

Running Head: Research, Direct Instruction, Whole Language

Hempenstall, K. (1996). The gulf between educational research and policy: The example of Direct Instruction and whole language. *Behaviour Change*, 13(1), 33-46.

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Abstract

The failure of our school system to effectively provide for the basic skill development of all its pupils is of concern to both the general and research communities. It is especially salient for those inclined towards empiricism as there are behavioural approaches to teaching, with excellent research support, which could make a major contribution to the prevention and alleviation of this distressing problem. Unfortunately, the evidence for the effectiveness of such programs is largely ignored by educational decision-makers. One behaviorally-based model, known as Direct Instruction, is contrasted with the currently popular approach to teaching called Whole Language, one with little empirical support and major theoretical weaknesses. The broader issue, examined within the context of this educational problem area, concerns researchers' responsibility for the dissemination and application of their work within the community.

Student failure in the education system has received a great deal of publicity in recent years. This increased interest may have resulted from a rise in consumerism among parents, and a parallel fall in the community regard held for the teaching profession (This loss of mystique is also evident among other professions, such as law, and medicine). In addition, education policies in recent times have encouraged parent participation in school management, and also in the classroom. Further, parents have been requested to take greater responsibility for their child's educational progress, particularly in the critically important area of reading development. When students experience failure parents have begun to ask schools and governments for explanations.

The systematic measurement of school achievement has not been seriously addressed in Australian education until recently. It has been argued (Conway, 1994; Heaney, 1993; Pennington & Speagle, 1993) that this reluctance was partly because of a disdain for standardised measurement held by influential teacher-training and teacher-union officials, and perhaps because, for governments, the results of national testing might prove financially expensive. While systematic, nationally compiled figures may not be available, there is now a general acceptance that our school system is unable to guarantee a successful education in basic skills for between ten and twenty five percent of our children (Australian House of Representatives Enquiry, 1993; Prior, 1993; Richards, 1995). These students are often described as at-risk students because, unless special provision is made for them, their future is sadly, bleakly predictable.

Currently, our school system fails at-risk children in several related and cumulative ways. It supports and promotes an approach to teaching (in particular, teaching reading) called Whole Language, which is educationally unsound (Adams & Bruck, 1995; Liberman & Liberman, 1990), and particularly disadvantages at-risk students (Bateman, 1991; Yates, 1988). Vellutino (1991) and other contemporary researchers (Ball, 1993; Bateman, 1991; Blachman, 1991; Byrne, 1991; Byrne & Fielding-Barnsley, 1989; Eldredge, 1991; Gersten & Dimino, 1993; Groff, 1990; Liberman & Liberman, 1990; Nicholson, Bailey & McArthur, 1991; Rayner & Pollatsek, 1989; Solman & Stanovich, 1992; Stahl & Miller, 1989; Tunmer & Hoover, 1993; Weir, 1990) are in agreement that Whole Language is not a comprehensive approach to reading instruction, and contributes to the literacy problem.

The Whole Language approach views children as natural learners, and teachers as benign guides rather than as active directors of learning. The outcome of such a philosophy is a view that intrusion in a child's literacy development (or lack of it) is unproductive, and possibly counter-productive (Smith, 1978). Thus when children are failed by this system, the outcome may be explained to parents as a normal consequence of the individual differences between children. When after years of failure, and parents will no longer accept explanations based on individual differences, or slow maturation, schools are forced to admit that there is now a problem but that it perhaps stems from the home background, and besides little funding is available to redress this (system-induced) failure.

Of those schools able to find resources to help some students, there is a strong likelihood of additional exposure to the model of instruction which failed the first time. However, by this time (often Year Four), students have probably developed "acute print allergy". This condition, an understandable consequence of extended failure at a societally-valued task, is often a more formidable hurdle to overcome than a reading problem. Understandable, but inexcusable, is the finding of a Melbourne University study that such students typically make no progress in reading between Year Four and Year Ten (Richards, 1995).

Our system is failing students at each step of the way--from beginning reading in the early years, through to the absence of opportunities for reading instruction in upper-primary and secondary schools. There are better and fairer ways of teaching beginning reading to at-risk readers, and retrieving older students whose progress has stalled. This knowledge of alternative approaches more effective than currently endorsed models comes from an enormous body of educational research. Unfortunately, this research is yet to play a major role in educational policy-making.

The idea that the results of empirical research should play a strong part in decision-making and policy-development in any important area of human service is probably neither novel nor in need of justification to readers of this journal. However, in the field of education to name one such area,

there is relatively little weighting given to research (Gable & Warren, 1993). Rather, broad philosophical principles have been the determining factor in the direction taken, most evidently in the fields of teaching and learning. This preference for dogma over pragmatism has been noted in a number of countries besides Australia (Stanovich, 1994), and has led to the current domination of the Whole Language philosophy in policies on teaching and learning. The Australian House of Representatives Enquiry "The Literacy Challenge" (1993) noted that Whole Language has Australia-wide support and ".... virtually all curriculum guidelines on primary school literacy teaching produced are based on this approach. ... Virtually all teachers have undertaken the inservice training course, Early Literacy Inservice Course (ELIC), which is also based on a whole language approach to learning & literacy." (p.25).

Given that Whole Language is a model endorsed and promulgated in Australia and elsewhere by government education bodies, the disparity between its wide acceptance and the vast contrary evidence is alarming.

Thus far, Whole Language philosophy itself has been relatively impervious to the results of research. There are a number of researchers (Adams & Bruck, 1995; Chaney, 1990; Fields & Kemp, 1992; Gersten & Dimino, 1993; Heymsfeld, 1989; Mather, 1992; McCaslin, 1989; McGinitie, 1991; McKenna, Robinson & Miller, (1990a, 1990b); Spiegel, 1992; Stahl & Miller, 1989; Stanovich, 1994) who consider that the investment in Whole Language is too great for it to be completely displaced, and who seek a rapprochement, allowing Whole Language to take advantage of effective practices and still retain its flavour. However, Whole Language stalwarts view such gestures as reactionary, as they consider a skill development model incompatible with the essence of Whole Language (Edelsky, 1990; Heymsfeld, 1989; Goodman, 1989). In fact, as McCaslin (1989) notes, Whole Language advocates assert that the research perspective itself is responsible for inappropriate teaching practices. Edelsky (1990) argues that " ... procedural rigour in research design is no more than a thinly disguised demand that Whole Language be translated into terms that fit a skills model of reading and a positivist model of research." (p.10).

Ball (1993) also notes the conflict between the Whole Language perspective and research. In her view the pedagogical battle between empiricists and whole language supporters is reflective of a broader debate evident in many of the social sciences. The major debate is between those who support a reductionist, positivist philosophy of science and those who rebel against that position adopting a holistic, post positivist, relativistic stance. To relativists, such as Weaver (1988), all empirical research is futile in determining teaching practice because in performing the research we cannot avoid affecting the outcome, thereby confounding results. Relativists view reality as phenomenological, that is, it has no existence independent of our unique individual perspective. They tend to favour ethnographic approaches such as case studies and classroom observation as the appropriate means of enquiry. Empiricists view reality as "essentially cognitive transcending" (Rescher, 1982, as cited in Groff, 1990), and see ethnographic research as useful for raising, not answering, questions about teaching practice.

There is, then, a vast gulf separating empirical approaches to teaching and learning from those currently favoured in our schools. The gulf transcends mere disagreement about effective strategies; the differences are at a more fundamental level, and represent a significant challenge even to find a mutually acceptable framework to allow dialogue.

In recent years empiricists have begun to examine in fine-grained detail elements of the teaching process. Most earlier comparative studies were focussed on determining the relative effectiveness of competing models, but not upon which elements of the models contributed most (and least) to effectiveness. One of the most thoroughly researched models is that known as Direct Instruction. The development of programs based on this model uses as a fundamental principle the incorporation of such empirical findings. It differs from Whole Language in its assumptions about the teaching process, about learner characteristics, and about the means of syllabus construction. It could be described as the antithesis of whole language, the polar extreme, the heavyweight of the behavioural models in education.

Those who support such behaviourally-based models are likely to agree with Stanovich (1994) when he proposes that competing claims to knowledge (such as about models of teaching) should be evaluated according to three criteria. Firstly, findings should be published in refereed

journals. If research is to be useful it must be well designed, and able to justify its findings. When peer review is part of the process of research the well-known taunt "research can prove anything you want" becomes less credible. Poorly designed studies are rejected (sometimes to appear in unrefereed journals). Secondly, reported results should be replicated by independent researchers. One feels more comfortable when research findings are repeated in studies where the researchers have no particular stake in the outcome. Thirdly, there is a consensus within the appropriate research community about the reliability and validity of the findings. This last criterion requires considerable reading across the field, but the frequency with which a particular study is cited, and accepted as legitimate, in journal articles provides one measure. Although the use of these criteria cannot guarantee infallibility it does offer reasonable consumer protection against spurious claims to knowledge.

It is clear that such principles do not always guide educational decision-makers as the Direct Instruction approach has had very little impact on our school system despite the evidence for its effectiveness for a wide range of student learning problems. By contrast, the Whole Language approach fails to meet these criteria yet has achieved international acceptance on a broad scale.

Although their [whole language] theories lack any academically acceptable research base they continue to dominate educational policy. Direct Instruction models are ignored notwithstanding the huge body of research which indicates that direct instruction is vastly superior if basic skills and knowledge are the goal. (Weir, 1990, p.30).

The Development of the Direct Instruction Teaching Model.

A major educational study was federally funded in the U.S.A. in the late 1960's. It arose because of a concern about poor educational outcomes for disadvantaged students. Entitled Follow Through, it was aimed at the primary school stage, and was designed to determine which methods of teaching would be most effective for disadvantaged students throughout their primary school career. It followed an early intervention project called Head Start, which had as its goal the overcoming of educational disadvantage prior to school entry, that is, at the kindergarten level. The results of Head Start interventions unfortunately were not durable, and Follow Through was to assess how best to maintain and build on Head Start's gains. This huge study involved 75,000 children in 180 communities over the first three years of their school life. There were nine major sponsors covering a broad range of educational philosophies. They included child directed learning, individualized instruction, language experience, learning styles, self esteem development, cognitive emphasis, parent based teaching, direct instruction, and behavioural teaching. The models can be reduced to three distinct themes--those emphasizing basic academic outcomes, cognitive development, or affective development. The models which emphasised the systematic teaching of basic skills (Direct Instruction and Behaviour Analysis), performed best. In reading, the Direct Instruction model, which also has a strong phonic emphasis, had the most impressive results. There were criticisms that variability in implementation across sites made judgements of model superiority dubious, and that overall effects were too small to be pleased about (House, Glass, McLean & Walker, 1978). Nevertheless when the data was re-analysed by several groups (Bereiter & Kurland, 1981; House et al, 1978; Meyer, Gersten & Gutkin, 1983) the Direct Instruction model still produced the best gains. Later follow-up studies (Becker & Gersten, 1982; Gersten, Keating & Becker, 1988) were completed over the following 10 years and add support to the argument that the superiority of the Direct Instruction model was real, significant, and lasting.

The Direct Instruction model lauded in Follow Through had its beginnings in the early 1960's through the work of Carl Bereiter and Siegfried Engelmann. The subsequent involvement of Wes Becker and Doug Carnine among others led to the publication of a number of teaching programs in 1969. The programs share a common teaching style readily observable to any classroom visitor. The instruction takes place in small groups with a teacher directing activities with the aid of a script, and students are actively involved in responding to a fast paced lesson during which they receive constant feedback. Programs are designed according to what, not whom, is to be taught. Thus all children work through the same sequence of tasks directed by a teacher using the same teaching strategies. Individual differences are allowed for through different entry points, reinforcement, amounts of practice, and correction strategies (Gregory, 1983).

Characteristics of the Direct Instruction Model

There are a number of important characteristics of Direct Instruction programs (Becker, 1977). It is assumed that all children can learn and be taught, thus failure to learn is viewed as failure to teach effectively (Engelmann, 1980). Children who are behind must be taught to learn faster--this implies a focus on features of teaching designed to improve efficiency. These features derive from the design of instruction and from process variables such as how the curriculum is implemented. Curriculum is designed with the goal of "faultless instruction" (Engelmann, 1980), that is, sequences or routines for which there is only one logical interpretation. The designer's brief is to avoid ambiguity in instruction--the focus is on logical-analysis principles. These principles allow the organisation of concepts according to their structure and the communication of them to the learner through the presentation of positive and negative examples.

Engelmann (1980) highlighted four design principles:

1. Where possible teach a general case, that is, those skills which when mastered can be applied across a range of problems for which specific solutions have not been taught (e.g., decoding regular words). These generalizations may be taught inductively by examples only, or deductively by providing a rule and a range of examples to define the rule's boundaries.
2. Teach the essentials. The essentials are determined by an analysis of the skills necessary to achieve the desired objective. There is an underlying assertion that, for reading, it is possible to achieve skilled reading by analysis and teaching of subskills in a cumulative framework. Advocates of a "whole language" perspective would disagree with the possibility, or desirability, of teaching in this manner.
3. Keep errors to a minimum. Direct Instruction designers consider errors counter-productive and time-wasting. For remedial learners a high success rate is useful in building and maintaining motivation lost through a history of failure. This low error rate is achieved by the use of the instructional design principles explained in Theory of Instruction (Engelmann & Carnine, 1982), and by ensuring students have the pre-skills needed to commence any program (via a placement test).
4. Adequate practice. Direct Instruction programs include the requirement for mastery learning (usually above 90% mastery). Students continue to focus on a given task until that criterion is reached. The objective of this strategy is the achievement of retention without the requirement that all students complete the identical regimen. The practice schedule commences with massed practice, shifting to a spaced schedule. The amount of practice decreases as the relevant skill is incorporated into more complex skills. Advocates of Direct Instruction argue that this feature of instruction is particularly important for low-achieving students and is too often paid scant regard (Engelmann, 1980). Although this emphasis on practice may be unfashionable, there is ample supporting research, and a number of effective schools are increasingly endorsing its importance (Rist, 1992). "The strategies that have fallen out of style, such as memorizing, reciting and drilling, are what we need to do. They're simple--but fundamental--things that make complex thinking possible." (p.19).

Roots of the Direct Instruction Model

It is these principles of instructional design which sets Direct Instruction apart from traditional and modern behavioural approaches to teaching.

However the model does share a number of features with other behavioural approaches (e.g., reinforcement, stimulus control, prompting, shaping, extinction, fading), and with the effective teaching movement (mastery learning, teacher presentation skills, academic engaged time, and correction procedures).

These latter features have been researched thoroughly over the past 20 years and have generally been accepted as comprising "direct instruction"(note lower case letters) (Gersten, Woodward & Darch, 1986). Rosenshine (1979) used the expression direct instruction to describe a set of instructional variables relating teacher behaviour and classroom organization to high levels of academic performance for primary school students. High levels of achievement were related to the amount of content covered and mastered. Hence the pacing of a lesson can be controlled to enhance learning. Academic engaged time refers to the percentage of the allotted time for a subject during which students are actively engaged. A range of studies (Rosenshine & Berliner, 1978) have

highlighted the reduction in engagement which occurs when students work alone as opposed to working with a teacher in a small group, or as a whole class. The choral responding typical of Direct Instruction programs is one way of ensuring high student engagement. As an example, the author counted 300 responses in the 10 minutes of teacher-directed decoding activity in a Year 7 reading group (Hempenstall, 1990a).

A strong focus on the academic was found to be characteristic of effective teachers. Non-academic activities, while perhaps enjoyable or directed at other educational goals, were consistently negatively correlated with achievement. Yet in Rosenshine's (1980) review of studies it was clear that an academic focus rather than an affective emphasis also produced classrooms with high student self-esteem and a warm atmosphere. Less structured programs and teachers with an affective focus had students with lower self-esteem. Teacher-centred rather than student-centred classrooms had higher achievement levels. Analogously, teachers who were strong leaders and did not base their teaching around student choice of activities were more successful. Solomon & Kendall (1976, as cited in Rosenshine, 1980) indicated that permissiveness, spontaneity and lack of classroom control were "negatively related, not only to achievement gain, but also to positive growth in creativity, inquiry, writing ability, and self esteem for the students in those classrooms." (p.18).

The instructional procedure called demonstration-practice-feedback (sometimes, model-lead-test) had strong research support. This deceptively simple strategy combines in one general model three elements of teaching strongly related to achievement. It comprises an invariant sequence in which a short demonstration of the skill or material is followed by guided practice, during which feedback is provided to the student (and further demonstration if necessary). The second phase usually involves response to teacher questions about the material previously presented. It would appear that the overlearning this phase induces is particularly valuable. The third phase, that of independent practice, is later evaluated by the teacher. Medley's (1982) review indicated the efficacy for low SES students of a controlled practice strategy involving low cognitive level questions, a high success rate (above 80%), and infrequent criticism. The popularity among many teachers of high cognitive level question implicit in discovery-learning models is difficult to justify empirically. These high level questions require students to manipulate concepts without having been shown how to do so. Research on discovery approaches has indicated a negative relationship with student achievement. Winnie's (1979) review of 19 experimental studies on higher order questions made this point very strongly, as does Yates (1988).

To summarize the findings of research into teacher variables with a positive impact on student learning, Rosenshine & Berliner (1978) provide a definition for direct instruction, a concept related to but distinct from Direct Instruction.

Direct instruction pertains to a set of teaching behaviours focussed on academic matters where goals are clear to students; time allocated for instruction is sufficient and continuous; content coverage is extensive; student performance is monitored; questions are at a low cognitive level and produce many correct responses; and feedback to students is immediate and academically oriented. In direct instruction, the teacher controls the instructional goals, chooses material appropriate for the student's ability level, and paces the instructional episode (p.7).

Further Evaluation of the Direct Instruction Model.

Even if one disregards the Follow Through results, evaluation of Direct Instruction programs has been very extensive. For example, Fabre (1984) compiled an annotated bibliography of almost 200 studies completed prior to 1984. For the most part research findings have been very impressive. Notable positive reviews of outcome research are provided by Gregory (1983), Lockery & Maggs (1982), Gersten (1985), White (1988), Kinder & Carnine, (1991). See later for contrary views.

Whereas Direct Instruction was originally designed to assist disadvantaged students, its emphasis on task characteristics and effective teaching principles transcends learner characteristics and has been found valuable across a range of learners. Lockery & Maggs (1982) reviewed research indicating success with average children, those with mild, moderate or severe skill deficits, those in resource rooms, withdrawal classes and special classes in regular schools, disadvantaged students (including

aboriginal and children whose first language is not English), students in special facilities for mild, moderate and severe intellectual disability, and physical disabilities. Gersten (1985) in his review of studies involving students with a range of disabilities concluded that Direct Instruction tended to produce higher academic gains than traditional approaches. He also suggested that the mastery criterion (in excess of 90%) may be particularly important for special education students, and called for more formative evaluation where only one instructional variable is manipulated; and more instructional-dimensions research to highlight which variables alone, or in company, are associated with academic gains. Gersten (p.55) describes the Leinhardt, Zigmond & Cooley (1981) study with 105 learning disabled students. The authors noted three teaching behaviours were strongly associated with student progress in reading - the use of reinforcers, academic focus, and a teacher instruction variable involving demonstration, practice and feedback. Each of these is critical to the definition of direct instruction (Rosenshine, 1979), and supports the notion that there are teacher behaviours which transcend student characteristics. This study was the first to demonstrate that specific direct instruction principles have value for learning disabled students.

White's (1988) meta-analysis of studies involving learning disabled, intellectually disabled, and reading disabled students restricted its focus to those studies employing equivalent experimental and comparison groups. White reported an effect size of 0.84 standard deviation units for the Direct Instruction over comparison treatments. This is markedly above the 0.25-0.33 standard for educational significance of an educational treatment effect (Stebbins, St. Pierre, Proper, Anderson & Cerva, 1977). White concluded that regardless of the disabling condition, whether mild, moderate, or severe, and regardless of the students' age, the Direct Instruction approach was effective in all the skill areas research has addressed.

Further support for the approach comes from Kavale (1990). His summary of research into direct instruction and effective teaching concludes that they are five to ten times more effective for learning disabled students than are practices aimed at altering unobservable learning processes such as perception. Binder & Watkins (1990) describe Direct Instruction (along with Precision Teaching) as the approaches best supported by research to address the problems of teaching found in the English-speaking world.

Recently Hendrickson & Frank (1993) provided this bold prediction:
The decade of the 1990's will witness, in classrooms serving students with mild mental retardation, the implementation of a group of instructional methods often referred to as effective teaching practices or direct instruction, if we heed the literature published in this area over the past 15 years". (p.11)

Criticisms of Direct Instruction.

Despite the long history of empirical support for Direct Instruction, unsurprisingly there have also been criticisms. These have been based on a number of different grounds, and are of varying credibility.

1. Direct Instruction is an IBM (the former publisher) conspiracy to oppress the masses (Nicholls, 1980).
2. Direct Instruction causes delinquency (Schweinhart, Weikart & Lerner, 1986). Further, its "side effects may be lethal" (Boomer, 1988, p.12).
3. Its view of the reading process is wrong (Gollash, 1980).
4. It is incompatible with other more important principles:
 - (a) Normalization (Penney, 1988).
 - (b) The wholistic nature of reading (Giffen, 1980; Goodman, 1986).
 - (c) A naturalistic educational paradigm (Heshusius, 1991).
 - (d) Flexible reciprocal child-teacher interaction (Ashman & Elkins, 1990).
 - (e) Teacher professionalism (McFaul, 1983).
5. The success of Direct Instruction is illusory, based on tests which do not measure reading (Cambourne, 1979).

6. Other approaches are more effective e.g. Whole Language (Weaver, 1991), discovery learning (Bay, Staver, Bryan & Hale, 1992); or as effective as Direct Instruction (Kuder, 1990; O'Connor, Jenkins, Cole, Mills, 1993).
7. It may be inappropriate for certain sub groups.
 - (a) Those in special education (Heshusius, 1991; Kuder, 1991; Penney, 1988).
 - (b) Those with certain learning styles, for example, internal locus of control (McFaul, 1983; Peterson, 1979).
 - (c) Those of high ability (Peterson, 1979).
8. Its use is best restricted to basic skill development (Peterson, 1979).
9. It is best used in conjunction with other approaches (Delpit, 1988; Gettinger, 1993; Harper, Mallette, Maheady, Brennan, 1993; Spiegel, 1992; Stevens, Slavin & Farnish, 1991).
10. Students might not find it acceptable (Reetz & Hoover, 1992).

Of the literature critical of the model, much is based on philosophical issues concerning reality and power; on theoretical issues such as the nature of the learning process, the role of teaching, or issues of measurement. Of the few outcome studies in which alternative approaches have proved equivalent or superior, issues of treatment fidelity have arisen. It is not always made clear whether the model described is the Direct Instruction model or a direct instruction clone of unknown rigour. When the Direct Instruction model is used it is rarely specified whether the program presenters have the training necessary to follow the approach faithfully. Further the relative rarity of such findings compared to the vast literature supportive of the approach allows some sanguinity about such exceptions.

It is of interest that the debate on Direct Instruction has become much more widespread in recent years. An issue of *Education and Treatment of Children* was devoted to Direct Instruction in 1988. The National Reading Conference in the USA has regular sessions on the pedagogical impact and appropriateness of Direct Instruction (Kameenui & Shannon, 1988). The *Journal of Learning Disabilities* (1991) devoted two issues to "sameness analysis"--an instructional design principle important in Direct Instruction (Englemann & Carnine, 1982). In recent years writers of texts on teaching (Becker, 1986), special education (Cole & Chan, 1990; Gable & Warren, 1993, Greaves & McLaughlin, 1993; Scruggs & Wong, 1990; Wolery, Ault & Doyle, 1992), and educational psychology texts (Joyce, Weil & Showers, 1992; Kameenui & Simmons, 1990; Tuckman, 1991) have included Direct Instruction as a legitimate approach to a range of educational problems. This represents the increasing academic acceptance of the model which until the mid-1980's was virtually ignored by researchers and writers other than advocates from, or influenced by, the University of Oregon. From one of the most respected writers and researchers on the problems of learning disability (a term coined by Kirk & Bateman in 1962) comes the highest praise. "The documented success of Siegfried Englemann and his colleagues' direct instruction reading programs with thousands of hard-to-teach and high risk children is unsurpassed in the annals of reading history" (Bateman, 1991, p.11).

Despite the controversy, Direct Instruction research and program development continues. It no longer has a sole emphasis on instructional design for basic skills such as reading, spelling, maths, language, and writing--but has broadened its area of application to include higher order skills e.g., literary analysis, logic, chemistry, critical reading, geometry and social studies (Carnine, 1991; Casazza, 1993; Darch, 1993; Grossen & Carnine 1990b; Kinder & Carnine 1991). Use has been made of technology through computer-assisted instruction, low cost networking and videodisc courseware (Kinder & Carnine, 1991); and, researchers have begun to test the model in non-English speaking countries, for example, third world countries (Grossen & Kelly, 1992), and Japan (Nakano, Kageyama, & Kioshita; 1993). It has also shown promise in recent research on teaching a most challenging group of students--school aged children with TBI, traumatic brain injury (Glang, Singer, Cooley, Tish, 1992).

There seems little doubt that Direct Instruction will continue to be a viable and productive model throughout the 1990's. The major hurdle continues to be its lack of attractiveness for educators, and resultant absence of penetration into classrooms.

Hendrickson & Franks's (1993) prediction about the increasing use of Direct Instruction is brave because despite its impressive research support, Direct Instruction has made little impact in regular or special education thus far. Maggs and White (1982) wrote despairingly. "Few professions are more steeped in mythology, and less open to empirical findings than are teachers" (p. 131). Murphy (1980) considered that behavioural consultants should be the agents of change, but are generally naive about the politics of change in organizations, and thus unable to influence decision-makers. He suggests that an improved understanding of organizational contingencies would enhance the likelihood of successful implementation. Barnes (1985) suggested five reasons for the approach's lack of acceptance in education.

1. The phonic emphasis in reading conflicts with the popular "Whole Language" philosophy.
2. The model's highly structured scripted lessons are viewed as demeaning to trained teachers.
3. It over-emphasizes basic skills and ignores higher order goals.
4. The emphasis on the teacher's responsibility for learning outcomes threatens those teachers holding the view that student performance is largely determined by the child's genetic or family history.
5. The structure requires a routine which bores teachers. Students become bored either for the same reason, or because of the teacher's resultant lack of enthusiasm. Barnes does not accept the validity of these objections but highlights them as obstacles to be overcome.

Fields (1986) posits the "practicality ethic" as the key characteristic of programs likely to be readily adopted. Can the recommendation be easily translated into practice in the classroom? Is the recommendation congruent with the teacher's philosophy or goals? How difficult in time and effort is implementation? Fields sees problems for Direct Instruction in each of these areas and recommends fall-back positions: accepting levels of implementation--from the total package for schools with a major priority of lifting student achievement, through to the general acceptance of an active teaching style, that is, practising some elements of direct instructional strategies in a teacher's classroom. Hempenstall (1990b) argues that a pilot program successfully provided for a few, or even one, student in a school can be the springboard upon which subsequent more extensive program installation may follow. In his view consultants need to "get their hands dirty" by assisting with timetabling problems, being available to support the teacher(s), providing both hard and soft data to overcome inevitable resistance, and being the "critical friend" to ensure program fidelity--particularly lesson regularity in the face of competing demands on schools to include interesting but educationally marginal activities. He sees the absence of a Direct Instruction teacher training infrastructure as a hurdle to replicating the impressive results obtained when programs are faithfully implemented.

Riddell & Sperling (1988) express concern at the gulf between literacy research findings and teachers' practice. They call for research aimed at discovering why empirically proven practices are "thwarted, undermined, or ignored in the classroom" (P.319). The concern is even more impelling if one accepts Roger's (1983, as cited in Ruddell & Sperling) assertion that there is often a period of 25 to 35 years between a research discovery and its serious implementation.

Solity (1991) further notes some aspects of Direct Instruction unappealing to teachers; however, he views the problem within the wider context of the negative view many teachers have of behavioural approaches in general. He considers the method of introduction of behavioural concepts as crucial to acceptance, and cites examples of "softer" language being more acceptable. Gersten and Guskey (1985) argue that teachers' methods have evolved largely through experiences in their own classroom, and a model which requires a significant change from that practice will evoke reluctance. In their studies, teachers' philosophies which were generally antithetical to Direct Instruction became consonant with those of Direct Instruction following successful program implementation. Hence attitude change followed rather than preceded behaviour change. They argue that trying to change attitudes through, for example, presenting research data alone is unlikely to be successful. Consonant with Hempenstall's (1990b) position, they argue that a well organized pilot program in the school, run by a respected teacher with good consultant support, is likely to produce gains difficult to ignore in children personally known to the teachers. The salience of change in known children combined with strong instructional leadership from the school administration may lead to a change in teacher

behaviour. As in Gersten and Guskey's study, a teacher's initial reluctance may be transformed into a new energy-giving direction in teaching.

Lindsley (1992) is quite scathing in addressing the general question of why effective teaching tools aren't widely adopted. He considers that teachers have been:

... seduced by natural learning approaches Most educators have bought the myth that academic learning does not require discipline--that the best learning is easy and fun. They do not realize that it is fluent performance that is fun. The process of learning, of changing performance, is most often stressful and painful (p. 22).

Gable & Warren (1993) have also noted that the potential role of behavioural science in general, but with particular emphasis to education, has been largely ignored by decision-makers and even by many practitioners. They refer to Carnine's (1991) lament that decision-makers lack a scientific framework and are inclined to accept proposals based on good intentions and unsupported opinions. Meyer (1991, cited in Gable & Warren), however, blames the research community for choosing restricted methodology (e.g., single subject design), and for being too remote from classrooms. She believes greater attention will be paid when credibility of research is improved. On the other hand, perhaps it is the tendency of empiricists to place caveats on their findings, as opposed to the wondrous claims of ideologues and faddists unrestrained by scientific ethics, which makes decision-makers wary. Fister and Kemp (1993) consider several likely obstacles, important among them being the absence of an accountability link between decision-makers and student achievement. Such a link seems unlikely without a regular mandated state or national test program. They also apportion some responsibility to the research community for failing to appreciate the necessary nexus between research and its adoption by the relevant target group. The specific criticisms include a failure to take responsibility for communicating findings clearly, and with the end-users in mind. Researchers have often validated practices over too brief a time-frame, and in too limited a range of settings to allow general program adoption across settings. Without considering the organizational ramifications (such as staff and personnel costs) adequately, the viability of even the very best intervention cannot be guaranteed. The methods of introduction and staff training in innovative practices can have a marked bearing on their adoption and continuation.

Fister and Kemp (1993) argue that researchers have failed to meet their own criterion by not incorporating research-validated staff-training procedures, and organizational analysis in their strategies for promoting program adoption. Their final criticism involves the rarity of the establishment of model sites exemplifying excellent practice. When prospective adoptees are able to see the reality rather than the rhetoric of a program they are arguably more likely to take the (often uncomfortable) steps towards adoption. In addition, it is possible to discuss with on-site teachers the realities of being involved in the innovation.

Woodward (1993) points out that there is often a gulf between researchers and teachers. Researchers may view teachers as unnecessarily conservative and resistant to change, whereas teachers may consider researchers as unrealistic in their expectations, and lacking in understanding of the school system and culture. Teachers may also respond defensively to calls for change because of the implied criticism of their past practices, and the perceived devaluation of the professionalism of teachers (in that other professions are determining their teaching practices).

Thus there are two groups whom researchers need to be able to influence if their innovations are to be adopted. At the classroom level, teachers are the focal point of such innovations and their competent and enthusiastic participation is required if success is to be achieved. At the school administration level, principals are being given increasing discretion as to how funds are to be disbursed, thus time spent in discussing educational priorities, and cost-effective means of achieving them may be time well spent, bearing in mind Gersten and Guskey's (1985) comment on the importance of strong instructional leadership. At the broader system level, decision makers presumably require different information, and assurances about the viability of change of practice (cost being fundamental). Given that many researchers have neither the funding, the interest, and perhaps the skill to promulgate their findings it is clear that the relationship between science, school practice, and government policy-making will remain vexed.

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