Closing the Performance Gap: Merging Technology, Instructional Design, and Content Analysis

by John Woodward
Douglas Carnine
University of Oregon
Maria Collins
Boise State University

Although it is common for differences between novice and expert teachers to be associated with instructional design, the amount of subject area knowledge as a main factor that distinguishes novices from experts (Chi, 1981; Chi & Simon, 1981), a closer examination of experts reveals something else. Recent work in cognitive science has underscored the importance of subject area knowledge as a main factor that distinguishes novices from experts. Chi (1981) has shown that experts are better at solving problems that are not only different but are also more complex than those faced by novices. The present article adds a chemistry study using videodisc technology to the group and, most importantly, presents data on normal high school students in quasi-experimental designs in order to gauge the progress of our experimental students as they acquire competence in a content area.

The data collected in our measures are by no means abnormal—they are well within the range of typical instruction at the secondary level. While in some cases handicapped students may not have been directly taught the knowledge i.e., a particular vocabulary word or how to derive a conclusion from two premises, it is not unreasonable to expect that many of these students have mastered this knowledge on their own. Performance levels of nonhandicapped students were significantly above a chance level of responding, enough to justify this assumption.

As the difference between the experimental groups and their non-handicapped peers diminish after instruction, we are better able to understand the combined effects of content analysis, instructional design principles, and technology on the acquisition of domain-specific knowledge. What follows is a description of each program, the results of our quasi-experimental analysis with normal high school students, and the implications for knowledge development within a specific content area.

Fact Teaching Example: Vocabulary Instruction

Vocabulary instruction is regarded as an important academic knowledge, particularly as it is highly correlated with reading comprehension skills. As we reported in the Winter, 1986 issue, two methods of computer assisted instruction (CAI) for teaching vocabulary to

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A School-Wide Discipline Plan
A Management Primer for Teachers and Principals

by Geoffrey Colvin, Ph.D.
Behavior Specialist
Natrona County School District #1
Captain, Wyoming

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North Casper Elementary School
Casper, Wyoming

Betty Clinton, M.S.
Teacher: emotionally disturbed
Natrona County School District #1
Casper, Wyoming

A principal at the beginning was worried about how many referrals coming to the office from regular classroom teachers. The referrals were quite frequent and seemed to have to be taken up in common. A cross section of the referrals followed:

What's the deal? Al never has a pen?
Please visit with him and get him to bring his stuff to school.

Cass argued with me, talked back, mouthed off and defied directives.
Everything was explained, but Charlie NEVER listens.

From 1:00 p.m. to 1:30 p.m., Pete was either arguing with everyone or complaining and tattling. After the teacher incident, I sent him out and he continued to complain. This happens every class with different people. Here's the list:

1. Bickering with Cheri
2. Out of seat
3. Moving furniture
4. Cheating
5. Pete needs 1:1 monitoring.

Jor refused to go to the end of the line, tried to get in front of a student.
Was sent to the end of the line for pushing and shoveing two students who were ahead of him. They were also sent to the end of the line.
He argued violently when I refused to allow him to get in front of another student. He then hid under his desk and said, "I'll slap you on your bald head if you come close to me."

Denna refuses to even try to complete her homework and is wasting my time by trying to argue and smart mouth me. Her parents said, "You have her in school for six hours a day and if you are teaching her, as you get paid for, then she doesn't need to have me teaching her at home and doing the same thing."

Charles has three marks for wandering around the room. His behavior is disruptive and he is not using his time to do his work. He needs medicine for being so hyper.

Joshua got into trouble for being so immature and he does not listen to directions. Please place him in a class who are immature and who do not follow directions.

Janet called Mosy a bitch because whenever you call on Mosy she never answers.

To Principal: I really need your help. Bubba is keeping himself, as well as the rest of the class, from learning. Today he completed 3 assignments while everyone else completed 13 plus extra points. I have had to give him five penalty points for various offenses, which is the maximum you can know. The only way Bubba gets anything accomplished is if he sits right next to me and I don't help anyone else. He is so distractive that he cannot sit still or concentrate on anything else. If you have any idea why Bubba has fallen apart, please let me know. I care about him and am concerned about Bubba, but I cannot afford to lose the whole class. He was placed in my class because they thought I could help him, but he needs to come half way.

The Principal began to see a few patterns in the referrals and drew the following conclusions:

1. The vast majority of referrals were related to classroom discipline.
2. Most referrals came from just a few teachers.
3. Teachers who had some kind of formal discipline plan made fewer referrals than those who had no discipline plan.

The Principal was then faced with the problem of identifying a plan for assisting the teachers with their work and establishing some kind of whole school discipline plan. There are basically five
Send in Nominations for the 1986 ADI Excellence Awards

Editor’s note. Sorry we missed placing this August 1, 1986 last issue. But there is still plenty of time to get in your nominations for the ADI Excellence in Education awards.

Each year we recognize three or four individuals who have distinguished themselves by their commitment to excellence in education for all students through the technology of direct instruction. Awards have been given since 1982 in three categories: teaching (elementary or secondary), administration/supervision, and college level teacher training and/or research.

We invite nominations about people committed to effective education regardless of their title or position. In making your nomination, we ask that you provide as much supporting documentation as possible (letters from various persons who have worked with the nominee, a resume, publications, or whatever is most relevant in a particular case).

Nominations should be sent to the ADI Board of Directors no later than August 31, 1986 to:

Association for Direct Instruction
1986 Awards Committee
P.O. Box 10252
Eugene, Oregon 97440

Dear Readers of ADI News:

I need your help in gathering studies for 2 different meta-analyses (or “quantitative review studies”). The first is the American Psychological Association’s (APA) 2002 revision of the 1994 edition of “meta-analysis of research on teaching.” The second is the Journal of Research on Technology in Education’s (JRE) standard meta-analysis of research on teaching. Both are due to be published in the fall of 2002. If you are aware of any recent research that may be relevant to these meta-analyses, please send me a copy to be included in future reviews.

CRITERIA FOR META-ANALYSES 1 STUDIES

Meta-analysis 1 includes all studies that compare group(s) taught with some kind of direct instruction treatment with group(s) that received either a comparison treatment or no treatment. The “direct instruction treatment” may be labeled: active teaching, Direct Instruction, direct instruction, DISTAR, direct-verbal instruction, direct instruction, direct teaching, or directed teaching. Or, the direct instruction group(s) may be taught with educational programs that have been developed, at least in part, by Direct Instruction. The meta-analysis 1 includes all studies that compare group(s) taught with some kind of direct instruction treatment with group(s) that received either a comparison treatment or no treatment. The “direct instruction treatment” may be labeled: active teaching, Direct Instruction, direct instruction, DISTAR, direct-verbal instruction, direct instruction, direct teaching, or directed teaching. Or, the direct instruction group(s) may be taught with educational programs that have been developed, at least in part, by Direct Instruction. The meta-analysis 1 includes all studies that compare group(s) taught with some kind of direct instruction treatment with group(s) that received either a comparison treatment or no treatment. The “direct instruction treatment” may be labeled: active teaching, Direct Instruction, direct instruction, DISTAR, direct-verbal instruction, direct instruction, direct teaching, or directed teaching. Or, the direct instruction group(s) may be taught with educational programs that have been developed, at least in part, by Direct Instruction.

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Reading Instruction for Poverty Level Preschoolers

By Paul Weidberg
Early Childhood Development Center
Department of Psychology
University of Alabama

Editor's Note. This article is a shortening of the article of the same title which appeared in the Winter 1983-84 issue. This work remains in my mind as the most outstanding demonstration of the value of DI following Through (By Benjamin Bloom's Mastery Learning proposition that 95% of all students can learn 95% of what is to be taught in basic skills to mastery, if given good teaching and enough time. The author, Paul Weidberg, was an AID Excellence Award winner in 1986.

Ever since it opened its doors to poverty-stricken children in 1979, the Head Start program has been able to show dramatic achievements of its 24 children.

Background

When we began we knew how terrifying all-English language instruction from poverty homes were in skills related to reading. This led us to champion the teaching of this skill subject in our preschool setting. However, despite these strong convictions, our early efforts were not directed at generalizable word attack or decoding strategies. Instead of teaching the requisite skills for decoding words, we engaged in modeling and encouraging "reading-like" behaviors: going to the book area, pointing to the book, following the print, turning pages properly, etc. We soon discovered that reading did not magically evolve from these activities.

It became obvious that to establish substantial and continual improvement in reading, we would need to abandon our traditional methods and search for a program that focused the young reader's attention on the key elements of the printed word, i.e., its sounds, and provided a logically consistent, manageable way of decoding words. That opportunity presented itself when, in mid 1975, we observed a Distar Reading I program in a rural all-black school. The teacher's training consisted of a weekend workshop. Her pacing was marginal and she was in a classroom full of children challenging the children. We worried about all those signals, about the drill and the focus from script material. Yet, the children didn't seem to mind and, to our astonishment, they executed independently and accurately each word. About the same time, we saw Engelmann's (1986) provocative movie where previously disadvantaged preschoolers, just starting first grade, were eagerly doing basic algebra problems and understanding mathematical concepts typically reserved for much older children. The impressive and preliminary achievement data from the Engelmann-Becker Direct Instruction Model in the Head Start Program (Becker, Engelmann, & Thomas, 1975) also came to our attention. Noteworthy was that children from disadvantaged children started on DI in kindergarten. Their end-of-third grade reading achievement scores exceeded 10. The Wide Range Achievement Test (WRAT) were from 0.7 to 1.0 grade points higher than first graders started DI programs.

These events provided the impetus for the author to spend his sabbatical leave at the University of Oregon in 1976. Both DI programs and the other DI programming and taught Distar Reading and Arithmetic to Title I children from the public school in Tuscaloosa in the summer of that year. DI programs were set up at the ECDCD.

Program Usage

During the first school year in which Distar was implemented (1976-77), priority went to the five-year-olds who were taught from the Language I and Reading I programs. From 1977-1978, the Arithmetic I program was added to the curriculum of the five-year-olds and the Language I and Reading I programs were started with the beginning four-year-olds. By 1979-1980 and thereafter, all three programs were taught to beginning four and five-year-old groups.

Children staying for one year typically finished all of Language I and Reading I and three-quarters of Arithmetic I. Those staying an additional year usually completed all Level II components of Language, Reading and Arithmetic and at least half of Arithmetic II. Those teachers each taught three groups, daily, in the Language (Reading and Language) and one in the afternoons (Arithmetic). Group size varied from five to eight children. If another group was needed, a fourth group in language was held once in the morning for children lacking even rudimentary language skills and for later entering children requiring catch-up work. It was usually taught by the part-time cook or upon completion of that person's breakfast chores. All of the staff were trained in DI procedures by the author.

Children Served

The ECDCD offers year-round, full-time services to preschoolers living within a ten-mile radius of its location on the University of Alabama campus in Tuscaloosa. Funding is largely through yearly contractual arrangements with the state welfare agency under Title XX of the Social Security Act and the University of Alabama's Office of Sponsored Research. The Department of Human Development and sponsors and sponsors the ECDCD.

Single-parent and extended family patterns predominated among the children served. Over 60 percent of the children are Black and 60 percent are male. The family demographics resemble those of low SES groups and are characteristic of families whose children have participated in previous preschool intervention programs.

When they begin, the preschoolers are unable to read, print words, spell, or do any mathematical computation. The Slaven IQ test, which are scores of which are taken as an indication of verbal competency, is individually given following a two-to-three week adaption period. The mean entry IQ over the past three years (N=58) has been 87, with only 19 percent of the IQ's exceeding 100.

Evaluation Design

Continuous Progress Tests (CPT) in Reading, (Becker, Carmine, & Davis, 1978), administered individually after every 10 to 15 days of instruction, provided an estimate of how well the children were mastering the concepts and skills being taught. The results for a randomly selected group showed their performance on major tasks was consistently high across all lessons; for small skill identifications, although answers averaged about 97 percent; for word identification, it was 95 percent for trained words (nonsense and unfamiliar); for the oral reading of three- sentence stories, beginning at lesson 120 of Reading I, it was nearly 100 percent; and for answering simple comprehension questions, it was 95 percent.

Norm-referenced tests were also administered and the children's progress was recorded in two ways. First, norm-referenced comparisons were made in which the average of the ECDCD children were compared to established standards. Second, norm-referenced tests were used to provide between-group (or treat- ment) comparisons during one program year. In 1980, during which the test scores of the ECDCD children (Distar-trained) were contrasted with those of other preschool programs (non-Distar-trained) on various evaluative instruments that measured common instructional objectives. The non-Distar-trained preschoolers came from a local Head Start program in Tuscaloosa (for eight years) and from a Child Development preschool (in operation for ten years). The latter was run by the Home Economics Division of the University of Alabama which, like the ECDCD, was a campus-based facility. These two programs were compared to distinguish between group differences and federal standards.

Both the Head Start and Child Development programs essentially followed a Structured-Cognitive Model in which the Head Start Unit at the University of Alabama and the Wide Range Achievement Test (WRAT) was given every program year to the ECDCD children. In Figure 1 the mean percentile scores are plotted on the wide range achievement test reading. The average obtained scores were substantially higher than the 50th percentile. The DI-trained 1st-graders were consistently near or above the 80th percentile (two to three standard deviations above norm). The DI-trained K-grade groups were also advanced, averaging between the 75th and 90th percentile across program years. Previous WRAT evaluations of DI preschools used grade equivalent (G.E.) scores to assess reading and other academic skills. Considering just those studies containing 1st-entering children having two preschool years of DI, Reading, the obtained G.E. in WRAT Reading have always been higher than the normative value of 1.0 for beginning first graders. Berger (1986) reported a mean G.E. of 3.5 for the initial 13 graduates of the Berger-Engellman (1966) preschool. Engellman (1970) obtained a mean G.E. of 2.6 for 12 1st-graders taught by an improved reading program that was phonics based and focused greater attention on the lowest performers. Seven middle to late preschoolers taught for two years with the revised program obtained a mean G.E. of 3.4. Anderson (1982) reported a mean G.E. of 2.8 for 87 children trained for a program year whose average entering IQ was close to 106.

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**Figure 1: WRAT Reading across program years. Data are plotted in equal percentile units on a .25 standard deviation scale.**

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Preschool Reading – By Paul Weissberg

The G.E. in WRAT Reading for our 1st-starting ECDC children with two program years (N=31) was 3.8 (which simply means an extremely high WRAT score for this age group and does not imply that the children can read and comprehend third grade books). Chief among the reasons for the higher G.E. is that our facility, being a full-day preschool (the others were half-day) allowed for longer engagement time in reading, and that ours, also being a more recent preschool, had the advantage of using improved DI programming materials and teacher presentation procedures.

The reason DI-trained pres- schoolers do so well on WRAT Reading can be understood by considering the subskills tested (Table 1). Clearly, it is the substantive subclass of decoding words that distinguishes DI from non-DI children.

The same pattern of WRAT subclass performance for the ECDC groups in 1980 has been obtained for every evaluation year. Especially provocative was the decoding performance of the 1st- starting children with two program years. Of the first 50 WRAT words, a total of 21 words should have been familiar since they were explicitly taught in DI Reading (12 words from Level 1 and 9 words from Level II). Nevertheless, the preschoolers were able to decode a large number of new-sounding words, such as site, weather, stack, cliff, street, glitter, and threshold. The two-year-old DI-trained children had little trouble with other word lists of the 220 Dolch sight words (from preprimer to third grade), an average of 95 percent were correctly read, and of the 32 words enrolled in Durkin (1966) to identify early readers, 99 percent were correctly read. These findings suggest that the excellent decoding skills imparted to public-school children by the DI Reading program (Becker, 1977; Becker & Gersten, 1982) can be similarly generated with preschoolers.

Returning to the performance of the non-DI groups, one might expect that these children, by virtue of being competent only in the rudimentary skills, would rank relatively low with respect to their same-aged peers who comprised the WRAT standardization sample. Such is not the case. The average non-DI-trained child between 6 and 6½ years of age and about a grade who obtains the raw score of 23.9 (Table 1) would place at the 47th percentile. This value compares favorably with the commonly reported 20th percentile found with disadvantaged children entering first grade (Baker et al., 1979). This favorable showing was replicated by the author with Head Start preschoolers, evaluated again in 1982 (8=N=8) and 1983 (N=12) who placed, respectively, at the 42nd and 45th percentile. That a preschool intervention program can be judged as a relatively successful project if normative data from the WRAT are used, even though its graduates are barely able to read, is possible because the skills tapped by the WRAT to gauge average first grade ENTERING performance are mediocre ones. Stated differently, entering first graders are not expected to be proficient at reading (nor at spelling or doing written arithmetic problems).

The WRAT does not assess any comprehension skills. We, therefore, chose for the first evaluation year in 1977, the Gates-MacGinitie Test and the Metropolitan Achievement Test (MAT) after that.

The median grade equivalent scores (G.E.) by MAT subtest for the 1st- starting ECDC children by program year are presented in Figure 2. (As with the WRAT, averaging was based upon raw score conversion to standard scores, from which the median G.E. and percentiles for each year could be derived.) It is readily apparent that for most evaluation years the plotted G.E. either approximated or is higher than that of first grade. The non-DI groups, the corresponding percentiles vary somewhat for each of the median obtained G.E. values (the 70th percentile for Word Knowledge (G.E. = 2.1)); for Word Analysis, the 94th percentile (G.E. = 3.0); the 80th percentile for Reading Sentences and Stories (G.E. = 2.4); and for the Total Reading (not shown in Figure 2), the 78th percentile (G.E. = 2.2).

The performance of the 1st-starting DI groups seems remarkable in light of the fact that disadvantaged children are commonly from four to six months below grade level in reading at the end of first grade.

It cannot be said that the K-aged DI children are reading at the grade level. Having only one program year, they have not been taught to distinguish between long and short vowel sounds in many words by applying the silent-e rule; they are unfamiliar with the sounds made by many letter combinations (e.g., ou, all). They have not been taught capital letters or words containing these letters will cause problems, particularly when they are dissimilar to their lower-case counterparts (e.g., di, da, g, r); and, since they have not been phased out of the special DI orthography containing macrons, joined letters, and so forth, the regular orthography inherent in primary grade achievement tests is likely to be troublesome.

The K-aged DI children are further limited since the first year of DI Reading stresses reading for accuracy, rather than for speed. Thus, they often do not finish all of the items on the test. In the Elementary Stories and Sentences, the K-aged DI children are correct on 42 percent of the items attempted, as opposed to only 28 percent correct on the same items based on all of the other items on the TIP test, whether attempted or not.

Not only are the K-aged DI children penalized for taking their time to decode words, many of which are irregular, they will have the added burden of making out the meaning of many MAT words. They are not likely to know the meaning of special, famous, treat, picture, fish, first, and stary night, and they may not know what certain idioms mean, as in to catch a bus, use meets land, and so on.

It is not lost, however, for the K-aged DI children. The 1st-starting children were in the same exact predicament as the K-aged children just before they got another year of DI training. Fortunately, during that second year their promising decoding skills were enlarged to include a broader set of words and they were taught to read with increased fluency, speed, and expression, both during class and during independent reading activities. The greater stress in the second year of DI Reading in developing

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Table 1: Mean WRAT Reading Subtest Raw Scores for DI and Non-DI Programs

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Maximum Score</th>
<th>K-Age</th>
<th>1st-Starting Age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>DI (N=10)</td>
<td>Non-DI (N=25)</td>
</tr>
<tr>
<td>Letter matching</td>
<td>10</td>
<td>9.9</td>
<td>10.0</td>
</tr>
<tr>
<td>Letter naming</td>
<td>75</td>
<td>9.1</td>
<td>7.3</td>
</tr>
<tr>
<td>Reading</td>
<td>75</td>
<td>9.1</td>
<td>7.3</td>
</tr>
<tr>
<td>Raw Score</td>
<td>26.7</td>
<td>16.4</td>
<td>20.9</td>
</tr>
</tbody>
</table>

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Table 2: Mean MAT Subtest Scores of First-Starting Children With One versus Two Years of DI Reading

<table>
<thead>
<tr>
<th>MAT Subtest</th>
<th>Type of Measure</th>
<th>One Year (N=12)</th>
<th>Two Year (N=31)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Knowledge</td>
<td>Mean S.S.</td>
<td>33.6</td>
<td>49.4</td>
</tr>
<tr>
<td></td>
<td>Mean G.E.</td>
<td>1.5</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>Mean %ile</td>
<td>28th</td>
<td>77th</td>
</tr>
<tr>
<td>Word Analysis</td>
<td>Mean S.S.</td>
<td>37.2</td>
<td>51.2</td>
</tr>
<tr>
<td></td>
<td>Mean G.E.</td>
<td>1.7</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Mean %ile</td>
<td>40th</td>
<td>92nd</td>
</tr>
<tr>
<td>Reading Sentences and Stories</td>
<td>Mean S.S.</td>
<td>31.6</td>
<td>50.4</td>
</tr>
<tr>
<td></td>
<td>Mean G.E.</td>
<td>1.4</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td>Mean %ile</td>
<td>22nd</td>
<td>88th</td>
</tr>
<tr>
<td>Total Reading</td>
<td>Mean S.S.</td>
<td>32.1</td>
<td>49.1</td>
</tr>
<tr>
<td></td>
<td>Mean G.E.</td>
<td>1.5</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td>Mean %ile</td>
<td>23rd</td>
<td>88th</td>
</tr>
</tbody>
</table>

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*S.S. = Standard Score; G.E. = Grade Equivalent Score; Percentiles (%ile) are based on an end-of-first grade norm group.
mildly handicapped secondary students were compared. The study examined the effect of size of the teaching set and provisions for daily and cumulative review on the acquisition and maintenance of word meaning. The two programs presented the same 50 words and definitions.

The Small Teaching Set program tests students on words and their definitions with the words they cannot identify (Carrine, Rankin, & Granzin, 1964). After testing the students on new words, the program provides instruction on a “teaching set” of no more than three words which the student missed on the test. These words are then added to a new practice set. The program tests the student on new words and adds words the student does not know to the practice set. Once the student has mastered ten words, the program presents a cumulative review lesson on those words. Figure 1 is a visual representation of the practice and review schedules embodied in the program. Figure 1 shows how a word moves from an initial test item through a practice test to a final cumulative review lesson.

The Large Teaching Set program teaches words in sets of 25 words (Davidson & Eckert, 1983). The student may choose to see the words in one of four types of formats: (a) a teaching display which shows the word, its definition, and one example sentence; (b) a multiple choice quiz format; (c) an exercise in which a definition is displayed and the student must spell the correct missing word to complete a sentence; and (d) an arcade-type game in which the student matches words to their definitions.

Preschool Reading

comprehension skills, aided by the Distar Language II program which features more complex syntax, semantic relations, and an enlarged vocabulary, inevitably helped them to read for information and meaning.

One- versus Two-Program Years

Chart 1 lists the children from the BCDC who took the MAT, 12 and 31, respectively, completed one and two years of Distar Reading. As revealed in Table 2, length of program participation has a major effect on MAT outcomes. The standard score differences between the one-year and two-year children are significant for every subset and for Total Reading (all p<.001). The absolute differences in subtest grade scores, from 0.8 to 1.0 points, are what one would expect from an extra year of training in reading. Both groups are highest in the decoding based Word Analysis subtest, again lending credence to the power of the reading program to teach this skill.

The Future

With the answer to the question, whether educationally at-risk preschoolers can be taught advanced reading skills, is clearly in the affirmative, the more nagging and not as easily researched question of “what happened to the graduates” is currently being pursued. We are finding that our preschoolers, leaving with two years of Distar Reading are having an easy time in first grade and many of them begin reading at the second grade level without any problem. Our concern rests with those leaving with only one year of Distar reading, either entering a public school kindergarten or first grade program that does not build on the moderate reading skills we developed. Fortunately, Distar Reading is catching on in the city schools so the issue of program continuity can be addressed.

References


Performance of Mildly Handicapped Students

Twenty-four mildly handicapped high school students were randomly assigned to one of the two Distar programs. Students worked individually on their assigned program 20 minutes a day for 11 days. All of the words were considered important by two or more special education teachers. A final list of 25 verbs and 25 adjectives was used.

All students were given a 50 item, multiple choice test as soon as they achieved mastery (i.e., 90 percent accuracy). Eight of the 12 subjects (67%) in the Large Teaching Set program and 10 of the 12 subjects (83%) in the Small Teaching Set program met mastery criterion by the end of the 12 sessions. The study was terminated after 11 sessions because the subjects were mastering almost no new words and were experiencing frustrations and hostility. The mean number of sessions to mastery for those who reached mastery was 7.6 for those in the Small Teaching Set and 9.1 in the Large Teaching Set program. Results of a t-test indicate the difference is significant (p<.05). Hence, subjects in the Small Teaching Set program met mastery significantly less time. In addition, more students in the Small Teaching Set program reached mastery within 12 lessons. Given that both programs achieved equivalent levels of performance on the multiple-choice tests, their difference in acquisition rates becomes even more meaningful. Subjects taught with the Small Teaching Set program required less time to meet mastery criterion on the words, yet their posttest performance was equal to that of subjects in the other treatment who took longer reaching mastery.

Non-Handicapped Student Comparison

The 50-item multiple choice test was administered to nonhandicapped 10th-grade students in a regular English class. As Table 3 demonstrates, the poorest mean scores of the mildly handicapped students were slightly higher than the nonhandicapped students’ mean score. Students in all groups scored at near mastery levels (range 80-84%). After analysis of 11 sessions of computer-assisted vocabulary instruction, the performance of mildly handicapped subjects on the multiple choice test was very similar to that of nonhandicapped 10th grade students.

Implications for Software Design

Two issues arise from this study. First, the size of the teaching set and schedules for review led to an empirically significant difference between the two handicapped groups. These were comparatively subtle instructional design principles, yet it is essential for tasks where a considerable amount of memorization is required.

Second, the Large Teaching Set program contained an arcade-type game as an added activity. During the study, some of the Small Teaching Set students occasionally asked the experimenter why they didn’t get to play a game like the one in the other program. However, in an attitude survey administered after the study, students in the Small Teaching Set rated their program higher on the question, “Did you enjoy working on the computer?” When asked what they specifically did not like about the programs, not one subject in the Small Teaching Set program mentioned the lack of a computer game format. This finding is important for CAI software designers who apparently believe that for educational software to be motivating, it must approximate computer games that are popular in video arcades. Focusing on these kinds of surface features—rather than the design considerations implied by the task—leads to software programs that are insufficienly structured for success.

Reasoning Skills

An understanding of elementary reasoning and logical principles precedes a student’s further training in analytic thinking. Once a student has a firm grounding in basic reasoning, teachers are in a better position to show students how to spot faulty arguments, identify false conclusions, and detect unwarranted generalizations. Zellin and Bilsky (1980), however, suggest that educators create a self-fulfilling prophecy by not...
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Performance Gap

Continued from Page 5

routinely teaching reasoning skills to special education students. These students consistently perform poorly on logical problem solving tasks (Spitz & Borry, 1977) and, as a consequence, teachers often believe that these students cannot be taught reasoning skills.

The Reasoning Skills program (Engelhard, Carnine, & Collins, 1983) was designed to teach students: (a) to draw conclusions from two statements of evidence, and (b) to determine whether a three-statement argument was logical or illogical. For the first objective, the program taught students the possible key words (some, all, no) that can begin a statement from an argument; their relationship to inclusive, overlapping, and non-overlapping classes; and relevant rules for constructing arguments. For the other major objective, students were taught to identify unsound arguments by specifying one of three reasons.

The major strength of the Reasoning Skills program is the teaching of an explicit, step-by-step strategy based on a series of carefully controlled rules. Figure 25 represents the skill of drawing a conclusion from two statements of evidence. This requires the student to first identify the evidence statements and check for key words that begin each statement. On this basis, the student is able to use a set of rules to first determine the key word in the conclusion and then to complete the rest of the conclusion based on an examination of the classes in the evidence.

Figure 25 portrays a more complex task: critiquing an argument. A student must read both the evidence and conclusion and determine if the conclusion follows from the two evidence statements. As in the previous task, the student must look at key words and classes. However, he or she must make this evaluation by using a set criteria (i.e., the multiple choice items) that force the student to apply all previously learned knowledge about arguments. Thus, to critique our argument, the student must consider more features than when constructing a conclusion (e.g., implications of the key word in the conclusion for class membership and order in the evidence statements).

There are subtle but considerable advantages to the Reasoning Skills program over more traditional teaching of logic. In keeping with typical introductions to elementary logic, the program stresses a formal or abstract analysis of statements. However, it is done with a minimum of verbiage. Concepts such as major and minor premises, middle terms, distribution of terms, and subject and predicate distinctions are avoided. Even further, the reflexive relationship between the statements of evidence (i.e., their order or position can be interchanged with no effect on the conclusion) are demonstrated in the program rather than the typical method where the major premise is conventionally written first. For example, consider the argument:

All French presidents are bald.
Some socialists are French presidents.

Some socialists are bald.
All French presidents are bald.

These students, particularly mildly handicapped students, who continually see only this kind of argument will have difficulty drawing conclusions when the statements of evidence are reversed.

Performance of Mildly Handicapped Students

The main interest in our study was to examine the effects of a correction procedure on two groups of remedial and mildly handicapped students. Thirty-four students were randomly assigned to one of two groups: the Basic Correction or the Elaborated Correction group. If a student in the Basic Correction group made an error, he or she was only given the correct answer. When a student in the Elaborated Correction group made a mistake, he or she was immediately corrected and an explanation was provided. It was later revealed that the student was not correct. This was the only difference between the two groups. We also examined any differences regarding acquisition time between students. In both groups, students worked individually on a microcomputer. Students worked on their respective version of the program until they completed five sections. Students were measured on parallel forms of the Test of Factual Logic (1984) and a transfer measure. A 2 x 3 analysis of variance (ANOVA) with one between subjects (type of correction) and one within subjects factor (time of test) was performed on the data. The analysis involved a planned comparison that looked at the post and maintenance tests only. The ANOVA indicated a significant difference favoring the Elaborated Corrections group (p<.001). There was also a significant difference between the two groups on the transfer test, again favoring the Elaborated Correction group (p<.05).

Times for the two groups to complete the five lessons were roughly equivalent, indicating the extra time required to read and eliminate key words may have been compensated for by faster acquisition of the material. This interpretation suggests that taking more time early in a complex instructional sequence to offer elaborated corrections may, in fact, lead to savings in instructional time later in a program.

Reasoning skills were acquired without any instruction from the teacher. The groups demonstrated a mean score of 68%-70% on the posttest (a dramatic gain from the mean scores of 26 to 34 percent on the pretest). The systematic design of instruction—particularly through a series of carefully controlled rules—may have contributed to this gain.

Non—Handicapped Student Comparison

Following this study, the program was revised and presented to another sample of mildly handicapped secondary students. The Test of Factual Logic was also administered to three non-handicapped groups: a tenth grade honors class, a third grade regular class, and college level education students. Part 1 of the Test of Factual Logic measures the students' ability to identify the key word (or quantifier) in the conclusion and write the remainder of the conclusion based on two evidence statements. Tukey post hoc comp-

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parisons showed only one significant difference between the first three groups (i.e., the high-workload, non-students, the honors class, the logic class, and the education students) (p<.05). The collective results suggest that students scored significantly lower than the instructed handicapped students and the other two groups.

Part II of the test requires students to determine whether or not an argument is faulty and if so, select a reason. A true/false test was used to evaluate the students' skills. The skills were divided into three sets: (1) identifying valid arguments, (2) identifying invalid arguments, and (3) identifying argument structures.

The results indicated that the students had difficulty with the third set of arguments. The students were able to identify invalid arguments more easily than they were able to identify valid arguments. The students were also able to identify argument structures more easily than they were able to identify invalid arguments. The students were able to identify valid arguments more easily than they were able to identify argument structures.

Implications for Software Design

As previously described, the Reasoning Skills Program contains several instructional design features that allow the student to achieve competence in a complex area of knowledge. The most important is a generalizable strategy that applied to arguments except ones containing circular reasoning. Once we devised an overall strategy, the program was divided into distinct components. Necessary skills for each component were pretaught. For example, students are taught how to evaluate evidence statements to see if they are appropriate before they apply rules for using key words in determining the logical soundness of the argument.

Each component was chained to the next one as the learner moved from one component to the next, providing feedback and instruction for each component. Students were prompted to look at the first word in the conclusion. Eventually, this procedure was varied and instruction focused on the two classes in the conclusion: premise and conclusion components and prompt fading continued through each of the different types of arguments (i.e., all, none, no) were gradually integrated. Students were given discrimination practice between the different types of arguments for the remaining lessons in the program.

By minimizing the verbage traditionally associated with the subject and concentrating, instead, on class size, the student is able to "reason" about arguments. The program demonstrates that a CAI tutorial can teach these skills without adding teacher instruction. What is required is a careful preliminary analysis of the content for the curriculum designer. The next step, which has been completed yet, is to link the program materials with reasoning and logic (e.g., not recognizing arguments or detecting improper generalizations in short paragraphs).

Problem Solving Teaching Example

Health Promotion

Secondary students spend a considerable amount of their time completing application-oriented activities. These academic tasks often involve higher-order cognitive skills, and students are asked to make a variety of inferences about a subject area by prudently using facts, concepts, and context-related strategies or problem solving.

One of our interests in studying simulations was to investigate how they could be used to enhance—rather than replace—secondary level instruction, not only in terms of their effect on basic fact and concept retention, but as they related to problem solving. We chose a health simulation because it was designed to foster the acquisition of particular strategies. Health Ways was preceded by a tutorial containing three similar versions of the simulation profiles, each one slightly more complex than the preceding one. This gradual progression from simple to complex allowed aspects of an overall monitoring strategy to be introduced and practiced. Health was also a good subject area because it is rich in facts and concepts.

Figure 3 gives a visual representation of the strategies students need to succeed at Health Ways. Students monitor three separate strategies (i.e., checking changing health habits, checking the stress level, and maintaining health changes) through a monitoring or meta-strategy. While playing a Health Ways game, the student first prioritizes and changes a bad health habit, moving down the list through the tree until an appropriate action can be taken. If there is no current disease, he or she next looks at the hereditary disease. If there is one, a related health habit (e.g., eating foods with too much sugar for a person with a hereditary history of diabetes) is identified and the student attempts to change the habit through the Fab computer. Fab, essentially, simulates fate or chance. It displays four random numbers, each between five and twenty-five. Number values are associated with successful changes and the score on Fab determines whether or not the habit can be changed. Regardless of the success on the Fab game, the student must return to the upper level of the tree and move to the right to the check-stress level strategy. Again, the student descends in the tree, this time in the check-stress branch, to determine the appropriate action. Next, the student returns to the upper level, moving to the maintain-health-changes strategy and, if necessary, descends in that branch. The process of descending and traversing the tree (i.e., going back to the far left once the right most branch is checked) is repeated until the student succeeds or fails achieving the main goal (i.e., increasing expected age to winning age).

Performance of Mildly Handicapped Students

To measure the effects of the simulation, thirty students were randomly assigned to either the conventional or simulation condition. Direct instruction techniques were used to teach a typical health curriculum to all students for 20 minutes per day for twelve days. This was the first part of each day's lesson. At the end of the initial instruction, students separated into two groups - one which worked on application activities (the conventional group) and the other with the computer simulation (the simulation group). The conventional group worked in the resource room under the supervision of the resource

room teacher, who presented these students with a variety of application or review activities.

Simulation students, on the other hand, were taught in a computer lab, each student working alone at a microcomputer. The twelve day course of instruction for these students was broken into three phases: initial modeling (three days), guided practice on three simulation games (two days), and independent practice with individual feedback from the instructor (seven days). During the initial modeling phase, students were taught an explicit strategy for using the simulation. The effects of appropriate and inappropriate strategies were demonstrated. Students were first shown how to prioritize health problems by using information they had learned in the direct instruction portion of the lesson. As the researcher demonstrated progressively more difficult games or profiles, students were shown how to monitor and change two other variables: stress level and maintenance of health changes. During the guided practice phase, students were then able to practice different strategies with feedback from the researcher.

Students were assessed one day, two days, and two weeks following the instruction. On the first day, student's acquisition of health facts and concepts about health taught in the curriculum was measured by the Nutrition and Disease Test. The first 20 items of this test were solely from the written curriculum. The remaining 10 were questions over material that had been covered in both the written curriculum and the Health Ways simulation. Internal consistency reliability (coefficient alpha) of this measure is .84. On the second day, the students were given the Health Diagnosis Test, an individually administered test that measured prioritizing skills. This test was a set of three written profiles and measured health related problem solving skills (i.e., the student's ability to detect important health problems facing an individual, identify and change related health habits, and control stress as it is increased due to health changes). The Health Diagnosis Test has a test-retest reliability of .85, computed after the instruction the students were again given the Nutrition and Disease Test. This served as the validation test.

The 30-item Nutrition and Disease test was broken into two subcategories: (a) items reinforced with Health Ways simulation, and (b) items taught in the curriculum and not reinforced by the simulation. The effect on items reinforced by Health Ways was significant (p<.01). The effect on items not reinforced was not significant (p=06). This indicates that the simulation was an effective vehicle for reviewing material that had already been taught in the written curriculum.

Tests performed on the Diagnosis Test revealed no significant difference between the two groups (p=.001) in problem solving skills. Simulation students were also able to identify the same disease symptoms, prioritize them as to their effects on an individual's longevity, and prescribe appropriate remedies.

Continued on Page 9
Non-Handicapped Comparison
In a supplemental analysis, one aways analysis of variance (ANOVA) was used to compare the test performance of the non-handicapped students with a random selection of students from regular health classes who did not receive instruction in any of the textbook sections. The data were analyzed from each section of the Health Ways Nutrition and Disease Test and the Health Ways Diagnosis and Test. A Tukey post-hoc comparison indicated significant differences between the handicapped simulation students and those in the regular classroom (p<.01), as well as a significant difference between the regular classroom students and the mildly handicapped students in the conventional group (p<.01). A significant difference also appeared between the groups on the reinforced subscale of the Nutrition and Disease Test (p<.01). Tukey post-hoc comparison indicated a significant difference between the mildly handicapped simulation group and the regular classroom (p<.05), indicating the handicapped students taught by Health Ways, but no difference over time.

We infer from the results that a combination of direct instruction in basic facts and discussion of the simulation was successful in teaching problem solving in a content area. Further, the superior performance of the simulation group over non-handicapped students from regular health classes shows that this kind of problem solving is by no means an automatic byproduct of regular high school instruction. Instead, teaching competence in health requires a careful orchestration and integration of facts, concepts, and strategies.

Implications for Software Design
The success of the Health Ways study was a direct product of a careful analysis of simulation interactions. As Figure 3 indicates, a student must use many skills in order to execute appropriate actions. A student must have a firm grasp of both facts (e.g., what is cholesterol?), concepts (e.g., atherosclerosis is related to lipids and cholestrol) and strategies (e.g., the stress level is up and I haven't changed it, I should be raising it). For mildly handicapped students, the effect of this is usually frustration and a failure to learn anything from the simulation.

This is why an explicit strategy is essential. As with Reasoning Skills, components of the strategy are progressively introduced and then chained together. Three students first learned about prioritizing and then were prompted to execute specific actions under certain conditions (e.g., The character's current disease is lung cancer. What related habit should you look for? Does alcohol damage the liver? Does smoking?). When the next component (i.e., stress management) was introduced, the students naturally fell into the habit of prioritizing because the new component maintained the basic need to maintain a high level of success while learning essential skills.

Integrating software with traditional curriculum and using an explicit strategy for teaching procedure orientation and ability, and hence an indication of competence in the content area. In health, as in many other sciences, social studies, and the like, areas are a wide range of goals, many of which are discretionary. This study shows that both the software and the hardware can be adapted to meet important instructional goals, ones that lead to increased competence in the subject matter.

Finally, linking traditional practices to computer instruction allows for the optimal use of each medium. Group instruction is an efficient way of teaching and firming basic fact and concept knowledge. It is particularly appealing where schools only provide enough computers for an entire class in a computer lab, with the high-demand placing on labs, computer time must be used judiciously. In this study, Health Ways using conversational skills that could not be easily demonstrated by conventional means. Thus, computer use in health education may be an area in which its optimized.

Content Area Instruction: Videodisc Chemistry
The videodisc program in chemistry is one of several Core Concepts in science programs that have been developed by Systems Impact, Inc. In keeping with the other programs, the structure of the program is an advanced instructional design approach that organizes matter according to how information is most easily learned, not how it is speculated most convenient in instruction. By focusing on essential concepts in the discipline, it transforms textbooks, which have become encyclopedic because of their ever-increasing content, and a wide array of ancillary teaching aids (e.g., films, charts, lab experiments) into coherent instruction. The videodisc chemistry program concentrates systematic instruction in bonding, equilibrium, energy of activation and catalysis, atomic structure, and organic compounds.

Videodisc technology allows an interactive format usually not possible with conventional audio visual materials (e.g., filmstrip, overhead). Dynamic demonstrations are associated with nearly every concept that is presented, making it easier for the students to understand. State of the art computer graphics, sound effects, brisk pacing, highlights, and other techniques were used to auditorily stimulate students. It is also effective for experiments and demonstrations that are difficult or expensive to conduct in classroom situations.

The videodisc chemistry program follows a specific instructional pattern, one that aids teachers in diagnosing and remedying student learning problems. During the explanation of a concept, the narrator on the videodisc asks questions which the student must answer. Immediately following the explanation, students write answers to problems. This sequence of questions and answers is informal but. If more than 20 percent of the students miss it, the teacher plays the relevant explanation with the computer. We believe that low-level practice followed by repeated practice is repeated for each concept presented in the lesson.

Students also do homework and each new lesson begins with a quiz over the previous major concept or the previous lesson. The screen tells which section of the disc can be accessed for remediation. Finally, there is a test for fifth lesson. Again, teachers can diagnose student errors and select remedies from the disc based on menus that appear on the screen. The students can tell the computer what problems they have, and the computer can describe the solutions.

Comparison of Academically Low Achieving and Advanced Students
Critical to the development of each Core Concepts program is field testing in a videotape form. Programs are tested with a group of students high, middle, and low performing, and tested again. In the last chemistry program field test, students from a remedial general science class were included. These students had not yet passed a science class, which was a high school graduation requirement. Of these students, five were called learning disabled and eleven were called remedially placed. The students were given the questionnaire that all students were given. Students were taught with the chemistry program for four weeks, 30 minutes per day.

At the end of the four weeks, the low-achieving students were given a posttest. The test was also given to the advanced and remedial group of students at the same high school. For purposes of comparison, the differences in scores were compared in any way that were biased toward the Core Concepts Chemistry program (e.g., questions that used special terms, ones that referred to concepts that were in any way peculiar to the program. To insure that our test was unbiased, we asked two high school chemistry teachers to examine the test and refine it. After carefully considering each item, four questions were rejected. The four questions that were retained were a fair measure of beginning chemistry. Specifically, they were the beginning test chemistry students to know after one year, and by all means, these concepts should be known by second year, advanced placement chemistry students.

The results of the test were impressive. Students in the remedial general science class had an average score of 40 percent on the test with a standard deviation of 4.65. Learning disabled students averaged 43.4 percent (standard deviation was 2.75) and remedial students scored 83.2 percent (standard deviation was 5.33). The second year advanced placement students averaged 82.1 percent and had a standard deviation of 3.09. Put simply, the advanced students did not significantly different than the academically low-achieving students who had been through four weeks of instruction with videodisc Core Concepts.

Implications for Software Design
We feel that the Core Concepts Chemistry program was successful for two reasons. First, videodisc instruction allowed the designer the flexibility to demonstrate concepts in a manner unlike previous science demonstrations. By using interaction, graphics, and dynamic displays of information, sound effects, etc., more can be communicated to the student. This is supported, of course, by a highly structured presentation, one where the pacing is brisk and the teacher does not have to carefully correct student errors.

The second, and perhaps more important, feature of the programs presented, was the way in which we analyzed the content. Rather than trying to teach the main ideas, the designers found that now appeared high school chemistry--or for that matter, any high school science textbook--we focus on essential concepts and taught how they related to each other. For example, the role of energy is central to the chemistry of bonding, equilibrium, the energy of activation, and catalysts. Considerable time in the program was devoted to careful presentations, clear and detailed explanations, and systematic review. In following this pattern, students can learn fairly difficult content area material.

Conclusions
The four studies suggest that content analysis, instructional design principles, and computer technology can effectively work together in teaching mildly handicapped students to think more efficiently about a content area. We believe that successful learning can be achieved with or without the use of technology--begin with a careful analysis of the content. This requires an understanding of how different kinds of knowledge in the content area are related as well as how the student can be effectively sequenced. From this analysis comes the use of empirically based instructional design principles, and computer technology to help the student and teacher with or without the use of technology. We believe that successful learning can be achieved with or without the use of technology--begin with a careful analysis of the content. This requires an understanding of how different kinds of knowledge in the content area are related as well as how the student can be effectively sequenced. From this analysis comes the use of empirically based instructional design principles, and computer technology to help the student and teacher with or without the use of technology.

The four studies reviewed above bear out this curriculum process. The ability to define working knowledge that requires considerable practice. An above average amount of practice is required for mildly handicapped students. To increase the efficiency of this practice, an optimal example set size and cycles of review were employed. Finally, we used a CAI program incorporating these design principles in order to relieve teachers of this time consuming and relatively low level task.

In analyzing elementary reasoning skills (or basic teaching), we noted that traditional instruction often does not provide the strategy by which the student is likely to be even if it is not very important. We then used computer to remind them that when students erred they were reminded of the procedure for deriving the correct answer. We used a CAI program to test whether or not such knowledge could be adequately taught as a tutorial. Typically, CAI programs merely provide drill and practice exercises to supplement teacher instruction. Here the program was a true tutorial and did all the instruction.

The simulation instruction evolved out of an examination of problem solving. Instruction. As we noted previously, health is a complex content area, allowing for many kinds of instructional goals. Typical health educational programs treat many diseases and bad health habits in an indistinct, but undifferentiated fashion. That is, students are taught to do things by being

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Eugene Direct Instruction Training & Information Conference

PLACE: Eugene Hilton Hotel & Conference Center
DATES & TIMES: August 4-8, 1985 8:30 am-4:00pm daily
FOR: Teachers, of Regular and Special Education, Supervisors, Administrators, and Aides of all grade levels
FEE: $125.00 for the 5-day Conference

The Association for Direct Instruction is pleased to announce the 12th Annual Eugene Direct Instruction Training and Information Conference. The conference will be held at the Eugene Hilton Hotel and Conference Center, in Downtown Eugene. We hope that you are able to make the Conference the highlight of your summer and join with other professionals in furthering your skills and knowledge of instructional technologies. There is a full range of sessions designed for teachers, aides, supervisors, and administrators whose goal is providing educational excellence in all facets of education. Previous participants will find new course offerings in a number of areas of interest.

After a day of work, participants will enjoy evenings in Eugene. Next door to the Hilton is the Holt Center for the Performing Arts, a world-class performance hall. Within blocks of the conference site there are scores of restaurants catering to a variety of tastes. Eugene's setting will make the conference a rewarding professional experience as well as a relaxing vacation for you and your family. To help renew old friendships or make new acquaintances, a picnic has been planned for Monday afternoon. A new feature added to the conference this year is 2 weekend social hours. On Tuesday and Wednesday evening tutorials will be available to answer questions and provide an opportunity for making new contacts.

SESSIONS

A Teaching the Beginning Reader
A Reading Mastery III, IV, V, & VI
A Teaching Reading Accuracy & Fluency
A Base Reading Programs: Selecting, Translating to, & Adapting
A Teacher Training: Teaching Others to Teach DI Programs
A Solutions to Classroom Management In-K-12
A Generalized Compliance Training
A Computer Courseware: A Direct Instruction Perspective
A Overview of Direct Instruction Research and Theory
A Diagnosis, Corrections and Filing

B Teaching the Beginning Reader
B Reading Mastery III, IV, V, & VI
B Adapting to the Individual
B Teaching Oral & Written Comprehension Skills
B Distal Arithmetic I & II
B Reading Correction and Prevention
B Overview of All Direct Instruction Programs
B Solutions to Secondary Classroom Management
B Direct Instruction for the Severely Handicapped Learner
B Video Disc Instruction in Math
B Classroom Technology and Direct Instruction

C Effective Spelling Instruction
C Reading Mastery II and Fast-Cycle I & II
C Teaching Beginning Language Skills
C Teaching Facts and Facts in the Content Areas
C Teaching Academic Survival Skills-Study Skills
C Managing Students with Emotional Problems
C Direct Instruction Approach to Teaching Secondary Science
C Direct Instruction Approach to Teaching Secondary Social Studies
C Overview of Direct Instruction Theory
C Supplemental & Transitional Activities Related to DISTAR
C Accommodating a Nation of Readers: Issues & Implications
C Overview of Classroom Technology and Direct Instruction

E Teaching Expressive Writing Skills
E Overview of Aspects of Supervision & Monitoring of DI
E Direct Instruction & Mainstreaming
E Teach Your Child to Read in 100 Easy Lessons
E Overview of Direct Instruction Research

Trainers and Presenters:
Jean Ogborn, Schlafly Engelmann,
Wes Becker, Doug Carline, Randy Sprick, Bob Dixon, Gary Johnson
Marlyn Sprick, Gail Colvin, Gary Davis, Phyllis Haddow, Linda Youngmayr,
Kathy Mac Donald, Lynne Anderson-Johnson, Marie Collins
and other Direct Instruction Authors & Trainers

Conference Session & Events Schedule


AM A A A A C/E
PM B B B C/D

Eveining Events
A Meet the authors A Meet the authors A Meet the authors
A Annual All Meetings

There are 34 sessions offered during the 5-day conference. Participants may attend up to 4. Sessions are either educational or informational sessions. The focus of training sessions is on specific teaching behaviors. Task practice is involved in each of these sessions. The goal of informational sessions is to provide the kind of detailed information needed to implement successful techniques or understand the topic.

The sessions are scheduled in 4 time periods. Each participant will choose one "A" session, one "B" session and either one "C" session or one "D" and one "E" session.

The Association for Direct Instruction Announces the 12th Annual Eugene Direct Instruction Training & Information Conference

PLACE: Eugene Hilton Hotel & Conference Center
DATES & TIMES: August 4-8, 1985 8:30 am-4:00pm daily
FOR: Teachers, of Regular and Special Education, Supervisors, Administrators, and Aides of all grade levels
FEE: $125.00 for the 5-day Conference

The Association for Direct Instruction is pleased to announce the 12th Annual Eugene Direct Instruction Training and Information Conference. The conference will be held at the Eugene Hilton Hotel and Conference Center, in Downtown Eugene. We hope that you are able to make the Conference the highlight of your summer and join with other professionals in furthering your skills and knowledge of instructional technologies. There is a full range of sessions designed for teachers, aides, supervisors, and administrators whose goal is providing educational excellence in all facets of education. Previous participants will find new course offerings in a number of areas of interest.

After a day of work, participants will enjoy evenings in Eugene. Next door to the Hilton is the Holt Center for the Performing Arts, a world-class performance hall. Within blocks of the conference site there are scores of restaurants catering to a variety of tastes. Eugene's setting will make the conference a rewarding professional experience as well as a relaxing vacation for you and your family. To help renew old friendships or make new acquaintances, a picnic has been planned for Monday afternoon. A new feature added to the conference this year is 2 weekend social hours. On Tuesday and Wednesday evening tutorials will be available to answer questions and provide an opportunity for making new contacts.

SESSIONS

A Teaching the Beginning Reader
A Reading Mastery III, IV, V, & VI
A Teaching Reading Accuracy & Fluency
A Base Reading Programs: Selecting, Translating to, & Adapting
A Teacher Training: Teaching Others to Teach DI Programs
A Solutions to Classroom Management In-K-12
A Generalized Compliance Training
A Computer Courseware: A Direct Instruction Perspective
A Overview of Direct Instruction Research and Theory
A Diagnosis, Corrections and Filing

B Teaching the Beginning Reader
B Reading Mastery III, IV, V, & VI
B Adapting to the Individual
B Teaching Oral & Written Comprehension Skills
B Distal Arithmetic I & II
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Discipline Plan

Technology enables us to present certain kinds of instruction (e.g., the dynamic change in health profile and the process of chemical bonding) in ways that we were incapable of doing in the past; the computer based on the integration of traditional and technology-based curriculum. This point is critical. Sociologists in the past have too often looked at technology based programs as stand alone products. Many times this has led to peculiar developments — to games formats that will hold the students attention or to programs that are so broad — (e.g., LOGO, Rocky's Boots) that the instructional goals are neither clear nor easily accomplished. A better understanding of the application of technology in special education is gradually emerging as it is linked to the development of computer science and curriculum content analysis.

References

1. Establish Classroom Rules Or Expectations
   The first step is to identify and explicitly state the classroom rules. The rules need to be precise, practical and behaviorally expressed. It should be clear to the teacher, the student, and any observer whether a rule has been broken or kept. The students should be given a clear rationale for the rules to help them understand that good behavior leads to a positive classroom where children may learn and develop. Also, they need to understand that inappropriate behavior disrupts the classroom, causes tension, and can make learning and development very difficult and sometimes impossible.

2. Select Functional Rules
   A simple guideline for selecting classroom rules is to ask yourself the question: "What do students need to do so that I can be effective as a teacher?" With this orientation the rules address student behaviors that facilitate instruction and learning. The following list might serve as a useful source for selecting classroom rules:

- Be on time for class.
- Enter the classroom quietly.
- Go to your assigned seat quickly.
- Begin the entry task promptly.
- Listen to the teacher's directions or expectations.
- Raise your hand if you wish to talk.
- Join in the discussion or lesson.
- Follow the teacher's directions.
- Organize required materials promptly.
- Start assigned work promptly.
- Keep working.
- Ask for help only after you have first tried yourself.
- Respect other's space and they will respect yours.
- Leave the room quietly.

3. Establish the Rules Immediately As the School Year Begins
   Students should be introduced to the classroom rules on the very first day of the school year. This allows a loose structure "Until everyone gets to know each other," or "Until rapport has been established the teacher will have a much harder time establishing rules.

4. Reinforce and Review the Rules
   Allow time in the classroom schedule to regularly reinforce and review the rules. In this way, students are constantly repeatedly reminded of the rules. Review times also provide an opportunity for teacher and students to identify which rules are not working or which rules need further clarification.

5. Practice Rules Which Are Frequently Broken
   If certain rules are consistently broken then the teacher should simulate the context and provide additional practice for the class. For example, suppose the teacher has a rule that the children enter the classroom quietly at all times. If the children are noisy coming in after recess, have the students line up outside the door, talk to them about the rule of entering the room quietly and have them come in. This procedure could be repeated several times until an acceptable criterion is reached. Clearly, if the students do not cooperate, then stronger measures would need to be taken, such as loss of free time for the students who are making noise or disrupting the practice. The teacher should also remind the students before the next recess that they should enter the room quietly and be waiting at the door to receive the students and to identify the students who may still be breaking the rule.

6. Establish Consequences for Inappropriate and Appropriate Behavior
   To strengthen the likelihood that students will follow the rules, there needs to be clear, positive consequences for students who keep the rules and clear, negative consequences for students who break the rules. The best...
Discipline Plan

Positive consequence for keeping the rules is teacher approval. Teachers should always try to keep the rules fair and for granted. They need to work hard to provide constant acknowledgement of students who do cooperate. Other positive consequences could include extra privileges, and access to preferred activities. These are useful for maintaining a high level of behavior, so that better performance can be more strongly acknowledged and rewarded. It is good practice to keep the reward system more strongly consecrated. For example, for a hierarchy for negative consequences could include:

1st Infraction: Warning (reminder, name on the chalkboard, etc.)
2nd Infraction: Isolation within the room
3rd Infraction: Miss next recess
4th Infraction: Miss full day of recesses
5th Infraction: Discipline referral to the principal

Note: Consequences should be tied to the rule broken as far as possible. For example, if the student breaks a rule during free time, then there could be less free time for the student. If a student breaks a rule during group work, then the student could be removed (partially or fully) from the group.

Useful Strategies for Managing Behavior

Many behaviors can be prevented or nipped in the bud if the teacher uses appropriate strategies at the right time. The following strategies, though not exhaustive, are commonly used by teachers to manage behavior:

1. Respect for the Teacher
   - The most effective way to manage behavior is to gain the student’s respect. This can be done in two steps: securing a student’s respect in the classroom.
     a. Require respect. The teacher needs to come from the first day of school that he or she is the responsible adult in charge of the class. Disrespect violates a basic classroom rule and will lead to a punishment. The teacher should also strive to gain respect by being warm, consistent, fair, a good role model, mentally healthy, and professionally competent, but not necessarily just “friendly.”
     b. Show respect. The teacher needs to show respect to the students. If the teacher requires respect and does not show respect to the students, the teacher will end up functioning as a tyrant and the students will fear him or her.

2. Planned Ignoring
   - Many inappropriate behaviors are maintained by the teacher’s critical attention to them. Behaviors such as low volume noises, mumbling, "funny faces," inappropriate ways of raising hands, asking questions, and making comments to the teacher are often ignored.

3. There are situations however, where behaviors cannot be ignored, such as:
   b. Acts that are too intrusive, i.e., they disrupt the lesson.
   c. Behaviors related to safety.
   d. Serious behaviors (e.g., breaking a window).

4. Reminders or Warnings
   - If a student is just beginning to break a rule or exhibit inappropriate behavior, then a timely warning or reminder can serve as the cool down area. Once the student regains calm it may be possible to address the concerns and talk about things without a "fight." The cool down period is also beneficial after students have been in a verbal or physical fight.

5. Proximity and Touch Control
   - Some students are upset from time to time. A student may be helped by physical proximity. The teacher might stand close to the student, or move the student to a seat where the teacher is able to be closer to the student. The teacher might offer the student a shoulder and say, "Take it easy," or, "Let’s not have a big battle today." In this situation the teacher is showing understanding of the fact that the student is upset and letting the student know that.

6. Slow Interest in the Student
   - Teacher approval and interest is a powerful way of getting students’ trust and cooperation. In general, the teacher may show interest in the tasks they are performing in, or ask them about their interests at home. It is important to let them talk, versus asking a series of questions. Questions are useful in getting started, but after that the teacher should try to listen and to encourage conversation.

7. Display Affect
   - Students often respond to a teacher who displays a positive, supportive and appreciative approach to them. Students will step acting-out behavior in the classroom simply because they do not see the teacher who may they may exhibit the acting-out behaviors with other teachers and in other settings.

8. Direct Appeal
   - For some students a direct appeal can be very effective in arresting behavior. The teacher may say to the student, "Come on Billy, see if you can put out that fire and have a good day." or "Mary, see if you can settle down and keep out of trouble." This approach is more effective with students who have some degree of self-control and who have reasonable rapport with the teacher. Class leaders often respond to the direct appeal approach.

9. Contracts
   - A contract can be a useful tool for dealing with prolonged misbehavior. The terms of the contract should be spelled out in writing. It should list behaviors both positive and negative, and the corresponding consequences. The contract should be reviewed on a regular basis.

10. Cool Down Time
    - Some students with emotional problems may be upset as much as two hours after the classroom or may begin to get upset for some reason or other in the classroom. If behavior continues to deteriorate the teacher may get out of control. For these students, it is better to have a cool down time available. A section of the room, a corner, or partitioned area could serve as the cool down area. Once the student regains calm it may be possible to address the concerns and talk about things without a "fight." The cool down period is also beneficial after students have been in a verbal or physical fight.

11. Removal of the Student from the Scene of Conflict
    - It may be necessary to remove a student from the scene of conflict in order to gain control of the group. Sometimes the group, or audience, will be too stimulating for a student who is losing control. Or, the student who is losing control can be removed from the group and the teacher loses control of the group as well as the individual.

12. Helping Students Problem Solve
    - This approach is designed to help students understand exactly what they should do to be removed from the room. The student may be highly inappropriate. The student needs to be taught how to identify situations that may be stressful and to identify or use alternative strategies to deal with the problem. Some student mistakes because they are unable to develop and use problem-solving techniques. Questions the teacher helps them "think through" each step of problem solving then they have a better chance of learning skills.

13. Using Group Influence
    - The group can be used as a positive way to shape appropriate behavior. The teacher needs to develop in the group a sense of group norms. Students often respond to other students. Students should not be used to punish students.

14. Removal of the Group
    - If a student commits the authority of a teacher through physical violence or through verbal assaults, then the group will be removed from the room. This approach allows the teacher to deal one-to-one with the student and takes away the class’s support. The student does not have to face the class and the teacher has more of a chance of gaining control of the student. This technique needs to be rehearsed with the class so that the students may respond quickly. The students need to know exactly where to go and the receiving staff (librarian, next door teacher, vice principal) to be prepared.

15. Recognition of Good Behavior
    - If a student does not display appropriate behavior very often, then it is important to recognize and respond to good behavior when it occurs. In addition, teachers should not assume that students will behave appropriately. Teachers need to (1) recognize and acknowledge or show approval of good behavior. Teachers should also seize opportunities to praise the whole class (where appropriate) in the presence of a visitor.

16. Rehearsal and Review
    - If a student has a difficult time behavior well in certain situations then the teacher may rehearse some rules just before the student enters the problem area. The teacher may rehearse the behavior after the event. This approach is particularly useful for the less structured areas such as recess, hallway, and cafeteria. For some students it is helpful to spell out the acceptable behaviors or the behaviors that are not acceptable which are acceptable for this context and to identify the behaviors that are not acceptable.

17. Provide a Focus on the Issue
    - When a student breaks a rule or behaves inappropriately the teacher should immediately provide a focus on the issue. Especially when a number of students are involved, then it is useful to have the student discuss his/her actions with the other students in the class. It is necessary to have the students report of actions (what they did) versus the teacher’s report of actions (what they should do). This approach is to identify what the student did, deliver consequences and help them to identify what should have been done.

18. Reduce Anxiety
    - Many acting-out behaviors are a result of stress. The stress builds to such a level that the student suffers (either verbal or physical). The outbursts can be prevented if the teacher can recognize the signs of stress and use simple stress reduction techniques. The signs of stress are:
      a. Legs moving rapidly, tapping a pencil or some object on the desk exces- sively, nervous habits (lack of concentration, eyes darting around the room, head kept down, inability to get started and starting then changing to something else. The stress can sometimes be reduc- ed by:
      b. Talking to the student as a teacher, not as a friend. It is important to address the stress by comments such as, “You look as though you are upset,” or “I can tell that something is bothering you.” The teacher could allow the student to have a quiet place, an easy activity instead of the assigned task. Note: Some teachers fear efforts to reduce stress, because they believe they may be reinforcing off-task behavior. The answer really is, “Time will tell.” If the student is manipulating the teacher then the “stress behaviors” will increase in frequency. If the student is truly under stress then these strategies will help avoid escalation and help the student to become calm.

19. Speak to a “Third Person”
    - In some cases it is more productive to speak to a student indirectly through a situation and review the student’s behavior after the event. The student may speak to a student behind the target student just loud enough so that the target student can hear the students exhibit. The teacher might say, “I sure hope Michael can get through the day today.

Continued on Page 13
A "Solutions" Approach to Educational Computing

by Dennis M. Davis

Imagine that you own a business. You
started small, but you have grown to
the point where it makes sense to consider
automating some of your accounting
and inventory operations. When you
call in the representative of a computer
company to give his pitch, how will you
know whether computerizing will be
worth it for you?

I'm no businessman, but I think I
would be sold if the computer representa-
tive could show me how, after I deduct the
cost of the computer system, I would
still save money and/or increase produc-
tivity by computerizing. It would be
worth it, but other words, be cost effective for me to
computerize.

Conversely, since I am now doing "by
hand" all the operations the computer
promises to automate for me, if I could
not be assured of saving money and/or
increasing productivity, there would be
no reason for me to computerize my
business. It would not be cost effective.

Wouldn't it be nice if we had such a
clean criterion to apply in educational
computing—to help us decide whether
to computerize, to help us figure out
what a computer must do for us in
order to be, "worth it." In the trouble is, we're
teachers; we're not in business, with a
profit motive and a bottom line against
which cost effectiveness can be meas-
ured. Right?

I don't believe it.

There is something like cost effec-
tiveness in education. Teachers need to
save time, not because for them "time is
money" as it is for the businessman, but
because the more time you save from
routine tasks, the more time you have
for high-quality interactions with
students, for prep, or even just for
recreation and regeneration.

The key to increased cost effectiveness
in terms of increased effectiveness: more
learning for each unit of teaching.

Multiple choice exams aren't attuned to this "educa-
tional cost effectiveness" that interest
in computers within our schools is wanting
and the educational computing market
has suffered.

Syrupes vs. Causes

This situation becomes increasingly
frustrating in time goes on, as educa-
tional computing continues to fall short of
the potential we know it has, and even
pointing out the "syrupes of the problem that are really just symptoms.

Some of those causes include:

a. The computers are computer illiterate. "The
reason why computers have not been ef-
fective in our schools," some observers
don't know enough about them or about how
to use them for. What we need is, to train teachers as
computer experts and let them solve the prob-
lem of what to do with computers in their
classrooms.

But, it's not up to teachers to make educational computing viable. Teachers
don't need more horses. If educational computing wants a mass market, it just
has to meet teachers and students where they are and do what they need. Other-
wise, it's not cost effective.

"Courseware quality is abysmal. There
is a definite truth to this complaint, as
anyone who has used commercial
courses knows. But my favorite ver-
ion of this says like this: 'Bad courseware
has not worked in the schools. However,
good word processors, databases,
teaches, etc. have been successful in
offices, so let's market them to
schools—and instead of courseware!'

I'm not opposed to making educatio-
nal use of word processors or any
other software tool that can make a con-
tribution to instructional effectiveness.
But I am also aware that teachers' primary responsibility is to deliver the
curriculum and that to reach a mass
classroom computing must place a high priority on providing cur-
ricular instruction. Otherwise, educa-
tional computing cannot be cost effective.

We haven't got the right machines
in the schools. Again, there is some-
type of machine (like the Amiga), even it's more powerful,
cheaper, and especially tailored to
educational development and delivery,
is not enough. Nor is the mere presence
of a network environment. Appropriately
packaged hardware and software perspective won't work any better than
the previous complaint's stature.

A computer perspective can make educational computing
cost effective.

The User's Perspective

The causes the experts give for the failure of educational computing to achieve its potential are numerous and varied,
and all have a couple of things in
common: they don't take the user's perspective, and they don't suggest solu-
tions.

"Solutions" is something of a catch-
word in the computer industry these
days. In the small business computing
market, who has software and
developers are coming to
realize that to sell computing success-
fully, you don't just sell machines or
software; you have to identify users' real
problems, develop (or license an
IP package) software that ad-
dress them, and market them as solu-
tions to those problems.

Continued on Page 14
Educational Computing

The "solutions" approach, in other words, is one whereby a customer exactly how and why comput-
erizing can be cost effective. It has work-
ed well, it has proven its worth. It's time to apply this approach to educational computing as well.

Specifying the Problem

To come up with a "solution" we must first determine what the specific computer users' real problems are. If we view this question not from the point of view of the manufacturer, the university, the CBE expert, or the software developer, but from the educational user's (the classroom teachers) perspective. It's not at all perplexing, and the list we generate is not long:

1. Computers are too hard to use. It takes too long to figure out how to connect up the parts. It stops working, and what to do about it. It's too complicated to have to add DOS to disks to figure out what DOS commands and what they do. It's too hard to figure out how some software works. It's too hard to keep track of lots of floppy disks. When educational software comes with a manage-
mastery, and learning sufficiently. Small lessons designed to fit on single floppy disks will not quantitatively improve the educational system. They can't function as an integral part of the curriculum—they must be ancilliary. And teachers get far too little control (in the form of power) to use computers without management of instruction over student performance when students work individually, on single disk lessons, at stand-alone microcomputer workstations.

2. Educational software materials don't increase students' learning and are designed, instead, to increase students' learning and using computers in the classroom—something teachers and students have been doing all along. The advantage is that they can be used much less expensive. Two things have, however, since changed: (1) multimedia computer based educational materials have been successful in educational applications largely because it lacks data bases. (2) We are seeing the development of bigger systems like PLATO), and those critical features missing in many current products. One such is that networks that are far less expensive than PLATO to implement, and of making the environment simi-
lar to PLATO to the PCC management system that has, in other words, been the system for effective education. And not just "bottom line" cost ef-
ficient. Let me cite a brief example of what's shown above is likely to have a significant impact on the traditional textbook. The students in one classroom had been working on problems that looked like this:
Case Study

Continued from Page 14

coding & B: Spelling Mastery A. B., D: Distar Arithmetic I, II: Correction with Addition, Subtraction, Multiplication, & Division; Distar Language III: Expressive Writing or the Central California Writing Project. 1 supplement to Student's Text System 80 Reading and Arithmetic, computer software, SRA Reading Lab & Reading for Understanding and any published worksheets including c Reading Mastery II seatwork. There also students with special supplementary worksheets.

A Study of Peter

Peter's mother went into labor at 4½ months and a procedure was used at that time to delay labor. He was born ten weeks premature and was delivered by cesarean section. At birth, he had episodes where his heart rate slowed and he stopped breathing. He had invasions five days later. Subsequent to that, he was found to have moderate palsy of the lower extremities which he felt to be secondary to static utero- battle- phosphathy. A later diagnosis listed cerebral palsy with spastic diplegia.

Peter has had many operations and any educational assessments that the cussions reached in those assessments all are pretty much the same thing. He is right and verbal, and he can listen accurately and completely. Pediatric problems are associated with a few damage to areas of the brain which involve visual-perception and visual-motor activities. He is currently 13 years old and at a 5.4 year level on the Torrance Freedom Integration. When during a program about a wrestling match, one was seated across a table and asked, "What does it look at this upside down?"

Peter had been involved in a variety of public and private schools. Until the beginning of fourth grade none of those experiences involved Direct Instruction. My first contact with Peter was during the middle of the third grade, when I was requested to test him in preparation for a possible increase in his public school. As a result of the pretest results, his basal scores were 2.9 (reading) and 2.1 (writing). The child was rated as working at a 1.6 level in reading, spelling, and writing skills were limited to recognition of a few words. His reading and writing skills were limited to recognition of a few words. His math skills were better. He was fast and accurate on addition and subtraction facts and knew a little over half of the multiplication facts. Mentally, he could do two-digit addition and subtraction problems with some regrouping. He could not solve a problem to his head, or divide it. He had no experience with division.

During the testing and throughout our work together, it has been clear that he is intelligent and has a well-developed vocabulary. He is informed on, and can discuss, current events. He was upset and of the assassination of Indira Gandhi. He has an extensive knowledge of sports facts and figures. He loves knowing, but is uncomfortable with new learning and also wants very much to learn.

In the fourth grade, he began work in my program with goals for math and perceptual-motor development. He continued with those areas of instruction through the fifth grade. The major focus was on number sense and the introduction to the number line. He began Corrective Math Addition, followed by Subtraction, Multiplication and Division. Those programs were overlapped. At the time of the last Key Math Test, he had completed Addition and Subtraction. He was working in Multiplication and Division. See Key Math scores in Table 1.

Modifications to the math programs were limited to adding extra lines to the placement of answers and repeating some lessons. He had particular difficulty multiplying by two digits.

For sixth grade, he will be placed full-time in public school. Math, social studies, and science will be taught at our middle school in the special education class there. He will return to River School in the afternoon and will work with me on reading, spelling and handwriting.

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Table 1

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<th>DI Public School</th>
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<td>Measurement</td>
<td>1.3</td>
<td>2.1</td>
</tr>
<tr>
<td>Time</td>
<td>1.3</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>1.5</td>
<td>2.9</td>
</tr>
</tbody>
</table>

*I had to read all word problems to him.

Software Review

The McGraw-Hill Courseware Authoring System

Reviewed by Bryan Wickman

Equipment required. Apple IIe, Ile, IIC. Only one drive is necessary for students to use the lessons. Two drives are best for lesson development (if you do not want to constantly be swapping disks). The system does support a color monitor if you want to add some variety to the lessons.

Packaging. A 250 page manual and 5 disks are all included in a 3-ring binder. All disks included can be copied except the Authoring System Disk (2 copies of which are included). The other disks are a Demonstration disk, the Practice disk and the Delivery System. The manual is lengthy but thorough. You are provided with 2 options to learn the system: (1) the training section (92 pages) for the beginner, or (2) the Quick-Start section (8 pages) for users familiar with other authoring systems. I have experience with 6 other authoring systems, and I was totally lost in this section.

Lessons are comprised of 7 parts: Introduction, Main Idea, Example, Practice, Help, and Feedback. Lessons do not have to include all of these components. A section may be omitted if it is not needed. The system is "learner controlled"—the student can choose to do those lesson components in any order. Once a particular component has been completed, the menu driven system asks the student which component he or she wishes to do next.

To build a lesson the Authoring System is loaded into the computer, (See Figure 1, Main Menu). The user then goes through a process of designing a lesson, screen by screen (each screen is a separate file saved on disk). The designer must use a rigid system of labeling the files so that once all the screens are completed, the lesson can be linked together properly. If you have mislabeled a file, your lesson will not run.

The system has its own editor. There is on-line help, so you can view your options with a keypress. You may use 4 different fonts, colored text, backgrounds and patterns, or add graphics that you have created with the graphics package that is included. Once " Draw" in the " Input Mode" (where you will do most of your text entry) the text is shown in the sequence entered. If you are typing and make an error, and then backspace over it and correct it; when the program is ready, the lesson will be put up on the screen with the error and then the cursor will back over it and correct it. To avoid this errors must be corrected in the " Edit Mode". This is a drawback as I have a hard time leaving my errors to correct later.

The system supports Yes/No, True/False, Word Selection, Multiple Choice, and fill-in-the-blank question types. For fill-in questions the system allows the designer to use wildcard symbols in answers so that they are correct spelling is not required, students won't be penalized. For each correct, if there is feedback, the machine prompts you to enter a feedback file name. You must remember to write the feedback file later, or your lesson won't run properly. Once you have created a question screen (each question is on a separate file) you can enter it through the "Question Checker" portion of the system. If you choose not to, and Figure 1.

Case Study

Continued

His current reading and spelling grade-equivalent scores on the Brigance Comprehensive Inventory of Basic Skills are:

- Word Recognition: 1
- Oral Reading: (late first)
- Vocabulary: 1
- Passage Comprehension: (near 1st grade)

We are, in our own ways, looking forward to next year. I am afraid to see if I can improve him to read and spell. I am the only teacher that he has not complained about and he thinks I'm funny. I'll let you know if we are successful.

Continued on Page 15
there is a problem with your question, the lesson bombs and you have wasted a lot of time.

As mentioned earlier, the system does support graphics. You can either insert previously created DOS 3.3 graphics or build your own with the “Graphics Builder” portion of the system. This feature can do a number of editing “tricks”, such as rotating a negative image, swapping positions on the screen (allowing for a low level of animation), reducing the size, and filling the background with patterns.

Once you have designed all of the screens that are needed to make up the components of the lessons, they must all be copied onto a disk and “linked”. To do this you must load the “Lesson Builder”. The menu driven system prompts you to enter the name of the lesson. The system then verifies that the displayed list includes all of the files needed for that lesson. If you respond yes, it proceeds to link the files, and you have created a lesson. If you have created too large a lesson, the system will inform you that your lesson is too long, go back and edit it. The manual isn’t very specific about how long is “too long”, but they suggest lessons not be more than 30 screens in length. This seems like a rather severe limitation. Another unfortunate detail is that once a lesson is linked you may not edit the screens without having to re-link the files.

The Authoring System has a records keeping function. A student logs on when they begin a lesson. The system keeps track of the first 10 items in the lesson for 5 students. If more than 5 students use the lesson the scores must be cleared out or the next scores will not be recorded. If this is the case, the system does inform you that the scores won’t be saved. The information on each student is item number, times tried, number correct, and percentage of correct responses.

Summary: If a teacher has a good background in authoring systems, this program can be a useful system. However the potential user should be aware of the limitations we have noted.

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