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Emphasis on Adolescents and Young Adults

LEARNING DISABILITIES IN ADOLESCENTS AND YOUNG ADULT POPULATIONS: RESEARCH IMPLICATIONS PART I

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The University of Kansas Institute for Research in Learning Disabilities is supported by a contract (#300-77-0494) with the Bureau of Education for the Handicapped, Department of Health, Education, and Welfare, U. S. Office of Education, through Title VI-G of Public Law 91-230. The University of Kansas Institute, a joint research effort involving the Department of Special Education and the Bureau of Child Research, has specified the learning disabled adolescent and young adult as the target population. The major responsibility of the Institute is to develop effective means of identifying learning disabled populations at the secondary level and to construct interventions that will have an effect upon school performance and life adjustment. Many areas of research have been designed to study the problems of LD adolescents and young adults in both school and non-school settings (e.g., employment, juvenile justice, military, etc.)

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Cooperating Agencies

Were it not for the cooperation of many agencies in the public and private sector, the research efforts of The University of Kansas Institute for Research in Learning Disabilities could not be conducted. The Institute has maintained an on-going dialogue with participating school districts and agencies to give focus to the research questions and issues that we address as an Institute. We see this dialogue as a means of reducing the gap between research and practice. This communication also allows us to design procedures that: (a) protect the LD adolescent or young adult, (b) disrupt the on-going program as little as possible, and (c) provide appropriate research data.

The majority of our research to this time has been conducted in school settings in both Kansas and Missouri. School districts in Kansas which have participated or currently are participating in various studies include: Unified School District (USD) 437 Auburn-Washburn; USD 384, Blue Valley; USD 204, Bonner Springs; USD 308, Hutchinson; USD 500, Kansas City; USD 469, Lansing; USD 497, Lawrence; USD 453, Leavenworth; USD 480, Liberal; USD 233, Olathe; USD 290, Ottawa; USD 305, Salina; USD 450, Shawnee Heights; USD 512, Shawnee Mission; USD 464, Tonganoxie; USD 202, Turner; and USD 501, Topeka. Interlocal agencies in Kansas which have participated include: the Central Kansas Cooperative in Education, Salina; the East Central Kansas Special Education Cooperative, Paola; and the South Central Kansas Special Education Cooperative, Pratt. Parochial schools involved in our studies include: Bishop Miege High School, Shawnee Mission; Bishop Ward High School, Kansas City, Kansas; and O'Hara High School, Kansas City, Missouri. The Kansas State Department of Education also has been helpful in our research efforts.

Studies are also being conducted in several school districts in Missouri, including Center School District, Kansas City; the New School for Human Education, Kansas City; the Kansas City, Missouri School District; the Lee's Summit School District; the Raytown School District; and the School District of St. Joseph. In addition, school districts in Beaverton, Oregon; Delta County, Colorado; Elkhart, Indiana; Houston, Texas; Jonesboro, Arkansas; Montrose County, Colorado; Omaha, Nebraska; and Ottumwa, Iowa, have also participated in our studies. The Iowa Department of Public Instruction also has been helpful in our research effort.

Agencies currently participating in research in the juvenile justice system are the Overland Park, Kansas Youth Diversion Project; the Douglas, Johnson, Leavenworth, and Sedgwick County, Kansas Juvenile Courts; and the judicial district serving the Pittsburgh-Parsons, Kansas area. Other agencies which have participated in out-of-school studies are: Penn House and Achievement Place of Lawrence, Kansas; Kansas State Industrial Reformatory, Hutchinson, Kansas; the U. S. Military; and Job Corps. Numerous employers in the public and private sector have also aided us with studies in employment.

While the agencies mentioned above allowed us to contact individuals and supported our efforts, the cooperation of those individuals--LD adolescents and young adults; parents; professionals in education, the criminal justice system, the business community, and the military--have provided the valuable data for our research. Our sincere appreciation is expressed to all those who have contributed information to our research effort. This information will assist us in our research endeavors that have the potential of yielding greatest payoff for interventions with the LD adolescent and young adult.

LEARNING DISABILITIES IN ADOLESCENT AND ADULT POPULATIONS:

A SUMMARY OF RESEARCH FINDINGS--PART I

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LEARNING DISABILITIES IN ADOLESCENT AND ADULT POPULATIONS: A SUMMARY OF RESEARCH FINDINGS

The learning disability (LD) field traditionally has devoted most of its attention and resources to the issues of service delivery and teacher training. In recent years, however, increased emphasis has been given to research and validation activities. A significant amount of research on LD populations has been conducted by the five LD Research Institutes funded by the Office of Special Education and Rehabilitation Services under Title VI-G of PL 91-230 from 1977 to 1983.* The purpose of this article and a companion article to follow in another issue of Focus on Exceptional Children is to summarize the major findings and instructional implications of one of these institutes, The University of Kansas Institute for Research in Learning Disabilities (KU-IRLD) from 1977 to 1981.** The KU-IRLD has had as its research focus the LD adolescent and young adult. Little empirical information is available on LD adolescents and young adults, in particular, and underachieving adolescents in general (Deshler, Warner, Schumaker, & Alley, in press). Consequently, most field practices for these adolescents have been based largely on clinical beliefs and nonvalidated of assessment and instructional models. Therefore,

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*The five institutes are located at the following universities: Columbia University (Teacher's College), University of Illinois-Chicago Circle, University of Kansas, University of Minnesota and University of Virginia.

**The authors of this manuscript wish to acknowledge the instrumental role of Drs. Edward L. Meyen and Richard Schiefelbusch in the KU-IRLD. Their leadership and direction during the early years of the Institute were instrumental in setting a pattern for our overall efforts. Dr. Meyen is Associate Vice Chancellor of Research and Development, and Dr. Schiefelbusch is Director of the Bureau of Child Research at the University of Kansas.

the major mission of the KU-IRLD has been to develop effective means of identifying LD populations at the secondary and postsecondary levels and to construct interventions that will have an impact upon school performance and life adjustment.

The KU-IRLD adopted as its primary research strategy the development of a comprehensive epidemiological data base. This epidemiological data base was created during the initial years of the Institute (1977-79) for the purpose of analyzing data from a variety of sources (parents, teachers, students, administrators, peers, etc.) in order to describe both the learner and the settings or conditions under which learning and failure occurred. This research strategy was seen as critical to the development of a data-based profile of older-aged LD individuals and their learning environments.

After establishing the epidemiology base, the focus of our research activities shifted to the design of intervention procedures based on the epidemiological findings. The majority of our work during the 1980 and 1981 school years was to develop a comprehensive intervention model for LD students in secondary settings. The final phase of our research strategy will be to examine procedures that enhance the generalization of skills across settings and conditons. Institute research has been conducted in both school and nonschool settings. Since older-aged LD individuals must be studied in those settings that become increasingly important with the passage of time, this population has been studied in the military, Job Corps, employment settings, adult basic education settings, and juvenile courts.

The purpose of this article is to present a synopsis of some of our major findings during the past four years. As a result of our research, we have a clearer, but by no means definite, sense of what the condition of learning disabilities means in adolescent and young adult populations. Hopefully,

program decision making will be enhanced by these data. The article has been organized under four major areas of findings: academic achievement and ability, cognitive processing, setting demands, and academic interventions.

Within these areas, findings will be reviewed to describe the LD adolescent as a learner, to describe the demands of the secondary school that LD students face every day, and to describe interventions which are being developed to help LD adolescents compensate for their deficits and survive the demands of the mainstream curriculum in secondary schools. The reviews of the four major areas of findings will begin with a statement of the problem and issue(s) to be addressed. This will be followed by a discussion of some of our major findings related to each issue. Finally, educational implications will be presented. Readers are encouraged to write to the KU-IRLD for detailed research reports on any of the studies cited in this article.*

ACADEMIC ACHIEVEMENT AND ABILITY

It is difficult to defend the assumption that we can develop sound instructional programs for any group of students with special learning needs if we are unable to describe the nature and extent of their learning problems. Yet, to date, the extent of published information pertaining to the academic and cognitive characteristics of adolescents with learning disabilities remains extremely limited. Much of the existing data on adolescents is either anecdotal or stems from studies of students referred to psychological, medical, and educational clinics. Consequently, to draw conclusions about public school LD adolescents based on this infomation is a risky procedure at best.

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*Information on obtaining research reports from the KU-IRLD can be obtained by writing to Donald D. Deshler, University of Kansas Institute for Research in Learning Disabilities, 313 Carruth-O'Leary Hall, Lawrence, Kansas 66045.

As part of our epidemiological study of LD adolescents, these students' achievement and ability levels were investigated and compared to those of low-achieving (LA) students. In addition, we were interested in the ways in which school-defined adolescents differ from other low-achieving (LA) students with respect to ability and achievement. Each of the LD and LA students in our epidemiological study was administered subtests comprising the three achievement clusters of the Woodcock-Johnson Psycho-educational Battery (WJPB): Reading, Written Language, and Math. In addition, each subject was administered the Block Design and Vocabulary subtests of either the WISC-R or the WAIS, depending upon their age. Students' full-scale IQs were estimated from these subtests. Student test performance was studied as it differed across school districts and across the junior- and senior-high levels.

This section will include a description of the general academic achievement and ability of LD adolescents in public-school programs based on these and data from other studies sponsored by the KU-IRLD. Specifically, the following related issues were targeted: Are LD adolescents a special subgroup of the much larger group of low-achieving and underachieving adolescents in the secondary schools? Are their deficiencies best described as very general or as specific? Do these students continue to make progress in the development of basic academic skills as they move through the secondary grades? Do any measures discriminate LD adolescents from other low achievers? Do definitions of learning disabilities vary among districts? And finally, do LD adolescents possess sufficient study skills to profit from participation in the regular classroom?

LD Adolescents Are the Lowest of the Low Achievers

As reported elsewhere (Warner, Alley, Deshler, & Schumaker, 1980), LD adolescents exhibit very low levels of basic skill development compared to

their age peers including other low achievers (LA). Typically, they score below the 10th percentile on the three achievement clusters of Reading, Written Language, and Mathematics. Of these three areas, the Written Language cluster of the WJPB was found to be the most powerful single discriminator of the LD and LA samples in our study. A recent analysis of the major types of items from this cluster revealed that the items measuring spelling are powerful discriminators between LD and LA students. Thus, spelling deserves strong consideration as a discriminating variable in the identification of LD adolescents.

Most LD Adolescents Exhibit Very General Deficiencies

LD adolescents generally exhibit low performance in the achievement areas of reading, written language, and math (Warner et al., 1980). For example, out of 307 LD students, 200 scored at or below the 10th percentile of the Written Language cluster of the WJPB. Of these 200, 80% (or 160) were equally low in the Reading cluster, while 72% (or 143) were equally low on the Mathematics cluster.

A study of the IQ data presents additional factors to be considered. Based on the Block Design and Vocabulary subtests of the WISC-R/WAIS, each student's full-scale IQ score was determined. For the junior-high sample (n = 156), the mean estimated IQ was 89.59; for the senior-high sample (n = 152), the mean was 94.80. About half the students in each of these groups scored above their respective group means. In a related study, Skrtic (1980a) found that LD adolescents performed significantly lower than their non-LD peers on a measure of formal reasoning ability.

In addition, about three-fourths of our total LD sample met proposed federal criteria for severe discrepancy (Federal Register, November, 1976). That is, these students were achieving at or below 50% of the expected grade

level in one or more of three achievement areas (Warner, 1981); however, a substantial portion (40%) of the low-achieving group also met this criterion. Thus, a number of LD adolescents exhibit very substantial underachievement, i.e., their IQ test performance is much higher than their achievement test performance. On the other hand, a large proportion of LD adolescents scored in the 80's and below on our IQ measure. This low measured intelligence combined with very low achievement levels suggest that these adolescents' disabilities are very general rather than specific.

LD Adolescents Demonstrate Very Little Growth in Basic Skills Across the Secondary Grades

In spite of a major focus on basic skill remediation in most secondary LD programs (Deshler, Lowrey, & Alley, 1979), our data suggest that growth in these skills is very modest among LD students during adolescence. Furthermore, the students seem to have reached a plateau by the time they reach 10th grade. Because we did not follow individual students as they progressed through the secondary grades to obtain longitudinal data, inferences based on existing, cross-sectional data remain very tentative. In the areas of reading and written language, LD students' average achievement in seventh grade is at a high third-grade level only to plateau at the fifth-grade level in senior high. In the area of mathematics, average achievement in seventh grade is at the beginning fifth-grade level plateauing at the sixth-grade level in senior high.

Measures of Academic Ability and Achievement Are the Most Powerful Discrimination of LD Adolescents and Other Low Achievers

As part of our epidemiological study, data were collected on a large number of variables in addition to those currently under discussion. These included attitudinal, behavioral and demographic characteristics as reported by parents, teachers, and the youths themselves. Results indicated that once

the LD and and low-achieving groups were equated statistically for achievement and ability, virtually none of the other variables served to differentiate reliably the two groups. Based on this finding, it may be concluded that, aside from being the lowest of the low achievers in their school districts, LD adolescents are more like other low achievers than they are unlike them. This conclusion is supported by two recent comparisons of LD and low-achieving students at the elementary level (Taylor, Satz, & Friel, 1979; Ysseldyke, Algozzine, Shinn, & McGue, 1979).

The Extent of Low Achievement and Underachievement Among LD Adolescents Depends on the District of Attendance

As part of our epidemiological study, levels of achievement and underachievement were compared in three different school districts. In one of the districts the citizens' socioeconomic (SES) status, was relatively high, another district included citizens predominantly of lower socioeconomic status, while the third district occupied a middle level between the two in terms of socioeconomic status. Results of the across-district comparison revealed striking differences between the achievement levels of the LD and LA students in the three districts. For example, in order to achieve maximum discrimination between LD and low-achieving high-school students in the low SES district, the fifth percentile of the Written Language Cluster of the WJPB had to be used. In the highest SES district, on the other hand, this figure shifted to the 15th percentile based on the national norms published in the manual (Warner et al., 1980). These district effects imply that: (a) each district serves the lowest of its low achievers, and (b) the same students would not necessarily be considered LD by the two different school districts. Clearly, these findings pose a serious dilemma in the pursuit of a consistent definition of learning disabilities.

LD Adolescents Are Deficient in Study Skills and Strategies forMeeting the Demands of Regular Secondary Classrooms

In a study of school-classified LD students, a group of secondary LD teachers estimated that more than 85% of LD adolescents exhibit problems in several areas, including test-taking and study skills (Alley, Deshler, & Warner, 1979). Similarly, Carlson and Alley (1981) found that LD high-school students performed significantly more poorly than a group of high-achieving students on notetaking, monitoring writing errors, test-taking, scanning a textbook passage, and listening comprehension. Also, the LD students' performance on a set of minimal-competency standards for each of the five areas indicated that only 10% of them met or exceeded minimal competency on three or more of the tests; 22% of the LD students met or exceeded minimal competency on none of the tests.

Another group of researchers (Schumaker, Sheldon-Wildgen, & Sherman, 1980) observed LD and non-LD junior-high students in their regular classrooms. Their findings showed that LD students listened much less attentively to statements by the teacher and used a study strategy that researchers called "alternate reading and writing" less often than did the non-LD students. Overall, the LD students engaged in seven percent fewer intervals of study behaviors and 16% more intervals of rule-violating behaviors as compared to the non-LD students.

Educational Implications

The following educational recommendations are based on a description of students who are being served in LD programs. Students for whom there was evidence of other handicaps (e.g., sensory impairment or emotional disturbance) were removed from our LD sample. Nevertheless, a very restrictive definition of LD was not applied. With this in mind, it may be generalized that the group being served is very heterogeneous (it is probably more correct to view

this group as being made up of several subgroups, each with a different predominant educational need). Based on this diversity, three issues arise. First, to what extent are teaching methods and curricula needed which are unique to LD adolescents, as distinct from low achievers in general? Our data would suggest, or at least fail to contradict, the proposition that similar interventions would be appropriate for both school-defined LD students and low-achieving students.

Second, to what extent should basic skill remediation be emphasized in the curriculum? Assuming that the LD students in our sample have been exposed to such remediation for a number of years, the plateauing effect found does not support a continual emphasis on such remediation, at least in its present form. Rather, the following approach may be taken. First, as our data show, a substantial proportion of LD adolescents are at or above the fourth-grade level in basic skill development but lack adequate study skills. We believe that it is possible and desirable to support these students in the regular curriculum by teaching them specific learning strategies. A more thorough discussion of the rationale and efficacy of the learning strategies approach appears in Deshler et al. (in press). For those students whose basic skills are so low that a learning strategies approach is ineffective, two courses of action are possible: (a) the skill deficit may in some instances be bypassed through the use of procedures such as tape recording written material, and (b) a program of basic skill remediation may be initiated, although in a more intensive fashion than is typical.

This leads to the third general issue arising from our findings. How broad and intensive should an LD program for LD adolescents be? It appears that LD programs include a large number of students in with significant deficiencies in the following areas: general academic ability, reading, writing,

mathematics, and study skills. In combination, these cognitive and academic deficiencies result in very general performance deficits in secondary schools. It appears unlikely that a resource-room model, in which such an adolescent receives special help for only one class period per day, is sufficiently powerful to address the learning needs of that adolescent. Some LD adolescents may need intensive intervention for a limited period of time. For students whose deficiencies are less severe and more narrow in scope, a learning strategies program within a resource room format may be a very effective tool in meeting their educational needs.

COGNITIVE PROCESSING

In spite of various controversies, theories of cognitive processing continue to influence thinking and practice in the field of learning disabilities. Process training, as advocated and developed through the 1960's (e.g., Barsch, 1967; Kephart, 1971, Kirk & Kirk, 1971), came under heavy attack during the early 1970's as being ineffective (e.g., Hallahan & Cruickshank, 1973; Hammill & Larsen, 1974; Hammill & Wiederholt, 1973). During the 1970's and up to the present, however, theories of information processing from developmental and cognitive psychology continue to provide a powerful impetus for research related to learning disabilities. To a greater extent, these more recent efforts are based on empirical findings from the study of normal adults and children (Hallahan & Bryan, 1981). The study of the relationship between information processing and learning disabilities holds promise in that it may lead the way to the identification of instructionally meaningful subgroups of LD students and provide direction to the content of appropriate instruction for these individuals.

In much of the LD information processing research, students are presented with tasks that nominally tap processes such as memory or attention. Interest,

however, has not focused on whether or not the student did well, but rather on how he/she approached a given task. Based on such studies, it has been widely documented that LD students approach tasks passively (e.g., Hallahan & Bryan, 1981; Torgesen, 1977). For example, LD students are less likely than their normally achieving peers spontaneously to use specific cognitive operations such as verbal rehearsal, mental elaborations, and meaningful grouping of stimuli, when asked to memorize material for later recall. These findings have led to two major hypotheses about the causes of such passivity.

As part of the first of these hypotheses, LD students are seen as deficient or developmentally delayed in executive functioning. As postulated by Atkinson and Shiffrin (1968) and as further conceptualized by Butterfield and Belmont (1977), the executive is that part of the information-processing system that selects and coordinates the use of specific processes, like rehearsal, in light of the demands of a specific task. Executive skills are higher order skills that include the following metacognitive processes: initial monitoring of a problem or task to see if the goal is clear, other forms of monitoring and checking, making plans, and evaluating the success of implementations of those plans (Brown, 1978).

As part of the second hypothesis, LD students are seen as less active in invoking activities such as rehearsal because they are less intrinsically motivated to perform well or to expend effort on the various tasks, both in and out of school (e.g., Henker, Whalen, & Hinshaw, 1980; Wong, 1980). This hypothesis is clearly related to the first since one cannot expect an individual's executive and other resources to be martialled in the absence of motivation to reach a particular goal.

KU-IRLD data applicable to each of these hypotheses will now be discussed. First, a KU-IRLD study relating to LD adolescents' executive functioning will

be described. Next, a study relating to the impact of motivation on cognitive processes will be considered.

Many LD Adolescents Exhibit Immature Executive Functioning

In a comparison of the executive functioning of groups of LD, low-achieving, and normally achieving adolescents in grades 7 through 12, students were required to listen to 14 lists of seven words each (Warner, Schumaker, Alley, & Deshler, 1982). Subjects were asked to repeat the words in an order that differed from the order in which they were presented. The speed with which the lists were presented was controlled by having students tap a pencil on the table each time they wanted a new word to be presented. By recording the pencil taps and measuring the length of time between each tap, the students' rehearsal strategies could be inferred independently of recall accuracy. The measure of executive functioning entailed the degree to which the pattern of pencil tap intervals corresponded to an optimal pattern based on a theoretical and empirical viewpoint.

Results showed that the normally achieving students were superior to the other two groups (LD and low achievers) both in accuracy and in executive functioning. With one exception, the groups of LD and low-achieving students did not differ from one another along these two dimensions, once the two groups were equated statistically for levels of achievement. The exception consisted of the higher performance of low-achieving females compared to LD females in terms of accuracy, even when the groups were equated with respect to achievement.

In spite of the deficient performance of the LD group as a whole, it was found that, depending on grade level and district of attendance, between 40% and 48% of the LD sample adopted an optimal strategy on this relatively novel task. In conclusion, our data support the idea that, as a group, LD adolescents

exhibit deficiencies in executive functioning. However, rather than being unique to the condition of learning disabilities, such deficiencies appear to characterize low achievers in general. Equally important was the finding that not all LD students failed to adopt an optimum strategy. When combined with the finding that a proportion of LD adolescents have IQ scores that are above the normative mean of 100, these results indicate that, at least for a significant proportion of LD adolescents, executive processing is among their strengths rather than their deficits.

Cognitive Deficiencies Can Negatively Influence Performance in Spite of Increased Incentives to Do Well

A study by Mellard and Alley (1982) explored the relationship between motivation and strategy use by comparing LD students' performance on a task in a situation where no incentives were used to a situation where monetary incentives were used. In previous work with elementary-aged students (e.g., Haines & Torgesen, 1979; Hallahan, Tarver, Kauffman, & Graybeal, 1978), it has been found that LD students' performance on tasks requiring rehearsal can be improved simply by providing monetary incentives. In Mellard and Alley's complex discrimination learning task, in which students were required to keep track of the status of each of eight bivalued visual stimuli, LD adolescents' performance was not improved by the payment of cash for good performance. It was concluded, therefore, that the LD students' (mean IQ = 85.78) approach to the task was inefficient and that this inefficiency was not altered by incentives and verbal feedback on the correctness of their responding. Compared to a group of normal controls, the LD students, as a group, were less likely to profit from experimenter-provided feedback; also they were less likely to follow a logical, strategic, problem-solving approach. While these behaviors are similar to those usually characterized as "passive" (Torgesen, 1977), Mellard and Alley noted that the LD students in their sample seemed to be actively

engaged in the task. Thus, the remediation of LD adolescents' cognitive deficiencies does not simply consist of altering motivational factors in their environments. It is likely that the cognitive deficiencies themselves must be addressed.

Educational Implications

The available data pertaining to the executive and motivational characteristics of LD adolescents are still so limited that only tentative implications can be drawn. The findings of Brown (1978) and Butterfield and Belmont (1977) with respect to mentally retarded youngsters indicate that it may be profitable to train executive skills in those LD adolescents who exhibit executive functioning deficits. Given the data at hand, some LD students may learn very rapidly to use their already developed skills. For others, however, the training of such skills may be a very long process.

With respect to the impact of motivation on LD adolescents' cognitive performance, much more research is needed. However, it is unlikely that the manipulation of motivation will, by itself, sufficiently improve LD adolescents' performance, especially on complex tasks. Rather, interventions will also have to be aimed at improving cognitive efficiency. The teaching of cognitive strategies to LD adolescents should result in improved efficiency.

SETTING DEMANDS

The relationship between the setting in which the individual must function and his/her disability represents a major issue in the field of learning disabilities. Traditionally, the conceptualization of learning disabilities has centered solely on the individual's attributes and, thus, has focused on causes of the disability within the individual. Following this conceptualization, educators planning interventions for LD adolescents have assumed that the skills taught to elementary LD students are also essential for secondary

LD students (if these have not been mastered previously). However, as interest in the condition of learning disabilities in adolescence has grown, differences have been recognized in the settings in which the two age groups must function. Despite this recognition, little research specifying the nature of these differences is available.

As the research program of the KU-IRLD was designed, Lewin's (1935) formulation of behavior, B = f (PE) (where B = behavior, P = person, and E = environment), was adopted as an appropriate means of conceptualizing and researching learning disabilities. Thus, learning disability was viewed as a condition resulting from a complex interaction between the learner and the environment. Several KU-IRLD studies have provided information about the settings in which adolescents must perform and, consequently, have contributed to an understanding of the interaction between the LD individual and his/her environment. Conclusions and data from these studies follow.

Secondary-School Settings Place Complex Demands on Adolescents' Oral Language, Reading, Writing, and Listening Skills

In a study of secondary-school settings conducted by Moran (1980), the oral language of 25 senior-high and 7 junior-high school teachers was audiotaped for an entire class session (45 to 50 minutes). An analysis of these tapes provided the following perspective of the secondary-school classroom environment. First, secondary teachers were found to lecture significantly more often than they involved students in discussion through questioning. Surprisingly, junior-high teachers lectured as much as did senior-high teachers. Second, teachers presented few advance organizers that might help students listen more efficiently. Third, checks for understanding of directions and feedback about student performance occurred infrequently in secondary classrooms. Fourth, teachers' self-reported language behavior differed from the observed data. Although teachers perceived their use of "Wh" questions about content

as their most frequent behavior, observation revealed that, in reality, they more frequently stated facts or opinions or gave commands. Fifth, teachers spoke four times for each student utterance. Sixth, the mean number of morphemes per teacher utterance was 10, exceeding the recommended number for adult processing of information. Based on these findings, Moran concluded that the teaching style in core courses at the secondary level places heavy demands on LD students' listening skills and, because they are not asked to demonstrate knowledge verbally, on their writing skills as well.

Schumaker et al. (1980) observed LD and non-LD junior-high students and their teachers in regular classrooms. They found that seatwork was the class format most often used (47% of the time). In this format, students were required to work independently on assignments using reading and writing skills. The next most frequently used class format was lecture (21% of the time), followed by class discussion (10% of the time), and the use of audio-visual aids (10% of the time). Less frequently used formats were group work, individual reports to the class and free time. These results replicate Moran's study showing that the most commonly used format involving listening or speaking was lecturing format. Schumaker et al. also reported very little student-teacher interaction. Students rarely requested help from teachers or answered teacher questions. Similarly, during lectures, students rarely asked questions or made comments. Teachers rarely asked questions, made suggestions to individual students, or gave verbal feedback to the students about their work.

In an observational study of the interactions of regular classroom teachers and LD and non-LD students in grades 9-12, Skrtic (1980b) found that regular classroom teachers interacted with LD students as often as they interacted with non-LD students. The content of these interactions was predominantly verbal and related more often to academic tasks than to social interactions.

Teachers directed the same proportion of positive and negative academic interactions to LD as to non-LD students; however, more negative social interactions were directed toward the non-LD students. In addition, teachers offered assistance to LD students as often as they offered to help non-LD students. LD students initiated interactions with the teacher in class by volunteering answers and requesting help as often as non-LD students. These results show that LD students: (a) must interact verbally in both academic and social situations with the teacher, (b) must respond to the teacher's offer of assistance, and (c) must initiate interaction in the classroom (e.g., volunteering answers, requesting help).

Knowlton and Schlick (in preparation) validated the expectations of mainstreamed LD students held by 27 secondary regular classroom teachers. Their data showed that teachers hold expectations of LD students in five categories, four of which are pertinent to the present discussion by reflecting setting demands. They are: skills to cope with subject matter (such as reading and spelling), general study skills (e.g., notetaking, composition and writing, use of the library and references), independent work habits (e.g., locating correct page, requesting assistance when needed, making appropriate response to classroom work situation), and communication skills (e.g., speaking clearly, seeking information).

Secondary schools, however, are not the only settings in which LD adolescents are expected to demonstrate oral language, reading, writing, and listening skills. Mathews, Whang, and Fawcett (1980) identified and validated 13 employment-related skills for an occupational skills assessment instrument. Both social and nonsocial interaction skills were included as very important for obtaining and maintaining employment. The skills require: (a) reading and writing (writing a letter to request an interview in response to a help-

wanted advertisement, completing a federal income tax form), (b) listening (accepting suggestions from an employer, accepting criticism from an employer), and (c) oral language (telephoning to request an interview, participating in an interview, providing constructive criticism to co-workers, explaining a problem to a supervisor, complimenting a co-worker).

Data showed that regular classroom teachers at the secondary level not only expect LD adolescents' reading, writing, oral language, and listening skills to be developed, they also place demands on those skills during classroom instruction. In addition, demands are placed on these skills in out-of-school settings. Thus, successful performance by LD adolescents mainstreamed in the secondary school setting and employed in work settings requires that they meet the various language demands placed on them in those environments.

Settings in Which LD Adolescents Must Function Require the Ability to Function Independently

Data provided by Moran and Schumaker et al. have shown that teachers provide little feedback (positive or negative) to students in secondary classrooms. In addition, Moran found that teachers provide few advance organizers for students and only infrequently check students' understanding of instructions. Similarly, Skrtic (1980b) found that LD students must volunteer answers and must request help. Furthermore, Schumaker et al. noted that secondary students were required to work independently during 47% of class time. In support of these findings, Knowlton and Schlick's study of secondary regular classroom teachers' expectations of LD students indicated that independent work habits constitute a major category of expectations (e.g., locates correct page, budgets time, requests assistance when needed, makes appropriate response to classroom work situations and works beyond expectations). This category consisted of the largest number of individual expectations among the five categories utilized in their study.

Although Mathews et als. study of employment-related skills did not directly address independent functioning, successful performance of several of the specific skills on their test (e.g., getting a job lead from a friend, writing a letter to request an interview in response to a help-wanted advertisement, telephoning to request an interview when there is not a job opening, complimenting a coworker on a job done well) requires that the individual take the initiative and function independently.

Together, these data provide a picture of the environments in which the LD adolescent is expected to perform independently without continuous monitoring. In addition, in school settings, the LD student is required to recognize his/her need for assistance and to assume the initiative in obtaining such assistance. Similarly, in the employment setting, the LD adolescent is expected to assume the initiative in completing job-related tasks which employers and employed adults consider to be important.

Educational Implications

These findings emphasize the importance of considering setting demands and conditions when making educational decisions for LD adolescents and young adults. As a whole, the data suggest that the demands encountered by older LD individuals are markedly different from those encountered by younger LD children, especially in school settings. To be successful in secondary-school settings, LD adolescents must possess a broad array of strategies that will allow them to deal independently and effectively with existing information-processing demands. Since teacher instruction is largely unidirectional and presented in a lecture format, students must demonstrate sophisticated listening, notetaking, attending, and problem-solving skills. Although learner characteristics are critical to the development of educational programs, the conditions and demands of the environment as well as the interaction between learner characteristics

and the environment are also critical factors which must not be overlooked. Thus, it is imperative that intervention procedures be designed to increase LD adolescents' learning efficiency and effectiveness and thereby inable them to cope more adequately with the demands of the settings in which they must function.

ACADEMIC INTERVENTIONS

Since the mid 1970's the learning disability field has focused a significant amount of attention on methodologies for intervening successfully with LD adolescent populations (Alley & Deshler, 1979). Such intervention approaches have ranged from basic skill remediation procedures (Goodman & Mann, 1976) to alternative curriculum models (Wiederholt & McEntire, 1980). In addition, some approaches have advocated changing the setting and conditions for learning rather than changing the learner (Hartwell, Wiseman, & VanReusen, 1979; Mosby, 1979).

Given the findings of our epidemiology research on learner and setting attributes, the staff of the KU-IRLD has selected a learning strategies approach as the most appropriate intervention for LD adolescents. As defined by Alley and Deshler, learning strategies are "techniques, principles, or rules that will facilitate the acquisition, manipulation, storage, and retrieval of information across situations and settings" (1979, p. 13). A learning strategies approach is designed to teach students "how to learn" rather than to teach them specific content. This intervention approach was adopted as the focus of the KU-IRLD research for the following reasons: (a) the demands of the secondary curricula require the acquisition of skills (such as problem solving, error monitoring, scanning, etc.) that enhance the student's ability to cope with the heavy content requirements; and (b) training of basic academic skills in such areas as word attack, mathematical computation, while important,

is not sufficient to enable LD individuals to adjust successfully in school or in the world of work.

Our intervention research has been a multistage effort with each stage designed to answer a key question. The first question pertained to internal validity: Can it be demonstrated that a specific learning strategy intervention package causes a change in the performance of LD students? A second key question related to the degree to which learning strategy packets, as designed by the KU-IRLD, can be successfully accommodated existing secondary resource rooms. Finally, the following questions about the external validity of the learning strategy packets were asked: What proportion of the LD population responds to the learning strategy approach? What subpopulations respond differently? The tentative research conclusions which can be derived from the results of our research to date are discussed below.

Learning Strategy Interventions Cause Change in LD Adolescents' Performance

To demonstrate that learning strategy interventions cause a change in LD students, a series of single-subject experimental design studies was conducted. Each study tested a specific learning strategy designed to help students deal with three major demands of the secondary school: (a) gaining information from written materials, (b) expressing information in writing, and (c) gaining information from oral material. Studies have been completed on the following strategies: word identification, paraphrasing, visual imagery, self-questioning, Multipass (a strategy for attacking textbook chapters), sentence writing, paragraph organization, error monitoring, and listening and notetaking. Each strategy was taught to students using a specific teaching methodology comprised of nine steps: student awareness of his/ her current learning habit, description of the new learning strategy, strategy modeling, student verbal rehearsal of the strategy, student practice of the strategy in

controlled materials, feedback, student practice of the strategy in grade-level materials, feedback, and test (Deshler, Alley, Warner, & Schumaker, 1981).

Subjects selected for this research were formally classified as learning disabled and were enrolled in special education programs in their public high schools. Students were individually taught a particular strategy by a certified LD teacher. Each strategy was designed to ensure that student change after learning the strategy would be observable and objectifiable. For example, with the reading strategies the students were observed and intermittent probes were made to determine whether they were using the strategy. When the students had finished reading, either verbal reports were collected of information learned or they were administered a written test over the information.

Thus far, results are very positive. Of the 70 students who have received individual strategy instruction, only one has been unable to learn a strategy. Another student demonstrated mastery of two reading strategies in controlled materials but was unable to perform them in grade-level materials. In addition, although two students made marked gains in their notetaking skills, they did not reach criterion on the notetaking strategy within the time allowed. All remaining students learned their strategy to criterion and, in the case of reading strategies, have been able to generalize their use of strategy skills to grade-level materials. In short, gains from baseline performance levels to post-intervention levels are marked. Given these results and the large number of replications conducted, it is apparent that the learning strategy packages developed by the KU-IRLD produce changes in LD adolescents' performance. Furthermore, the subjects have been able to generalize their use of the strategies to grade-level materials--a critical factor if their performance in the regular classroom is to be improved.

Learning Strategy Packets Can Be Used Within Existing Resource Room Programs in Secondary Schools

The questions of how practical the learning strategy packets were for application in a resource room setting became paramount after their internal validity was established. Teacher feedback on the strategy packets indicated that, while they were pleased with the results, they would not be able to use them routinely in their resource rooms due to the heavy requirements involved in individual instruction. As a result of such feedback, modifications were made. First, specific guidelines were written for teachers to follow when teaching the strategies to groups of students (e.g., 4-6 students). That is, for each of the nine instructional steps, specific suggestions were made on how to teach the strategy to a group. Second, each of the instructional packages was revised to reflect the requirements of group instruction. Finally, a brief instructional module was designed to familiarize students with group work including rules to follow in group work and the importance of cooperative learning efforts.

The performance of high-school students who have been instructed in strategies through a group format compares very favorably with the performance of those taught individually. In addition, both teachers and students have indicated high satisfaction with the procedures. In fact, students in the group program were more satisfied than students in another program involving less student/teacher interaction.

Success in Learning Strategy Intervention Is a Function of Student Attributes

As might be expected, strategies instruction has not been found to be appropriate for all secondary LD students. Thus far, the prerequisites specified by the instructional packages designed by the KU-IRLD screen out certain students (e.g., those who read below the fourth-grade level). However, for the students who have received strategies instruction, some interesting obser-

vations can be made. Teachers who have participated in the field testing of the packets seem repeatedly to divide the participating LD students into two groups. One group is characterized by the quickness with which they learn and independently apply the strategy ("It's as if he/she just wasn't aware of the strategy for a given task, but once taught, it is readily applied"). The second group of LD adolescents has been characterized by the slow, plodding manner in which they approach strategies instruction and reach mastery. Nevertheless, they do reach mastery given sufficient time. These observations have led the KU-IRLD into a line of research designed to investigate the specific student characteristics associated with the two types of strategies learning. For example, studies (e.g., Mehring, 1981; Wolf, 1982) have correlated learning strategy acquisition with such factors as locus of control, knowledge of word meaning, field dependence, and learning potential. Analysis of the results of these studies has not demonstrated an association between the above factors and strategies acquisition. Additional variables such as IQ and achievement test scores are currently under investigation. A clearer understanding of student attributes related to strategy acquisition will have direct implications for instructional decision making.

Educational Implications

The results of our academic intervention research on learning strategies portray a somewhat optimistic picture for the older LD individual's ability to master skills directly related to the demands of secondary-school settings. The favorable results are particularly encouraging in light of our epidemiological data indicating that LD adolescents' basic skill development plateaus between the fifth- and seventh-grade level. According to our intervention research, LD adolescents can be taught specific strategies that they can subsequently apply to different materials, including those used in their

regular classrooms. The successful application of these training packets in secondary-school resource room settings is encouraging due to the heavy student caseloads of most LD teachers. However, while some progress has been made, many intervention questions remain. Among the most pressing are: In what sequence can the strategies be most effectively taught? What student attributes are correlated with effective strategy learning? How much can younger LD students (e.g., junior high and elementary-school students) benefit from strategy instruction? and What is the role of other intervention procedures (e.g., curriculum modification, basic-skill remediation, etc.) in an overall intervention program for LD adolescents? These questions will receive the attention of the KU-IRLD in subsequent months.

CONCLUSIONS

The failure of individuals to function adequately in their environments is of great concern to the individuals themselves, to educators (both regular and special), and to parents. The data about LD adolescents and young adults presented here and in a companion article to follow in a later issue of Focus on Exceptional Children reveal a complex picture of the characteristics of the LD individual as well as the characteristics and demands of the environments in which they typically function. As these characteristics are identified, the challenge becomes one of understanding the complex interaction between individual characteristics and setting demands.

Even now, however, a tentative statement can be made about the interaction between individual characteristics and setting demands. Settings in which LD adolescents and young adults are expected to function place complex demands on their cognitive and academic skills, the very areas in which LD adolescents have been found to exhibit deficiencies. Thus, when placed in a setting that necessitates the performance of skills in which they are deficient, LD adoles-

cents perform more poorly than their peers. However, in spite of this condition, LD adolescents are not markedly different from others who are also experiencing difficulties in the same environments. As noted previously, LD adolescents in school environments are quite similar to low achievers in this setting. Based on what we know now, interventions that teach the LD individual how to learn, that help the LD individual recognize opportunities for generalization, and that specifically teach the LD individual how to generalize appear to be the most promising. Thus, all intervention research shows that we can teach LD students the strategies and that some generalization occurs.

Our knowledge of the contribution of individual characteristics, setting demands, and the interaction of characteristics, demands, and learning strategies interventions is growing. Greater awareness of the effects of these on the complexity of learning disabilities and their remediation will enable us to refine the interventions so as to significantly impact learning disabilities in adolescents and young adults.

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