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ABSTRACT

This monograph highlights how educational technology can benefit students at risk of school failure, particularly students with emotional/behavioral disorders (E/BD). It discusses how technology can improve student motivation to learn, increase engagement in learning, improve academic outcomes, meet the needs of tactile/kinesthetic learners, link incarcerated youth with community support services, increase preservice teacher and inservice learning opportunities, and assist with instructional decision-making. The monograph includes six papers that present research-based technology solutions devised to meet the challenges of training professionals, program development for students with E/BD, and using technology in interventions for students with E/BD. Papers include: (1) "Introduction: Technology, The Great Equalizer" (Lynn K. Wilder); (2) "Project PEGS! Interactive CDs for Practice in Effective Guidance Strategies: Using Technology To Train Teachers in Applying Positive Behavioral Interventions" (Mary M. Wood and others); (3) "Using Interactive Media To Teach Behavior Intervention Planning" (Carl J. Liaupsin and others); (4) "Delivering 500 Provide and Practical Interventions through CD-ROM and Online Technologies" (Ray Beck); (5) "Use of PowerPoint To Increase Reading and Language Skills; A Research-Based Approach" (Francie Murry); and (6) "Hypermedia and Students with E/BD: Developing Untapped Talents and Fostering Success" (Matthew J. Mayer and Peter E. Leone). (Papers include references.) (CR)

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Integrating Technology in Program Development for Children/Youth with E/BD

Lynn K. Wilder and Sharon Black (Eds.)

Brigham Young University

U.S. DEPARTMENT OF EDUCATION
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Introduction: Technology, the Great Equalizer

Lynn K. Wilder

Technology can be a great equalizer for students at risk of school failure (Jameson, 1999). Access to technology, which is access to today's knowledge, is an essential piece of a 21st century education for all students, rich and poor, black and white, abled and disabled. Professionals in emotional/behavioral disorders (E/BD) and students with E/BD use technology for myriads of beneficial purposes. As authors of subsequent chapters and others have demonstrated, technology can improve student motivation to learn (Belanger, 2000), increase engagement in learning, improve academic outcomes, meet the needs of tactile/kinesthetic learners, and link incarcerated youth with community support services (Kaczynski & Platt, 1999). For professionals, it can increase preservice and inservice learning opportunities, enhance their classroom presentations, simplify their communications with other professionals and with parents/guardians, streamline their record keeping, and assist them with instructional decision-making.

Challenges

But technology (e. g., a student laptop) is not readily available to all students. Welter (1997) states "that freedom of the press only applies to those who own a press" (p. 9). When available to some and not others in public schools, technology fails to equalize students' learning opportunities and, instead, creates the great digital divide between haves and have nots (Stoicheva, 2000). Educational opportunities based on technological access are determined by the community in which students live (Jameson, 1999); similar inequity of access runs across lines of ethnicity, ability, language, gender, and socioeconomic situation (Jameson, 1999; Stoicheva, 2000; Welter, 1997).

Wealthy school districts, with healthy personal and commercial tax bases, build architecturally beautiful schools with high arching entryways, glass walls, indoor tracks, etc.; technology is readily available to students of these schools. They have easy access to CADCAM systems, audio and video technology, and computers for everyone. Too often, poorer districts still use older buildings with inadequate wiring for computers, insufficient funds for equipment, and too little space—or too little clean, dry, and secure space—in which to house computers and other technology. The technology gap between rich and poor is widening (Hayden & Cauthen, 1996) and affects many students with E/BD.

This gap occurs across school districts, within school districts, and even across classrooms within a given school. The gap across school districts is largely due to differences in tax bases: i. e. funds available, and the commitment of those with the power to spend the funds for technology. Within school districts, the students' access to technology depends on the school administrators' long-term commitment to technology and their competence in writing and administering technology plans (Jameson, 1999). Gaps between classrooms occur because some teachers are better able to use and teach technology than others.

An aging professional force is not adequately prepared to use or teach the technology without extensive retraining. Many teachers and other professionals lack the skills to use the technology themselves, even if it is available. Inability to use the technology limits their access to knowledge and to personal training opportunities. In turn, they are unable or unwilling to promote student inquiry through technology because they cannot do so themselves. Instead of using technology for learning, teachers may encourage students to play games on computers during free time, or they may withhold it from some students as a punishment and give access to others as a reward (Hayden & Cauthen, 1996).

In addition, some professionals harbor negative attitudes toward technology; this limits its use by these professionals and their students (Jameson, 1999). Regardless of personal biases, professionals must become technologically competent so that they can help students sort through the information, organize, synthesize, and use that information productively. Technology is not going away. Without focus and purpose, it can be useless, wasting precious instructional time, or even harmful, providing learning opportunities that students should not have. Without responsible adult direction, students may become lost on the sea of the Internet without a compass. To summarize, the two major challenges to the use of technology by both students and professionals are cost and knowledge (Stoicheva, 2000).

Solutions

According to Welter (1997), cost and knowledge should not prohibit the use of technology, "If we cannot find a way to provide all of our students, schools, and teachers with universal access to the same advanced information technologies, we are in effect endorsing a form of state sponsored illiteracy" (p. 5) and inequity. Projects like the Teacher Network Initiative (Schwab & Foa, 2001) help defray costs. The International Technology Education Association's Technology for All Americans (i. e., all U. S. citizens) Project has recently released Standards for Technological Literacy: Content for the Study of Technology. This document enunciates literacy

standards and benchmarks for all students K-12, standards that help define appropriate technological knowledge (Dugger, 2001).

This remainder of this monograph will present research-based solutions devised by the distinguished authors to meet the challenges of insufficient professional and student knowledge by (a) using technology to train professionals to work with students with E/BD, (b) using technology in program development for students with E/BD, and (c) using technology in interventions for students with E/BD. Emerging technologies, such as the CD-ROM format for inservice training and the Internet formats for storing, retrieving, and communicating information, can save time for teachers and individualize their training. Using PowerPoint and hypermedia formats help students develop both traditional and technological knowledge, while using highly motivating tactile/kinesthetic modes of learning.

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Project PEGS! Interactive CDs for Practice in Effective Guidance Strategies:

Using Technology to Train Teachers in Applying Positive Behavioral Interventions

Mary M. Wood, Diane Wahlers, Mark Lacy, and John O'Connor

Project PEGS -- Practice in Effective Guidance Strategies -- is at the mid-point of a three-year development program. The project mission is to design and produce a series of three interactive CD-ROM (CD) simulations to enable adults to learn and practice positive behavioral intervention strategies designed for use with young children ages 2 to 6, elementary school age children ages 6 to 12, and secondary school students ages 12 to 16. The CD target user groups include novice teachers; paraprofessionals; student teachers; school administrators and supervisors; school support staff including psychologists, social workers, and counselors; teacher educators; community service providers; and state level educators.

The program is based on the belief that effective management should result in observable increase in student participation in classroom activities and corresponding decrease in problem behavior. Each CD in the series uses the same prototype instructional design and computer simulation engine, while the graphics, text, and feedback content are modified to reflect developmental differences among the student age groups. Figure 1 outlines the 12 core positive behavioral intervention strategies selected for the program content (Martens, Peterson, Witt, & Cirone, 1986; Quirk, 1993; Wood, 1996). The strategies are research-based interventions proven effective with children and youth with and without social, emotional, or behavioral problems (Wood, Davis, & Swindle, 1998). The user is informed that these are core strategies needed by all adults who are responsible for the day-to-day education of children and youth, and the strategies are not presented as all-inclusive. Figure 2 lists the selected behavior problems the child characters portray in the simulations. A significant aspect of the series is the opportunity for users to explore the reasons why these behaviors occur. By identifying the purposes of students' behaviors in terms of meeting their unique concerns and needs, users learn to effectively individualize the selection of strategies.

CD-ROM Development Process

The CD series has five major development components:

1. Collaboration with an experienced subcontract firm for instructional software design and development. LetterPress Software, Inc. in Logan, Utah provided technical development of the core simulation engine used in all

three programs in the series. In addition to weekly distance communication via email and telephone, numerous two-day joint design meetings were held with the Developmental Therapy-Teaching Program staff at the University of Georgia and LetterPress Software, Inc. software designers. Topics included a detailed review of instructional goals and content in response to stakeholder and formative field evaluation feedback. Each issue was addressed at these meetings, and decisions were made concerning final deliverables and revision schedules. The ultimate goal was completion of the Georgia gold copy—the final elementary school version—achieved in January 2001.

2. Guidance from a diverse, volunteer advisory council. An active 12-member advisory council with experience and interest in the programmatic needs of children and youth in the three targeted age groups has provided stakeholder input and formative evaluation at every phase of the project. Members represent a diversity of ages, genders, ethnicity, professions, and parenting experiences. The council members tested the prototype individually for both content and technical concerns: e.g., ease of use, readability, and relevancy.

3. A dissemination and distribution system. In collaboration with the Georgia Department of Education, a plan is in place for a statewide distribution system for the series. Directors of the Georgia Learning Resource Systems (GLRS), charged with staff development in all of the 17 educational regions of the state, are implementing use of the CD for inservice training in their regions. They were provided with an introduction to the CD and an opportunity to use it independently. The responses were highly positive. Then three regional directors were asked to sponsor a local meeting and invite principals and special education coordinators to use and evaluate the CD in a computer lab; 90 leadership individuals participated. As a result, statewide dissemination has been initiated as preliminary planning for national distribution.

4. A companion instructor's guide for school-wide implementation. An inservice course with a 75-page instructor's guide is designed for 10 instructional hours with the CD as a companion computer lab assignment. Developed by the Georgia Department of Education, the course is intended to expand individual CD training for school-wide programs in using positive behavioral intervention strategies to reduce discipline problems. Additionally, the course is recommended as a part of paraprofessional and substitute teacher training and as a resource to assist general and special education teachers when they team for inclusion of special needs children in regular classrooms.

5. Formative and summative field testing. To attain the goal of helping adults increase their skill in working proactively and successfully with children/youth who have troubled and troubling behaviors, any program must be

supported by both formative and summative evaluation activities. The standards established for the CDs were that they should be shown to be must be educationally sound, instructionally effective, and clearly relevant to the specified stakeholder groups.

Formative Evaluation Activities

Issues of *content validity, accessible format, market need, instructional effectiveness, practicality,* and *inservice usefulness* were addressed in a series of formative evaluation procedures. These were the questions:

1. Are the most prevalent school-related behavior problems represented, and are they portrayed clearly by the students acting in the simulations, including those with and without special needs?
2. Do the student characters in the simulations portray the range of clearly recognizable behavior problems from most severe to least severe?
3. Are the student responses to the adult strategies portrayed in the program authentic real-life responses?
4. Are content, instructional design, and technical attributes interesting, and user friendly, and is the content perceived as valuable by potential users?

To answer these questions, six experienced teacher educators and the advisory council members were asked to read the descriptive vignettes of the students' behavior. Four of the six professional reviewers had 20 to 35 years prior experience in classrooms for troubled students, where they had been teacher trainers, program supervisors, and direct service providers. They independently matched these descriptions with the list of typical problem behaviors (the target behaviors identified in Figure 2). The results verified that all targeted behaviors are included in the portrayals of the students. Staff and council responses were then analyzed to verify the authenticity in range of behavior severity conveyed by individual child characters who represented those with and without special needs. Between seven and eight different problems were identified in each of the portrayals of special needs children, reflecting the reality that a troubled student often uses more than one troubling behavior. In contrast, the three children portrayed as being without special needs were identified with only one to three problem behaviors. The respondents all correctly identified the three children with special needs who were designated as those with the most severe behavior problems and the three designated as having the least severe problem behaviors. These findings verify both the range of severity in the portrayed behavior problems and the clarity with which differences can be detected by professionals and other stakeholders.

To further examine the reliability of this conclusion, the professionals were then asked to rank the student characters' behavior problems from *most severe* (marked 1) to *least severe* (marked 6). Four of the six raters (67%) ranked all of the students in identical order. The three students designed as those with special needs were ranked at the top third for severity. Those designed as being without special needs were ranked by all raters in the bottom third for severity. One student was identified by 100% of the raters as having the fewest behavior problems. These findings confirm that the student characters realistically portray a range of behavior problems from severe to mild.

To verify the validity of the responses written into the computer by each student for every possible strategy that might be selected by a user, the experienced professionals again reviewed each vignette and behavior description independently. They then designated the response(s) each child would mostly likely make to every possible intervention. The standard for authenticity was consensus among the reviewers. The reviewers met as a group to examine their ratings. They also determined by consensus the most effective intervention and each child's typical response to being ignored. In total, 3,456 individualized computer "rules" were developed by consensus among the raters (144 responses to each intervention option for each of the 6 children in each of four different activities). Results of this process ensure that the portrayed responses by the students to the interventions in the simulations are valid and authentic to real-life situations of elementary school students.

With the first prototype, a focus group of 12 teachers was asked to use the CD. As a group these teachers discussed their experiences and made recommendations for improvements. Another group of 16 college students taking a behavior management course in Special Education was asked to keep daily logs while using the revised beta version of the CD over a 10-day period. They were then asked to rate content, value as a learning experience, and technical attributes on a 26-item checklist (1 = highly satisfactory to 5 = not satisfactory). Finally, they participated in a focus group discussion. Results indicate that they generally approved the CD as a learning tool, found it reasonably user friendly, and considered it valuable for student teachers. They also made numerous suggestions for further enhancing the usability. Project staff and LetterPress reviewed findings from each of these formative evaluation activities. Revisions were made when changes would clearly enhance the final product. Overall, the results of these several formative evaluation activities suggest that the CD meets the standards set for *content validity, interest, relevance, usefulness,* and *user friendly design.*

Field Impact Study

The first impact study was conducted to explore the effectiveness of the *PEGS! Program* CD-ROM (CD) with elementary school teachers who have difficult-to-manage students. Three elementary school principals volunteered assistance in the study to see if teachers' skills and effectiveness with students' behavior problems improved after using the CD. The principals were asked to select teachers in their school who were in their first or second year of teaching or had difficult-to-manage students. These teachers were then asked to participate in a trial evaluation of the CD.

There were 12 teachers who participated, with 203 students between 4 and 10 years of age in pre-K through 3rd grade; 7 of the participants were 1st through 3rd grade teachers. In addition, 1 teacher assistant, 1 media specialist who worked with small groups of students daily, 2 pre-K teachers, and 1 resource room teacher were included. All of the participants indicated that they were moderately to very experienced with computers, and 75% were under age 30.

Before beginning the evaluation, each teacher was observed by two trained evaluators simultaneously for 30 minutes. The teacher selected the time and activity for the evaluators to observe. One evaluator recorded the number of management strategies used by the teacher minute-by-minute during the observation period. She also recorded the number of positive and negative behaviors the students used in responding to the teacher's management strategies. Student behavior was recorded as positive when the strategy maintained or increased participation in the learning activity. Negative behavior was recorded when a strategy failed to maintain or improve a student's participation in the activity. Concurrently, the second evaluator used a 26-item observational rating checklist to judge the quality of the teacher's strategies and the students' responses. Each item was rated from +5 to –5 to reflect the relative effectiveness of the teacher in obtaining student participation. The ratings were summed to obtain a quality score (QS).

The teachers were then asked to use the CD for up to 10 days. The task was to achieve the greatest possible participation from the students in the animations. The teachers were encouraged to set their own times, use the CD daily, keep logs of time spent, and make written comments as they used it. At the end of the trial period, the teachers completed a checklist to evaluate their experiences with the CD. Then the same evaluators returned to the teachers' classrooms to repeat the observation procedures.

Summary of Results

Analysis of the teachers' log records indicates that they spent an average of 3 hours in total with the CD during the 10-day trial period. In addition, 10 of the teachers also rated the experience on a 26-item checklist. The standard for satisfaction was a rating greater than 3 on a 5-point scale for each item. Items were grouped to reflect ratings of *Content*, the value of the CD as *a Learning Opportunity*, and *Ease of Use*. Some teachers gave the CD the maximum ratings possible both for *Learning Opportunity* and for *Ease of Use*. Table 1 summarizes their ratings and shows distinct teacher satisfaction overall and for each evaluation dimension.

The observational data of teachers' actual classroom use of these strategies at baseline and at Time 2 resulted in these findings: Among the 203 students, a total of 289 instances of negative responses to the teachers were recorded in 8 classrooms at the baseline observation, while 4 classrooms had no observed negative responses. Following the 10-day trial period, no negative responses were observed in 8 classrooms, and the total number of negative student responses in the remaining 4 classrooms had declined to 129 instances—a 55% reduction in problem behavior overall. Effectiveness of the teachers' actual classroom management skills increased from an average quality rating score (QS) of 93 at the preliminary observation to a QS of 116 at the second observation. Among the teachers with classroom behavior problems, there were 105 instances of ignoring at baseline (an average of 13 instances per teacher in a 30-minute period). At Time 2, their use of ignoring had dropped to 55 instances (an average of 7 instances per teacher).

In summary, the field study results indicate that as the teachers' skills in using the management strategies increased, their students' negative behaviors decreased.

- After 3 hours of practice with the CD in a 10-day period, the teachers improved their actual classroom skills using the 12 basic management strategies by 25%, while problem behaviors of their students dropped 55%.

- Ignoring by teachers who had students with problem behaviors dropped 48%, while their skill scores in using other strategies increased 51%. The students' problem behaviors in response to ignoring dropped 56%.

- The most frequently used management strategies were *motivate with materials, provide clear structure, remind students of rules, move closer to students, praise and encourage,* and *redirect students to activity*. At baseline, there was an average of 22 instances of negative responses to these strategies per teacher during a

30-minute observation. At Time 2, students' negative responses to these strategies had dropped to an average of 5 per teacher.

Conclusions

This first field study of impact indicates that the PEGS! CD, when used for about 3 hours over a 10-day period, is highly effective with beginning teachers and with those who have behavior management problems in their elementary school classrooms. Use of the CD can be expected to result in a reduction by more than half of the behavior problems among elementary school students. The CD increases the skill with which teachers obtain greater student participation by using positive behavioral intervention strategies more skillfully and by ignoring behavior problems less often. The simulated practice offers an easy-to-use learning format with content that the teachers find useful and relevant to their everyday behavior management problems.

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views or policies of the Office of Special Education Programs, U. S. Department of Education, or the Georgia Department of Education, nor does mention of trade names, commercial products, or organizations imply endorsement by the U. S. Government or the Georgia Department of Education.

[Fig. 1 separate attachment turns horizontally]

Figure 2. TYPICAL BEHAVIOR PROBLEMS INCLUDED IN THE PEGS! PROGRAM

Introduction to this CD-ROM:

Behavior problems of children can be grouped into one of nine general categories, described below. These groupings are easy to remember and offer a beginning guide to understanding why children behave the way they do.

You will meet all of these behavior problems as you work with the children in this program. Watch a child's behavior and then consider into which category that behavior belongs. And don't be surprised if you observe several problem behaviors in the same child. Then make a choice among many strategies about what response from you will work best for that child in that activity. Keep the goal in mind—to encourage the greatest possible participation in learning.

- Talking or Behaving Like a Much Younger Child
- Frequently Unhappy, Overly Sensitive, Sad, Irritable
- Physical Complaints, Tired
- Very Short Attention Span, Restless, Hyperactive
- Listening Difficulties, Day Dreaming
- Impertinent, Defiant, Resentful, Negative

- Withdrawn From Peers or Adults
- Hurtful or Destructive to Self or Others
- Unmanageable Anger

Table 1. TEACHERS' RATINGS OF THE CD AFTER THE TRIALS (N = 10 TEACHERS)

	Rating of Content	*Rating of the Learning Opportunity*	*Rating of Ease of Use*	*Overall Rating of the CD*
Number of Items*	6	11	9	26
Satisfaction Standard	>18	>33	>27	>78
Average Rating	21	42	39	102
Range	14-29	23-55**	25-45**	63-125

* Each item was rated 5 (*Yes*) to 1 (*No*) with 3 (*Somewhat*) as the middle score.

** Maximum score possible for this section.

Using Interactive Media to Teach Behavior Intervention Planning

Carl J. Liaupsin, Terrence M. Scott, and C. Michael Nelson

The 1997 amendments to the Individuals with Disabilities Education Act (IDEA) mandates the development of behavior intervention plans (BIP) based on functional behavioral assessment (FBA) for those students with disabilities who exhibit behaviors that constitute a pattern of misbehavior or require a change in placement (Pub. L. No. 105-17, §615 (K)1.B.i). This federal mandate has generated a need to train large numbers of personnel in the process of creating behavior intervention plans (BIPs) based on the perceived function of student problem behavior. However, some features of traditional professional development models reduce the likelihood that the training will produce the desired outcomes (Scott & Nelson, 1999; Sailor, Freeman, Britten, McCart, Smith, Scott, & Nelson, 1999-2000). These include the difficulty of delivering a consistent message across large or multiple groups, the high cost of obtaining substitute teachers, and the difficulty scheduling convenient training dates.

The use of self-instructional, interactive training methodologies provides one way to meet the immediate need to train large numbers of pre-service and in-service personnel in strategies for conducting functional behavioral assessments (FBAs) and developing BIPs. Such methods can help schools and agencies to provide standardized, accountable, and accessible training. This paper describes an interactive multi-media program that teaches a six-step process for developing a BIP.

Program Description

In 1998, the Office of Special Education Programs of the U. S. Department of Education funded a National Technical Assistance Center for Positive Behavioral Interventions and Supports. The focus of this center is to build the capacity of schools to provide multiple levels of positive behavior support to all students, including those with or at risk of developing emotional and behavioral disorders. The authors are partners in this center, and, in support of project goals, they are developing a set of five interactive computer-based training modules (Table 1). The second module in this series, the BIP module, which has recently been published, presents a six-step process for developing behavior intervention plans (Scott, Liaupsin, & Nelson, 2001).

The BIP module, contained on a cross-platform CD-ROM, was programmed using Authorware 5.0 (1998), a tutorial development program. The remainder of this paper describes the intended audience, the contents of the tutorial and case studies sections, the instructional features incorporated into the design of the module, and the

instructional options for implementation. Finally, the plan for conducting a comprehensive evaluation of the module is described.

Audience. The BIP module was designed to be appropriate for a wide variety of professionals who work with students who exhibit problem behavior. These professionals include general education teachers, special education teachers, counselors, school psychologists, and social workers. The BIP module is also appropriate for use by pre-service and in-service personnel in college methods courses that focus on behavior management, assessment, and intervention planning.

Tutorial. The tutorial section of the BIP module presents a six-step process for the development of behavior intervention plans. The tutorial begins with a review of the process of functional behavioral assessment and a brief introduction to the process of behavior intervention planning. Users then are introduced to a case example that is featured throughout the tutorial to illustrate the steps involved in the process. Video scenarios are used to demonstrate the function of the student's behavior and to illustrate both incorrect teacher responses and proper implementation of various planning outcomes. Interactive skill checks are presented throughout the tutorial. These skill checks allow users to evaluate their understanding of the content presented in each section.

Each of the steps in the behavior intervention planning process is presented through a direct instruction strategy that includes presentation of new content, demonstration, guided practice, and review. As users proceed through the tutorial, they are guided through the process of filling out a behavior intervention planning form based on the case study (Figure 1). The process presented in the tutorial includes the following six steps: (1) identifying the function of the problem behavior, (2) selecting a replacement behavior, (3) designing a teaching plan, (4) arranging the environment to facilitate success, (5) developing consequences for desired and undesired behavior, and (6) writing and monitoring behavioral objectives.

Case Studies. The case study section of the BIP module guides users through completion of a BIP for two students. One student is a middle schooler with physical disabilities who breaks a variety of classroom rules to access attention from a select group of peers. The other student is a high school pupil who makes rude and threatening remarks to the teacher to avoid academic tasks.

At the beginning of the case study section, the user is prompted to select a student and print a copy of the BIP form. As in the tutorial, users complete this form as they go through each of the six steps in the process. After completing a section of the BIP form, users are prompted to move to the next screen, which shows the responses of

an expert behavior analyst for comparison. (At the beginning of the case study section, users are cautioned that the recommendations of the expert represent only one opinion and that there may be more than one correct answer for each step in the process.)

Instructional Features. The BIP module was designed to include a number of instructional features to promote user understanding of the content. These features include cues to assist users in relating the planning form to the instructional process, a set of cumulative notes presenting key information, two forms to guide users in developing BIPs, and a page that provides easy access to the videos included in the module.

The instructional design of the BIP module involves active engagement in the BIP process. To assist users in following the process on their hard copy of the planning form, a miniature image of the planning form is presented at the beginning of each step, and the section of the form being presented is highlighted.

A review of key information is presented at the end of each section of the tutorial in a feature called the "Summary Notebook," which has the on-screen appearance of a ring-bound notebook. Tabs on the side of the notebook allow users to review summary information from sections of the tutorial that they have already completed.

Two forms are included to assist users in understanding the behavior intervention planning process. The BIP form provides users with a structured framework of prompts for developing an effective individualized intervention plan (Figure 1). The consequence planning decision flowchart also provides users with a structure for intervention planning (Figure 2). However, this form structures decision making with regard to the content and delivery of both positve and negative consequences.

Finally, a feature called the "Video Gallery" is included in the BIP module to provide easy access to all of the video scenarios included in the tutorial and case study sections. The Video Gallery, which can be accessed from the main menu of the program, presents a still image from each video along with a short description the content of the scenario.

Instructional Options. The BIP module is designed primarily for use as a self-instructional tutorial, allowing individuals to work at their own pace. School personnel can use the BIP module individually in their own classrooms or at home. However, district or regional training coordinators may invite groups of teachers to complete the module individually in the school's computer lab as part of a scheduled professional development day, awarding professional development credit for completion. Instructors of higher education methods courses in the areas of behavior management and assessment may choose to assign the BIP module as an outside activity or use the Video

Gallery to incorporate the videos into their own presentations. Finally, it may be appropriate for intervention teams to view the BIP module together to gain group understanding of the concepts and to practice team problem solving using the case study materials. Notes regarding instructional options for use of the BIP module are included in the accompanying user's manual.

Evaluation Plan. The research literature contains few examples of the evaluation of professional development software programs, and most of the examples that do exist have considered only the training outcomes of such programs (Liaupsin, 2001). However, more comprehensive evaluations can provide information regarding the validity of content, the quality of design, the perceptions of users, and the barriers that might be encountered when implementing professional development software. Plans are underway to incorporate these considerations into the evaluation of the BIP module.

Summary

The BIP module is a useful alternative to traditional methods of professional development, capable of training large numbers of personnel in the development of behavior intervention planning techniques. However, professional development programs are most effective when they (1) are based on a clear vision of outcomes, (2) include the development of long and short term training goals, and (3) provide follow-up technical assistance (National Joint Committee on Learning Disabilities, 2000). While the BIP module is comprehensive, it should be considered as only one element of a well-designed professional development program in behavior intervention planning.

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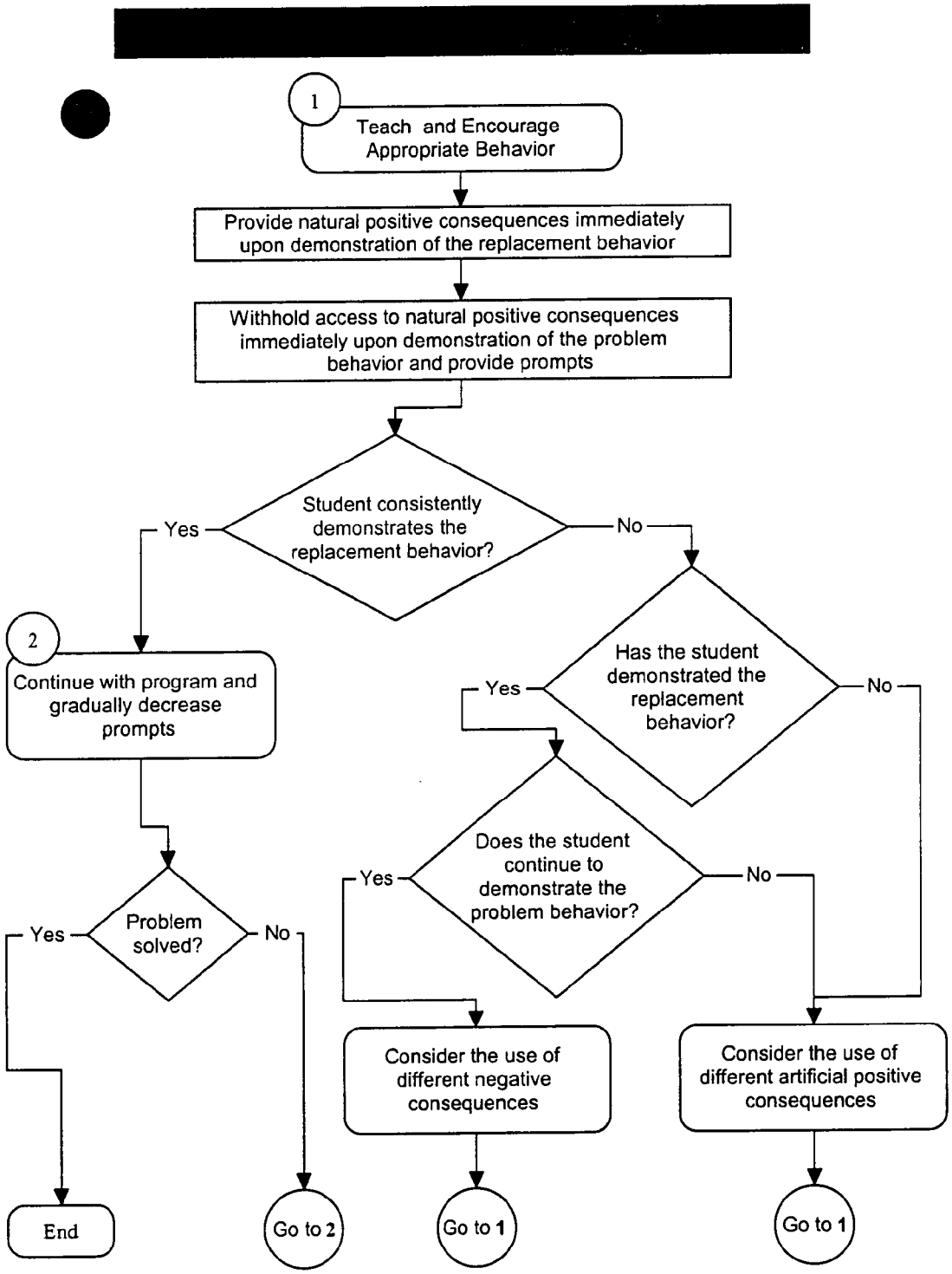
Table 1: Topics in the Proposed 5 Module Series

Understanding Problem Behavior
Functional Behavioral Assessment
Behavior Intervention Planning
Data Collection and Behavioral Objectives
Implementing School-Wide Positive Behavioral Support

Figure 1: Behavior Intervention Planning Form

Figure 2: Consequence Planning Decision Model



Delivering 500 Proven and Practical Interventions Through

CD-ROM and Online Technologies

Ray Beck, Ed.D.

Introduction

Linking research-based yet user-friendly interventions with the practitioner has been a challenge ever since educators recognized a gap between research and the application of research findings in the classroom. While translating research into less sophisticated nomenclature concerns many researchers, the real challenge is putting proven practices into the hands of practitioners in an efficient and accessible format that does not require an inordinate amount of teacher time, or overtax existing staff development plans.

One aspect of the challenge of providing practical and validated interventions is the need to find specific interventions for a select group of students who demonstrate either behavioral excesses or behavioral deficits. Although some of these students with behavior problems will be served in special education settings, many will remain with a general education teacher who is likely to have received no training in working with these students; simultaneously, the diversity of behavioral challenges that teachers are expected to accommodate continues to increase.

The need is apparent: teachers and other practitioners must be helped to utilize technology to locate proven and practical interventions and to implement them, all without excessive technical training. While a number of "cookbook" approaches are available to the practitioner, most are presented solely in print without visual demonstrations, and such approaches usually do not treat the "intervention" as only one step in a process. In contrast, the model outlined in this chapter begins with a process of describing (rather than labeling) student behavior and then employing one or more of three unique yet complementary resources to address the identified behavioral excesses and deficits.

The succeeding sections will describe in depth a proven model that is designed to assist teachers and other practitioners (regular and special) in accommodating the individual needs of most students commonly found in general education classrooms, particularly those with behavioral and academic challenges. This model, *RIDE* (*Responding to Individual Differences in Education*), is a set of resources developed in a public school setting over a decade ago that has evolved from a stack of nine Apple II-E floppy diskettes, with 55 interventions and 18 video

demonstrations into a collection of more than 500 interventions (tactics) and 105 video demonstrations that is available on CD-ROM and now on the Internet.

2. Development of *RIDE*

In 1988, following the charge by Madeline Will (then Assistant Secretary of Education) to consider special education students a shared responsibility of all teachers, the Great Falls (Montana) Public Schools systematically surveyed their classroom teachers about the kinds of resources they want and need if they were to address the needs of students with behavioral and/or academic challenges. Upon compiling a description of student behaviors (excesses and deficits), project staff created RIDE by the following process: (1) identifying and rewriting articles that focused on classroom interventions from the educational and psychological literature; (2) matching identified problems with specific research-based interventions; (3) developing a software program (Macintosh and Windows) with the capacity to store and retrieve hundreds of ideas (the "Computer Tactics Bank"); and (4) providing video demonstrations of how the interventions should be implemented (the "Video Library").

Two additional components in the current package complement Computer Tactics Bank and Video Library. The first additional component is a set of statements concerning effective classroom research, derived from a larger body of effective schools research. Using this resource, "Effective Classroom Research," teachers match their current teaching methods and instructional procedures with those reported in the literature. The second additional component guides the development and training of a building-level team of teachers and other staff, the "School-Wide Assistance Team," charged with solving problems and offering assistance to referring colleagues.

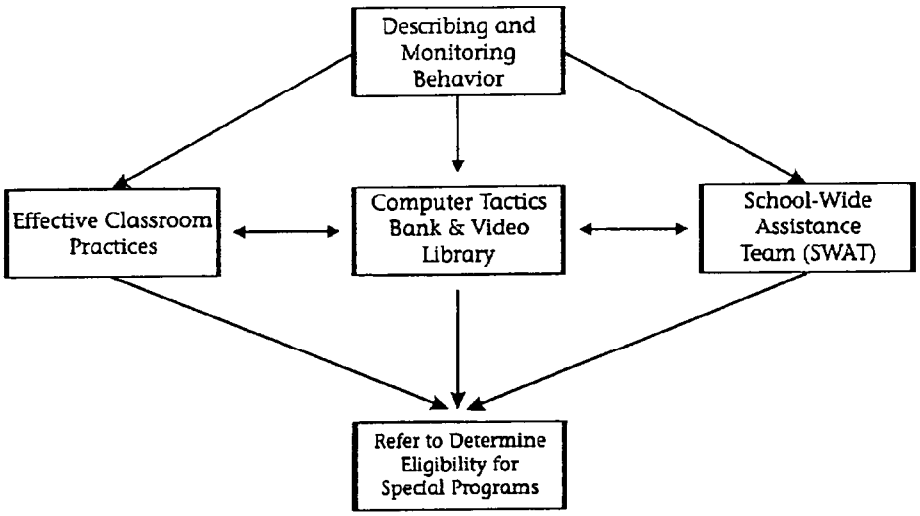
The compilation of these three main resources, the Computer Tactics Bank/Video Library, Effective Classroom Research, and School-Wide Assistance Team, has been tried, proven effective, and validated by the U.S. Office of Education. Since 1988, more than 3,000 rural and urban school buildings (preschool, elementary, and middle schools) have adopted *RIDE*, and six states have implemented it statewide (AK, GA, ME, OK, SC, UT). Department of Defense Dependent Schools (DoDDS) have adopted *RIDE* on most overseas military bases. Pmprovements that constitute evidence of effectiveness include a significant decrease in referrals to special education, more appropriate referrals to special education, significant increases in teachers handling problems effectively without requesting outside help, and a sense of empowerment by teachers and practitioners in implementing behavior management and academic improvement strategies.

1. The *RIDE* Model

RIDE operates on the premise that, when provided with proven, practical, and immediately accessible practices, teachers and other practitioners will become their own best resource. Easier said than done, of course. Despite our best intentions to offer updated literature reviews, to produce new videos, and to package the manuals, Computer Tactics Bank, and Video Library in one kit, many schools' kits were soon shelved. Why? Not because the ideas were inappropriate, impractical, or unproven; but because the hassle involved in locating the kit within the school building, finding a VCR, dragging the video monitor to a location next to a computer, etc. seemed daunting to many practitioners. Thus the notion of using technology was, in our thinking, the best answer to the frustrating problems of storing and retrieving a growing body of information and to the frustrating unlikelihood of classroom practitioners utilizing the resources over time. Accordingly, all *RIDE* materials developed since 1988 are now available on CD-ROM and the Internet.

Figure 1 depicts the *RIDE* process and the resources available (CD-ROM and Internet versions).

Figure 1: The *RIDE* Process



The implementation steps recommended by *RIDE* are as follows:

Step 1. Describe rather than label student behavior.

Step 2. Compare current instructional and curriculum procedures to best practices available in Effective Classroom Research.

Step 3. Access a bank of interventions, Computer Tactics Bank, with video supplements ,Video Library.

Step 4. Request assistance from a team of colleagues, the School-Wide Assistance Team.

Step 5. If necessary, refer to the student to determine eligibility for special programs.

Step 1. Description of Behavior

To begin the process, it is essential that teachers describe rather than label the student's behavior. Labeling a student "lazy," for example, is not helpful in solving the problem. A better approach is to ask such questions as, "What is the student doing?" or "What does lazy look like?" Using a behavioral phrase such as "The student does not complete work on time" gives the teacher a more concrete starting point. Not only does this approach permit a more immediate access to the literature, but also it clarifies communication among staff members. In addition, the use of a behavioral description allows the separation of the student from the problem (i.e., the behavior).

The following are a few examples of behavioral descriptions with interventions immediately accessible in *RIDE*: talk-outs, out-of-seat behavior, bullying, fighting, noises, gestures, swearing, following directions, completing school work, and turning in work on time. To assist teachers in describing student behavior, *RIDE* provides a "Behavioral Description Form" that prompts a teacher to address four tasks: (1) describing the target behavior(s); (2) choosing one behavior from the list of target behaviors on which to begin working; (3) building and/or teaching positive behavior; and (4) monitoring the extent to which the behavior changes. In addition to the "Behavioral Description Form," subscribers can download from the Internet all *RIDE* documents necessary for implementing the interventions.

Step 2. Effective Classroom Research

This resource is based on the premise that teachers can benefit from systematically examining the extent to which their current classroom procedures are congruent with the findings of educational research. Sometimes a learning or behavioral problem may not rest so much with the student as with the approach taken by the teacher. In order to investigate this possibility, the teacher must ask the question, "Are my classroom practices in accord with what has been found to promote appropriate social behavior and academic learning?"

The guidelines presented in this resource were largely derived from a literature review conducted by the Northwest Regional Laboratory of Portland, Oregon, reported in a document entitled *Effective Schooling Practices:*

A Research Synthesis. Five themes seemed to emerge, representative of a larger body of literature, reflecting classroom practices closely associated with students experiencing behavioral excesses and deficits. These themes are (1) High Expectations for All Students, (2) Clear and Focused Instruction, (3) Closely Monitored Learning, (4) Positive Behavior Management Plans, and (5) Positive Atmosphere in the Classroom. From the five themes, 15 questions were selected that, if answered in the negative, prompt the teacher to make adjustments.

Step 3. Computer Tactics Bank and Video Library

The resources found in the Computer Tactics Bank and Video Library differ from the Effective Classroom Research in that they are specific interventions targeted toward specific problem areas. More than 400 interventions have been added to the Computer Tactics Bank since the Model was launched in 1988. Accompanying the individual tactics (described in two to three pages each) are 106 video demonstrations ranging from 6 to 10 minutes. Programmers created both a Windows (PC) and a Macintosh platform in three program versions: Early Childhood (pre-K through grade 2), Elementary (grades 1 through 6), and Middle School (grades 6 through 8). Software can be installed on individual computers or accessed through a network. The user-friendly format allows teachers, through a click of a computer mouse, to review dozens of tactics and video demonstrations that link specific problems (e.g., talk-outs, out-of-seats) to specific research-based tactics. Hard copies of the tactics can be printed either by individual tactic or by groups of tactics.

In the Early Childhood version, 18 problem areas were identified by teachers and support staff, including such problems as aggression, self-control, talk-outs, following directions, staying on task, tantrums, crying, whining, tattling, transitioning, speech and language, over-dependency, fine and gross motor skills, and safety; 192 written tactics (of 300 to 400 words each) and a Video Library of 33 brief demonstrations are available to support teachers in addressing such problems. Teachers and other practitioners also can add their own customized tactics (interventions) to the Computer Tactics Bank.

The Elementary version includes 23 problem areas and, like the Early Childhood version, covers problems such as talk-outs, out-of-seats, social skills, aggression, bullying, compliance, noises and gestures, tattling, blaming others, swearing, staying on task, completing work, participating, cooperating with others, shyness, and transitioning. Like the Early Childhood version, the Elementary version allows teachers to add tactics of their own design. The Computer Tactics Bank in this version comprises 244 written tactics (of 300 to 400 words) plus 40 video demonstrations (each eight to ten minutes in length).

The Middle School version has 18 problem areas: e.g., social skills, aggression, talk-outs, out-of-seats, bullying, study skills, staying on task, basic skills, etc.. The CD-ROM contains 225 tactics (of 300-400 words) and 35 video scenarios (eight to ten minutes in length). And, like the other two versions, teachers can include their own customized tactics.

Each tactic is presented in a specific sequence of five steps: (1) a short introductory statement explaining the intent or purpose of the tactic; (2) the exact steps necessary to implement the intervention; (3) details of any special considerations that should be addressed; (4) guidelines for monitoring that describe how to determine if the tactic is having a positive effect; and (5) the original source and reference(s).

Perhaps one of the most important aspects of the Computer Tactics Bank and the Video Library resource is their independence from the other two resources: Effective Classroom Practices and School-Wide Assistance Teams. Although the *RIDE* process is frequently implemented building wide, teachers and other practitioners often find the interventions available in the Tactics Bank and Video Library to be the most valuable. Thus once teachers become accustomed to how *RIDE* works, they can find immediate help by accessing the bank of over 500 interventions.

Step 4. School-Wide Assistance Team

Integral to *RIDE* is a team of building-level colleagues usually composed of regular classroom teachers. In some cases, the talent of other building staff is sought: the custodian, teacher aide, school secretary, playground assistant, etc., may be invited to sit in on team meetings (hence the name *School-Wide* Assistance Team). In one school utilizing this resource, for example, a custodian presented a better idea about how to work with a withdrawn child than did the teaching faculty.

A protocol is provided for a referring teacher to gain access to the team and to the knowledge base of its members. Among the steps is a form that must be filled out detailing the nature of the problem and the solution(s) that have been tried to date. When the team meeting is called, the team members complete additional specified steps that help to ensure that interpersonal as well as procedural considerations are followed. These steps include establishing a climate of trust, focusing on a description of the behavior rather than a label, encouraging input from all parties, generating as many solutions as possible without judgment (brainstorming), encouraging the referring teacher to choose a solution, and, finally, writing an action plan that includes a follow-up date.

Step 5. Special Programs

A final step in the *RIDE* process allows for the referring teacher to request that the target student be referred to determine eligibility for special programs.

Conclusion

Convincing teachers and support staff to seek and implement interventions from the professional literature has been a challenge ever since researchers have attempted to link research to practice. The traditional medium—which has not been very effective—has been the printed word, generally published in lengthy and jargon-filled articles. To complicate the matter, teachers often do not have immediate access to the dozens of available journals that present interventions. Even if they do have such access, most do not take the time (or have the time) to systematically review and sort out applicable information from such articles. Many journal articles are overloaded with figures, tables, and statistical analysis, when all a teacher may want to know is "What was the intervention that helped the student stay in his or her seat, attending and responding?"

RIDE, as described in this chapter, provides practitioners, via CD-ROM or the Internet, with practical and user-friendly interventions in an efficient and cost-effective manner. *RIDE* provides a wide variety of interventions found in the professional and scholarly literature and supports the implementation of those interventions through a jargon-free description, often accompanied by a brief video demonstration. Two other components are infused into RIDE to allow teachers to judge their current classroom practices against effective classroom practices literature, and to utilize building-level staff to help problem solve difficult student behavior.

Available Products and Services

All three versions of the *RIDE* resources (Early Childhood, Elementary, and Middle School) are available on CD-ROM in Macintosh and PC platforms. The CD-ROM contains all the tactics and video demonstrations. Additionally, the *RIDE* Computer Tactics Bank and Video Library are now available on the Internet through a yearly subscription. Subscribers will be offered a minimum of 45 interventions per year on the Web (15 each in Early Childhood, Elementary and Middle School), with a periodic release of selected video demonstrations via either the Internet or CD-ROM. With either technology, a one-day training program is available, as is a recommended follow-up visit three to four months later. For additional information on material costs and training, contact the publisher, Sopris West, at (800) 547-6747.

Use of Powerpoint to Increase Reading and Language Skills: A Research-Based Approach

Francie Murry

The Political

Considerable state and national attention has been focused on the literacy skills of children and youth in the United States due to the establishment of content standards and assessment accountability. Substantial scrutiny has been given to whether students with disabilities should be included in the state's content standard assessments. A teacher and administrator may hesitate to have a student with E/BD participate in the testing due to the student's inability to remain focused during the seat time required to complete the assessments. In addition, the E/BD student is likely to perform poorly and to negatively skew the test scores. Not only may this inclusion be disruptive, but may also negatively skew school scores.

The Poor Get Poorer

Many students with E/BD are poor readers. This deficit may be related to behavior or due to a secondary learning disability. Nevertheless, E/BD students describe reading as slow, inaccurate, and laborious. In order to obtain meaning from written text, they spend a great deal of time re-reading passages, decoding unfamiliar and often familiar words, and trying to control feelings of stress brought on by fatigue. This procedure takes them considerably more time than reading requires of their competent peers, their quantity of reading is less, exposure to new vocabulary is less, and practice reading is less. Thus the opportunities to improve literacy skills are less.

Students at the secondary level are dealing with the fatigue of a growing body, growing responsibility, and increased social learning, leaving little time, energy, or motivation for struggling with an activity that does not come easily. Interpretations of recent neuroscience research have promoted the idea that children and youth have a window of optimum learning opportunity due to patterns of brain development, which, once passed, leaves little chance of recovering uncultivated ability (Goleman, 1995).

The United States Department of Education reports that students using technology have a distinct advantage over similar students who are not using technology especially in the area of basic skills tests performance (1996). Instruction in the use of technology has several capabilities that may influence the reading and writing process. There is a growing market of writing support tools available for computer that go beyond the word processor to support word recognition, reading fluency and automaticity, reading comprehension processes and social biological factors involved in literacy (MacArthur, 1996).

The use of computer technology in the workplace is also increasing rapidly. The American Society for Training and Development (ASTD) found that 73 % of training professionals said that computer skills are "essential for employment" (Bassi, Gallagher, & Schroer, 1996). It is predicted that by the 21st century, it is predicted that 60% of U.S. jobs will require the use of a computer. A large and growing gap remains between those with easy access to technology and those with little or none (Katz & Aspden 1997). Differences in access to computer and communications technology are created and complicated by household income, educational attainment, race and ethnicity, age, and gender, with the greatest inequities occurring for those with the lowest income and the fewest educational opportunities. As computers become integral to business, education, and other areas of life, these inequities result in greater limitations in access to employment, knowledge, learning, and participation in society by students with EB/D.

The integration of neuroscience and technology can improve how students with EB/D learn literacy skills. Scientists know that brains can continue to develop throughout life and that through intensive training brains can be "rewired" to improve the skills basic to all learning (Sylwester, 2000).

Hope Lies in Technology

One example for youth with E/BD that incorporate the principles discussed in this monograph is the use of PowerPoint presentation templates and the Carnegie Training templates to improve student literacy, specifically reading and writing. Concomitant results were found for increases in language usage skills as well. The key elements described include the following:

- The supportive social context for writing, reading, and presenting. The building of group membership.
- The importance of meaningful writing tasks and purposeful opportunities for oral language use. Emotional reciprocity by design.
- Brain-based learning methodology:
    1. orchestrated immersion.
    2. emotional safety.
    3. appropriate challenge.
    4. active processing.
- Rich engagement with active learning

Intensive training must focus on the way the brain processes language-encoded information since there is evidence that it is in these processes that a reading disability originates (NICHD, 2000). In conjunction with teaching phonics and promoting phonological awareness, a balanced approach to reading instruction is emphasized, integrating good literature, recreational reading, and writing (Adams, Treiman, and Pressley, 1997). While high school students, particularly those categorized as EB/D, would resist being taught phonics, they would not deny the opportunity to be in charge and be the teacher.

Students begin by using keyboarding skills and developing a simple PowerPoint presentation that is set to automatically move forward. This presentation promotes the alphabetic principle by fading in graphic displays of letters combined with auditory phonological pairing. Students share these programs with elementary students who are at risk for reading failure, capitalizing on the gains of teaching a skill and being a model of mastery of that skill.

Keyboarding is considered a standard part of curricula, as it is an essential skill. The keyboarding action enhances neurological connections associated with letter identification, language development, and sound processing. The use of a word processing program gives the students power to produce printed work that is free of errors and/or erasure marks possibly for the first time in their lives. Mentoring relationships are the organizing principle for group membership for a classroom of students with EB/D. Their significance is assured as they create a sense of belonging and allow students to contribute to another person's learning. These benefits are not promoted by traditional school system structures for students with EB/D. Weinstein understood the need for school systems to change to correct the learning dilemma faced by students when he stated, "Nowhere else [but in the schools] are large groups of individuals packed too closely together for so many hours, yet expected to perform at peak efficiency on difficult learning tasks and to interact harmoniously" (1979). Next, the template for "Introducing a Speaker," as shown in Figure 1, is used by the students to practice their first outline; additional topics and skills involved include adapting length, recognizing story structure, developing vocabulary , adapting syntactic complexity, and correcting errors in spelling, capitalization, and punctuation. Scaffolded interactions between teachers and students are enhanced by use of a projection panel. The teacher can scaffold students' work by sharing in the writing process and providing coaching as needed (Cochran-Smith, 1991). The visibility of text on the screen provides an opportunity to model the writing processes and to spend time exploring techniques for planning and revising. This sharing of responsibility is designed to provide opportunities for reciprocity and for modeling of collaboration (Daiute, 1986).

Many students with poor reading skills have a good command of the spoken language and, therefore, introducing a speaker is not something they consider beyond their ability. Each student selects and invites a member of the community to give a short talk. Once the speaker is selected and confirmed, the student uses the template to develop an introduction of that individual. The steps of goal setting, planning, and carrying out the task are the initial steps that lead toward effective writing. Deciding on a target audience, generating content through either memory or research, and organizing the material are all activities of experienced writers (Graham, 1991). The Carnegie templates help students with EB/D overcome deficits that are typical barriers to achieving proficiency in literacy: the need for more than average planning time, production of limited information, and lack of awareness of common text structures that provide organization of material and generate more content (Garner, Alexander, & Hare, 1991). Learning accelerates with greater opportunities for input and mental stimulation and experiential learning (learning by application) provides those opportunities. Students use increasingly complex templates and, depending on need, create their own individualized templates. After the outline is completed, students use the computer reading machine to check their outlines for sense, word accuracy, and correct usage (e.g., Kurzweil 3000).

Personalization of the presentations takes place as students import graphics, learn how to add word art, create animation, change the slide design, and polish transitions. During the practice "talk through," the instructor can audiotape the presentation. If several tapes are made during the practices, an oral history of the presentation development is created. Once the presentation is in an adequate format, the outline format for the PowerPoint presentation can be printed out. Through the use of the audiotape(s) and the slide presentation, the student expands phrases into sentences and slides into paragraphs using a word processing program. The computer reading machine reads the paper aloud while students listen for stops, pauses, and new beginnings as clues for punctuation and sentence structure.

Qualitative Outcomes

After using this program, many of the students changed their goals for learning and educational attainment. Some considered further education, a new goal they had not previously thought within their reach. Students expressed such thoughts as, "I learned that I can learn," and "I am smarter than I thought." Consistent with their thoughts, they displayed a greater degree of self-directed learning, better goal setting, increased reading, and improved school grades. Students showed gains in the quantity and quality of their reading, writing, mathematics,

science and language skills. These changes were evident in student portfolios, class publications, and sharing of writing with community members.

Affective Outcomes

These outcomes have been significant, as they have affected many areas of the student's lives both within and outside of school. In addition to increased feelings of capability for learning, the students showed greater autonomy and increased self-confidence along with a general sense of competence and pride. With improved self-efficacy, they recognized new options for their lives. Self-motivation, in turn, produced better attitudes about school, thereby improving academic performance.

In summary, technology will not cure academic performance deficits of students with EB/D. Simply having access to word processing has little impact on the academic or behavioral conditions of students. Teacher must understand the process of literacy development and not be afraid of technology. Students with EB/D need technological skills not only to advance in school, but also to grow in the realms of employment, social contexts, and self-efficacy.

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Figure 1. Carnegie Template for Introducing a Speaker

Introduction

•Speaker's name

•Qualifications

- Relevant experience
- Recognition by others

Hypermedia and Students With E/BD:

Developing Untapped Talents and Fostering Success

Matthew J. Mayer and Peter E. Leone

Many students with emotional/behavioral disorders (E/BD) who have experienced disruptions to their education over the years often have problems with written language, organization and planning skills, and general success in core academic subjects. Classroom activities that require such skills can be problematic, leading to poor academic performance and related behavioral difficulties. Consider the following brief description of one such student.

Jeffrey, a ninth-grade student, has a history of delayed language development. He has been diagnosed with intermittent explosive disorder, typical bipolar affective disorder, and ADHD. Psychological and educational testing has placed him in the low average to borderline range. He has had long-term difficulties with written assignments and with related academic tasks. He has demonstrated a variety of oppositional, physically threatening, and other negative behaviors. Based on this description, the prognosis for his success in academics would seem questionable.

However, Jeffrey recently constructed a remarkably sophisticated interactive multimedia CD-ROM that tells the life story of the character Miss Jane Pittman, based on the book and film The Autobiography of Miss Jane Pittman. Using Microsoft PowerPoint, Jeffrey included in his project a combination of multimedia elements: photographs, movie segments, graphic time lines, and many rich sections of text, including a lengthy biography and a multi-level thematic analysis of the main character's life experiences.

Jeffrey's success is not unique. Other students at his school have enjoyed success developing multimedia interactive CD-ROMs using Microsoft PowerPoint. One might ask how students such as Jeffrey would experience this level of success. Clearly, motivation was significant, but the motivation of the project itself does not explain how Jeffrey and other students focused their efforts for several months to work through such a complex undertaking from beginning to end. Other factors must have been involved. What might they be? Also, what overall impact does such an experience have on the student? Does the student develop improved writing skills? Stronger organizational and planning skills?

Understanding and responding to these questions in regard to Jeffrey and his classmates requires consideration of many factors: (a) writing in computer environments, (b) learning and communicating in hypermedia environments, and (c) adopting instructional strategies that support students with E/BD. In the following sections,

we highlight research in these areas, synthesize this information, and interpret Jeffrey's success. We conclude with recommendations for teachers interested in similar activities to promote student success.

Writing In Computer Environments

The research on writing in computer environments has not consistently demonstrated benefits to students (Bangert-Drowns, 1993). Several studies have found that students' revision of their work when working on computers was no better in quality or quantity than when using traditional pens and pencils, or that students using computers for writing actually engaged in less revision than students using traditional writing methods (MacArthur & Graham, 1987; Tone & Winchester, 1988). Daiute (1986) found that students using programs with on-screen revision prompts made more revisions than students using a basic word processor. Stine (as cited in Tone & Winchester, 1988) reported that computer use led to modest improvements in the quality and quantity of student writing. MacArthur (1988) found that teachers were able to have more interactions with students engaged in writing on computers. A review of 26 studies (Hawisher, 1989) found that "a writer's or student's particular habits and strategies for composing seem to take precedence over the influence of the machinery." Hawisher and Selfe (1998) stated that students' learning approaches to writing activities tend to carry over to their use of computers for writing.

Smith and Lansman (1989) suggested that the complex cognitive demands of the writing process could be facilitated through computer support. Daiute and Dalton (1993) demonstrated that computer writing activities can also facilitate student-to-student collaboration and lead to improved writing in elementary school age writers. These researchers found that students who engaged in talking about each other's writing projects learned about story structure and that the concrete activity in which they engaged was the critical determinant in their learning the abstract concept of story structure. Students with dysgraphia as well as those with language-based learning disabilities who have experienced cycles of failure in writing production have been able to engage in more writing activities as a result of access to word processing hardware and software (Smith, 1991, p. 362). Fitzsimmons-Hunter and Moran (1998) reported on a project where students used Smartboards for writing activities. They concluded that the simpler functionality--without the "bells and whistles" of modern word processors--helped to focus attention on the writing process.

This partial review of research on writing in computer environments suggests several things. First, computers, in and of themselves, do not make students better writers. Students bring many of the same writing limitations to the computer that they had with paper and pencil. Computers can provide motivation and lessen

frustration typically associated with poor handwriting and messy-looking papers that have undergone multiple corrections and revisions. Computers can also facilitate more learning interactions between teachers and students. Finally, writing projects that occur in a collaborative learning environment can facilitate improved writing skills.

Learning and Communicating In Hypermedia Environments

The term hypermedia has taken on different meanings over the years. For the purposes of this discussion, hypermedia refers to a computer-generated activity or project that includes multimedia elements (text, pictures, sounds, animation, and video), allows for nonlinear links throughout the hypermedia project, and allows end-user control. It can include some types of presentation software, such as Microsoft PowerPoint. Hypermedia has been touted as a technology that offers new and exciting opportunities to engage reluctant learners and improve student learning. Recent research studies on effects of hypermedia-based instruction have yielded inconsistent and often conflicting results (Liao, 1998). Liao performed a meta-analysis of 35 studies from 1987 to 1997 that compared the effects of hypermedia to those of traditional instruction on student achievement. The grand mean effect size was 0.48, suggesting moderately positive effects.

An exploration of the "learner as multimedia designer" (Liu & Rutledge, 1997), using at-risk high school students, found improvements in personal goal structures that promote investment in learning, as well as improved self-efficacy. Design skills such as planning, presenting, and collaboration also improved as a result of the multimedia design activity. The authors suggested that such multimedia projects provide an avenue of success for students who have generally failed in traditional academic tasks. Liu (1998) found that elementary students, particularly those of low to moderate abilities, demonstrated higher creativity when working collaboratively than when working individually when using hypermedia.

Jacobson and Spiro (1995) demonstrated that hypertext instruction allowed college students to better understand complex information, compared to a traditional approach. Ayersman (1996) cited several studies that demonstrated improved learning among K-12 students who used hypermedia instruction, as well as a 1990 study by Kinzer showing that video-related activities promoted increased writing and comprehension skills among language arts students with learning disabilities. Case studies of 22 at-risk elementary students (Daiute & Morse, 1994) found that targeting at-risk students' strengths by tapping their cultural and linguistic backgrounds through designing multimedia instructional activities can promote success. The authors speculated that traditional instructional activities that involve writing often target students' weaknesses, prolonging the cycle of failure. Tergan (1997)

suggested that the research on the effectiveness of hypermedia has underestimated its potential due to problems with research design and poor linkages to cognitive theory.

Theoretical Perspectives

Several theoretical models of learning in hypermedia environments may help explain why students such as Jeffrey are successful in ways they have never succeeded in before. According to Reed, Ayersman, and Liu (1996), hypermedia presents three broad types of learning opportunities: knowledge presentation, knowledge representation, and knowledge construction. They cited four models of learning that apply to hypermedia environments: (a) semantic networks, (b) concept webbing/mapping, (c) frames/scripting, and (d) schema theory. Semantic networks, which involve ways in which word meanings are represented and connected in memory, can involve a hierarchical structure. Concept webbing/mapping can mimic human brainstorming sessions that allow multiple nonlinear pathways among concepts emanating from one or several key ideas. Frames/scripts refer to frames of information, where a frame is a static unit of information that is situation-bound. A script (Schank & Abelson, 1977) is a collection of frames, usually organized and sequenced to represent a temporally bound set of events or procedures. Schemata, as taken from Piaget's theories, are structures that people construct to process and interpret new information based on their worldly experiences.

These four models may help to explain why some students can learn well with hypermedia activities. For example, hypermedia, with a multitude of links among ideas represented by keywords, provides a dynamic means of representing and, as part of a learning process, *reinforcing* semantic networks. Concept webbing/mapping allows for nonlinear connections among different types of information and knowledge structures. This is a particularly valuable learning tool for several reasons. First, students engaged in collaborative learning experiences can use webbing to build on new insights. Second, research by Gordon and Lewis (as cited in Ayersman, 1996) suggests that nonlinear knowledge structures can improve understanding of a broader context and support global learning objectives. Third, students with unique learning styles and language difficulties can pursue alternate paths in a nonlinear knowledge representation, yet learn at levels comparable to peers using traditional methods.

Frames and scripts can provide students a means to link textual and graphic materials to represent temporally bound procedures or events. This approach can offer a superior learning tool (Bransford, Brown, & Cocking, 2000, p. 124) compared to a text-only approach because students will have multiple memory codes for the frames that share context and that can be cued from multiple types of prompts. Daiute and Morse (1994)

demonstrated that sound and images could enhance learning and subsequent written expression, partially, because students could better remember information that was presented in multiple modes. This finding is supported by research in episodic memory (Engelkamp, 1998, p. 15), which has found that modality-specific stimuli affect memory performance independent of semantic memory. Also use of schema has been shown to improve information recall (Kardash, Royer, & Greene, 1988; Reed, Ayersman, & Liu, 1996). Students who are able to use hypermedia to construct knowledge using their unique schema can better attend to relationships in the information, can remember more, and can understand more complex relationships, compared to a traditional text-based approach.

Cognitive flexibility theory (CFT) (Jacobson & Spiro, 1995; Spiro & Jehng, 1990; Spiro, Vispoel, Schmitz, Samarapungavan, & Boerger, 1987), based on case-related knowledge acquisition, has emerged as a model of learning in hypermedia environments. CFT addresses complex knowledge structures and suggests that as information becomes more complex, it is more "ill-structured" or irregular, compared to simpler knowledge that can be represented in a clear, well-structured manner. Cognitive flexibility refers to one's ability to restructure knowledge as an adaptive response to changing needs, particularly when working with complex material that may require thinking along several conceptual dimensions. CFT posits that nonlinear aspects of hypermedia-based learning allow students to repeatedly "criss-cross" a landscape of complex knowledge structures and pursue a richer, deeper understanding of these knowledge structures.

Jacobson and Spiro (1995) demonstrated that students using hypermedia experienced richer knowledge transfer, compared to using traditional methods. They argued that failure to learn more complex knowledge might be partly due to applying methods appropriate for simpler, better structured content. They criticized instructional approaches that (a) use singular concepts to address complex ideas, (b) present abstract information apart from real-world context, (c) oversimplify complex ideas, (d) break down knowledge components, assuming that parts can be individually learned and reassembled, and (e) rely on rote memorization.

The researchers offered several recommendations. First, they suggested that teachers focus on using multiple representations of knowledge, avoiding rigid, monolithic presentations of ideas. Second, teachers should link abstract concepts to variable case examples. Third, complex ideas should be introduced early in discussions so that students can gradually learn to cognitively manage more difficult concepts. Breaking down and studying isolated components can decontextualize the material. Fourth, the web-like aspects of knowledge connections must

be stressed. Fifth, students must be supported in their efforts to construct knowledge, with opportunities to assemble abstract and case-specific information jointly in their learning activities.

These suggestions are important to student learning because students often have to process, interpret, and apply complex information in ways that vary from the initial encoding experience. When students engage in learning activities based on rote memory, they are locked into more rigid knowledge structures that resist application to new and complex understandings. Under more traditional instruction, students often have "inert knowledge": knowledge that can be produced or used only under limited conditions--often those matching the encoding situation.

Hypermedia can offer students the ability to connect knowledge structures using multiple associative paths. Complexity can be modeled without losing sight of the context and structure of the knowledge. Students can pursue smaller or partial views of a complex knowledge structure, simultaneously recognizing connective relationships among the parts. Multiple thematic conceptualizations of complex knowledge can be facilitated in hypermedia environments. Snyder (1998) suggested that hypertext allows students with special learning needs to use verbal and nonverbal information sources of varying complexity and difficulty. Students can weave together information in a meaningful knowledge structure that helps them learn what may have been problematic in a more traditional text-only form.

From a cognitive load perspective, hypermedia may allow students who have difficulty with the more complex structure of written materials to model relationships in meaningful ways. When reading traditional texts, students must simultaneously address local and global comprehension issues. This demand can exceed the cognitive capabilities of some students. The complex writing process places multiple cognitive demands on the learner. The requirement that the writer have thorough knowledge of the subject, coordinate the structure towards a central purpose, and make appropriate use of vocabulary and syntax, form a system of cognitive constraints (Smith & Lansman, 1989). Smith and Lansman suggested that the use of hypermedia could reduce the cognitive load somewhat, so that the student writer can produce meaningful writing.

Related Research

Research on graphic organizers (Robinson, 1998) suggests that graphic representation of story structure (as is usually present in a hypermedia environment) can serve as "ideational scaffolding" for students, helping them to manage detailed and variable material. Related research by Sharp and colleagues (1995) found that use of visual

images in stories helped at-risk young children build improved mental models, promoting better processing of linguistic information.

Research on memory for actions (Engelkamp, 1998), a facet of episodic memory, as well as research in the theory of manipulatives in mathematics education may shed light on how hypermedia-based activities may help students learn relational structures. The action-like effect of pressing linkage buttons (what we may consider as a semi-concrete material) on the screen and realizing a predictable result—being taken to a related part of a larger structure of an on-screen presentation--may help students internalize and understand aspects of a knowledge structure that were previously difficult for them to fathom.

Multiple intelligences theory (Gardner, 1983) suggests that people have at least seven types of intelligences: linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, interpersonal and intrapersonal. Hypermedia environments may offer students ways to use and understand knowledge through multiple access points, drawing on areas of strength that may not be utilized in more traditional instructional activities (McGrath, et al., 1997).

Pros and Cons of Hypermedia Learning

Hypermedia-based learning has its critics. Some general criticisms of hypermedia-based instruction include the following: (a) students may spend inordinate amounts of time and effort on "bells and whistles" instead of the main content; (b) engagement in hypermedia authoring may take time away from interactive class sessions where the teacher is a facilitator of higher level critical and reflective thought; (c) students may get the "wrong message," suggesting that text-only communication is somehow lacking or deficient, reinforcing students' negative attitudes towards writing ; and (d) given the time and resource constraints of the classroom, the time-consuming nature of hypermedia project activity, and the "push" towards technology in schools, beneficial reading and writing activities may be displaced in favor of hypermedia activities.

Several researchers have investigated specific learning mechanisms in hypermedia-based education and have questioned the benefits. Mayer, Heiser, and Lonn (2001) found that simultaneous on-screen text presentation in combination with animation and narration lowered students' knowledge retention. The researchers suggested that students' cognitive resources were split among competing tasks. Niederhauser, Reynolds, Salmen, and Skolmoski (2000) suggested that according to cognitive flexibility theory, students who used more hyperlinks criss-crossing a complex knowledge structure would achieve a deeper level of understanding. The researchers tested a "compare

and contrast" approach to learning concepts and found that extensive use of hyperlinks interfered with learning and resulted in lower scores representing knowledge acquisition.

Notwithstanding these criticisms of hypermedia-based learning, research on learning and communicating in hypermedia environments suggests several benefits to at-risk learners such as Jeffrey. First, beyond the obvious motivational appeal to reluctant learners, students are more likely to participate because hypermedia doesn't force one down a predetermined pathway. Second, the non-linear aspects of hypermedia mean that the student is not forced into a linear learning dependency that may signal difficulties down the road where earlier information was problematic. As a creator of information, the student can begin by building on his or her strengths, cementing associations and building relationships in the knowledge structure. Third, the availability of alternate communicative elements (e.g., drawing, photograph, or movie segment) may lighten the cognitive load and allow the student to better explain relationships among topical elements. Also the ability to repeatedly pursue alternate pathways among elements of a complex structure can help students grasp the overall complexity in stages (Spiro & Jehng, 1990). Finally, hypermedia projects are conducive to collaborative learning endeavors.

General Instructional Strategies To Support Students With E/BD

Munk and Repp (1994) reviewed research that examined instructional variables that mitigated disruptive behaviors. They found that the following instructional practices reduced student disruptions: (a) allowing choice of task, (b) providing variability among tasks, (c) adjusting instruction pace to student needs, (d) interlacing high-probability tasks, (e) breaking more complicated tasks into manageable components, and (f) adjusting task difficulty to student capabilities.

Summarizing best practices research from the Office of Special Education Programs (OSEP), Quinn et al. (2000) discussed what has been learned about maintaining student engagement in academic tasks. Their recommendations included the following: (a) communicate clear lesson objectives, (b) provide lively instruction showing enthusiasm, (c) use clear, concise language, (d) teach cognitive strategies, (e) provide immediate positive reinforcement, (f) use relevant materials and authentic examples, (g) allow appropriate wait time when prompting students for answers, (h) minimize digressions, and (i) use interesting and appropriate audio-visual aids.

The majority of these research findings pertain directly to the learning situation of students like Jeffrey: (a) Hypermedia allows the student to intersperse high interest and readily attainable tasks with related writing tasks; (b) a tremendous variability is possible among project tasks; (c) lively exchanges may occur around students' work,

promoting positive reinforcement; (d) hypermedia projects work well with instructional rubrics that use clear, concise language to help students understand an activity; (e) hypermedia is highly conducive to the inclusion of relevant, real-world content; (f) complex hypermedia-based learning projects can be pursued over time, allowing students to work on manageable parts, while retaining the ability to understand the greater whole; (g) hypermedia-based learning and knowledge construction activities allow learners of varying capabilities, with different learning styles, to pursue learning at different paces; and (i) students can engage in collaborative learning.

Lessons Learned and Recommendations

Jeffrey's PowerPoint project gave him the opportunity to marshal his limited academic skills to work with a complex, richly detailed project, using creativity that he had rarely applied in prior schoolwork. He was able to develop many new computer skills, improve written language skills, demonstrate higher-level critical thought processes, and persevere with a high level of investment over several months. In sum, he was able to experience academic success at a level not previously realized. Other students who experienced success in comparable projects had a variety of learning and behavioral difficulties, and many had stronger cognitive abilities than Jeffrey. Most of these students had experienced school failure, including difficulty with written language assignments, and had rarely persevered with demanding academic tasks. This type of project was highly beneficial to these students as well.

Some students had difficulties. Several students were so disengaged from the school experience that it was difficult to keep them invested in such a long-term project, despite numerous instructional supports. All students were given the following support for their project: (a) an instructional rubric outlining project requirements, (b) graphical storyboard planning sheets, (c) shared note sheets containing supporting information; (d) ongoing group discussions about project ideas and information, and (e) ongoing help from fellow students and the instructor.

It was important to provide initial guidance and to set clear expectations in plain language. Students needed supports, as discussed above, as well as many opportunities to interact with peers and with the teacher during the process. A somewhat informal, collaborative class atmosphere was maintained and during this project, which proved to be beneficial. It was particularly important in this project to offer flexibility when students were having a difficult day, perhaps allowing them to spend more time playing with graphical attributes of pictures than focusing on text production. The main goal was to maintain long-term investment in and ownership of the learning experience by the student.

Conclusion

A hypermedia authoring activity of this type can be highly beneficial to students with E/BD who have experienced school failure, have limited written language skills, and have difficulty persevering with academic tasks. Hypermedia projects can allow students to build on individual strengths and learning styles, develop organizational and planning skills, improve written language skills, cultivate critical thinking skills, build transferable computer skills, learn to persevere in academic tasks, benefit from positive peer interactions, and ultimately, realize the satisfaction of success. Many at-risk students can learn and achieve in ways that may surprise their teachers if only these students are given appropriate opportunities to demonstrate their potential for success.

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