, learning difficulties

Students with learning difficulties are entering universities in greater numbers than ever before (Snyder & Dillow, 2010; Stodden, Conway, & Chang, 2003; Wilhelm, 2003). Students who face learning difficulties or challenges at the university level are those with identified disabilities such as learning disabilities or attention deficit disorder, which may affect how they acquire information. Despite innovations in instructional technology, class lecture remains the principal method for communicating course content to college students. Researchers have asserted that in taking notes, students relate lecture topics to their own background knowledge, which in turn may increase their comprehension of the topic and eventual synthesis and recall of the material presented (Brazeau, 2006; Castello & Monereo, 2005; DiVesta & Gray, 1972). Successful students typically review their lecture notes as part of their preparation for exams. In general, note taking is considered essential to student academic success (Kiewra & Benton, 1988; Titsworth, 2001).

Notwithstanding the importance of effective note taking, many students possess inadequate note-taking skills, creating incomplete and unrelated notes (Kiewra, 2002). In lecture settings, students typically record only 11–70% of the key information presented (Anderson & Armbruster, 1991; Kiewra, 1985). It is likely that students with learning difficulties record even less information (Boyle, 2007; Kirby, Silvestri, Allingham, Parrila, & La Fave, 2008; Suritsky & Hughes, 1991; Vogel, 1982), which may make note taking a critical deficit for college students who may already present risks for failure.

Students with disabilities must self-identify at university admission to receive official accommodations under the Americans With Disabilities Act (1990) and Section 504 of the Rehabilitation Act of 1973. In 2003–2004, 11.3% of undergraduates reported having a disability or special learning need (Katsiyannis, Zhang, Landmark, & Reber, 2009). To increase their access to an appropriate education, these students tend to be given broad accommodations, such as extended time on tests, and may be granted testing in a distraction-free environment to deal with undergraduate and graduate coursework (Wilhelm, 2003). Given the fact that many students will choose not to self-identify (Tincani, 2004; Vogel, 1982), may not qualify for accommodations despite high school services for a disabil-

Ann Maydosz and Sharon A. Raver, Department of Communication Disorders and Special Education, Old Dominion University.

Correspondence concerning this article should be addressed to Ann Maydosz, Department of Communication Disorders and Special Education, CSC 116, Old Dominion University, Norfolk, VA 23529-0136. E-mail: amaydosz@odu.edu

ity (Sparks & Lovett, 2009), or may try to use compensatory skills developed in high school, the precise number of unidentified students with disabilities at the university level is difficult to ascertain.

Whereas differentiation of instruction and curricula to meet the needs of diverse learners has become an expected practice at the elementary and secondary school levels, no such expectations exist in higher education (Scott, McGuire, & Shaw, 2003). Researchers have posited that college students at risk for academic failure might benefit from instruction in college survival skills such as note taking (Einstein, Morris, & Smith, 1985; Gettinger & Seibert, 2002; Simmons, 2006; Suritsky & Hughes, 1991). Unfortunately, learning strategy instruction at the university level, even for students with identified disabilities, is not commonplace (Gettinger & Seibert, 2002). As more course content is being made available to students through course delivery applications such as Blackboard, coupled with theoretical shifts such as the universal design of course work (Center for Applied Special Technology [CAST], 2007; Scott et al., 2003), it has now become less time consuming for instructors to provide copies of their notes to all students. Furthermore, the importance of this topic is enhanced by the fact that research on the efficacy of providing notes, the type of notes to provide, and the timing of the provision of lecture notes appears to be ambiguous (Hughes & Suritsky, 1993; Kobayashi, 2006; Mercer & Mercer, 2005; Raver & Maydosz, 2009; Suritsky & Hughes, 1991). Consequently, a summative examination of the topic may assist instructors in shaping their courses to meet the needs of a diverse population of learners.

Method

The research for this literature review was gathered in two phases in an attempt to provide both background on note taking at the university level and research on college students with disabilities and note taking. The first phase used the HM Wilson, EBSCOHost, PsycARTICLES, and PsycINFO databases, using peer-reviewed journals with both qualitative and quantitative research. The following search terms were used: *instructor-provided notes*, *instructor-supplied notes*, and *college students with learning diffi-*

culties or disabilities with note taking or teaching methods. Given that seminal articles on college students and note taking originated over 30 years ago, no date parameters were set. From the articles retrieved in this search, we reviewed the 50 articles that met the criteria of university-level instruction and student note taking. Articles that were retained addressed either note taking in general, difficulties with note taking, or students with learning difficulties and note taking.

Given the paucity of articles addressing students with learning difficulties, we conducted a second search using the specific disability terms *disabilities*, *learning disabilities*, and *attention-deficit/hyperactivity disorder (ADHD)* because learning disabilities and ADHD are high-incidence disabilities at the postsecondary level (Fichten et al., 2009). This search used the following databases: Journals @ Ovid Fulltext, PsycARTICLES, Academic Search Complete, PsycINFO, Psychology and Behavioral Sciences Collection, Teacher Reference Center, HM Wilson, Education Research Complete, Education Full Text Collection (Sage), and ERIC. Some of the databases proved sensitive to the space between *note* and *taking* in the term *note taking* and the terms *college* and *postsecondary* did not give the same results in all databases. Therefore, six main sets of parameters were deployed: (a) *postsecondary students with learning disabilities and note taking*, (b) *college students with learning disabilities and note taking*, (c) *postsecondary students with disabilities and note taking*, (d) *college students with disabilities and note taking*, (e) *postsecondary students with ADHD and note taking*, and (f) *college students with ADHD and note taking*. Disability services at the postsecondary level, unlike those given at the elementary and secondary levels under the Individuals With Disabilities Education Act (IDEA), do not require students to be identified under a disability category, only that students demonstrate a physical or mental impairment that substantially limits one or more life activities (Americans With Disabilities Act, 1990; Section 504 of the Rehabilitation Act Regulations, 1973). For this discussion, *learning difficulties* includes students who, where specified, were served for having a learning disability, ADHD, or a learning difficulty otherwise unspecified.

Furthermore, a hierarchical search method was used to identify additional relevant articles cited within articles located by the database searches. In sum, 41 articles were included in this review. This discussion is organized into four sections: note taking at the university level, note taking and university students with learning difficulties, the utility of instructor-provided notes, and recommendations for practice.

Note Taking at the University Level

Note taking is thought to be an important enhancement to the process of learning (Ruhl & Suritsky, 1995). Some researchers suggest that the act of taking notes engages students in learning tasks and deepens their understanding and ability to apply new material (Katayama & Crooks, 2003). In a seminal work on note taking, DiVesta and Gray (1972) proposed that taking and reviewing notes correspond to the encoding and external storage functions of the brain, respectively. The act of taking notes may have an influence on the encoding function of the brain by requiring students to prioritize and paraphrase information, which engages the learner's attention and moves the information into long-term memory (DiVesta & Gray; Katayama & Crooks, 2003; Suritsky & Hughes, 1991). The encoding of information may happen most effectively at the point of acquisition, as when students take their own notes (Kiewra, 1985). When examinations loom, the student must retrieve or recall the information that has been encoded and stored. According to Kiewra (1985), notes taken by individuals during a lecture, although often incomplete, are recalled more readily than those provided by the instructor. In their discussion of note taking, Castello and Monereo (2005) asserted that the function of note taking exceeds simple encoding and external storage analogies. They reported that note taking could be used as a strategic procedure that can promote knowledge reconstruction and transformation, resulting in cognitive change. Brazeau (2006) argued that active learning, a key aspect of student engagement, is reduced when students are not directly involved in the process of collecting and sorting information for note taking.

As an academic skill, note taking during a lecture requires self-regulation of a number of processes and abilities (Bonner & Holliday,

2006; Gettinger & Siebert, 2002). Suritsky and Hughes (1991) proposed that note taking requires the skills of listening, cognitive processing, recording lecture content in written form, and reviewing recorded information. Peverly and colleagues (2007) identified three processes hypothesized to be necessary for quality note taking: (a) transcription fluency, (b) verbal working memory, and (c) the ability to identify main ideas. As such, the ability of college students to take useful notes differs greatly. In several studies on student-taken notes for the inclusion of critical ideas, researchers have reported an accuracy range as low as 11% to a high of about 70% of critical information included in student-taken notes (Anderson & Armbruster, 1991; Hughes & Suritsky, 1994; Kiewra, 1985).

Note Taking and University Students With Learning Difficulties

Research on students with learning difficulties and their ability to perform college-level skills like note taking is limited. However, considering that university instructors are expected to be content area, not pedagogy, experts and have little preparation in how to teach students with disabilities (Scott et al., 2003), an understanding of college-level high-incidence disabling conditions such as learning disabilities and ADHD (Fichten et al., 2009) might be a useful first step in inferring the effect of learning difficulties on note taking. A summary of the empirical studies that address students with learning difficulties and note taking is presented in Table 1.

In a review of the literature, Sparks and Lovett (2009) reported that college students with learning disabilities typically have intelligence and achievement scores that fall within average ranges with the exception of language achievement scores, which tend to be lower. However, students with learning disabilities are likely to arrive at college with less college preparatory work than their peers without disabilities (Sparks & Lovett) and often have challenges related to auditory processing, reading, and writing skills (Ruhl & Suritsky, 1995). Glutting, Youngstrom, and Watkins (2005) evaluated the College Attention-Deficit Hyperactivity Disorder Response Evaluation, using the responses of 1,079 college students to find that

Table 1
Studies of Postsecondary Students With Disabilities and Note Taking

Authors	Participants	Method	Results
Hughes & Suritsky, 1993	30 students with learning disabilities and 30 students without disabilities	Comparison of students' notes for information recorded and use of abbreviations	Students with learning disabilities included 36% of total information units compared with 56% for students without learning disabilities; students with learning disabilities used fewer abbreviations and abbreviated fewer words and wrote more slowly than students without learning disabilities.
Mortimore & Crozier, 2006	62 students with dyslexia and 74 students without dyslexia	Survey regarding academic skill difficulties and use of resources	78% of the students with dyslexia reported difficulties with note taking as compared with 18% of students without dyslexia; 55 students with dyslexia reported that they'd like to have copies of the lecture notes compared with 21 of the students without dyslexia; 93% of the students with dyslexia reported needing lecture notes.
Ruhl & Suritsky, 1995	33 students with learning disabilities	Investigated use of a pause procedure or an instructor-provided outline on student notes	Students in the pause procedure group (2- to 3-min pauses during lecture) demonstrated better performance on an immediate free-recall test; students in the pause and outline + pause groups had more complete notes.
Suritsky, 1993	31 students with learning disabilities	Survey of note-taking difficulties, requests for accommodations, and suggestions for instructors	Note-taking skills: writing fast enough (3.30), paying attention (2.89), making sense of notes (2.87), deciding important information to note (2.57). Accommodations requested: outline of lecture (10%), discuss notes outside of class (10%), provide a copy of the instructor's notes (3%). Suggestions: provide lecture handouts/outlines (45%), decrease presentation rate (39%), identify important lecture points (39%), increase the use of overhead transparencies (16%), and ensure a match between lecture and test content (10%).

Note. Values in parentheses for Suritsky, 1993, are the students' report of level of difficulty (1 = no difficulty; 3 = some difficulty; 5 = extreme difficulty) of academic tasks using a 5-point Likert scale.

nearly 70% reported that they "daydreamed in class" and "avoided, disliked or were reluctant to engage in school tasks that required sustained mental effort" (p. 49). For students with ADHD, distractibility and the proclivity to attend to stimuli other than the lecture may cause the omission of important lecture information (Hecker, Burns, Elkind, Elkind, & Katz, 2002). Despite the IQ and achievement scores neces-

sary to attend college, the preparation, processing, skill, and executive function deficits of students with learning difficulties may significantly limit their ability to be effective note takers, which, therefore, may impede their performance in lecture classes.

The demands of accurately recording key aspects of a lecture may overtax students with attention and comprehension problems (Get-

tinger & Siebert, 2002; Hughes & Suritsky, 1993). Students with learning difficulties must quickly organize and record lecture information, all while maintaining adequate attention on the lecturer (Ruhl & Suritsky, 2005). Hughes and Suritsky (1993) interviewed university students with learning disabilities about note taking and found that writing fast enough, deciding what to write, making sense of their notes, and paying attention were the most often cited difficulties encountered. Some students reported that they attempted to write a verbatim transcript of the lecture. Kirby et al. (2008) compared the learning strategies and study approaches of students with and without dyslexia and found that students with dyslexia had significantly lower scores on the Selecting Main Ideas (i.e., ability to identify important information and details) and Test-Taking Strategies portions of the Learning and Study Strategies Inventory.

Students with learning difficulties may have deficits in fine motor skills, which may involve handwriting, and other areas necessary for quality note taking such as listening skills, cognitive processing, and problems in the organization and recall of information (Hughes & Suritsky, 1993, 1994; Mercer & Mercer, 2005). They may also have inadequate listening skills (Vogel, 1982; Williams & Eggert, 2002). Williams and Eggert (2002) found that when listening patterns were assessed, the range of students who could repeat what the instructor had just said ranged from 10% to 98%. Similarly, deficits in short-term auditory memory combined with lack of note taking strategies, such as using abbreviated common words, can cause students to miss critical lecture points.

Cognitive processing deficits, including poor phonemic awareness, may interfere with students' ability to accurately record unfamiliar vocabulary, an important skill in using notes for later study. This may be especially true when metaphors, idioms, or figures of speech are used or familiar words are used in a new context (Vogel, 1982). Kirby et al. (2008) reported that postsecondary students with dyslexia have particular difficulty with spelling, taking lecture notes, and synthesizing course material for examinations. In addition, students with learning difficulties may have problems accessing background knowledge or possess limited background knowledge of the topic, which affects

their ability to prioritize information during lectures (Anderson-Inman, Knox-Quinn, & Szymanski, 1999; Kiewra & Benton, 1988; Suritsky & Hughes, 1991).

Many students with learning difficulties have considerably fewer analytic and organizational skills than typical university students (Cukras, 2006) and are unaware of the strategies that are used automatically by academically competent students (Gettinger & Siebert, 2002), which may mean that they take inadequate notes during lecture classes. Hughes and Suritsky (1994) examined the lecture notes of 60 university students with and without learning disabilities for note completeness and the use of abbreviations. Note completeness was measured by the inclusion of cued information units (e.g., the instructor had verbally cued the students that the information was important) and noncued information units. The notes of the students with learning disabilities included 36% of the total information content of the lecture compared with 56% in the notes of the students without learning disabilities. Students with learning disabilities included only 46% of the cued information, whereas students without learning disabilities recorded 77%. Abbreviations used in note taking were measured in terms of total abbreviations employed and total number of words abbreviated. The students with learning disabilities used slightly over half as many abbreviated words (19) than did the students without learning disabilities (34). Clearly, a higher use of abbreviations means that students are more accurate in capturing what the instructor is teaching. Furthermore, the students with learning disabilities abbreviated fewer words overall (11) than the students without learning disabilities (18). A student who misses or misrecords key aspects of the lecture is at a considerable disadvantage when using his or her notes to review for an examination (Grabe, 2005).

Finally, Glenn et al. (1997) constructed a predictive model for learning disabilities based on a screening questionnaire for college students. The eight most predictive items for forecasting success at the college level were (a) pronouncing words, (b) comprehending mathematical word problems, (c) formulating summary statements, (d) spelling, (e) reading at a slow rate, (f) finishing tests in allotted time, (g) taking notes in lectures, and (h) falling asleep while reading (Glenn et al.). The literature suggests that students with learning difficulties are at risk for producing inadequate notes

during lecture-based classes. One way to address this potential deficit is to offer instructor-provided lecture notes.

The Utility of Instructor-Provided Lecture Notes

Not all instructors provide notes to the students in their courses (Stefanou, Hoffman, & Vilee, 2008). Instructors may be concerned that giving their notes may reduce attendance or infringe on their intellectual property rights (Hannon, 2008). Some instructors may be unaware of the accommodations typically accorded to students with disabilities (Katsiyannis et al., 2009) or may view students with disabilities as a distinct group from other students they teach who have a variety of learning needs (Barnard, Stevens, Siwatu, & Lan, 2008).

However, giving the instructor's notes in advance may reduce cognitive overload and allow students to use their auditory and visual skills to attend to the discussion, resulting in greater intake of information (Stefanou et al., 2008). Kiewra (1985) found that students who reviewed notes from the instructor achieved significantly higher scores on a delayed exam than those students who reviewed only their own notes. He concluded that, because of the faulty note-taking skills many students exhibit, students should be provided instructor notes and also should be encouraged to take their own notes for optimal performance. However, Kobayashi (2006) asserted that student notes, although not as complete as instructor notes, contained personally meaningful information that might aid in their recall, and that students who were given the instructor's notes could become dependent on the instructor and fail to become independent learners.

Student preferences in this area have been investigated. Bonner and Holliday (2006) conducted a qualitative study of 32 college students taking a 300-level genetics course. Students were provided copies of the instructor's transparencies and notes, as well as notes from the publisher of the text. Students reported that being provided notes was essential to the ultimate quality of their notes. This may be particularly important for students with disabilities. Fichten et al. (2009) surveyed 223 students with disabilities about the benefits and problems of electronic materials and learning in their courses

such as the accessibility of websites, use of course management systems, and accessibility of audio clips and videos. The most common benefit cited by students (41%) was availability of online course notes. Using survey research, Mortimore and Crozier (2006) studied 62 college students with dyslexia. The students reported that their greatest challenges were note taking, organizing essays, and using writing to express ideas. Students indicated that note taking had supplanted other educational difficulties such as spelling and organizing essays when they transitioned to college. The students reported that they would have liked to have lecture notes (48%) and copies of overheads (60%) but had not been given them. When students who had been given these resources were combined with those who wanted the resource, the percentages rose to 93% for the provision of the lecture notes and 88% for copies of the overheads. These students also reported that they struggled most frequently with taking notes while listening and watching and having the instructors talk too quickly and remove the notes before they were finished writing.

Note Taking and Academic Performance

Kobayashi (2006) conducted a meta-analysis involving 33 studies that examined the effects of note taking and learner performance. He found that instructor-provided notes significantly heightened the posttest scores of students who took and reviewed class notes. Kobayashi theorized that providing instructor notes to the students acted as a guide to cue them about the important information in the lecture. Similarly, Raver and Maydosz (2009) found that 154 undergraduate and graduate students in an introductory special education course who were given instructor-provided notes either before or after lectures performed at a statistically significant higher level on a posttest than students who were not provided instructor notes. In contrast, Murphy and Cross (2002) used a pre-posttest design to study the effect of providing the instructor's lecture notes to 400 biology students in a semester-long study. Although most of the students downloaded the notes, those who did not download the notes scored higher than those who did.

Providing Notes Before Versus After Lectures

Some researchers have hypothesized that having a set of instructor-provided notes available before a lecture would facilitate learning. For example, Grabe (2005) examined the effect of providing notes online in advance in an introductory psychology class. Data from 183 students on the frequency and pattern of notes usage, student attendance, and relationship to exam scores indicated that students who accessed the advance notes outperformed students who did not use the advance notes on two of three examinations. Along the same lines, Grabe and Christopherson (2007) studied 329 psychology students' use of advance and postclass notes and exam performance in three conditions: (a) partial notes (available in advance of the class), (b) complete notes (partial notes plus notes generated by a graduate teaching assistant available before the next class meeting), and (c) an audiotaped lecture (available before the next class meeting). Students accessed the advance partial notes most often, and 61% reported that they reviewed them. Furthermore, those students who accessed the partial notes in any format achieved higher examination scores on two of three examinations than those who did not.

Providing Instructor Notes and Attendance

Some instructors may be leery of posting notes before lectures because of the concern that students may not attend class. Much of the research regarding the timing of the presentation of the notes has found little connection between posting lecture notes in advance and decreases in class attendance (Grabe, 2005; Grabe & Christopherson, 2007; James, Burke, & Hutchins, 2006; Vandehy, Marsh, & Diekhoff, 2005).

It is apparent that more research is needed that examines faculty attitudes regarding the kinds of support they are most comfortable providing students with learning difficulties and which forms of support or accommodations are most effective. However, offering students the option of securing a copy of instructor's notes before or after lectures seems to have a positive impact on some learners. Students with learning difficulties have expressed that they find this practice highly beneficial, although the research exploring this question is limited.

Practice Recommendations

This literature review generated several suggestions for improving current practices for teaching a diverse body of college students. There are several modifications that instructors can effortlessly make to enhance the performance of students with, as well as those without, learning difficulties in lecture-based courses. Five recommendations are discussed.

First, the majority of the research suggests that providing instructor-developed lecture notes or handouts seems to benefit students' learning. These notes appear to ensure that some basic content is accurately recorded, and they aid in content recall that, consequently, improves performance on exams. Such notes are easy to generate now with the common use of presentation software such as PowerPoint. However, the research is divided about whether making these notes available before or immediately after lectures is most advantageous to students with learning difficulties. This question definitely warrants further study.

Second, students with learning difficulties have reported that slowing the pace of the instructor's lecture presentations assists them in more accurately taking notes. Building in appropriate pauses may allow students to clarify the lecture content with the instructor or another student, add words to notes already taken, or correct information as they are recording it (Suritsky & Hughes, 1991). Ruhl and Suritsky (1995) studied the effect of three 2-min pauses and an instructor-provided outline on immediate recall of lecture ideas and a measure of notes completeness when they studied college students with learning disabilities. Students in the pause-only condition exhibited higher scores on the free-recall measure than the outline and pause and outline-only groups. The completeness of notes measure indicated that the pause and outline and pause groups were superior to the outline-only group.

Third, students with learning difficulties have indicated that when the instructor identifies important lecture points, it tends to guide them in highlighting this material in their notes as well as assists them in prioritizing the content. Lecturers should write a word or phrase on the board, repeat critical information, or otherwise focus students' attention on information to cue

and guide students' note-taking efforts (Hughes & Suritsky, 1993; Suritsky & Hughes, 1991).

Fourth, increasing the use of visual aids such as PowerPoint, embedding video clips, and the use of a Smartboard during lectures may support the note taking of students who are challenged by quickly taking notes. The use of images, varying backgrounds on visuals, uncluttered slide formats, and embedded movies and websites can draw attention to the relevant points of the lecture (James et al., 2006), helping all students learn the material.

And finally, faculty attitudes toward students with disabilities or learning difficulties may also influence instructors' decisions to provide or not provide notes for these students. Barnard et al. (2008) found an inverse relationship between faculty acceptance of diversity and their attitudes toward disability. In other words, some faculty members may not view disability as a subset of the diverse student population that makes up today's campuses. Older students, part-time students working full-time jobs, and more students who are linguistically and cultural diverse contribute to the diversity of the student body but are not necessarily provided disability services. Vogel, Leyser, Wyland, and Brulle (1999) found that faculty were most willing to provide accommodations such as permission to record their lectures and least willing to provide outlines of their lecture notes to their students with learning disabilities. Such attitudes about disability may continue to be a barrier for students with learning difficulties. Conversely, Murray, Wren, and Keys (2008) found that 194 faculty members reported that they were willing to provide teaching accommodations such as copies of the lecture notes to students with learning disabilities. Common sense suggests that by providing lecture accommodations typically accorded to students with identified disabilities (e.g., allowing taping of lectures or copying of another student's notes) to all students, instructors are offering supports that will benefit every student in a class. Consequently, it seems reasonable to provide them to all students.

In addition, the literature suggests that struggling students may benefit from direct instruction in organizational skills, study skills, and the use of advance organizers (Einstein et al., 1985; Gettinger & Seibert, 2002). Simmons (2006) surveyed 254 students who reported that a study

skills course should be offered at community colleges. Eighty-nine percent of the respondents indicated that a study skills course should include instruction in note taking, 92.9% felt that ways to study should be included, and 85% desired instruction in time management skills. Such students could be taught to incorporate key ideas rather than attempting to record verbatim content, how to paraphrase key ideas, how to create outlines of material, and how to review notes after taking them to fill in missing information so that they are more prepared when they review before exams (Simmons, 2006; Suritsky & Hughes, 1991).

Today, there are a growing number of universities that offer short courses and workshops that train study skills, most of which involve note-taking skills, to freshmen and students who are experiencing academic challenges. These prepare students to recognize and respond to instructors' tone and organizational cues (e.g., the lecturer repeats information or uses other ways to emphasize information). Students should be taught to use abbreviations (e.g., =, &, +), to omit letters, to shorten words, and to abbreviate reoccurring lecture terms (e.g., toc = table of contents) to allow a greater volume of information to be recorded (Hughes & Suritsky, 1994).

These recommendations align with the tenets of universal design for learning (Scott et al., 2003). Universal design for learning, which was strongly underwritten in the most recent amendments to the IDEA (2004), holds that all instruction can be modified to provide greater access for all preschool, elementary, and secondary students. This philosophy of teaching espouses addressing the needs of diverse learners, including those with disabilities and providing opportunities for access, participation, and learning through a variety of modifications to traditional instructional methods (CAST, 2007). Although IDEA does not affect higher education, its principles and spirit should be guideposts for higher education. These recommendations may serve to alleviate some of the problems students with learning difficulties face as they progress through their college years.

Conclusion

Note taking at the university level has been studied for more than 30 years without conclu-

sive results. It has become clear, however, that note taking can be challenging for students with and without learning difficulties. There is no doubt that note taking is an expectation at universities and that taking notes appears to be more beneficial to learning than not taking notes at all (Kobayashi, 2006; Titsworth, 2001). Given that the university student population is growing more diverse each year, it is time for leaders in higher education to take an assertive role in ensuring that all instructors provide whatever is reasonable to support the academic performance of all students who enroll in their classes.

References

- Americans With Disabilities Act of 1990, 42 U.S.C. § 12101. (1990).
- Anderson, T. H., & Armbruster, B. B. (1991). The value of taking notes during lectures. In R. F. Flippe & D. C. Caverly (Eds.), *Teaching reading and study strategies at the college level* (pp. 166–194). Newark, DE: International Reading Association.
- Anderson-Inman, L., Knox-Quinn, C., & Syzmanski, M. (1999). Computer-supported studying: Stories of successful transition to postsecondary education. *Career Development for Exceptional Individuals, 22*, 185–212.
- Barnard, L., Stevens, T., Siwatu, K. O., & Lan, W. (2008). Diversity beliefs as a mediator to faculty attitudes toward students with disabilities. *Journal of Diversity in Higher Education, 1*, 169–175.
- Bonner, J. M., & Holliday, W. G. (2006). How college science students engage in note-taking strategies. *Journal of Research in Science Teaching, 43*, 786–818.
- Boyle, J. R. (2007). The process of note taking: Implications for students with mild disabilities. *The Clearing House, 80*, 227–230.
- Brazeau, G. (2006). Handouts in the classroom: Is note taking a lost skill? *American Journal of Pharmaceutical Education, 70*, 1–2.
- Castello, M., & Monereo, C. (2005). Students' note-taking as a knowledge-construction tool. *Educational Studies in Language and Literature, 5*, 265–285.
- Center for Applied Special Technology (CAST). (2007). *What is universal design for learning?* Retrieved from <http://www.cast.org>
- Cukras, G. G. (2006). The investigation of study strategies that maximize learning for underprepared students. *College Teaching, 54*, 194–197.
- DiVesta, F. J., & Gray, G. S. (1972). Listening and note taking. *Journal of Educational Psychology, 63*, 8–14.
- Einstein, G. O., Morris, J., & Smith, S. (1985). Note-taking, individual differences, and memory for lecture information. *Journal of Educational Psychology, 77*, 522–532.
- Fichten, C. S., Ferraro, V., Asuncion, J. V., Chwojka, C., Barile, M., Nguyen, M. N., . . . Wolforth, J. (2009). Disabilities and e-learning problems and solutions: An exploratory study. *Educational Technology & Society, 12*, 241–256.
- Gettinger, M., & Seibert, J. K. (2002). Contributions of study skills to academic competence. *School Psychology Review, 31*, 350–365.
- Glenn, J., Eslinger, P., Chinchilli, V., Eittington, N. J., Martel, J., Salisbury, J., . . . Deegan, D. (1997). Validation of a questionnaire to screen university students for learning disabilities. *Advances in Health Sciences Education, 2*, 213–220.
- Glutting, J. J., Youngstrom, E. A., & Watkins, M. W. (2005). ADHD and college students: Exploratory and confirmatory factor structures with student and parent data. *Psychological Assessment, 17*, 44–55.
- Grabe, M. (2005). Voluntary use of online lecture notes: Correlates of note use and note use as an alternative to class attendance. *Computers and Education, 44*, 409–421.
- Grabe, M., & Christopherson, K. (2007). Optional student use of online lecture resources: Resource preferences, performance and lecture attendance. *Journal of Computer-Assisted Learning, 24*, 1–10.
- Hannon, C. (2008). Paper-based computing. *Education Quarterly, 4*, 15–16.
- Hecker, L., Burns, L., Elkind, J., Elkind, K., & Katz, L. (2002). Benefits of assistive reading software for students with attention disorders. *Annals of Dyslexia, 52*, 243–272.
- Hughes, C. A., & Suritsky, S. K. (1993). Notetaking skills and strategies for students with learning disabilities. *Preventing School Failure, 38*, 7–12.
- Hughes, C. A., & Suritsky, S. K. (1994). Note-taking skills of university students with and without disabilities. *Journal of Learning Disabilities, 27*, 20–24.
- Individuals With Disabilities Education Improvement Act, 20 U.S.C. § 1400 *et seq.* (2004).
- James, K. E., Burke, L. A., & Hutchins, H. A. (2006). Powerful or pointless? Faculty versus student perceptions of PowerPoint use in business education. *Business Communication Quarterly, 69*, 374–396.
- Katayama, A. D., & Crooks, S. M. (2003). Online notes: Differential effects of studying complete or partial graphically organized notes. *Journal of Experimental Education, 71*, 293–312.
- Katsiyannis, A., Zhang, D., Landmark, L., & Reber, A. (2009). Postsecondary education for individuals with disabilities. *Journal of Disability Policy Studies, 20*, 35–45.

- Kiewra, K. (1985). Providing the instructor's notes: An effective addition to student note-taking. *Educational Psychologist, 20*, 33–39.
- Kiewra, K. (2002). How classroom teachers can help students learn and teach them how to learn. *Theory Into Practice, 41*, 71–80.
- Kiewra, K., & Benton, S. L. (1988). The relationship between information processing ability and note taking. *Contemporary Educational Psychology, 13*, 33–44.
- Kirby, J. R., Silvestri, R., Allingham, B. H., Parrila, R., & La Fave, C. B. (2008). Learning strategies and study approaches of postsecondary students with dyslexia. *Journal of Learning Disabilities, 41*, 85–96.
- Kobayashi, K. (2006). Combined effects of note-taking/reviewing on learning and the enhancement through interventions: A meta-analytic review. *Educational Psychology, 26*, 459–477.
- Mercer, C. D., & Mercer, A. R. (2005). *Teaching students with learning problems* (7th ed.). Upper Saddle River, NJ: Pearson.
- Mortimore, T., & Crozier, W. R. (2006). Dyslexia and difficulties with study skill in higher education. *Studies in Higher Education, 31*, 235–251.
- Murphy, T. M., & Cross, V. (2002). Should students get the instructor's lecture notes? *Journal of Biological Education, 36*, 72–75.
- Murray, C., Wren, C., & Keys, C. (2008). University faculty perceptions of students with learning disabilities: Correlates and group differences. *Learning Disability Quarterly, 31*, 95–113.
- Peverly, S. T., Ramaswamy, V., Brown, C., Sumowski, J., Alidoost, M., & Garner, J. (2007). What predicts skill in lecture note taking? *Journal of Educational Psychology, 99*, 167–180.
- Raver, S. A., & Maydosz, A. (2009). *The impact of the provision and timing of instructor-provided notes on the learning of university students*. Unpublished manuscript.
- Rehabilitation Act of 1973; 29 U.S.C. §§ 794 *et seq.* (1973).
- Ruhl, K. L., & Suritsky, S. (1995). The pause procedure and/or an outline: Effect on immediate free recall and lecture notes taken by college students with learning disabilities. *Learning Disability Quarterly, 18*, 2–11.
- Scott, S. S., McGuire, J. M., & Shaw, S. F. (2003). Universal design for instruction: A new paradigm for adult instruction in postsecondary education. *Remedial and Special Education, 24*, 369–379.
- Simmons, M. (2006). Effective study skills for postsecondary education. *College Quarterly, 9*(2), 1–8.
- Snyder, T. D., & Dillow, S. A. (2010). *Digest of educational statistics 2009*. NCES 2010–013. Washington, DC: National Center for Education Statistics, U.S. Department of Education. Retrieved from <http://nces.ed.gov/pubs2010/2010013.pdf>
- Sparks, R. L., & Lovett, B. J. (2009). College students with learning disabilities diagnoses: Who are they and how do they perform? *Journal of Learning Disabilities, 42*, 494–510.
- Stefanou, C., Hoffman, L., & Vielee, N. (2008). Note-taking in the college classroom as evidence of generative learning. *Learning Environment Resources, 11*, 1–17.
- Stodden, R., Conway, M., & Chang, K. (2003). Findings from the study of transition, technology, and postsecondary supports for youth with disabilities: Implications for secondary school educators. *Journal of Special Education Technology, 18*(4), 29–44.
- Suritsky, S. K. (1993). Notetaking difficulties reported by university students with learning disabilities. *Journal on Postsecondary Education and Disability, 10*, 3–10.
- Suritsky, S. K., & Hughes, C. A. (1991). Benefits of notetaking: Implications for secondary and postsecondary students with learning disabilities. *Learning Disability Quarterly, 14*, 7–18.
- Tincani, M. (2004). Improving outcomes for college students with disabilities: Ten strategies for instructors. *College Teaching, 52*, 128–132.
- Titworth, B. S. (2001). The effects of teacher immediacy, use of organizational lecture cues and students' notetaking on cognitive learning. *Communication Education, 50*, 283–297.
- Vandehey, M., Marsh, C. M., & Diekhoff, G. M. (2005). Providing students with instructors' notes: Problems with reading, studying and attendance. *Teaching of Psychology, 32*, 49–51.
- Vogel, S. A. (1982). On developing LD college programs. *Journal of Learning Disabilities, 15*, 518–528.
- Vogel, S., Leyser, Y., Wyland, S., & Brulle, A. (1999). Students with learning disabilities in higher education: Faculty attitude and practices. *Learning Disabilities Research & Practice, 14*, 173–186.
- Wilhelm, S. (2003). Accommodating mental disabilities in higher education: A practical guide to ADA requirements. *Journal of Law and Education, 32*, 217–237.
- Williams, R. L., & Eggert, A. C. (2002). Notetaking in college classes: Student patterns and instructional strategies. *Journal of General Education, 51*, 173–199.

Received June 9, 2009

Revision received May 18, 2010

Accepted May 18, 2010 ■