The Nature and Effectiveness of Learning Disability Services for College Students

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This article summarizes the research literature that describes the nature and effectiveness of services that are provided to college students with learning disabilities. Six categories of services are described: assistive technologies and programs, program modifications, therapy and counseling, strategy training, direct academic assistance, and interventions designed to strengthen weak academic skills. Nearly all of the literature that was examined fell within the first 5 categories, with only 3 studies describing efforts to directly improve the academic performance that identified a student's learning disability. In addition, there is almost a total lack of evidence showing that any of the first 5 categories of services resulted in improved academic performance. There was, however, evidence that attempts at improving academic skills resulted in improved academic performance. The article concludes with a discussion of the role that learning disability services should play in a college environment.

\textbf{KEY WORDS:} learning disabilities, learning disabilities services; college students.

Research directed at developing effective procedures for assisting the academic learning of students with learning disabilities has increased dramatically in recent years. The vast majority of this research has been concerned with assisting younger students. There is, however, an increasing need for techniques that assist older students with learning disabilities. This article summarizes the research literature concerned with assisting the academic performance of college students with learning disabilities. The first section of the article documents the lack of research with older students, examines the consequences of having a learning disability for students who enter

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college, and then briefly discusses the general availability of services in U.S. and Canadian universities. The remaining sections of the article describe the nature of services provided to students with disabilities and discuss the advantages and disadvantages of the different types of services. Where available, the article also reviews evidence regarding the effectiveness of those services.

Before beginning the literature review, several clarifications regarding terminology are in order. Throughout the article we discuss learning disabilities in general, but it should be understood that in the vast majority of the cases the area of disability is reading. When we make specific reference to reading problems, we describe those problems as involving a “specific reading disability.” Many of the studies we review use “dyslexia” rather than specific reading disability. For the purposes of this article, the two terms are synonymous.

RESEARCH EMPHASIS ON COLLEGE STUDENTS

The bulk of research in the field of learning disabilities has concentrated on children and adolescents, with comparatively little research involving adults. Only 13% of the articles published in the Journal of Learning Disabilities and 28% of those published in Learning Disabilities Quarterly in 1990 focused on adults (Patton and Polloway, 1992). In a follow-up survey by the authors it was found that for the Journal of Learning Disabilities 10% of the articles focused on adults in 1997, 71% of these focused on college students; in 1998 16% focused on adults, 70% of these focused on college students; and in 2000 12% focused on adults, 60% of these focused on college students. The figures for Learning Disability Quarterly were 10% adult focus in 1997 (all looking at college students), 0% in 1998, and 10% in 2000, again all of them regarding college students. It seems that the emphasis on adult populations and, specifically, college students is not increasing, if the rate of reporting in these major journals is to be taken as a reasonable indication of the actual state of affairs.

NUMBERS OF STUDENTS IN COLLEGE WITH LEARNING DISABILITIES

Students with learning disabilities attend college less frequently than do their peers without disabilities. Part of the reason for differences in college attendance between students with and without disabilities involves differences in aspirations. White et al. (1982) reported that 84% of high school students
without a disability had plans for further education whereas only 67% of high school students diagnosed with a learning disability described educational aspirations beyond high school. These numbers have increased substantially since that time, but the attendance rates of students with learning disabilities are still lower in postsecondary institutions than in the population at large (Henderson, 1999; Sergent et al., 1988).

Consistent with lower aspirations, students with learning disabilities often enroll in training programs rather than going to college. For instance, Fourquerean et al. (1991) found that 17% of their sample of students identified as being learning disabled attended college and that 9% attended vocational-technical school whereas 35% attended job training or training through military service. Martin's study reported even lower levels of students with learning disabilities attending college (Martin, 1996). He placed the percentages at 19% attending vocational school, 14% attending a 2-year college, and a mere 4% attending 4-year colleges. A study by Wagner (1989, as cited in Gregg, 1996) estimated that only 17% of students diagnosed as having a learning disability participated in postsecondary education and only 9% in 2- or 4-year colleges, as compared to 50% of students without disabilities attending postsecondary institutions. Other studies have shown that attendance rates are higher and are increasing faster in 2-year community colleges than in 4-year institutions (HEATH Resource Center, 1993).

Other studies also estimate the number of college students with learning disabilities at around 10% or less of the population. Houck et al. (1992) cite figures estimating the percentage of college students having learning disabilities as being somewhere between 3 and 11%. Astin et al. (1988, as cited in Vogel and Adelman, 1992) reported 1% of all freshmen claiming to have a learning disability, but Vogel and Adelman (1992) estimated that the percentage was much greater because of the exclusion of part-time and transfer students from the data set. In a more recent study, Vogel et al. (1998) conducted a survey of nearly 150 colleges and universities and found averages between 1 and 3% for the percentage of students claiming to have a learning disability, on the basis of the type of institution, with the lowest percentage found in public universities and the highest in 4-year independent colleges. The number of unreported cases undoubtedly adds to the total.

Although there is some disagreement about the actual number of college students who have a learning disability, there is general agreement that the numbers are increasing. In 1978, 3% of college freshmen reported disabilities whereas by 1991 9% did. The vast majority of this increase involved students with learning disabilities (Henderson, 1992). Taking the enrollment examination farther and examining only students with learning disabilities, Henderson (1999) found that the number of students reporting having a learning disability rose from 2% in 1991 to 4% in 1998.
The increase is attributed to several factors (Day and Edwards, 1996). The first was the passage of Section 504 “E” of the Rehabilitation Act of 1973, which made accessibility to postsecondary education for students with disabilities mandatory. This act was followed by the passage of PL 94-142 in 1975, mandating elementary and secondary education for children with learning disabilities. Improvements in educational accessibility in primary and secondary school allowed increasing numbers of students with learning disabilities to complete the coursework that enabled college admission.

Two other factors contributing to the growing numbers of students with learning disabilities being admitted to college are (a) the increased knowledge students have regarding their rights and options and (b) the fact that colleges have become more active in recruiting students with disabilities. Advocacy groups and other entities have contributed to the increasing awareness of students with disabilities by preparing guidebooks that inform students about the legal ramifications of their status, resulting in more students taking advantage of opportunities available to them. Colleges have also felt pressure to expand their recruiting efforts beyond traditional markets, and this pressure, accompanied by an increased use of computers and compensatory technology that allow more students to succeed independently, has made students with learning disabilities more attractive candidates for college admission.

Several other reasons for the increased enrollment of students with learning disabilities in college come from Strichart and Mangrum (1985). They note that high school programs have extended into colleges, thereby allowing secondary students to acquire experience in completing college level coursework. Students have also become increasingly aware of improved job opportunities that accompany postsecondary education, and this has produced greater desire to go to college.

Admissions for students with learning disabilities often involve the consideration of additional factors that tend not to be emphasized with students who are not disabled. From the Vogel et al. (1998) survey, it was found that only 45% of the institutions examined used the same admissions procedures for their students with learning disabilities as they did for the rest of the student body. Other institutions used additional reviews, modified standards, or even separated admission procedures to increase the chances that students with disabilities would be admitted. Additionally, many perspective college students now have the possibility of taking college admissions tests under modified conditions (Pitonak and Royer, 2001). This compensation might increase the enrollment of college students with learning disabilities in two ways. First, students with learning disabilities might be more likely to achieve good test scores with modified conditions. Second, more students might participate in the college admissions process if they believe they
have a reasonable chance of achieving a test score high enough to warrant admission.

ENROLLMENT PATTERNS AND INDICATORS OF SUCCESS FOR COLLEGE STUDENTS WITH LEARNING DISABILITIES

College students with learning disabilities display course enrollment patterns that are different from their classmates without disabilities. They tend to congregate in fields that place the least burden on areas of weakness, usually the fields of reading and writing (Johnston, 1984). Wilczenski (1993) found that students with learning disabilities, when compared with their peers, enrolled more frequently in the fine arts, social and behavioral sciences, and physical education than they did in other fields. An earlier study by Critchley (1973, as cited in Johnston, 1984) also found a preference for drama, music, and dance as majors. More recently, however, Henderson (1999) found that the preferences for certain types of majors are no longer as different between the populations of college students with and without disabilities as they were in the earlier studies.

Even though they self-select into fields that have a tendency to minimize the academic impact of their disability, college students with learning disabilities still tend to perform more poorly academically than their peers (Brinckerhoff et al., 1992; Cohen, 1984; Gregg, 1996; Vogel and Adelman, 1990; Wilczenski and Gillespie-Silver, 1992). Cowles and Keim (1995), for example, found that only 24% of the diagnosed students in their sample graduated from college compared with 43% in the general student body after 6 years, and most of those who graduated had received special support services. Other studies have documented poorer grades among students with learning disabilities but have reported they share the same dropout rates and rates of academic failure as their peers without disabilities (Vogel and Adelman, 1990, 1992; Wilczenski, 1993). Hurst and Smerdon (2000) report that students with learning disabilities are less likely to achieve an associate’s or a bachelor’s degree within 4 years when compared with the rest of the college population but that they are more likely to earn a certificate.

Students with learning disabilities have a variety of problems that contribute to their poorer academic performance. Because of the nature of their disabilities, they almost always need to spend more time and energy on their studies than do their peers (Bireley and Manley, 1980). Available study time is often a valuable commodity in college settings and making less efficient use of it is often a burden and a source of discouragement. In some cases, there may not be an adequate amount of time available for studying all
the coursework effectively regardless of the students’ best efforts. In addition, students with learning disabilities often have reading comprehension problems and other learning difficulties accompanied by unrealistic (usually overly optimistic) views of their abilities. Finally, they often have great difficulty in discovering methods that they can use to increase their academic performance despite these problems, which can easily lead to feelings of frustration and helplessness (Bireley and Manley, 1980).

THE LINK BETWEEN SERVICE AVAILABILITY AND ACADEMIC PERFORMANCE

Strichart and Mangrum (1985) suggest that virtually all students with learning disabilities require some degree of remedial services and that their relatively poor college performance is often attributable to colleges being less supportive of their needs than were their former elementary and secondary schools. Furthermore, Cowles and Keim (1995) suggested that there is a direct link between the likelihood that a student with a learning disability will graduate from college and the availability of support services for students with learning disabilities.

It is certain that the college environment has become more supportive since Strichart and Mangrum (1985) carried out their research. For example, Vogel et al. (1998) found that approximately 60% of the institutions they surveyed had established support services for students with disabilities between 1985 and the time of their survey. Nonetheless, most institutions generally place the burden of success primarily upon the shoulders of students. On the other hand, many elementary and secondary environments place that burden, to a greater degree, upon the teachers and support staff, who assist the students in obtaining the help they need (Brinckerhoff et al., 1992). Not only are college students who seek learning assistance personally responsible for identifying and acquiring services and appropriate testing, oftentimes they must pay for the help they receive. Because of this, a significant number of students do not report their problems and go through their college careers unassisted (Levinson, 1986). The low reporting rates of problems cited by Henderson (1999) suggest that this is still the case.

There is also a problem with availability of services. A study by McKee (1987, as reported in Cox and Klas, 1996) showed that 10% of Canadian colleges and universities have no learning disabilities services whatsoever and that only 16% have a written policy to deal with the issue. The situation is similar in U.S. schools. As of 1997, only 23 U.S. colleges and universities had Internet sites that specifically advertised a program for students with learning disabilities (LD Resources, 1997). Moreover, in 2000, 72% of all
institutions reported that they enrolled no students with learning disabilities (Hurst and Smerdon, 2000).

In the late 1980s, many colleges claimed to offer support services for students with learning disabilities, but in reality merely offered programs such as study skills enhancement that were directed at the entire student body (McGuire and Shaw, 1987; Strichart and Mangrum, 1985). More recently, the programs themselves have become less ephemeral, but their quality is highly variable. Because of administrative fiat, changes in funding, and changes in the image that the institution is trying to project, programs that were good one year can become a haphazard mix of services the next (Small, 1996).

For those students who are able to access specialized services, the important questions are what types of services are available and whether these services improve their ability to function in the college environment. The sections that follow address these questions by examining the research literature regarding the kinds of services that are available and the extent to which the provided services improve the ability of students to function in college environments.

SERVICES FOR COLLEGE STUDENTS WITH LEARNING DISABILITIES

Students with learning disabilities are legally guaranteed equal educational access, but there is dissention in educational circles as to what constitutes such equality. Basically, there are two approaches that institutions take when addressing the question of equal access. One is to change the student so that he or she is fully capable of functioning in any educational environment, and the second is to change the educational environment so that the student can succeed despite his or her disability.

There are reasons for preferring the first approach to the second. If the student's disability can be corrected by directly improving academic skills or by teaching compensatory strategies, then the student is empowered to succeed in any learning situation. In contrast, if the learning environment is changed to allow the student with a disability to succeed, then there is no guarantee that the student is capable of succeeding in an environment that has not been altered. There is also the troubling question of whether success in a modified educational environment is equivalent to success in an unaltered environment. For example, is a student who has succeeded in an altered environment equally adept at transferring his or her academic learning to the job place as would a student who has succeeded in an unaltered environment?

On the other hand, it may reasonably be argued that most college students with disabilities had access to programs designed to improve their
skills and to develop strategies throughout their elementary and secondary years, and that if their disabilities were not "corrected" by the time they entered college, there is no reason to expect correction from interventions occurring during postsecondary education. This argument assumes that adequate interventions were applied in the precollege educational settings, an assumption outside the scope of this article.

There is also the philosophical issue that, after students enter college, education is no longer considered a right of all students but a privilege available to those students qualified to complete college-level work (Navicky, 1998). Because of this belief, colleges are not under the same obligations that elementary and secondary schools are to supply remediation and make vast changes to accommodate individuals with learning disabilities. It can be argued that students who require extensive aid to succeed at the college level may not be prepared for college work in the first place, and that the college need not make accommodations to assist them. It is the authors' opinion that such beliefs are not entirely unwarranted but that certain modifications that give students with disabilities a boost toward success are definitely worthwhile.

The research literature we examined describes both approaches that attempt to change either the environment or the student. The approaches for changing the academic environment in an effort to increase the likelihood that a college student with a learning disability succeeds consist of (a) providing students with disabilities with assistive technologies and programs, (b) creating changes in programs of study, and (c) providing students with direct academic assistance in the form of tutoring and special help. Approaches that are directed at changing the student include (a) providing therapy and counseling, (b) teaching students to use learning strategies, and (c) designing programs to strengthen weak academic skills. The reader should note that it is often the case that an assistance program at a given college or university includes more than one of the intervention types. The literature describing each of these approaches is summarized below.

ENVIRONMENT CHANGING APPROACHES

Assistive Technologies and Programs

The research literature describes a variety of assistive technologies and programs that are designed to put students with learning disabilities on more even ground with their peers who do not have disabilities. The category consists of technologies such as taped texts and proofreading programs that assist students in learning but also includes readers and note-takers that serve
a similar purpose. A common characteristic among assistive technologies and programs is that they are designed to make learning easier for the student with a disability by eliminating the necessity to use weak academic skills. For instance, taped texts eliminate the need to read, and scribes eliminate the need to write. It should be noted, however, that the technologies do not eliminate the need to perform the cognitive activities that drive the academic skill. Individuals with reading disabilities who listen to tape recordings of assigned texts still must comprehend what they are listening to, and those with writing disabilities still must plan and phrase the content that they dictate to scribes.

Perhaps the most common of the assistive technologies is the use of textbooks that are prerecorded onto audiotape, a method used in 69% of the schools surveyed by Yost et al. (1994) and at 55% of those surveyed by Hurst and Smerdon (2000). These tapes are potentially helpful for students with reading difficulties because they significantly reduce the burden of extracting information from printed text. A major problem with this technology, however, is that many students still find it difficult to separate important and lesser important material when listening to taped texts (Vogel, 1982). Additionally, there is the problem that the students are not practicing reading the subject material in question, thereby reducing or eliminating practice of a valuable skill that they might otherwise be acquiring. Of course, there is also the problem of availability, because it is likely that many of the textbooks and other materials students need have not been put on tape, especially if they are recently published.

Another assistive method for overcoming reading problems is the use of readers, a method that 69% of Yost et al.'s and 69% of Hurst and Smerdon's institutions employed (Hurst and Smerdon, 2000; Yost et al., 1994). Readers work much as taped texts do, with a live person substituting for the audio equipment. The use of readers allows the student to ask questions and seek help in identifying material that is most important and eliminates the problem of text being unavailable on tape. Disadvantages with the use of live readers are that the readers must be knowledgeable in the content area and have a large amount of available time. These conditions are sometimes difficult to meet, especially the time restriction when a student has a large and pressing reading assignment. In addition, there is the problem that the intervention reduces the need for the student to develop reading experience.

Other less commonly implemented assistive technologies and programs to help students with a variety of learning disabilities are offered by Raskind (1993, 1994). He includes various computer programs, such as word processors with spell checkers, proofreading programs, outlining programs, speech sensitive programs, personal data managers, and databases. Raskind also
describes a variety of technologies such as optical character recognition systems hooked to speech synthesizers that machine-read textbooks, and variable speech control tape recorders that allow students to slow down lectures and glean more information from them. These technologies are available at some colleges and universities (Day and Edwards, 1996). Hurst and Smerdon (2000) report that 58% of the institutions they surveyed provide access to at least one of these specialized technologies.

Some of these technologies such as spell checkers are useful tools that do not eliminate the need to engage in academic activities such as reading and writing. Others such as speech sensitive programs are far more elaborate and expensive, and can limit the practice of skills the student might otherwise be acquiring.

Recent legislation, such as Section 504 “E” of the Rehabilitation Act, the Technology-Related Assistance for Individuals with Disabilities Act, and the Americans with Disabilities Act, has set the stage for situations where the lack of provision of assistive technologies could result in litigation against the institution (Day and Edwards, 1996). California has started a statewide program for the institutionalized use of such technologies in assisting students with learning disabilities and several other colleges are following their lead (Day and Edwards, 1996). The large interest in such interventions, coupled with the stated interest of many postsecondary institutions in advanced technology, makes it probable that assistive technologies will soon become one of the most readily available interventions.

An example of how assistive technology is used in colleges is the case of the Omni 3000 reading machine used at Howard Community College (Yang, 1999). This is an advanced PC-based reading machine which incorporates text-to-speech software that reads text clearly while displaying the text and images as they appear on the page. At Howard Community College, the expensive system was available on only three workstations at the time of Yang’s article, with several dozen students making regular use of it. The program administrators have not collected any quantitative data, but they were convinced through anecdotal information that the system increased students’ ability to read and write on their own.

Clearly, however, there are vast monetary constraints associated with systems such as the Omni 3000. In the case of Howard Community College, only three students could use the system at any given time, and only in a particular place. Other technologies may be available that students can use in a place of their choice, but these are undoubtedly less sophisticated and, presumably, less helpful.

To sum up, assistive technologies and programs have a number of possible advantages, which include the following: making it possible for students with disabilities to succeed in the college classroom, allowing for
independent work without the assistance of human instructors, and providing success where other methods have failed (Raskind, 1994). These advantages must be balanced, however, by the possibility that once students leave the controlled college environment, they may be worse off than they would have been without assistance because they have become reliant on technologies that are no longer available to them. As an example, students with disabilities find ready access to devices such as spell checkers upon leaving college, but they may not find ready access to personal readers, taped texts, or optical character recognition systems with speech synthesizers upon entering the job market.

Program Modifications

Program modifications are services that change some portion of a college course or program of study in a manner that makes it easier for the student with a disability to succeed. Testing procedures are the most frequently changed aspect of courses. The basis for changing examination conditions is the belief that altered conditions can provide students with disabilities with an environment more favorable for academic success than can standard test conditions.

The most common testing modification is the use of extended or unlimited time, which, Hurst and Smerdon (2000) report, is used in 88% of the institutions they surveyed. This testing modification is implemented extensively because it is much easier to implement than other methods (Brinckerhoff et al., 1992). It is also the intervention recommended by a large number of experts in the field (Vogel, 1982), and it has been used since concern for college students with disabilities began to draw attention (Working Party on the Needs of the Dyslexic Adult, 1974).

The empirical basis for the provision of extra time comes from studies that examine the consequences of providing both students with and without disabilities with extra time on tests. Runyan (1991), for example, found that giving students with learning disabilities extra time on reading comprehension tests resulted in an improvement in their performance. In contrast, students without disabilities who were provided with extra time showed little change in their scores. Runyan (1991) used these data to support the view that extended time gives the students with a disability an even chance at succeeding in college courses. A similar study (Hill, 1984, as cited in Runyan, 1991) found that extended time on the ACT also reduced score gaps between students with and without disabilities. On the other hand, Jarvis (1997) found that although the untimed performances among students with learning disabilities improved to the level of the timed performances of students without disabilities on multiple-choice and short-answer tests, when the tests were
untimed for everyone, the students without disabilities benefited more than the ones with disabilities.

As the results of Jarvis' study suggest, there are controversial issues regarding the fairness of allowing one group of students more time than another to complete a test (Jarvis, 1997). We personally are concerned about whether the construct being measured by the test changes as a function of changing testing time and about how to decide the appropriate extra time to give to students with learning disabilities who may differ markedly in the severity of their disability. An examination of the psychometric, legal, and social policy issues surrounding the provision of additional time to complete tests is found in a recently published article by Pitoniak and Royer (2001).

Another test modification procedure involves providing a personal proctor during examinations. Allard et al. (1987) recommend allowing students with disabilities to take examinations alone with a proctor as a means of reducing distractions in group examination settings. Provision of this modification might be difficult as individual proctors might be in short supply. In addition, we have found no evidence in the literature that documents the extent to which personal proctors actually help students with disabilities achieve their optimal performance, especially in the absence of other test modifications.

Another test modification involves changing the format of the test for the student with a disability relative to the format for the rest of the class. Vogel and Sattler (1981, as cited in Vogel, 1982) recommend the use of essays as opposed to objective exams and the use of alternative methods to testing to gage performance among students with disabilities. Allard et al. (1987) also recommend the use of oral or taped exams and acceptance of taped rather than written answers. In some cases, such as when the test provides an insurmountable barrier to a student who would otherwise succeed, test modifications of this sort may even be required by law (Brinckerhoff et al., 1992).

There are, however, several problems with modifying test formats. The first is that it is often difficult to make a test using a different format that measures the same construct as the general test. Another related issue is that specialized tests may be graded differently than a standard test. As an example, it is unreasonable to allow all students in a class to hand in tape-recorded answers to tests, or even to allow all the students in large classes to submit essay answers. In situations where these provisions are made for select students, there is no guarantee that the grading metric is the same for the differing test formats. Because of this, test form modifications may end up being quite unfair to either group of students.

A final program modification, one that does not involve the changing of tests, is the changing of the college experience itself. As an example, Allard
et al. (1987) recommend allowing students who have disabilities more time (in semesters) to complete the necessary coursework than would normally be allowed. This allows them to spend more time on each individual course, thereby creating more of a match between ability and course demands.

Another college experience modification involves waiving certain courses that would normally be required to complete a college program, a change that, Hurst and Smerdon reported, was done in 42% of the institutions surveyed. Most often, this type of modification has involved waiving foreign language requirements for students with reading disabilities and math requirements for students with math disabilities. Yost et al. (1994) found that a minority of college personnel supported course waivers. Only 19% of administrators and teachers reacted favorably to foreign language waivers, and even fewer (15%) thought it appropriate to drop math requirements, indicating general disapproval among support providers for this sort of intervention.

A major problem with interventions that involve waiving course requirements is that the course work being waived may be an integral part of the student's college program, or the course work may prove important after college graduation. In addition, waiving learning requirements does nothing to help students overcome their disabilities, it may even encourage them not to attempt overcoming their disability.

A variant of course waiver procedures is course substitution. In this case, colleges substitute a traditionally required course with another of (presumably) equal value but more in line with the student's abilities (Learning Disabilities Support Services, 1997). Substitution may have the same problems as a course waiver if the substitute course does not cover the material that was traditionally required. This procedure may be viable, however, in circumstances where the substitute course covers information of equal value and importance to the student, but is tailored to the student's individual learning needs. Sparks and Javrosky (1999) examined the effects associated with the substitution of foreign language course requirements with other courses across three institutions (Sparks et al., 1999). Their data suggested that in the majority of cases the substitutions were unnecessary and that most of the students would have succeeded in the foreign language classes despite their disabilities. In fact, they were successful in high school foreign language classes before coming to college. The conclusion was that in most cases the assignment of substituted courses was done without any regard for the ability of the students and was thus an ineffective program modification.

To summarize, modifying the educational program can be done in such a fashion as to make it easier for the student to succeed despite his or her disability. There are drawbacks, however, in that the test or program that
has been modified may be different from that encountered by the rest of the students. In the case of tests, the test taken by the student with a disability may not be measuring the same thing as the test taken by the rest of the class, making a comparison of scores impossible and making grades for the class similarly incomparable. In the case of programs, changing the requirements for students with disabilities can result in a less robust educational experience than that for students without disabilities and may mean that the degree received by the students with disabilities does not signify a comparable amount of experience to that of the students without disabilities.

**Direct Assistance**

The most common forms of direct assistance interventions are tutoring and remediation. Both interventions are aimed at helping students learn specific course material. Yost et al. (1994) found that tutoring, used by 89% of the surveyed schools, was the most common form of intervention in colleges and universities, whereas Hurst and Smerdon reported that tutoring was only provided in 77% of institutions. Tutoring is also recommended as an effective procedure by several researchers (Allard et al., 1987; Vogel, 1982). It generally involves direct, one-on-one assistance from a professional or (more commonly) an upper-level undergraduate or graduate student in a particular course (Bireley and Manley, 1980).

The biggest problems with tutoring are that it can foster reliance on the tutor for learning the material (Deshler et al., 1984) and that it has been shown to have few long-term benefits (Brinckerhoff et al., 1992). Many students with learning disabilities see their tutors as their key to success in college and are reluctant or unwilling to let go of the assistance that the tutors provide (Barbaro, 1982). Such dependence can produce situations where students believe they are incapable of succeeding without the tutor, a form of learned helplessness that can have severe consequences when the tutor is no longer available. These negative factors have led researchers to recommend that tutoring be used in combination with other forms of assistance such as strategy training in an effort to avoid leaving students unprepared to learn on their own (Barbaro, 1982; Brinckerhoff et al., 1992; Deshler et al., 1984).

Remediation was used as an intervention in 71% of the colleges sampled by Yost et al. (1994). Remediation courses are more readily available at community colleges where the proportion of students with learning disabilities is higher than at competitive institutions (where they are rare) because of lower admissions (Mellard, 1994). Remediation involves the creation of
a separate class—usually a small group or sometimes just the individual student and the instructor—with a parallel curriculum specially designed for students who need extra help and time in the particular subject area (Vogel, 1982). Remedial courses may be taken along with or before the regular curriculum courses or may replace them. When students are highly motivated, they can make dramatic gains through remediation (Vogel, 1982). The intervention is, however, extremely high in terms of expense per student and may be beyond the means of the college or student (depending on who is paying). The advantage of remediation is that as skills improve, the need for course support diminishes and students become more independent (Vogel, 1982).

There is some concern, however, that remedial services could diminish the overall quality of education at colleges where they are provided (Cox and Klas, 1996). This could occur in situations where remedial courses are "watered-down" versions of regularly offered courses rather than supplemental courses designed to prepare students for the regular curriculum. The watering down of courses is an important concern and should be weighed carefully against the benefits incurred from the instruction (Deshler et al., 1984).

An example of a remedial program implemented at the University of Wisconsin, Oshkosh, is the Project Success Language Remediation Program (as reported by Nash, 1989). This program is a Simultaneous Multi-Sensory Instruction Program. It addresses basic reading and math skills among incoming freshmen for the eight summer weeks before classes begin. The program uses highly structured teaching methods and immediate feedback to train students in general strategies and skills so that they are up to speed when the semester begins. Once classes commence, the students are expected to take full course loads but are given the opportunity to use tutors provided through the program. The program claims to create average gains of about 1.1–1.5 grade levels in reading and spelling and to have a 71% graduation rate, which is substantially higher than before the program started.

Programs such as Project Success are supplemental to the normal college curriculum and thereby avoid the negative issues associated with a watered-down curriculum. They do, however, take a substantial amount of time and money to run and, because they are conducted in the summer, they conflict with the involved students’ other summer activities, such as holding a summer job that may be necessary to fund college.

Direct assistance interventions serve to improve students’ performance in a subject area and can be useful in helping students with learning disabilities make their way through college (Vogel, 1982). On the other hand, they can be either expensive (in the case of remediation), dependence causing (as in tutoring), or both.
STUDENT CHANGING APPROACHES

The approaches to providing services to students with learning disabilities that have been described thus far involve changing the college environment in an effort to increase the probability that students can succeed. We now turn to approaches that change the student rather than the college environment.

Therapy and Counseling

Many colleges offer psychological support to students with learning disabilities in an attempt to help them deal with their disability and the feelings of helplessness and frustration that accompany it. In general, students cope with their disability by becoming either strongly academically oriented and independent or depressed and dependent on the help of others (Lefebvre, 1984). Students in the second category often have personality and social problems, low motivation, low self-esteem, and are often hypersensitive (Lutwak and Fine, 1983). Other common problems associated with students in this second category are a lack of social skills, dependence on others, and high levels of stress and anxiety (Price, 1988). It is this group of students, especially, that often needs therapeutic assistance.

Therapy generally involves having students talk individually with a professional therapist about their daily experiences (Haufrecht and Berger, 1984; Kroll, 1984). The professional's job is to help students deal with failure and build self-esteem (Johnston, 1984). In some cases there may be a neuropsychological aspect to the therapy as well. This consists of the therapist explaining and helping students understand the underlying basis for their disability (Kemp, 1992). In other cases, the therapist attempts to help students overcome anxiety associated with course work through relaxation techniques (Decker et al., 1985; Haufrecht and Berger, 1984). There is some evidence that relaxation techniques by themselves do not necessarily improve academic performance. For instance, issues aside from anxiety, such as the disability itself, often contribute to the poor academic performance of students with learning disabilities (Decker et al., 1985). There are also reports that therapy may deal with other behavioral problems such as reckless and uncontrolled behavior that could stem from or be related to the learning disability (Wren et al., 1987).

Another way in which colleges provide therapy is through the formation of peer-support groups (Allard et al., 1987; Kroll, 1984). These support groups are designed to provide feelings of acceptance and can help in developing autonomy, integrity, positive self-identity, and self-esteem
(Kroll, 1984; McWhirter and McWhirter, 1990; Orzek, 1984). Peer support groups are often run by a trained professional who provides and structures discussion topics (Orzek, 1984). Support groups can also help improve social skills, which are often considered weak in many students with disabilities (Vogel, 1982).

In general, therapy and support groups do not directly address the academic difficulties associated with learning disabilities, and as the sole method of intervention they may not be all that effective. They can, however, help the students deal with a wide variety of psychological issues that stem from having a disability. These issues may, at times, severely hamper academic learning and hinder social relationships with peers. Properly conducted therapy helps students with emotional and social problems that would otherwise hamper their college performance (Barbaro, 1982).

A cautionary note that appears in the literature concerns the use of countertherapeutic styles, such as inadvertently limiting the student's options, fostering false autonomy, and developing negative dependency (Lutwak and Fine, 1983). These can have palpably negative effects on the students' college experience. Therapy should only be performed by therapists who have extensive training working with students with learning disabilities to avoid these pitfalls. Unfortunately, many individuals who work with students with learning disabilities do not have the necessary training, and their use of countertherapeutic techniques may do more harm than good (Lutwak and Fine, 1983).

Counseling is another often-used intervention. A counselor provides students with direction in terms of their college decisions and future goals (Vogel, 1982). Although the terms counseling and therapy are often used interchangeably in the literature, there is a functional difference between the counselor who deals with academic and job-related issues and the therapist who deals with emotional and experiential issues. Counselors may be trained professionals, though in some cases the counselor is a peer assigned to work as a mentor with the student (Allard et al. 1987).

Counseling sessions can serve a variety of purposes. They help students choose and schedule courses, reduce anxiety over perceived threats present in the academic environment, and identify their needs (Bireley and Manley, 1980). In addition, counselors are often responsible for contacting professors and setting up academic interventions such as special testing arrangements (Sullivan et al., 1993).

Counseling, again, is not an intervention that is designed to assist students directly in improving academic performance. Counselors, however, can be helpful in preparing students for the future and in helping them make intelligent decisions about course work that takes their limitations into account.
An excellent example from the literature of a program that makes use of therapy and counseling within the context of a specially designed course is the Language and Learning Seminar at York University in Ontario (Bat-Hayim, 1997). This program is taken by students with learning disabilities who also have difficulties with social skills. Along with some training in language and writing, much of the students' time is spent in therapy groups. These groups serve a multitude of purposes: they encourage the development of social skills, encourage the sharing of important emotional experiences, and allow group members to share proven strategies for overcoming the problems associated with their disabilities. Additionally, the students are instructed about their learning disabilities to dispel fears and combat a sensed lack of control that often accompanies them, and to recognize the universality of their experience with learning problems. Although no quantitative evidence is available, anecdotal evidence suggests that the program helped students reframe the problems caused by their disabilities and thereby deal with them more effectively.

In summary, counseling and therapeutic services are intervention services provided by a postsecondary institution to improve the college experience of students by helping them cope with disabilities within the environment and by aiding them in making decisions about their future. These interventions do not, however, provide any academic support and by themselves are likely inadequate in providing students with the tools needed for success. The counseling and therapeutic interventions, however, provide a helpful addition to a wide-ranging set of interventions.

**Strategy Training**

Many students with learning disabilities have problems with a variety of skills that may not be attributable to the learning disability per se, but which affect academic performance. As an example, students often have poor organizational skills that may not stem directly from a learning disability, but do negatively impact academic performance (Wren et al., 1987). One common form of intervention for college-age students with learning disabilities is to provide strategy training that addresses difficulties in academic, personal, and study skill areas (McWhirter and McWhirter, 1990). The provision of strategy training stems from research on people with learning disabilities with specific strategy deficiencies (Deshler et al., 1984; Swanson, 1990).

Some form of strategy training is a common feature of most college intervention programs. It involves training the student in a variety of skill areas—academic, emotional, and self-help—to improve classroom performance (Hildreth et al., 1994). The goal of strategy training is to help the
student approach problems and identify appropriate strategies for solving them (Borkowski, 1992; Butler, 1995; Ellis, 1993; Montague, 1993). Strategy training has long-lasting effects (Brinckerhoff et al., 1992; Swanson, 1990), especially if training staff is experienced and well-trained (Westberry, 1994). There is evidence that strategy training works best if students are not told what to do but, rather, are guided to develop the strategies themselves (Butler, 1995). Guided strategy development, accompanied by encouragement to explore a variety of strategies provided by course instructors, improves strategy generalization to other learning situations (Borkowski, 1992). Self-directed strategy learning also gives students tools that are more in line with their own cognitive processes, as opposed to being taught strategies that were designed for someone else's mode of thinking (Borkowski, 1992; Butler, 1995).

Study skill strategy training is also recommended for decreasing students' anxiety (Decker et al., 1985). The idea is that once students have tools they can use to learn more effectively, they become more confident as learners and feel less anxious in learning situations. In addition, effective strategy use can increase a student's self-esteem, resulting in a more positive attitude toward oneself and improved academic performance (Groteluschen et al., 1990).

Strategy training is provided to remedy a variety of problems. In Yost et al.'s survey, they found that 86% of the colleges surveyed taught strategies related to organization, 84% to test-taking, 83% to time management, 81% to studying, 79% to communication, 76% to memory, 74% to note-taking, 69% to listening, 64% to social interactions, and 52% to metacognition skills (Yost et al., 1994). In addition, Vogel (1982) found that writing strategies are taught as well. In some cases, strategy training is provided individually whereas in other cases it occurs as part of a college course (McWhirter and McWhirter, 1990).

An example of how strategy training works can be seen with memory strategy training. Memory trainers often focus on teaching techniques such as elaborative investigation, which entails training students to develop rational explanations for the information being studied. When combined with additional memory techniques, such as the use of mnemonics, these strategies greatly increase memory performance (Scruggs et al., 1993). Generally, the mnemonics used are discovered by the student rather than presented by the trainer (Haufrecht and Berger, 1984).

Another related intervention is the training of self-advocacy—an intervention used by 87% of the institutions in Yost et al.'s survey (Yost et al., 1994). This form of training concentrates on raising students' awareness of their learning disabilities and associated limitations and on developing their ability to convey this information to their professors so that they can get
the assistance they need (Roffman et al., 1994). Self-advocacy training expands students’ self-knowledge and makes it usable in varying social contexts (Roffman et al., 1994). Self-advocacy skills are especially important when students must deal with professors who are skeptical about the existence of learning disabilities (McWhirter and McWhirter, 1990). Self-advocacy is also a step in the direction of promoting independence instead of reliance on the help of others in dealing with the disability (Brinckerhoff et al., 1992).

Strategy training interventions are very useful, especially when they involve substantial input from the students about the production of strategies. Strategy training can result in skill acquisition that helps students develop independence from institutional services and use strategies successfully long after they have left college (Brinckerhoff et al., 1992; Groteluschen et al., 1990). It should be noted, however, that strategy training and the use of strategies may not level the academic playing field between students with and without learning disabilities. Moreover, simply teaching a strategy does not assure that it is used as intended (Montague, 1993; Swanson, 1990). For this reason, it is important to provide enough feedback and support along with the training to ensure that the training “sticks” to the extent possible. To conclude, strategy training aids students in developing means for dealing with a wide-reaching variety of situations and can help them become more independent learners.

“Disability Attacking” Interventions

The final category of services describes interventions designed to improve academic weaknesses that define a student’s learning disability. As an example, in the case of a student with a specific reading disability, a disability attacking intervention is designed to improve the reading ability of the student to the point where course work is completed without elaborate accommodation procedures. Disability attacking interventions are commonly reported in studies with young children (see Vellutino et al., 1998, as an example), yet in Yost et al.’s survey (Yost et al., 1994) no colleges reported using intervention methods of this type and few reports were found in the literature surveyed for this article.

The studies that were found suggest that it is possible to improve the reading performance of college readers with disabilities. A study by Guyer and Sabatino (1989) used a modification of the Orton-Gillingham approach—a phonics-based skill-building program—in an attempt to improve the general reading performance of college students diagnosed with reading disabilities. The study involved randomly assigning 30 college students to one of three groups that participated in a summer school program.
One group received a version of an Orton-Gillingham approach developed specifically for use in the study. A second group received a commercially available non-phonics-based intervention that focused on building basic reading skills such as learning new vocabulary, identifying main ideas, and recognizing antonyms and synonyms. The third group was a control group that completed pretests and posttests but did not receive an intervention treatment. All students were pretested and posttested on the Wide Range Achievement Test – Revised (WRAT-R) and on the Woodcock Reading Mastery Tests (WRMT). In addition, students completed the Wechsler Adult Intelligence Scale – Revised that served as a covariate in the data analysis.

Guyer and Sabatino (1989) reported that the group receiving the Orton-Gillingham intervention made significantly greater gains on both the WRAT-R and the WRMT than did the two other groups. The group receiving the nonphonics program and the control group did not differ in performance on the two tests.

Phonics-based approaches are based on the commonly accepted idea that readers with dyslexia have a “phonological core deficit” that inhibits their ability to learn to read (e.g., Blachman, 1997). Phonics-based approaches attempt to repair this deficit by teaching readers about letter–sound correspondences, phonics-based word identification strategies, and blending the sounds of individual letters and letter sequences to identify words.

Another approach to remediating reading difficulties is more direct in addressing the problems experienced by readers with disabilities. Almost all readers with dyslexia are slow and many are also inaccurate when identifying words (e.g., Royer and Sinatra, 1994). Given this, a number of researchers have attempted to assist readers with disabilities by having them practice rapid word recognition. Royer (1997) has used this approach with elementary and secondary students with reading disabilities, and Cisero et al. (1997) report two case studies that describe using the technique with high school students. The Cisero et al. (1997) study involved two students who had a prior history of poor academic performance and who exhibited poor word recognition performance. Their intervention stemmed from the idea that high school students with dyslexia have trouble identifying new technical terms when reading their textbooks. To alleviate this difficulty, the technical vocabulary was isolated from the textbook and the students practiced rapid identification of the technical words followed by training in rapid retrieval of word meanings. Both students showed improvement in word recognition performance and, more importantly, grade improvement in the courses where the words were used.

Word fluency training, similar to that used by Cisero et al. (1997) with high school students, was used to improve the performance of college students with reading disabilities (Rath, 1999). Rath’s study involved four
college students diagnosed with reading disabilities who were asked to complete a variety of tests both before and after an 8-week intervention. The students completed computer-based assessments that measured the speed and accuracy of reading activities ranging from letter recognition to sentence understanding, and assessments of oral reading performance. Between the pre- and postassessments, the students practiced the rapid identification of words that were copied from textbook glossaries. All the students showed improvements in the computer-based assessments and improvements in the speed and accuracy with which they could orally read excerpts from their textbooks.

The benefits of having college students practice rapid performance of reading and math activities are also reported by Johnson and Layng (1992). Their approach, also based on techniques proven effective with younger students, was not described in great detail, but the results of the program appear remarkable. College students participating in a summer program who were identified as having difficulties with using fractions in math activities, and who started out with fifth-grade math skills on standardized tests, gained over 6 years in math computation performance and 2 years in math-problem-solving performance. Students with deficiencies in using whole numbers in computational activities started out at the fourth-grade level and gained nearly a year in computation, problem solving, and understanding math concepts. The program also showed remarkable results in reading. Students participating in training designed to improve rapid reading activities gained 1.1 years on the Nelson Denny test after 20 hr of practice. The authors report that the program, which is now fully operational at Malcolm X College in Chicago, IL, routinely averages two grade-level gains for every 20 hr of practice in both reading and mathematics.

The fluency training activities described in the Rath (1999) and Johnson and Layng (1992) studies have both direct achievement and strategic benefits. Their research indicates that training college students to rapidly perform both reading and math activities directly benefits their course achievement and/or their achievement on standardized tests. The strategic benefits stem from fluency training activities, producing strategies that students can use to improve performance in new learning situations. Rath and colleagues show students how to isolate new vocabulary found in a course of study and how to use fluency training to rapidly recognize and activate the meaning of the new words. This training provides students with strategies that can aid their lifetime learning.

The only major drawback to all of these disability attacking interventions is that they require a substantial time commitment beyond that required for classwork from both the student and the intervention provider. Research shows that the benefits seem worth the time commitment. Nevertheless,
practitioners should be aware of the additional strain on a student with a learning disability who is already struggling to get his or her work completed within the available time.

To summarize, disability attacking interventions improve the skills that are deficient as a result of the disability. It is unknown whether the gains are enough to level the playing field between the students with and without disabilities. It should also be noted that these interventions often require a sizable time commitment that may overburden students with disabilities.

CONCLUSIONS

The literature indicates that the number of students with learning disabilities attending college has steadily increased over recent years. Although many colleges and universities appear to have responded to this increase by developing programs of services for students with learning disabilities, not all colleges or universities presently have programs in place.

The programs that are in place fall into two categories of services. The first type—environment changing approaches—involves changing the college experience in an effort to increase the likelihood that students with disabilities succeed. Included in this category are (a) services that provide these students with technology devices or human helpers that enable them to circumvent their disability, (b) tutors and remedial courses, and (c) special programs of study so that difficult course work that exceeds deficient academic skills is avoided.

The second category of services—student changing approaches—consists of activities designed to provide students who have disabilities with coping skills or academic skills that enable them to succeed in an existing college environment. Examples of student changing services are therapy or counseling activities, teaching students learning strategies, and direct efforts to improve deficient academic skills.

Table I provides a summary of the benefits and potential problems associated with each of the six specific intervention programs described throughout. It is evident that every intervention has both strengths and drawbacks.

Although the literature describes a variety of intervention programs for college-age students with learning disabilities, there is little concern in the literature with two crucial issues that would better assist colleges and universities in developing programs for their students with learning disabilities. The first issue involves the goals of service programs for these students. The two categories of services identified in the literature review appear responsive to different goals. Services that entail changing the college environment so that students with learning disabilities can succeed seem responsive to the goal
Table I. Summary of the Positive and Negative Aspects of the Six Intervention Types Outlined in This Article

<table>
<thead>
<tr>
<th>Intervention type</th>
<th>Positive aspects</th>
<th>Negative aspects</th>
</tr>
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<tbody>
<tr>
<td>Assistive technologies and programs (recorded texts,</td>
<td>• Allows for independent work without tutors, etc.</td>
<td>• Student may become overly reliant on assistance that may become unavailable</td>
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<tr>
<td>readers, computer programs, etc.)</td>
<td>• Relieves the burden caused by the disability</td>
<td>after college</td>
</tr>
<tr>
<td>Program modifications (modified tests, modified course</td>
<td>• Makes college success more obtainable despite the disability</td>
<td>• Does not address fundamental skill problems caused by the disability</td>
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<td>requirements)</td>
<td>• Highly cost-effective</td>
<td>• Some technologies are expensive and human assistance may be limited</td>
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<tr>
<td>Direct assistance (tutoring, remedial classes)</td>
<td>• Bolsters deficient skills</td>
<td>because of scheduling</td>
</tr>
<tr>
<td></td>
<td>• Gives students opportunity for one-on-one instruction</td>
<td>• Modified tests and regular tests may measure different things</td>
</tr>
<tr>
<td>Therapy and counseling (emotional, social, guidance, etc.)</td>
<td>• Can help a student cope with problems associated with having a disability</td>
<td>• Modified programs of study may be of lesser quality</td>
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<tr>
<td></td>
<td>• Aids student choices on course selection, etc.</td>
<td>• Tutors may foster reliance rather than independence</td>
</tr>
<tr>
<td>Strategy training (memory, specific skills, etc.)</td>
<td>• Helps students develop higher levels of competency in a variety of fields</td>
<td>• Remedial classes may be easier than nonremedial classes</td>
</tr>
<tr>
<td></td>
<td>• Encourages independent learning</td>
<td>• Offering remedial classes is expensive</td>
</tr>
<tr>
<td>“Disability Attacking” Interventions (reading and math</td>
<td>• Improves specific skills that are deficient as a result of the disability</td>
<td>• Improper counselor training can result in counterproductive outcomes</td>
</tr>
<tr>
<td>training, etc.)</td>
<td>• May foster academic independence and self-efficacy</td>
<td>• Does not address academic problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Requires extensive time commitment and substantial monetary investment</td>
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of graduating students with disabilities from college. Measuring success in this manner avoids troubling questions such as whether the degree awarded to a student with a disability is equivalent to the degree awarded to other students or whether the academic competencies of the student with a disability transfer to activities beyond college as readily as the competencies of the other students.
The goal of service programs aimed at changing the student seems different. These services appear directed at the goal of providing students with life skills and learning skills that allow success in an unchanged college environment. Programs with this goal are concerned about whether the interventions they provide are sufficient to compensate for the students' disabilities.

Discussions regarding the service program goals for college students with learning disabilities should take place in the context of statutory obligations. What does it mean to say that a student with a learning disability has "equal access" to an educational experience? Is equal access defined in terms of success rates in altered environments or in terms of the acquisition of skills that allow success in an unaltered environment?

The second crucial issue lacking in the literature is the paucity of evidence documenting the effectiveness of intervention programs. There are many descriptions of programs in the literature but relatively little empirical documentation of program effectiveness. Evidence regarding the effectiveness of different types of intervention programs is very useful to colleges and universities initiating or upgrading their own programs of services.

The effectiveness issue is also directly related to the purpose issue. It is possible, for example, that the troubling questions regarding whether the college experience means the same thing for students with and without disabilities have no basis in fact. Research must show that students succeeding in an altered college environment are as well-prepared for life after college as those who succeed in an unaltered environment.

It is unlikely that true experiments will be used to examine the effectiveness of service programs. Methodological issues like random assignment of participants to treatments and ethical issues like the withholding of potentially beneficial services to participants make it difficult for colleges and universities to conduct controlled experiments comparing service alternatives. Examinations of services could be done, though, by using other types of research designs. Case study data showing performance before and after a treatment intervention is valuable when more controlled studies are not possible. Another valuable data source is quasi-experimental designs that compare the performance of students with disabilities receiving services with those of students who chose not to take advantage of available services. More comprehensive research could also involve large surveys that document the services that are provided and the present and postcollege outcomes associated with those services.

We invite researchers to develop a research plan that examines the intervention procedures both within a single institution and across institutions using several methods outlined earlier. It is suggested that this research plan compare individual interventions or compare programs combining interventions to determine what works best. We predict that a combination of
interventions, especially those involving interventions designed to change the student's ability and perception of their situation, will prove most effective in helping college students with disabilities.

REFERENCES


