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A Corporate Approach to the 2 R's: A Critique of IBM's Writing to Read Program

Educators thinking of buying the Writing to Read program should cautiously weigh the benefits against its high start-up and ongoing costs.

IBM's Writing to Read (WTR) program represents the largest direct corporate intervention in basic skills instruction currently implemented in this country. It merits review for two reasons: (1) many school districts may be considering purchasing it, and (2) it has yet to be subjected to rigorous critique.

According to an IBM brochure, "WTR is a computer-based instructional system designed to develop the writing and reading skills of kindergarten and 1st grade students." The program is indeed enticing. It offers the promise of solving two major problems for school administrators: what to do about reading instruction in kindergarten and 1st grade and what to do about computers. Moreover, it seems to combine a whole-language approach to literacy without neglecting phonics; offers expensive new technology from a prestigious Fortune 100 corporation; and has an aura of advanced, researched educational techniques. Not surprisingly, school districts are attracted to it (West 1989). The question remains, however: is it a good investment? To answer this question, we examine the program from four perspectives: the language learning paradigm on which it is based, the computer program design, the research conducted on its effectiveness, and implementation considerations (cost-effectiveness/marketing strategies). But, first, let's look briefly at what goes on in a WTR class.

The computer's role is to provide explicit phonics instruction using a special phonemic spelling system introduced in WTR.

Overview of the Program

A Writing to Read lab is a busy place, where a teacher and from one to five aides help children grouped at five work areas. Some children, wearing earphones, work on phonics at computer stations and ever so often say a sound or a word. At another location, children wearing earphones listen to stories on tape while following along in books. Other children are exploring manipulative letter shapes, while others fill in the blanks in workbooks. At another computer station, children type letters, words, or sentences on computers (some schools use typewriters for this). During the hour they spend at the lab daily, children cycle through three of these activities.

The essential feature purchased with the program is a computer tutorial/drill program, which runs only on IBM hardware. The computer's role is to provide explicit phonics instruction using a special phonemic spelling system introduced in WTR. Several games are included in the program. Through the computer's voice capabilities, children are able to hear words and sounds. Following is an example of

what children hear as they learn the 30 words that are presented during 10 computer cycles of 3 words each.

> This is a pig. See the word *pig*. Say *pig*. This is the sound *p*, /p/. Say *p*, type *p*. Say *pig*. This is the sound of *i*, /i/. Say *i*. Type *i*. Say *pig*. This is the sound of *g*, /g/. Say *g*. Type *g*. Say *pig*. Say *pig*. Type *pig*. Say *pig*. Type *pig*.

Language Learning Paradigm

Initial Teaching Alphabets

There is great appeal to the idea that we might make writing and reading easier for children by making the correspondence between the sounds and letters more regular (Why use *c* if we have both a *k* and an *s*?). However, WTR's use of a special spelling system is controversial.

A sizable body of related research, notably on Pitman's Initial Teaching Alphabet experiment during the 1960s, provides little empirical evidence for the instructional benefits of an initial phonemic alphabet. For example, Venezky wrote:

> More enthusiasm for spelling reform might be generated if initial reading in a reformed English alphabet or in a language with a highly "regular" orthography clearly progressed at a more satisfactory rate than is observed in this country. But in 100 years of reading research we have failed to even hint at such an outcome (1980, p. 30). [See also Just and Carpenter 1987].

Another difficulty with using an initial teaching alphabet is lack of reading material. Further, English is not a purely alphabetic system. Our seemingly irregular spelling patterns contain morphological data that give clues to meaning. For example, more accurate phonological spellings of the plural of *cat* and *dog* would be *dogz* and *kats*, for that is how they sound. Yet maintaining the representation with *s* provides much relevant linguistic information about plural formation. Research on the invented spellings of young preschool children also prompts questions about the value of introducing a special system of simplified sound letter correspondences. John Henry Martin, the program's creator, notes that the WTR system "has disadvantages of brief duration, but an enormous advantage in the long term" (Martin and Friedberg 1986, p. 62). But, in fact, many children develop their own logical systems for representing the sounds they wish to write based on the positions of the mouth used to make those sounds (Read 1986). The issue in writing that may be most important is acceptance of children's invented spellings as they learn how to write (Chomsky 1979), and teachers of WTR are encouraged to accept any spelling that makes phonemic sense (Martin and Friedberg 1986, p. 61).

In sum, designs of initial teaching alphabets have not been sufficiently grounded in empirical research to support their use for any beginning language arts program, including computer-based ones.

Phonics for Writing/Reading

Although the role of phonics instruction in reading is a matter of perennial debate, most commercially available programs contain both phonics and comprehension activities. "Effective reading programs," writes Chall, "expose children to a variety of activities that include a wide array of reading and writing" (1989, p. 523). It is the relative degree of emphasis on what is taught, when it is taught, and how it is taught that differentiates programs.

Writing to Read teaches phonics explicitly using a tutorial/drill approach. Children are tutored by the computer to recognize the sounds and the words; later they practice writing these sounds and words in workbooks. The phonics drill extracts the sounds from the 30 key words and then returns them to words, a recommended method (Beck and Juel, in press). Also recommended, however, is practice in blending sounds, but this the computer drill does not do. The children are not provided any stories containing the phonics patterns they have been taught with the computer to give them practice in decoding (as recommended in Anderson et al. 1985, p. 47). Unlike most kindergarten classrooms, WTR kindergarten classes and 1st grade classes both have daily writing. There is regularly scheduled time for children to write the letters and the words taught, as well as time for creative writing. The program does not focus on decoding.

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Opportunities to read (listen) are provided by the taped stories (Caldecott award winners) and follow-along books. Discussion and comprehension activities, however, are not contained in this component. Although children's active engagement in reading is considered critical to reading experience (S. Lytle and Botel 1988), nothing at the listening center fosters this either before, during, or after the stories.

Whole-Language Perspective

Recent research on early literacy instruction suggests the importance of the use of language in meaningful contexts, of talking to share information, of writing for a purpose—often called the whole-language approach (Altwerter et al. 1987, Butler 1984, Teale and Sulzby 1986). Writing to Read classrooms, however, are often separated from the regular classrooms, making integration of its activities with other learning difficult.

Two WTR activities—spontaneous writing on the computer and manipulative play with letters—do fit comfortably into a whole-language framework. At the writing station children participate in writing of their own choice, and at the manipulative station they talk to each other while playing with letter shapes. But at the other stations, language use seems unneces-

sarily decontextualized. Many of the words selected to introduce the WTR phonemes, for example, are not frequently used by young children in their writing (e.g., *uniform*, *vase*, *oil*), even after they have been taught by WTR (Zurn 1987). The taped stories as implemented in WTR are devoid of natural inflection, presumably to make it easier to follow the words. Yet we know that inflection is an important factor in communicating meaning (Crystal 1979). In addition, children listen to the stories with earphones, making the activity solitary (Wittkugel 1988).

Nor is shared use of language encouraged when children are at the computer phonics station. Children seated two to a computer are isolated by earphones. Sitting next to a person and practicing sounds at the command of a computer does not seem to be language use in a meaningful context. Talking with a computer is a poor substitute for talking with a teacher at a felt board, playing letter and rhyming games with a class. At the work journal station, children simply fill in blanks.

Of all the stations, only the computer phonics component based on an initial teaching alphabet is unique to WTR. The activities which fit comfortably into the whole-language approach—expressive writing, manipulative play, and read-along stories *with* inflection—could easily be implemented in any classroom without IBM PCs or WTR.

Computer Phonics Program Design

The second perspective from which we examine the program is the design of the computer phonics component. In general, Writing to Read does not appear to exploit the capacity of computers to enhance instruction. For example, although computers can individualize instruction, WTR does not (Cleary 1984). All children must work at the same computer-driven pace and proceed through all stages of each drill.

Further, since the program does not analyze their responses, children can proceed through the drill without reading. For example, pointing to a word on the monitor, one observer asked a child, "Do you know what that says?"

The essential feature purchased with the Writing to Read program is a computer tutorial/drill program, which runs only on IBM hardware.

The child replied, "No, but when I get to that, I know I have to press this key." If a child does not indicate the correct response, the program does not branch to a different presentation or offer additional help but rather presents the same lesson again and again.

Another benefit computers offer is help in record keeping. Again, however, WTR does not take advantage of this opportunity; rather, the teacher must track each student's progress on a paper form.

In addition, the quality of the voice output in WTR is disappointing, especially since the program is designed to teach phonics to young children. One teacher spoke to us of the problem of hearing the *m* in *man*. There is also the problem of isolating sounds that are mediated by the letters surrounding them (Templeton 1986). Cleary mentions the confusion of WTR's presentation of the short *o* sound (as in *bot*) for the target *o* in *wagon*, in which the sound is controlled by *g* and *n*. He notes "the inconsistent messages being sent to children—the same inconsistencies that John Henry Martin is trying so hard to avoid" (1986, p. 30).

Since it is only the computer phonics program that is special to WTR, potential users should evaluate this component against other computer programs that claim to teach letter/sound correspondence. A great many are now available that are designed to utilize the advanced sound and graphics capabilities of new models of hardware.

What Research Has to Say

Next we look at the research on Writing to Read. By conducting an ERIC search, reviewing education periodicals, collecting evaluation reports from school district research offices, and using the evaluation of WTR done for IBM by Educational Testing Service, we have been able to gather 17 studies dealing with the implementation, acceptance, and benefits of WTR. Regrettably, all of these studies have inherent weaknesses that limit their utility. No study has found long-term benefits to participating students. Figure 1 summarizes the outcomes reported in each evaluation of WTR.[1] In the discussion that follows, we indicate why none of these studies meets basic standards for accepting IBM's claims of WTR effectiveness.

For example, all the studies done in more than one school were done in urban districts (this suggests that regression to the mean may explain positive results; no study corrected for possible regression effects). Six of the 17 studies were conducted in single schools; thus, the generalizability of their findings is severely limited.

In addition, in 15 of the 17 studies, the program length ranged from three to nine months; two followed a part of their study populations for a second year. The authors of the studies include research office staff, teachers conducting thesis projects, and ETS staff. None of the studies uses a true experimental design: for example, none randomly assigns kindergartners to treatment and control groups. Nor have teachers been randomly assigned in any of the studies. Only 7 of the 17 studies made any attempt to equate experimental and control groups, either by matching class groups on socioeconomic status (SES) and/or prior

achievement or by adjusting outcome scores to reflect pretest scores.

Even within districts, the fidelity of WTR implementation has varied considerably, with many districts assuming that adaptation to local school conditions is necessary and proper. Only one study (Moilanen 1986) deals specifically with this issue. As a result, when reviewing the research reports, it is inappropriate to consider WTR as a singular uniform program. This issue is seminal to a consideration of WTR. On the one hand, innovations are best implemented when teachers can adapt them to local circumstances. On the other hand, IBM gives relatively careful attention to providing orientation and support materials to teachers using WTR. If teachers freely adapt WTR, then the question is raised whether the program's failures are the fault of those teachers or of the program design.

Assessment

To determine the benefits of participation in Writing to Read, the authors of the various studies evaluated students' writing, reading, and oral language performance; they also conducted teacher and parent interviews and surveys. Again, most studies have used different instruments. Surveys and interviews of participating teachers, parents of participating students, and principals of WTR schools all indicate favorable reactions. Principals voiced concerns about the program's relatively high cost, but otherwise opinion is generally supportive. As mentioned earlier, there have been no consistent findings of student benefit from participation in WTR.

A major problem in critiquing WTR is that so little evaluation of it has been published. Our review is dependent, in part, on material acquired through personal contacts but not readily available to the education community. To support its claims, IBM uses testimony from clients, but the reports on which the testimonies are based are similarly difficult to obtain.

Fig. 1. Reported Outcomes of Writing to Read Programs

Study	Number of WTR Students	Reading			Writing		
		K	1	2	K	1	2
1. Brierley (1987)	252	+			+		
2. Collis et al. (1987)	40–60		N.S.			+	
3. ETS (1984)	845	+	N.S.		+	+	
4. Haines and Turner (1987)	74	+			+		
5. Kirkland (1984)*	600						
6. Levinson and Lalor (1989)	132	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
7. McDaniel and Buckner (1987)*	337						
8. Metropolitan PS (1987)	78		N.S.	N.S.		N.S.	
9. Moilanen (1986)*	1,799						
10. Naron and Elliot (1987)	74				N.S.	N.S.	
11. Ollila (1987)	40–60					N.S.	
12. Slavin (1988)							
a. Washington, D.C.	?	+	–				
b. Baltimore	?	+	+		+	+	
13. Spillman et al. (1986)	300				+	+	
14. Stevenson et al. (1988)	216	+	N.S.		+	+	
15. West (1985); Zenke and Keatley (1985)	1,612	+					
16. Whitmer and Miller (1988)	30		+				
17. Zurn (1987)	67				N.S.		
Number reporting results		8	8	2	9	9	1
Number favoring WTR		7	2	0	6	5	0

+ = positive effect of WTR
N.S. = no significant difference
– = negative effect of WTR

(Studies 2 and 11 and studies 12a and 14 may be based on the same treatment programs.)

*Kirkland's (1984) study focused on special education students. McDaniel and Buckner (1987) and Moilanen (1986) were implementation studies.

Alternative Explanations

A weakness of most of the studies is that they neglect to consider alternative explanations for their findings. At an obvious level, there is the likelihood of Hawthorne effects at any WTR site, particularly in the early years of implementation. Another possibility is that early WTR sites are in schools or districts supportive of innovation. The teachers participating in WTR may be more willing to experiment than their non-WTR colleagues. Since most WTR classrooms have at least one additional staff member in the room, and often two, any effects attributed to WTR could result from reduced pupil-staff ratios and concomitant increased time-on-task. For instance, Haines and Turner (1987) noted that WTR kindergarten teachers reported spending more time on reading and writing than they had in pre-WTR years, suggesting that time-on-task may explain differences between WTR and comparison groups.

Two studies (Whitmer and Miller 1987, Haines and Turner 1987) found an interaction of WTR outcomes and gender; another analysis (Moilanen 1986) discovered an interaction between reading readiness and WTR outcomes. Several studies have also found a relationship between higher socioeconomic status and benefit from WTR (e.g., Haines and Turner 1987, Naron and Elliot 1987). These results suggest that WTR may not have uniform effects for all participants.

Moreover, the most glaring oversight in interpreting the results of the studies is the failure to acknowledge that when students are spending time writing, whether or not on computers, they are receiving language instruction different from that of most kindergartners and 1st graders. Research on language learning indicates a strong relationship between learning to write and learning to read, but only one of the studies (Naron and Elliot 1987)

adequately addresses this issue. The study—conducted in a district where some teachers were using a writing process approach in their classrooms, some were doing WTR, and some were providing "traditional" instruction—found that the writing process classes outperformed the WTR classes on some measures.

Follow-Up

Finally, only 2 of the 17 studies (Levinson and Lalor 1989, Metropolitan Public Schools 1987) have yet followed a group of WTR students in a subsequent academic year, let alone for two or three years, to see if any of the claimed performance gains hold up when the students are no longer participating in WTR.

The Levinson and Lalor study found no significant differences between WTR and control group 2nd graders on standardized reading tests in the year following their WTR experience. Although they did note significant differences in writing performance, they acknowledge that the absence of an experimental group that was provided an aide or given writing instruction diminishes the strength of the results. The Metropolitan Public Schools study found no differences between WTR and other students' standardized reading achievement tests.

Given that WTR has been operational for six years, why aren't there any studies with longer time frames? This deficiency is a particular failing of the ETS study in which it would have been relatively easy to extend the time frame for another year, rather than rush to publish results extolling the virtues of WTR.

The ETS Study

Since the ETS evaluation is a key element in IBM's marketing of WTR, it deserves special consideration. Although the Executive Summary (ETS 1984) has the appearance of a technical report published by ETS, it is designed and published by IBM in a way that makes it extremely difficult to distill even the most basic elements from it. For example, the second paragraph indicates that the evaluation "covered more than 10,000 Kindergarten and Grade 1 students" including "3,210 using Writing to Read and 2,379 comparison students in classes not using Writing to Read" at 21 sites. Only upon careful examination of the tables in the back of the report does one find that the major conclusions of the study regarding writing and reading achievement are based on a kindergarten sample of 793 students at 14 sites and a 1st grade sample of 52 students at 1 site (students with initial reading measures and post-writing measures or pre- and post-reading measures).

Since it is only the computer phonics program that is special to WTR, potential users should evaluate this component against other computer programs that claim to teach letter/sound correspondence.

ETS concludes that WTR students do better in K-1 writing achievement, better in kindergarten reading, and as well as non-WTR students on grade 1 reading and K-1 spelling (3 of 6 conditions favor WTR). These findings, of themselves, do not strike us as a ringing endorsement of the program. Given the expense of WTR, the extra staffing, and the other sorts of circumstances discussed above, one could expect WTR students to outperform comparison students in all categories/conditions. Further, that students who spend time writing do better at it than those who don't shouldn't be surprising.

A number of other shortcomings of the ETS evaluation deserve brief mention. Although the study claims to be a two-year evaluation of WTR, all student performance data were collected in a seven-month period, from November 1983 to May 1984. Kindergarten assessment was done within-year; only 52 1st graders at one site had comparable kindergarten pre-test and 1st grade post-test data, and only these students met the two-year condition, albeit the period of instruction was only one year. Achievement data for reading were derived from each district's standardized testing program, so both testing conditions and equitability of data are indeterminate.

Marketing Strategy and Cost Considerations

Given that the research on Writing to Read does not show impressive effects on learning, why are people buying it? In developing and marketing Writing to Read, IBM followed a purposeful strategy:

- control development costs by using available hardware (initially the PC Junior);
- further control "research and development" costs by acquiring a product created by an independent entrepreneur (John Henry Martin);
- persuade pilot sites to absorb personnel, training, and installation costs at each site, as well as service and consumables costs;
- locate pilot installations in a variety of school districts and hire a prestigious independent research firm (Educational Testing Service) to provide empirical evidence that the product works;
- have the company's own public relations department repackage the evaluation, then use this summary as part of the promotional package;
- do *not* reevaluate the product once the market starts to develop—instead depend on testimonials from satisfied customers;
- continue to substitute good packaging and high pressure sales for product development;
- focus on big clients (i.e., big cities) and use these sales to drive the secondary market; invite potential clients to demonstration sites (in Atlanta).

What about the cost? In addition to the $15,000 hardware and software package (January 1989 price list), school districts can anticipate local in-

stallation costs including room preparation, wiring, furniture, and security; additional personnel (e.g., a WTR classroom aide); personnel training; consumables and software upgrades; annual maintenance fees; classrooms and utilities. Since each participating class requires an hour in the lab, the maximum daily would be five.

The Expense vs. the Benefits

With little independent research available about the program, few people have reason to question the claims of success that IBM presents in its printed material. The very fact that they're dealing with one of the most prestigious companies in the world apparently diminishes the risk of the investment.

And sales of Writing to Read continue to increase. There are several reasons teachers might feel positive about WTR. First, rarely are teachers provided with thousands of dollars worth of equipment. The fact that an aide (often several) is usually included increases the appeal. Perhaps teachers also feel good that an organization of IBM's stature endorses movement in the classroom and nonstandard spelling. Children are particularly enthusiastic about writing with the word processor and listening to stories on tapes. Parents and administrators also seem to like the program.

And yet, the *only* part of the program that is special to WTR, the phonics drill and practice using a phonemic alphabet, has no empirical foundation in research on language learning. Further, available evaluations provide little evidence of student benefit. Where students do demonstrate benefit—in writing—it is highly likely that similar benefit could be obtained by providing more opportunity for students to write in regular kindergarten and 1st grade programs. In addition, both start-up and ongoing costs are high in relation to the benefits of WTR.

Given the evidence, we are inclined to agree with Slavin (1988) that Writing to Read "is far too expensive for the results it achieves, and whatever effects it does have seem to be due to its moving reading into the kindergarten rather than any effects of the program per se." Anyone considering purchasing the Writing to Read program should consider carefully whether or not the benefits of this program justify its very high costs.

We would expect IBM, as a leader in the corporate community, to hold itself to the same levels of accountability in assessing the performance of its education products as the corporate community is encouraging educators to adopt in assessing performance of schools and school districts.□

[1]For information about the evaluations, write the authors at the address provided at the end of the article. The studies cited in Figure 1 are indicated by an * in the list of references.

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Not a Balanced Assessment: A Response to Freyd and Lytle

It is not possible here to address all the issues raised in Freyd and Lytle's critique. Instead, I will speak to a few major points in each area they considered to demonstrate that the critique, although it raises a few excellent points, is not a fair and balanced assessment of the Writing to Read program.

Language Learning Paradigm

Freyd and Lytle examine three parts of the language learning paradigm underlying the program.

Initial teaching alphabets. The authors erroneously equate the inventive spelling aspect of the WTR program with the Initial Teaching Alphabet (i/t/a) approach, which was developed as a means of avoiding the irregularities of English orthography in the beginning stages of reading and writing. I/t/a involved the use of a *modified* alphabet, whereas WTR uses *standard English spelling patterns from the beginning*. The 42 phonemes represented in WTR are encoded using the most common English spellings for those sounds. So, unlike children using i/t/a, WTR children do not have to *unlearn* a writing system; they simply have to expand it to include less frequently used spelling patterns.

Based on their misconception of the similarities between the two programs, Freyd and Lytle inappropriately apply criticisms raised about i/t/a to the WTR program; for example, the lack of appropriate (i.e., printed in i/t/a) reading materials. With the WTR program, however, children are not intended to read books printed in their simplified spelling system. In addition to books printed in standard English orthography at the Listening Library Station, children's own writings and those of their classmates are a source of motivating reading material. Further, their conclusion that i/t/a didn't work is challenged by Aukerman (1984), who expresses mystification at why i/t/a has gone into disuse "in light of the impressive results reported from schools where i/t/a was used" (p. 304).

Phonics for writing/reading. Although Freyd and Lytle correctly recognize that WTR uses an initial sound-letter (encoding) approach as opposed to the