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THEORETICAL PERSPECTIVES, INSTRUCTIONAL CONTEXTS, AND EFFICACY OF COGNITIVE STRATEGY-BASED INSTRUCTION

BY

DAVID WILLIAM PEAT

©

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled THEORETICAL PERSPECTIVES, INSTRUCTIONAL CONTEXTS, AND EFFICACY OF COGNITIVE STRATEGY- BASED INSTRUCTION submitted by DAVID WILLIAM PEAT in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Educational Psychology.

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External Examiner

Date .....Apr. 21/94.....

"It is impossible to carry out literacy work or to understand literacy by divorcing the reading of the word from the reading of the world."

PAUL FREIRE

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> "For from Him and through Him and to Him are all things. To Him be glory forever!" (Rms. 11: 36).

ABSTRACT

The five dissertation chapters are organized in a "broad to narrow" scheme, according to the breadth of context discussed in each chapter. Cognitive Strategy-based Instruction is viewed in the wider context of literacy in the first chapter. The second and third chapters examine Cognitive Strategy-based Instruction within the narrower context of the classroom. Two issues are addressed in these chapters - the identification and illustration of instructional principles that are consistent with Cognitive Strategy-based Instruction; and an analysis of instructional materials that are supportive of this approach to pedagogy.

The fourth chapter empirically examines the relationship between 'deep' learners, and their metacognitive development, an association theoretically described in the second chapter. The last chapter of the dissertation obtains its context from the University of Alberta's *Cognitive Education Project* (Mulcahy, Andrews, & Peat, 1989; Mulcahy, et al., 1993a; 1993b). It presents an empirically-based examination of SPELT (Strategies Programme for Effective Learning/Thinking) (Mulcahy, Marfo, Peat, & Andrews, 1987) upon elementary learning disabled (LD) students. Using hierarchical discriminate function analysis, it highlights the powerful and positive effects of the SPELT intervention, showing that a significant proportion of students originally (pre-test) categorized as LD are no longer thus labeled three years later (post-test), as compared to controls.

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INTRODUCTION

Context of Dissertation

The choice of topics represented by each of the dissertation chapters evolved due to long-term involvement with the Cognitive Education Project (CEP) (described below). Over time, Cognitive Strategy-based Instruction has become of particular interest, both in theoretical and applied terms. The writing of a Master's thesis (Peat, 1988) provided the opportunity to examine in detail, one specific approach to Cognitive Strategy-based Instruction — SPELT (Strategy Program for Effective Learning/Thinking (Mulcahy, Marfo, Peat, & Andrews, 1987). Since that time, it has become increasingly apparent that the instructional approach used in a classroom is just one aspect of what affects students' learning. The writing of this dissertation allowed the examination of some of the wider contexts of learning and instruction related to Cognitive Strategy-based Instruction. How does this form of instruction relate to literacy? What kind of learning is advanced by Cognitive Strategy-based Instruction? What practical ways can classrooms and instructional materials be organized to support this type of instruction? Which students are most powerfully affected by Cognitive Strategy-based Instruction? The dissertation articulates some of the insights gathered over the past number of years, and begins to answer these questions. It is an attempt to understand Cognitive Strategy-based Instruction from multiple paradigms (Skirtig, 1991).

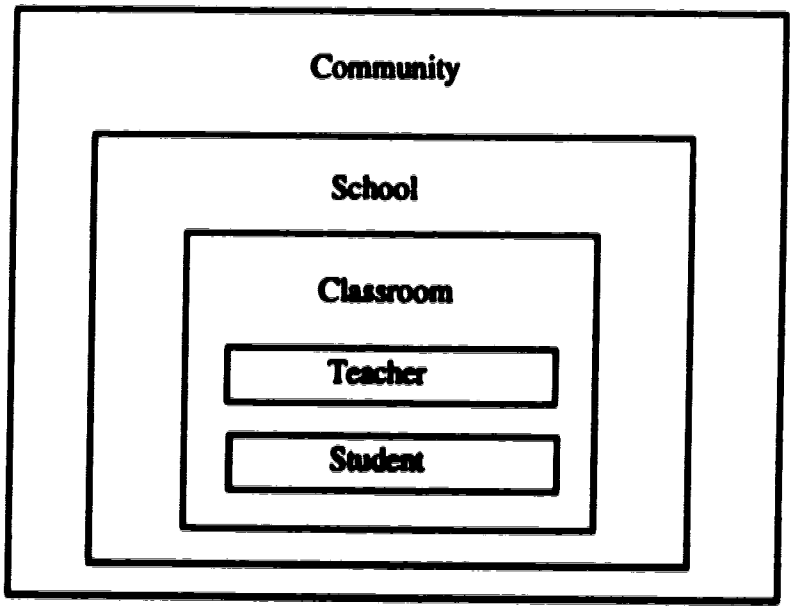
Format of Dissertation

In contrast to a "traditional" format, each chapter of the dissertation stands as an independent document. However, the theme of Cognitive Strategy-based Instruction (Marfo, Mulcahy, Peat, Andrews, & Cho, 1991) is evident throughout. The dissertation is composed of five papers (chapters) — the first two address the implications of instructional theory for practice; the third describes a practical instrument for teachers which allows them to evaluate learning resources to determine whether or not the materials support Cognitive

Strategy-based Instruction; the fourth paper empirically examines the instructional theory presented in the initial chapters; and the final chapter investigates the results of a specific cognitive strategy-based instructional approach upon an elementary school level, "learning disabled" population.

The five chapters are organized in a "broad to narrow" scheme, according to the breadth of context presented in each chapter. Following Biggs' (1991a) notion that students, teachers, classrooms, and communities are a hierarchy of systems (see Figure 1), 'breadth of context' refers to the number of systems explicitly discussed.

Figure 1: A Systemic Hierarchy



Cognitive Strategy-based Instruction, then, is viewed in the wider context of literacy in the first chapter. As the 'Integrated Systems Model of Literacy' will show, an examination of literacy involves all of the components of the above systemic hierarchy, from background knowledge of students to traditional ways of organizing cultural transmission in communities. Although community and school components are implicated, the remaining chapters examine Cognitive Strategy-based Instruction within the narrower context of the classroom. Two issues are addressed in the second and third chapters – the

identification and illustration of instructional principles that are consistent with Cognitive Strategy-based Instruction; and an analysis of instructional materials that support this type of pedagogy. The fourth chapter empirically examines the relationship between 'deep' learners and their metacognitive development, an association theoretically described in the second chapter. The last chapter of the dissertation relies on the data collected by the University of Alberta's *Cognitive Education Project* (Mulcahy, Peat, Mancini, Andrews, & Marfo, 1989; Mulcahy, et al., 1991, 1993a, 1993b). Using multivariate statistical procedures, it presents an empirically-based examination of SPELT (Strategies Programme for Effective Learning/Thinking) (Mulcahy, Marfo, Peat, & Andrews, 1987) upon students with learning disabilities.

Thesis Audience

In the area of Cognitive Strategy-based Instruction, there is a wide gap between what is known in academic circles and instructional practice in schools (Pressley, Goodchild, Fleet, Zajchowski, & Evans, 1989; Pressley et al., 1990). One rationale for choosing to complete the dissertation following a paper format rather than the traditional format, was to facilitate the process of directly disseminating to widely-read, teacher-focused journals some of the information found in academic publications and seldom read by classroom teachers. Each paper, then, is written for specific audiences with the differing styles and levels of vocabulary varied according to the needs of the target readers. The first two chapters are written for theoreticians and academics. The third chapter translates theoretical information and research results into a form and format easily accessible to classroom teachers. The last two chapters, with their empirical/theoretical base, are directed towards readers from those traditions. As well as targeting the teacher audience, the intent is to generally enhance a rapid dissemination of the information contained in each chapter, and to show a clear relationship amongst theoretical, empirical and instructional perspectives.

It is hoped that the dissertation, with the individual papers being disseminated to differing audiences in various journals, will raise the awareness of the educational community to the importance of Cognitive Strategy-based Instruction and its potential benefit for all students, but particularly to those with learning difficulties.

Detailed Summary of Each Chapter

Theoretically-based Chapters

Recently, several interdisciplinary works have been published on literacy, each presenting diverse views of literacy within their pages (Bloome, 1987; Garner, 1987; Leong & Randhawa, 1989; Wrolstad & Fisher, 1986). Included in each text are sections devoted to the description of cognitive processing skills and/or observable sub-skills of reading (e.g., decoding, word-identification) — the domain of Cognitive Strategy-based Instruction. However, none of the volumes come to terms with the divergent views of literacy expressed by the authors represented within the texts. The first chapter of the dissertation, entitled "Towards Minimizing, Social, Cultural, and Intellectual Disruptions Embedded in Literacy Instruction", attempts to reconcile competing perspectives about literacy by presenting an Integrative System Model of Literacy. The model illustrates relationships amongst various disciplines engaged in the study of literacy and allows Cognitive Strategy-based Instruction to be seen in the wider context of literacy instruction (Palincsar, David, Winn, & Stevens, 1991). Evaluative and generative implications of the model are then applied to instructional methodology, particularly for cross-cultural settings.

The question of identifying instructional principles that will help students to become "deep" learners is addressed in the second chapter. It begins by describing a comprehensive model of learning which accounts for relationships between teaching methodologies and the differing *kinds* or *types* of learning that are advanced by various approaches (Biggs, 1987, 1990, 1991b, 1991c). Then, based upon the model, the nature of students' approaches to learning that should be encouraged in school contexts is

presented. Finally, learning principles and their related methodologies, one being the Cognitive Strategies-based approach which should foster that kind of learning, are outlined.

Textbooks remain a powerful force in Canadian classrooms, perhaps even the dominant medium of instruction (Armbruster & Anderson, 1988; Leonard, 1990). Just as teachers' methodology can facilitate or discourage learning, so can text. Harris and Pressley (1991) recently identified the need for research regarding how to design text so that it supports strategy instruction. The third chapter, "Learning Resources Evaluation: A 'Considerate' Framework for Classroom Teachers", begins to address this concern by emphasizing the integration of Cognitive Strategies-based Instruction with the curriculum evaluation process. The focus is upon the analysis and design of 'considerate' learning resources which, as well as presenting content, also support students' development of a repertoire of transferable learning/thinking strategies. Based upon 'considerate text' literature and principles of Cognitive Strategy-based Instruction, the *Learning Resources Evaluation Form* is presented.

Empirically-based Chapters

The empirically-based chapters are derived from, and are an extension of, the initial theory-based chapters of the dissertation. As previously described, the second chapter presents an adaptation of John Biggs' comprehensive 3P (Presage, Process and Product) model of learning (Biggs, 1985, 1987, 1990, 1991b, 1991c). The model accounts for relationships between teaching methodologies and differing *kinds* or *types* of learning advanced by various instructional approaches. The theoretical position that students engaged in a deep approach to learning are more metacognitive than those whose motives and strategies lead to a surface approach to learning (Biggs, 1985; de Corte, 1990) is discussed in detail. The fourth chapter, "Are 'Deep' Learners More Metacognitive?", empirically examines this association. Relationships between student performance on the *Learning Process Questionnaire, Elementary Edition* (LPQ) (Biggs & Mulcahy, 1991), a

measure of deep versus surface learning and the *Metacognitive Reading Awareness Questionnaire* (MRAQ) (Mulcahy & Cheng, 1991), a measure of metacognitive awareness, are described. The conclusions validate and add further clarity to the theoretical position presented by the 3P model in Chapter II.

The fifth and final chapter of the dissertation, "An Examination of the Efficacy of Cognitive Strategy-based Instruction with Elementary Students who are Learning Disabled", draws upon and extends the research results of a three-year longitudinal study, the *Cognitive Education Project (CEP).* The CEP was a cooperative venture between the Department of Educational Psychology, University of Alberta, the Department of Education of the Government of Alberta, and various school districts throughout north-central Alberta and investigated the effects of two cognitive education programs and conventional instruction on student performance in four major areas: cognitive ability, academic achievement, affective perceptions, and cognitive strategy use. (Detailed results, including program deacriptions, are contained in Marfo, et al., 1991; Mulcahy, 1991; Mulcahy et al., 1991, 1993a, 1993b; Mulcahy, Peat, Mancini, Andrews, & Marfo, 1989; Mulcahy, Wilgosh, & Peat, 1990, 1991).

The initial CEP results have clear implications regarding the student impact of Cognitive Strategy-based Instruction, particularly with elementary students with learning disabilities (Mulcahy, et al., 1993a). These results are summarized in Table 1.

Table 1
3-year ANOVA Results for Grade 4/LD

Variable	Program Effect
Cognitive Ability	No
Academic Achievement	
Math Computation	No
Math Concepts and Application	Yes (1,2)
Reading Vocabulary	No
Reading Comprehension	Yes (2)
Affective Perceptions	
Perceived Competence	No
Self Concept	No
Locus of Control	Yes (1,2)
Cognitive Strategies	
Reading Strategies Awareness	Yes (1,2)
Reading Cloze Performance	Yes (2)
Comprehension Monitoring	Yes (2)
Math Problem Solving Strategies	Yes (2)
Perceived Problem Solving Ability	No

KEY: 1= IE, 2= SPELT

The results as indicated are after three years. This means that experimental students were involved in two years of intervention, then were followed for one year after intervention was discontinued. The changes shown, therefore, were maintained for one year after the withdrawal of Cognitive Strategies-based Instruction (See Mulcahy et al., 1993a for details of the instrumentation).

The advantages of the univariate approach were in the neatly structured and relatively straightforward interpretation of research results. Each dependent variable could be viewed separately, with the differential outcomes of the instructional programs on the three categories of students clearly shown at the two grade levels (Mulcahy et al., 1993a, 1993b). The analyses used in the CEP clearly demonstrated the program effects in terms of individual variables (Mulcahy et al., 1993a). It is particularly significant to note that positive changes in academic achievement, as measured by standardized achievement tests, were shown for the LD students in both experimental conditions. For the SPELT (Mulcahy, Marfo, Peat, & Andrews, 1987) condition, significant improvement was noted in math (concepts and applications) and in reading comprehension; for the IE (Instrumental

Enrichment) (Feuerstein, Rand, Hoffman, & Miller, 1980) students, significant favorable change was shown in math.

Cognitive Strategies-based Instruction was also shown to be effective in improving student thinking, particularly in comprehension monitoring skills. As well, the students involved in Cognitive Strategies-based Instruction displayed an increase in overall internal locus of control after two years of instruction as compared with controls.

These results suggest that, when this form of instruction is used, it may prevent some students from developing severe learning problems, and may decrease their being caught in the vortex of "learned helplessness" (Fincham & Cain, 1986). In the conclusion of the *CEP Final Report*, Mulcahy et al. (1993a, p.161) stated that "the impact of the teaching of cognitive strategies on the learning disabled students, particularly at grade 4, suggests that if the teaching approaches are used systematically throughout the elementary school, it may prevent some students from developing severe learning problems, and keep them in the mainstream". The fifth chapter empirically validates this suggested implication. Using hierarchical discriminate function analysis (Tabachnick & Fidell, 1989), it highlights the powerful and positive effects of the SPELT intervention, showing that, compared to controls, a higher proportion of students originally (pre-test) categorized as LD are no longer thus labeled three years later (post-test).

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CHAPTER I — TOWARDS MINIMIZING SOCIAL, CULTURAL AND INTELLECTUAL DISRUPTIONS EMBEDDED IN LITERACY INSTRUCTION

Preamble

Over the past number of years, personal involvement with the *Cognitive Education Project (CEP)* at the University of Alberta provided an opportunity to acquire in-depth knowledge concerning cognitive processing theory and its application to the design of instructional materials and methodologies for school-aged children and teachers. The focus of the CEP was specifically directed towards training teachers to incorporate the explicit teaching of learning/thinking strategies into their content instruction. Detailed information concerning the CEP is available elsewhere (Marfo, Mulcahy, Peat, Andrews, & Cho, 1991; Mulcahy, Peat, Andrews, Clifford, Darko-Yeboah, Norman, Cheng, Marfo & Cho, 1993; Mulcahy, Peat, Andrews, Darko-Yeboah, Marfo, & Cho, 1991; Mulcahy, Peat, Mancini, Andrews, & Marfo, 1989; Mulcahy, Wilgosh & Peat, 1990, 1991). Of these publications, the one that was of particular personal interest was the chapter in *Understanding Literacy and Cognition: Theory, Research and Application* (Leong & Randhawa, 1989).

In reviewing the book, I was firstly surprised that the chapter concerning a longitudinal examination of cognitive education (Mulcahy, Peat, Mancini, Andrews, & Marfo, 1989) (in which I was a coresearcher) would appear in a volume dedicated to understanding literacy. Secondly, I was struck by the wide breadth of topics and disciplines represented in the publication. Even though a psychologist and educator, I realized that I had spent little time either reading or thinking about literacy. This realization served as a catalyst for learning about theories and instructional methodologies concerning literacy instruction. The process was facilitated by my engaging in a graduate seminar entitled "Literacy and Cognition" at the University of Victoria; education concerning literacy continues with my employment as a school psychologist in the remote Canadian north. Working in the Yukon provides a first-hand view concerning schooling (i.e., the process of teaching people to become literate), including some of the cultural affects on First Nations people. Of particular concern, in an ethical and

philosophical sense, is the erosion of traditional culture which seems inherently to accompany the introduction of western literacy (Topping, 1987; Mangubhai, 1987). To address this concern, this chapter includes a section outlining practical pedagogical recommendations which appear to minimize social, cultural and intellectual disruptions of literacy instruction.

Introduction

The purpose of this chapter, is two-fold: i) to articulate a current personal attempt to interpret the diverse array of information, both practical and theoretical, concerning the complex concept called "literacy"; and, ii) to illustrate how this understanding has direct application to the evaluation and generation of approaches to literacy instruction.

A broad range of ideas is articulated in both academic and vernacular journals concerning the term literacy. A review of *some* of these diverse perspectives will be presented. Next, as synthesized from these seemingly disparate views as well as from personal experience, the "Integrative Systems Model" of literacy will emerge. The implications of the model for resolving opposing concepts of literacy will be shown. Finally, the pedagogical significance of the model will be demonstrated through its use as an evaluative tool for research findings and instructional methods.

It is important to note that the review of the literature presented is selective, and as such, reflects personal bias. A more systematic methodology for surveying publications concerning literacy, including the addition of other perspectives, is more within the purview of literacy experts. An educator's current understanding and reasoning is all that is presented; as more learning takes place, as more is experienced, the views and instructional approaches written about here will inevitably change.

What is Literacy?

In terms of both research and instructional practice, the definition of literacy to which one adheres is of central importance. The kinds of questions asked and the type of evidence gathered are influenced by the way literacy is conceptualized; this, in turn, determines whether

the people being studied are perceived as 'literate'. In educational theory and practice, the definition of literacy affects the goals of instruction, the way instruction is carried out, and the assessment process. As Orasanu (1987) stated, "...[E]ffective instruction is grounded in an understanding of literacy skills and how they are acquired" (p. viii).

Researchers from a broad variety of disciplines have been studying aspects of literacy for many years. Trying to determine and document the effects of literacy instruction on individuals and/or the culture of literate (Chall, Snow, Barnes, Chandler, Goodman, Hemphill, & Jacobs, 1982; Harste & Mikulecky, 1984; Hirsch, 1987; Taylor, 1983, 1988), illiterate (Freire, 1982; Gee, 1986; Mangubhai, 1987; Topping, 1987), multi-literate (Scribner & Cole, 1981), or marginally literate and immigrant populations (Auerbach, 1989; Bourne, 1988) remains an issue for researchers and educators. However, "... the common understanding of what is involved in being literate is still vague and incomplete" (Wrolstad & Fisher, 1986, p. ix). Literacy has been and continues to be an area of investigation for anthropologists, cognitive scientists, literary critics, historians, philosophers, political scientists, sociologists, psychologists, ethnologists, linguists, psycholinguists, educators, and others.

Recent cross-disciplinary volumes and series (Bloome, 1987; de Castell, Luke, & Egan, 1986; Garner, 1987; Leong & Randhawa, 1989; Olson, Torrence, & Hildyard, 1985; Wrolstad & Fisher, 1986) illustrate the diversity and complexity of perspectives, traditions, and emphases concerning literacy. The views articulated in these publications, being from such diverse traditions, are not conceptually cohesive. The variance of perspectives contained in these volumes illustrates a gradual evolution of the literacy concept from one of denoting mere skills to one accounting for broader cultural and/or technological contexts (C. K. Leong, personal communication, April, 1990; Langer, 1988). Although an abundance of information exists about literacy, it is difficult to develop a *comprehensive* conception of literacy itself (Dubin, 1989; Langer, 1988).

Langer (1988) brought a degree of order to the plethora of meanings of literacy by positing that the term denotes an *action*, a *skill* or a *state*; with each use stemming from a

different set of traditions and the accompanying divergent emphases of investigation. Her approach, as detailed below, provided a notion of the breadth of perspectives represented by various disciplines involved in literacy studies.

Literacy as Actions

The view of literacy as "actions" (i.e., purposeful, observable events) is exemplified by discussions which focus upon the use of written language in a social, political, economic, and/or cultural context — the home, school, or community. In particular, educational and ethnographic literature concerning literacy tends to refer to actions. For example, "life-skills" such as filling out an income tax form, writing letters, reading instructional manuals on the job, understanding a novel, or engaging in Bible reading in church, are all taken to be indicative of literacy. Since each of these activities requires very different abilities and skills, estimates from studies using observed actions as the basis for determining literacy rates fluctuate widely according to the behaviors examined. Careful interpretation of investigations which view literacy from an action perspective is required in order to determine what skills were measured, and whether or not the findings can be related to those described in other research (Langer, 1988).

Literacy as a Skill or Set of Skills

Studies illustrating the skill approach to literacy typically involve investigating, either together or separately, two qualitatively different kinds of skills: a) individuals' conscious and/or automatic mental operations that occur during the completion of an activity, and/or, b) observable sub-skills which, when operating in tandem, enable literate activities to take place. Literacy is seen as a set of enabling behaviors or skills that permit literate activities to be carried out. When literacy is viewed as a skill or series of sub-skills, the focus of concern is usually toward individuals' learning and development, and away from the role of literacy in a social context (Langer, 1988).

Research investigating various types and levels of thinking skills which correspond to the development of literacy exemplifies the "mental operations" aspect of the skill approach

(Chall et al., 1982; Olson, 1977, 1989; Scribner & Cole, 1981; Torrance & Olson, 1987). Publications which describe cognitive processing skills and/or observable sub-skills of reading (e.g., decoding, word-identification), typify literacy as comprised of a number of inter-related sub-skills of the reading process (Bloome, 1987; Garner, 1987; Leong, 1987).

Literacy as a State

Literacy is sometimes viewed as "a state of being that marks a cultured or educated person". The issues addressed when this perspective is taken are far removed from those investigated by studies viewing literacy as either actions or skills. The attainment of the state of "literate" is measured by the knowledge a person has accumulated, mostly through formal schooling. Terms such as "The Great Books", a "core curriculum", or the nature of a "common culture" are used. The focus of discussion when literacy is viewed in this manner is upon the amount or kind of content that should be acquired in order for people to become literate (Langer, 1988).

Critique of Literacy Viewed as an Action, Skill or State

Although the three-pronged classification of literacy reviewed above provides some clarity, a closer examination of this literacy framework reveals that the ideas require further consolidation and refinement. As will be supported below, when definitions of literacy are analyzed in terms of action, skill, or state perspectives, a lack of distinction between the three components becomes apparent.

Some authors clearly define literacy from a viewpoint of *actions;* literate actions are placed in a social, political, economic and/or cultural context through the use of an adjective. For example, Taylor (1983) describes *family literacy* as "reading and writing ... activities that have consequences in and are affected by family life" (preface). Another example (Auerbach, 1989), subdivides family literacy according to two classes of actions, *broad* and *narrow*. The narrow definition reads, "performing school-like literacy activities within the family setting" (p.

166); the broad definition is stated as, "a range of activities and practices that are integrated into the fabric of daily life" (ibid).

The advantage of defining literacy as a *set of skills* is noted by Sekuler (as cited in Wrolstad & Fisher, 1986), a cognitive psychologist. He stated that:

> treating literacy as a complex set of skills, and the development of literacy as a complex form of skill learning promotes the recognition that the performance is not just flotsam and jetsam on a sea of potential information. In fact the performer is more like an excellent swimmer who knows where he or she wants to go and how to get there. According to this view, the performer actively controls that highly skilled performance we call literacy. (p. 77-78)

The skill perspective is found in Bormuth's definition of *reading literacy* as "the ability to exhibit all of the behaviors a person needs to respond appropriately to all possible reading tasks" (1975, as cited in Downing and Leong, 1982, p. 2), and similarly in Illich's (1987) definition of *clerical literacy* — "the ability to read and write" (p. 9).

In the same article that defines clerical literacy (a skill perspective), Illich (1987) delineates another form, *lay literacy*, which mirrors the view of literacy as a state. It is described as:

> a distinct mode of perception in which the book has become the decisive metaphor through which we perceive of the self and its place. .....a mind-frame defined by a set of certainties which has spread within the realm of the alphabet since late medieval times. The lay literate is certain that speech can be frozen, that memories can be stored and retrieved, that secrets can be engraved in conscience, and therefore examined, and that experiences can be described. ..... a new type of space in which social reality is reconstructed: a new kind of network of fundamental assumptions about all that can be seen or known. (p. 9)

The definition offered by Traugott (1987) also seems to refer to literacy as a state:

> ...literacy is not the same as the ability to write or the presence of a writing system. ... Literacy involves a special use of writing: it is a register associated with linear, non-interactive strategies, and may be expressed orally as well as in writing: it is typified by "objectification" of the subject matter, by talk about texts, and by self-conscious attention to distinctions between what a text asserts and its interpretation, in other words, by certain kinds of attitudes toward language. (p. 33)

Hirsch (1987) coined another term referring to literacy as a state — *cultural literacy*:

> To be culturally literate is to possess the basic information needed to thrive in the modern world (p. xix)... namely, the network of information that all competent readers possess. It is the background information, stored in their minds, that enables them to take up a newspaper and read it with an adequate level of comprehension, getting the point, grasping the implications, relating what they read to the unstated context which alone gives meaning to what they read. (p. 3)

The above definitions to some degree reflect the action, skill and state categories (Langer, 1988). However, this is not the case with all current definitions. For example, Leong (1989) defined "*Reading* [literacy] as the interpretation, application, revision and invention of symbol systems" (p. 21). This definition seems to include both action and skill components. Chall et al.'s (1982) definition of literacy as "reading plus the related skills (writing, vocabulary knowledge, metalinguistic ability) that are crucial to much of school learning" (p. 1-6), also crosses the action and skill categories of Langer's (1988) formulation.

Although the distinction between the social emphasis of actions and the individual emphasis of skills is helpful when conceptualizing literacy, there is an inherent weakness in dividing literacy into an actions versus skills dichotomy. Since skills are viewed as either underlying mental processes or component sub-skills of literate actions, skills and actions appear to be inseparable. In fact, skills are inferred when actions are observed.

Olson's (1987) definition of literacy is broad and encompasses all three perspectives: literacy as action, skill and state. Olson articulates a view of literacy which goes well beyond scribal or functional literacy and emphasizes the intellectual benefits (Leong, personal communication, April, 1990; Traugott, 1987).

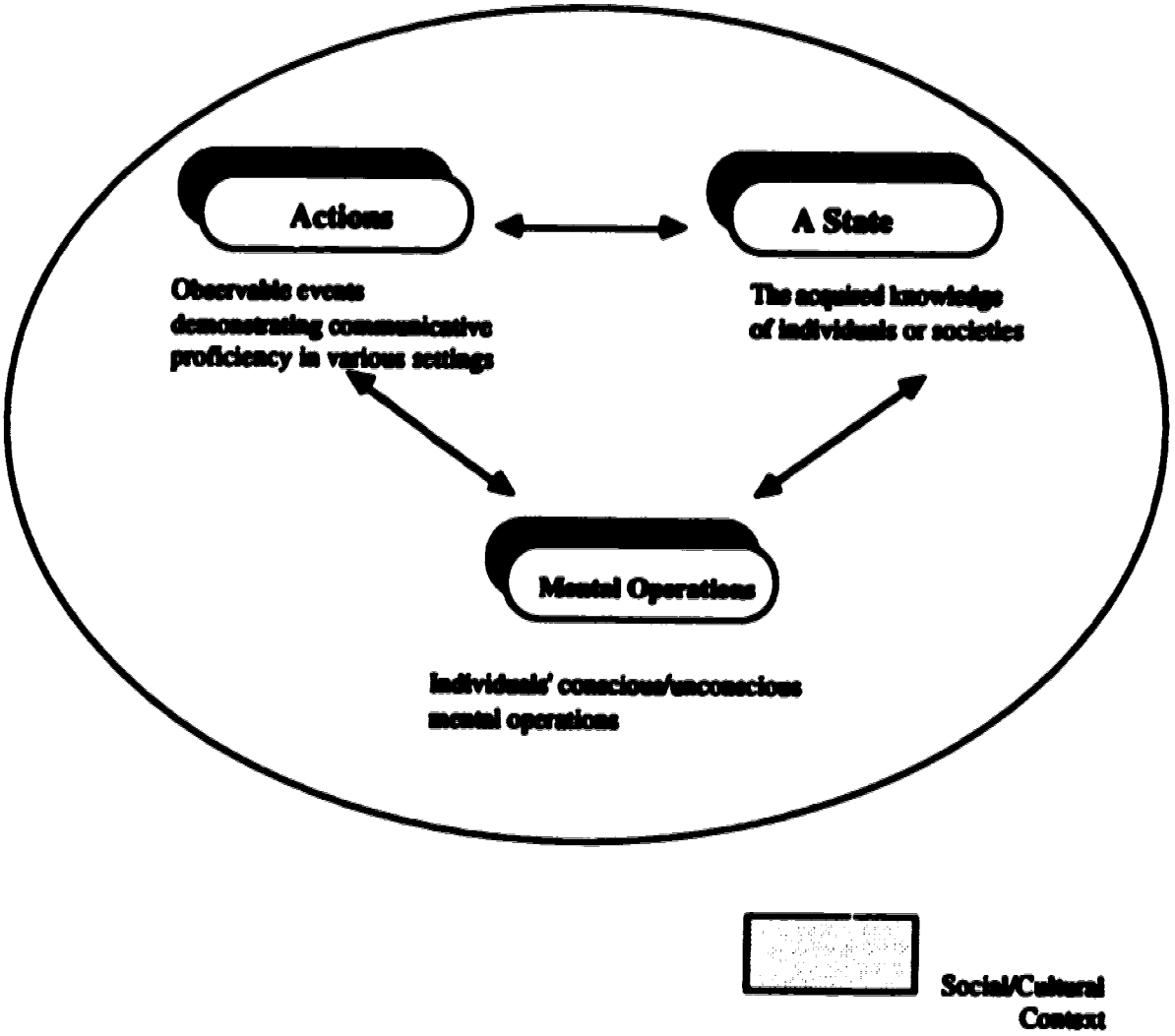
> Literacy skills are not merely "abilities" of children. Rather, literate competencies reflect a broad range of factors including the forms of oral discourse that children have mastered before they ever enter schools, the mastery of a particular form of discourse for talking about text, sets of assumptions about the fixidity [sic] and interpretability of texts, metalinguistic terms for referring to texts and their structures, and habits of using texts for a variety of purposes... a particular way of using language for a variety of purposes in a literate tradition. (Olson, 1987, p. 2)

Towards an Integration of the Three Perspectives

Research on literacy represents a rapidly growing body of knowledge. The multi-disciplinary volumes cited above indicate that a cross-fertilization of ideas concerning literacy is taking place. However, various disciplines appear to present a rival perspectives; there is little recognition that if the interrelationships among differing scholars' use of the term literacy were examined, then the differences might actually "represent complementary views of a complex subject rather than competing alternatives" (Langer, 1988, p. 43).

As an alternative to rival paradigms, Figure 1 presents the "Integrative Systems Model" of literacy — reformulated from Langer's (1988) framework. It takes into account possible relationships among the three competint appoaches to literacy. The term *model* is used here in a global sense to mean a "tentative ideational plan of relationships among variables" (Thomas, 1979, p. 12); "an organized representation of knowledge" (Gage & Needles, 1989, p. 264).

Figure 1: Integrative Systems Model of Literacy



The social/cultural context surrounding the three main aspects of literacy recognizes that the focus of literacy studies has shifted from one of methods of instruction to one of investigating the contributions of language, thought, context, and culture to literacy acquisition (Langer, 1988). Conceiving of literacy as embedded in the social/cultural context means that in order to gain a comprehensive view of literacy, the political and social as well as cognitive dimensions must be understood (Englert & Palincsar, 1991). As well, by embedding literacy in a social/cultural context, the model accomodates those who believe that literacy instruction should be a means whereby the poor and minorities develop an awareness of inequities in

society so that they can bring about sociopolitical change (Cummins, 1986; Freire, 1982; Malicky, 1991; Shore & Freire, 1987). The concept of literacy as a skill has been reformulated to emphasize that some researchers in literacy are concerned with the underlying *mental operations* of literate acts, which are not the same as *observable* sub-skills of tasks. Literacy studies concerned with sub-skills of a task (e.g., word-attack skills, comprehension) are accommodated under the action category.

The type of actions subsumed under literacy has been expanded. Rather than viewing literacy as solely concerned with actions relating to written language, the territory of literacy is conceived as also including the study of actions associated with "communicative proficiency" (Dubin, 1989; Taylor, 1988). This perspective underscores the cultural/contextual aspect of literacy which views writing as connected to linguistics, kinesics, proxemics, and the like (Dubin, 1989). The use of the term "proficiency" rather than "competence" avoids the confusion inherent in using the word competence, which for linguists, has both a technical and common sense meaning (Taylor, 1988). As well, the use of the term communicative proficiency allows the model to account for recent works which relate literacy in the traditional sense (e.g., written language), to other expressions of meaning such as graphic systems, the arts, scientific notation, and so on (Harste & Mikulecky, 1984; Leong & Randhawa, 1989; Wrolstad & Fisher, 1986).

The links between literacy as an action, mental operation, or state show literacy to include: a) actions that are outward manifestations of underlying mental operations; b) actions that influence mental operations by their facilitating growth in procedural, conditional, and declarative knowledge (Glaser, 1984; Marzano, Brandt, Hughes, Jones, Presseisen, Rankin, & Suhor, 1988); c) literate actions that favor individuals attaining a literate state (having declarative knowledge about content); and d) acquiring knowledge which influences and enables individuals to consciously control actions and mental operations (Garner, 1987).

As indicated by the arrows, the Integrative Systems Model of literacy presents its complex subject matter as made up of multiple, interacting components; an integration of

systems; an interconnected set of transactional parts in a state of equilibrium — to change any one part brings about change in others, and thus establishes a new equilibrium (Biggs, 1991). Literacy is shown, then, not as a static concept, but rather as a mechanism of growth and development. Notions of literacy as a longitudinal process, both in terms of an historical process within society or a developmental process within an individual or individuals are thus accounted for in the model.

Literacy as a static concept in terms of the acquisition of skills of reading or writing, or in terms of the number of years of schooling is inadequate. Literacy is not solely an individual achievement, but rather is dynamic and has differing implications in various cultural contexts (Gambell, 1989). Literacy includes a wide range of cultural activities that are not necessarily constrained by reading, writing or even schooling (Leong, 1989; Malicky, 1991). The Integrated Systems Model allows literacy to be viewed from a broad perspective and to be conceptualized through various facets which might interact.

Implications of Viewing Literacy as an Integrated System

Conceptualizing literacy as an integrated system has at least two advantages over discipline-specific perspectives; i) it permits the reconciliation of what appear to be competing alternatives of literacy into a complementary perspective, and, ii) it has evaluative and generative implications for instructional methodology.

The Reconciliation of Competing Perspectives

The Cognitive Effects of Literacy

Forming a comprehensive view of literacy is helpful, placing seemingly opposing views of literacy in perspective. For example, one hotly debated aspect of literacy is its relationship with the development of "higher order" cognitive skills. A brief synopsis of this area of disagreement follows.

The two opposing views are represented by Olson (1977, 1987, 1989; Olson, Torrance, & Hildyard, 1985; Torrance & Olson, 1987) and Street (1984; Gee, 1986). Their

writings show little attempt to reconcile or accommodate differences. Rather, their energies are channeled towards defending their respective positions through the destruction of the opponents' arguments.

At the core of Olson's (1977, 1987, 1989) view of literacy is his contention that literacy plays a central part in the growth of intellectual competence that would otherwise go largely undeveloped. In his 1977 seminal paper, Olson made the following assertions:

a) There is a transition from utterance to text both culturally and developmentally, with alphabetic text at the pinnacle of this evolutionary chain.

b) This transition can be described as one of increasing explicitness, with language increasingly able to stand as an unambiguous or autonomous representation of meaning. The British essayist technique is the exemplar of unambiguous text representations.

c) Historically, the process of writing essays provided rules for thinking which were a means for producing new knowledge; these new rules for thinking were a cornerstone for the development of deductive empirical science.

d) This changing role of language resulted in a reordering of the reality sustained by language. This altered relationship led to an upward stage of mental development from concrete to formal thought.

In later publications (Olson, 1989; Torrance and Olson, 1987) the view is modified somewhat by the admittance that "the relation between literacy and thought needs to be re-examined" (Olson, 1989, p. 3). However, a strong argument for literacy's contribution to higher order thinking is maintained. Olson's claims relate to the ability of the literate individual to interpret speech and text more explicitly and unambiguously than do those who are illiterate. He stated that this ability develops in two stages: first in "the evolution of a metalanguage for talking about text, for forming text, for developing commentaries and otherwise characterizing

the talk, writing and thought of others" (ibid, p. 13), and secondly, "in acquiring 'standard literate language' primarily in the course of schooling especially during the later school years" (ibid, p.13). It is in learning to talk about text that children acquire the concepts that are distinctive of literate thought (Olson, 1989; Torrance & Olson, 1987).

Drawing upon cross-cultural and ethnographic research, convincing, but somewhat vitriolic criticism, is leveled against Olson's point of view by Street (1984). Specific criticisms by Gee (1986), are outlined briefly as follows:

> a) Olson's perspective represents only one form of literacy, the essay-text form of writing prevalent in Western culture and supported by schools; the basis, if not always in practice, of our schools and universities [i.e., the type that "unambiguously represents meanings" (Olson, 1977, p. 264)].
>
> b) The essay-text form of literacy is neither natural nor universal, but rather one cultural way of making sense among many others. This way of making sense is associated with mainstream middle-class and upper middle-class groups and is, in fact, best represented by the ideology and practice of academics.
>
> c) Claims for literacy based upon this perspective are often tacit ways to privilege one social group's ways of doing things as if they were natural and universal. Many of the tasks used to measure cognitive flexibility, logical reasoning, or abstractness are in fact tests of the ability to use language explicitly. Explicitness is a factor that is a matter of convention, culturally variant.

Rather than pointedly denouncing one another's arguments, a more constructive approach would be to examine disparate views of literacy within a comprehensive model, and then to investigate how the differing perspectives relate to each other. For example, following the Integrated Systems Model of literacy, Olson's perspective of literacy is shown to be a narrow one — limited in terms of his view of *mental operations*. This is due to his focus being

only upon analytic, logical or abstract thinking; restricted in the view of literate *actions*, defining them only in terms of British essayist traditions; and restricted in the *state* of literacy advocated – Western. By placing Olson's perspective within the Integrated Systems Model of literacy, his perspective is recognized for what it is: *a detailed, insightful examination of one particular form of literacy.* As well, locating Olson's view of literacy within this comprehensive model reveals that the universal claims for the cognitive benefits of literacy are not necessarily warranted. The relationships between the British essayist form of literacy promoted by Olson and other aspects and forms of literacy are yet to be documented.

The Integrated Systems Model of Literacy: Research and Pedagogical Implications

Many accounts of the introduction of alphabetic literacy to non-literate societies condemn the erosion of traditional language and culture that accompanies the rise in literacy (Gee, 1986; Mangubhai, 1987; Topping, 1987), as well as the on-going use of literacy as a tool of oppression (Freire, 1982; Street, 1984). There is evidence that cultural erosion also takes place when a dominant form of literacy is imposed upon those who are culturally different (Auerbach, 1989; Bourne, 1988; Gee, 1986).

Recent thrusts of theory and practice in literacy recognize that "to study language and literacy outside of, or separate from, other forms of communication and separate from social contexts is to miss the multidimensional and transactional nature of meaning and expression" (Harste & Mikulecky, 1984, p. 71), and that, "[l]iteracy has no effects — indeed, no meaning — apart from particular cultural contexts in which it is used, and it has different effects in different contexts (Gee, 1986; p. 734). A comprehensive view of literacy should be consistent with this perspective.

To analyze cultural change that takes place as a dominant-culture literacy is introduced, and to determine whether or not the changes are damaging, is far beyond the scope of this chapter. However, the utility of the Integrative System Model of literacy can be illustrated by using it as a means to generate questions about past and present literacy practices and research.

The questions presented are broad in scope; some apply to research findings, others to classroom instructional practices. Similar questions could be generated from the model to analyze educators' perspectives or as a paradigm to evaluate the validity and generalization of the claims made by various investigators. One goal of these analyses could be to raise awareness of, so as to avoid the literacy practices of the past which were determined to be culturally damaging, and then, to introduce pedagogy which minimizes social, cultural and intellectual disruption.

The questions fall into categories consistent with the inherent components of literacy presented in the model — i) general questions relating to the overall thrust of the model; ii) questions associated with mental operations; iii) questions concerned with actions; and, iv) questions addressing literacy as a state.

General

i) How was literacy conceptualized — as actions, a state, underlying mental operations, or a combination of views?

ii) Were the relationships between the various identified components of literacy explored?

iii) Was there recognition that literacy is affected by the cultural context?

iv) Was there recognition that literacy development is a longitudinal process?

Mental Operations

i) Was the means of collecting data reflective of the broad range of communicative proficiencies of the cultural group?

ii) What aspect(s) of specific communicative competencies were investigated?

iii) Did the methodology chosen and/or the measures used reflect the communicative proficiency of the native tongue or the second language(s)?

Actions

i) What features of literacy were purported to be indicated by the observed actions?

ii) Did the actions only refer to the use of written materials or were other forms of communication also investigated?

iii) Was the relationship between other forms of communication and the observed actions explored?

iv) Did the actions examined tacitly express cultural arrogance on the part of the researcher(s)?

State

i) Was the state of literacy defined by the researcher's culture or by the culture of those being investigated, or by both perspectives?

ii) Was the state of literacy proposed one that elevates one type of literate state to a higher plane than another?

iii) If one form of literacy was elevated above another, what was the justification for categorizing people along a continuum of literacy?

iv) What are the cultural/sociological ramifications of becoming literate in terms of the values of the receiving culture? ..... in terms of values of the culture introducing literacy?

The questions generated above demonstrate that there is a philosophical underpinning embedded in the Integrative System Model of literacy. It assumes that different literacy practices facilitate the development of divergent specific skills (Bain & Yu, 1990; Olson, 1989; Scribner & Cole, 1981). "Literacy in and of itself leads to no higher order, global cognitive skills; all humans who are acculturated and socialized are already in possession of higher order cognitive skills, though their expression and the practices they are embedded in will differ across cultures" (Gee, p. 742). By emphasizing the importance of the social/cultural context in

all aspects of literacy, whether the concern is mental operations, actions or state, the justification for the proliferation of destructive dichotomies which place one group of individuals in a position of power, control, or advantage over another group is avoided. These dichotomies of thought include concepts of literate/non-literate; oral/literate; concrete/abstract; natural/unnatural; civilized/primitive (Auerbach, 1989; Bourne, 1988; Freire, 1982; Gee, 1986), for when literacy is viewed as a part of communicative proficiency, then all human beings are imbued with equal dignity and value.

Minimizing the Social, Cultural and Intellectual Disruptions of Literacy Instruction

Those who are involved in literacy teaching, "like it or not stand at the very heart of the most crucial educational, cultural, and political issues for our time" (Gee, 1986, p.743). The culture in which a student is immersed strongly invluences learning patterns, communication styles, perceptions and behavior (Educational research Service, 1991). Even though only one cultural expression of literacy among many, Western literacy, based upon the British essayist tradition, is spreading across the globe. Because Western literacy is associated with power and wealth, it is becoming the *lingua franca* of the world (Gee, 1986). The challenge is to support current instructional practices and to develop new and innovative methodologies which both allow societies to become literate in the Western sense and thereby participate in and change power structures, yet which minimize negative social, cultural and intellectual disruptions.

Minimizing social, cultural and intellectual disruptions can apply to more than simply a consideration of the instructional methods chosen to teach literacy — disruption may also relate to the way institutional structures are imposed upon a society. An example of *not* considering societal consequences brought about by schooling is found in the community of Old Crow, Yukon Territory, Canada. A Vuntut Gwichin Community, Old Crow is the most remote village on the mainland of Canada, accessible only by air, ski-doo, dog-team, or river transport during the summer. Young people in the community at about the age of 14-16 are faced with a decision — either end their formal education and stay in Old Crow, or leave the village to

continue schooling in a city 1200 kilometres to the south. Through interviews with elders in Old Crow (personal communications, September, 1993), it was learned that at the very age when students are now asked to leave their community, instruction by the elders in the skills necessary to 'live off the land' traditionally took place. The form of instruction was one of mentorship through experience and watching; young boys would accompany proficient hunters as they left the village to hunt, fish and 'live off the land' for extended periods of time. One of the results of not considering the previously established instructional methods in Old Crow, is that young people no longer are taught traditional skills by their elders to the extent that they were in the past.

Returning to applying the Integrative Systems Model of literacy, a brief compendium of 'culturally sensitive' instructional suggestions is presented. "Culturally sensitive instruction seeks an educationally productive balance between commonality and diversity in heterogenous schools and classrooms. ... The cultural diversity is ... recognized, respected, and used as an instructional resource." (Educational Research Service, 1991, p. 2).

Only the mental operations and action components of the model are applied to the generation of instructional suggestions; the 'state' view of literacy is not utilized due to its limited application to pedagogy. However, it should be noted that the state view of literacy is significant in the choosing of content material. If participation in power structures requires a comprehensive knowledge of the cultural semantics embedded in Western literacy, then an extensive knowledge base of Western thought (i.e., content) is necessary. If the content issue is one of identification of literate individuals in different cultures, then content material indicative of literacy would be chosen according to an analysis of differing cultural views of knowledge, excellence, aesthetics, ethics, and so on.

Mental Operations

There is a vast literature on the underlying, enabling, mental operations of literate acts; to attempt to summarize it would be futile at this point. However, two principles gleaned from this research which have particular importance to literacy instruction are as follows:

i) Reading is a complex behavior, involving the interaction of various factors: neuropsychological, psycholinguistic and psychological, but can be characterized as *primarily* a linguistic activity; (Bialystok, 1988; Fagan, 1988; Griffith & Olson, 1992; Leong, 1987; Mancini, Mulcahy, & Leong, 1990); and,

ii) Reading and writing are active, constructive processes (Harris & Pressley, 1991; Paris & Byrnes, 1989).

General instructional suggestions based on the above two assertions include: i) teaching toward more awareness of language; ii) teaching students to be reflective; iii) teaching specific text processing strategies; and, iv) guiding readers to manage a set of options when unknowns are encountered (Downing & Leong, 1982; Garner, 1987; Gee, 1986; Mulcahy et al., 1993).

One study which supports the notion of teaching toward more awareness of language (Chall, et al., 1982) demonstrated that for those who were culturally different than the institutional mainstream, vocabulary growth is related to writing in class and with field trips; comprehension gains are associated with the provision of comprehension strategies and with an instructional focus of critical thinking and reasoning.

A form of teaching which appears to encompass all four general instructional suggestions is "informed metacognitive instruction".

What is Informed Metacognitive Instruction?

Informed metacognitive instruction is "training with awareness" (Brown, 1982; de Corte, 1990; Nickerson, 1988; Pressley, Borkowski, & Schneider, 1987; Pressley, Goodchild, Fleet, Zajchowski, & Evans, 1989). It involves the explicit application of learning/thinking strategies to a learning task, *with the students being aware of the reasons for*

the application (Palincsar & Ransom, 1990; Perkins & Salomon, 1989; Pressley et al., 1990). Informed metacognitive instruction provides students with "culture's best secrets about how to obtain academic success, strategies many students would not discover at all or would discover only after a great deal of frustration and failure" (Harris & Pressley, 1991, p. 395). It allows knowledge about the thinking processes of Western literacy to be explicit and available to the learners. The methodology includes:

1. detailed instructions on how strategies should be used;
2. consistent use of the strategies across a variety of problems, materials and settings;
3. information about the usefulness of the strategies;
4. extensive practice of the strategies with reminders and prompts gradually faded out; and,
5. explicit teaching for generalization (Meichenbaum, 1986).

The explicit teaching for generalization is a crucial factor of informed metacognitive instruction. The conscious control of metacognitive skills and strategies influences the process of students' transferring their academic learning between subjects and to their "life-worlds". This form of instruction may have particular application to those who are attempting to function in a society that is culturally different from their own, for it facilitates being able to apply their learning to new situations and settings.

The recommendation to engage students in informed metacognitive instruction represents a convergence of opinion from diverse educational perspectives. Researchers and practitioners who take a constructivist perspective eloquently support this position (see Harris & Pressley, 1991; Paris & Byrnes, 1989), as do researchers from the process-outcome perspective (i.e., research emphasizing the link between teacher behavior and student achievement; see Brophy, 1988; Gage & Needles, 1989). Also, educators, researchers, and theoreticians who are presently promoting the development of "self-regulated" or

"autonomous" learners as a goal of education (see, e.g., Palincsar, David, Winn, & Stevens, 1991; Mulcahy, 1991; Zimmerman & Schunk, 1989) endorse this form of teaching.

Informed metacognitive instruction allows the underlying mental operations involved in literate activities to be made explicit. The development of individuals who are aware of personal and situational factors which influence learning, and who can consciously choose and implement strategies which are consistent with their known motives to achieve a desired outcome, is encouraged. In short, students develop into inter-dependent or independent learners, able to apply reading and writing competencies to thinking and reasoning and vice versa (Mulcahy, 1991; Palincsar, David, Winn & Stevens, 1991).

Actions

Actions designed to measure or to teach literacy should be based on the premise that "[i]ntervention in the child's home situation to improve the literacy-enhancing potential of that situation is likely to be ineffective if it fails to recognize the ecological setting within which the family functions" (Chall et al., p. 1). The goal of pedagogical practice which minimizes social, cultural and intellectual interruption, is "to increase the social significance of literacy by incorporating community cultural forms and social issues into the context of literacy activities" (Auerbach, 1988, p. 177).

Specific suggestions for the instruction of literate actions include:

a) Use literacy to address family and community problems. Dealing with political and economic issues such as immigration, employment, or housing through literacy increases its social significance and integrates literacy into the everyday activities of family life (Auerbach, 1988; Cummins, 1986; Fingeret, 1990; Freire, 1982; Langer, 1988). Engaging students in "critical dialogues" is one instructional method which accomplishes this. Critical dialogues are structured discussions focusing on literary elements, characters or circumstances in a story which directly apply to problems and/or ethical dilemmas encountered in the students' homes and/or their community (see Freire, 1985; Gentile & McMillan, 1992).

b) When children of illiterate parents are receiving literacy instruction, facilitate parents' development of reading and writing so that they are less dependent on their children. Dependency of parents on children is usually counter to their cultural roles, and places an unreasonable burden on the children (Auerbach, 1988).

c) Use literacy as a means of cultural transmission from one generation to the next. In situations where the younger generation is literate and the older is not, employ a broad range of literate activities to facilitate the transmission of cultural wisdom and folklore (Canadian Broadcasting Corporation, 1990).

d) Support the development of home language and culture through literacy activities. This helps build a foundation for the children's academic achievement and appreciation for their cultural heritage with the resultant positive influence on their self-concept (Auerbach, 1988). "When educators involve minority parents as partners in their children's education, parents appear to develop a sense of efficacy that communicates itself to children, with positive academic consequences" (Cummins, 1986, p. 26).

e) Ensure that those receiving literacy instruction gain access to a wide range of literary texts, their meanings and forms (Bourne, 1988; Chall et al., 1982).

f) Bring the functions and use of print, such as fliers, leaflets, signs, letters, newspapers, price tags, street signs and product labels, from the community into the classroom and vice versa (Fagan, 1988; Taylor, 1983).

g) If literacy is directed towards young children, there should be some intrinsic relationship between the literate activity and their immediate situation (Taylor, 1983, 1989).

h) Adjust instructional methodology and communication patterns so that they parallel culturally conditioned learning styles. For example, patterns of communication in the home can be mirrored in the school setting (see e.g., Cummins, 1986; Educational Research Service, 1991; Englert & Palincsar, 1991; More, 1987).

Summary

An attempt to make sense of the diverse array of information, both practical and theoretical about the complex concept called literacy was presented in the form of the Integrative Systems Model of literacy. The model illustrated how the understanding of literacy has direct application to instruction and research. As well, its utility in reconciling opposing concepts of literacy was presented. Finally, some practical suggestions for literacy instruction consistent with the model and which appear to minimize social, cultural and intellectual disruption were presented. Implementing even some of the suggestions provided indicates that educators and policy-makers need to re-define their roles within classrooms, communities and the broader society so that the disruption previously thought to be embedded in literacy instruction will not only be minimized for those acquiring literacy, but ideally their cultures will also be strengthened (Cummins, 1986).

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CHAPTER II - PROMOTING 'DEEP' APPROACHES TO LEARNING: INSTRUCTIONAL IMPLICATIONS

"The only people who achieve much are those who want knowledge so badly that they seek it while the conditions are still unfavourable. Favourable conditions never come." (Lewis, C. S., 1939). *Learning in War-Time.*

Introduction

One important aspect of educational psychology is the identification of psychological principles and their application to pedagogy (Snowman, 1986). These principles originate from diverse sources: experimental psychology, counselling theory and practice, behavioral psychology, social-learning theory, and cognitive psychology, to name just a few.

Indeed, one of the goals of teacher preparation programs is to enable teachers to understand, then consciously and systematically apply these learning principles to their teaching practice. Unfortunately, partly due to the diverse psychological paradigms, it is not a straightforward task to identify the axial principles, let alone present them in a manner that is translatable to classroom practice.

In order to reduce the task of teacher training to manageable proportions, numerous authors have presented what they feel are central guidelines for understanding basic processes of education and their classroom implications (see, e.g., Brophy, 1988; Hilgard & Bower, 1974; Wittrock & Lumsdaine, 1977; Foster, 1986; Glaser & Takanishi, 1986). These reviews are helpful in at least two ways: a) they summarize and clarify large bodies of knowledge, and b) they provide current pedagogical advice to teachers. A bridge is constructed "between the pure science stage and the ready application of what has been found out " (Hilgard & Bower, 1974, p. 609).

However, most of these reviews are not based upon a comprehensive model of learning, but are rather a "grab-bag" of learning principles and their related methodologies. As a result, although a bridge between theory and practice is made, there is no attempt to

explain the relationships between the various methodologies and the differing *kind or type* of learning that is advanced by applying the various approaches.

The goal of this paper is to begin to address these weaknesses. An adaptation of Biggs' (1985; 1987; 1990; 1991a; 1991b) comprehensive 3P (Presage, Process and Product) Model of Learning will be described. The 3P Model is one framework that accounts for relationships between teaching methodologies and differing *kinds* or *types* of learning advanced by various instructional approaches. Based upon the model, the nature of students' approaches to learning that should be encouraged in school contexts is presented. Flowing from this presentation is a discussion concerning the advantages of fostering students' development into individuals who consciously utilize metacognition in their approach to learning. Finally, methodologies which should foster "deep" learning will be outlined. However, before describing Bigg's Model of Learning, it may be helpful to first of a definition of learning.

What is Learning?

In nearly all conceptions of learning, whether originating from a behavioral or cognitive perspective, there seems to be general agreement that three factors should be included in the definition: "(a) a change in an individual's behavior or ability to do something, (b) a stipulation that this change must result from some sort of practice or experience, and, (c) a stipulation that the change is an enduring one" (Shuell, 1986, p. 412). Even though these aspects of change could also apply to amputation, disease or death, they are helpful in clarifying our conception of learning; the latter two factors exclude certain types of behavioral changes such as those due to maturation, temporary alterations due to drugs, and so on. There also appears to be general accord that both environmental factors and factors internal to the learner (e.g., knowledge, effort and ability) also contribute to learning in an interactive or transactional manner (Marfo, Mulcahy, Peat, Andrews & Cho, 1991; Shuell, 1986).

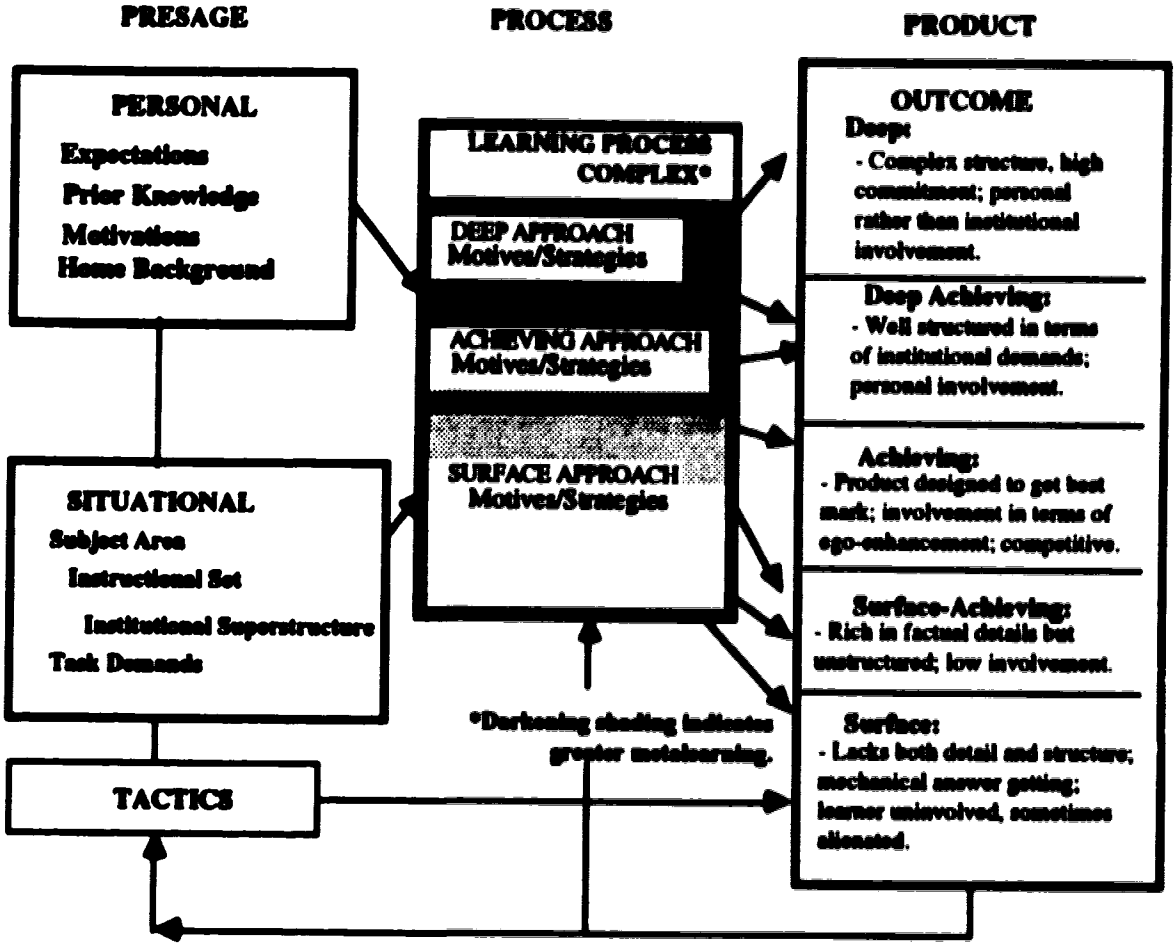
From a pedagogical point of view, it is extremely important for learning to be clearly conceptualized, for the view of learning that a teacher holds has major implications for teaching practice. How learning is viewed directly affects how content is presented, how lessons are designed, and how students are taught. Instructional methods and materials mirror assumptions about learning (Clark & Peterson, 1986; Jones, Palincsar, Ogle, & Carr, 1987). To illustrate, those who conceptualize learning as the accumulation of a vast amount of knowledge emphasize the learning of content. In contrast, those who see learning as a process of understanding, encourage students to use factual knowledge to comprehend their world, and also emphasize *how to* acquire this knowledge (Wittrock & Lumsdaine, 1977; Marzano et al., 1988; Peat & Mulcahy, 1990).

However learning is viewed, surely it is agreed that learning is a complex, multi-faceted activity; a process involving change. One systematic attempt to conceptualize what takes place during this learning process is Biggs' 3P Model of Learning. The model is the result of a fertile coupling of sound learning theory with an on-going systematic program of research which began in 1968 and continues today (Biggs, 1985, 1987, 1990, 1991a, 1991b).

Student Learning: The 3P Model

The 3P model recognizes that students engage in learning tasks for a variety of reasons. These reasons determine how students approach learning which, in turn, determines the quality of the outcome. This chain of events is captured in Biggs' 3P Model of Learning (See Figure 1).

FIGURE 1: 3P Model of Learning



(Adapted from Biggs, 1985, 1987, 1991a, 1991b; McClelland, 1988)

The model represents learning as an integrated system comprised of three main components: presage, process, and product, hence the '3P'. *Presage* factors exist prior to learning and are of two kinds — personal and situational. Personal factors pertain to the student and are described by Biggs (1991a, 1991b) as relatively stable, learning-related characteristics. These include abilities, expectations and motivations for learning, conceptions of what learning is, prior knowledge, home background, and the like. Situational factors are those pertaining to the teaching context and include the course structure, curriculum content, methods of teaching, and so on. Situational factors are largely outside the students' control due to their being set by the teacher and the educational

institution. This context generates the "climate" for learning which has important motivational components (Biggs, 1991a, 1991b).

The *learning process complex* concerns how students interpret the teaching context in the light of their own preconceptions, motivations, and strategic repertoire; this interpretation is comprised of a sophisticated kind of metacognitive activity which Biggs labels as "metalearning". The focus is upon the process of learning — upon how one goes about the task — rather than upon the content of the learning. Metalearning is the means by which students derive their approaches to learning; the approaches will, in turn, determine the type of learning outcome.

The combination of strategy and motive shown by the process component, combine into three approaches to learning — *deep*, *achieving*, and *surface*. These three approaches have been identified on numerous occasions by different researchers through the use of various factor analytic procedures (Biggs, 1987, 1991a, 1991b).

A *deep* approach is characterized by students who are intrinsically motivated; who see the learning task as interesting and personally involving; who focus upon underlying meaning rather than on rote facts or concrete, literal interpretations; and who study to increase knowledge and/or competence in particular subjects. The various task components are integrated with other tasks and with each other. For example, students who display a deep approach to learning read widely, discuss ideas with others, and may theorize and hypothesize about aspects of the task which they find particularly interesting (Biggs, 1985, 1991, 1991b).

A *surface* approach is indicated by learning that is motivated extrinsically, by factors such as gaining qualifications with pass-only aspirations and a corresponding fear of failure. A surface approach views learning as a means to some other end, with the focus of learning centering upon concrete and literal aspects of the task (Biggs, 1985, 1991a, 1991b).

At any given time surface and deep approaches are mutually exclusive. However, the third approach — *achieving* — may be connected to either of the other two. For instance, surface-achievers systematically memorize detail to obtain high grades; deep-achievers are planful and organized in their pursuit of both meaning and high grades. The achieving approach is based upon the extrinsic motive of ego-enhancement that comes from visibly obtaining high grades; marks are seen as important and worthy of competitive effort.

These approaches to learning apply to two levels of generality: i) the way an individual characteristically goes about most academic tasks and, ii) the way a particular task is handled by a student at a certain point in time. To illustrate, a student who usually approaches learning from a surface approach (is at university to please his/her parents and is content to coast through, just passing), may be assigned a project that he/she is passionately interested in; thus, for a time, he/she would approach learning using a deep approach. Conversely, a deep approach graduate student who is near the end of his/her doctoral program may approach the composition of certain papers or course requirements on a surface level — simply get them completed so that he/she can get on with what he/she personally considers to be truly interesting research.

Two other features of the 3P Model, *metalearning* and *tactics*, need further clarification before a comprehensive picture can be formed. Figure 1 presents metalearning as increasing vertically, from surface to deep approaches. Metalearning involves the twin components of metacognition evident in the literature: *cognitive self-appraisal* and *self-management* (Biggs, 1985, 1991a, 1991b; Brown, 1978; Flavell, 1976, 1979; Mulcahy, Peat, Mancini, Andrews, & Marfo, 1989; Paris, Wasik, & Van der Westhuizen, 1988; Paris & Winograd, 1990). The deepening shading is meant to visually illustrate the idea that an individual engaging in a surface approach to a learning task is often not aware of the motives and strategies operating during the learning process, but is guided by a "gut-feeling" (Kirby, 1991; Rigney, 1978). In contrast, individuals using a deep approach

operate from an awareness of their own perceptions of motives, strategies and task structure. Deep approach individuals are able to express why they should or should not be using a particular strategy or completing a specific task. Task specific *tactics* do not involve metalearning but are performed purely at the rote learning level and are simply "methods used to gain an end" (Snowman, 1986, p. 244).

The arrows linking the product factors back to both the process and presage factors in Figure 1 illustrate a departure from Biggs' original 3P Model (1985, 1987, 1991a, 1991b) in terms of the stability of some of the presage factors. Although situation presage factors are not controlled by the student, at least some of the personal presage factors, particularly those related to motivation, appear *not* to be 'relatively stable', but rather, amenable to change. To view personal presage factors as stable may lead to an overly pessimistic view concerning personal change through intervention.

In one longitudinal study which documented change in a presage factor, overall internal locus of control was increased for learning disabled and average grade 4 students as compared to controls through cognitive strategies training (Mulcahy, Wilgosh, & Peat, 1991). The connections between locus of control and other factors have been established by several researchers; significant positive correlations have been shown between locus of control and school-related factors such as academic achievement, the acquisition of information, and, inversely, to learned helplessness (McClelland, 1987).

These studies lend support to Paris & Byrnes' (1989) view of children as constructing their own personal theories about self, effort, academic tasks, and instrumental strategies, based upon the barrage of continuous data about their relative strengths and weaknesses in the classroom received from years of seat-work, classroom evaluation, social comparison, and external evaluation. Theories about strategies are formed by children's knowledge about what strategies are, how to use them, and finally, when and how strategies are effective. "...[T]hese theories have a proactive influence on

expectations, attitudes, and effort as well as a retroactive role in personal explanation" (p. 174).

Kurtz and Borkowski (1984), also argued that the emergence of strategic skills is linked to beliefs about successes and failures. "A child who has an accurate, perceptive understanding of how her mind works should be more persistent, experience greater success via selected strategy use, and correctly reason that good performance is due to *controllable* (my emphasis) factors such as effort and strategy deployment" (p. 337). When students increase their metacognitive awareness and strategic learning behavior, in a complex and interactive fashion, corresponding beliefs about reasons for learning successes and failures are constructed (Kurtz & Borkowski, 1984; Paris & Byrnes, 1989; Paris & Winograd, 1990). These beliefs, in turn, influence, for good or ill, self-initiative, performance and self-esteem.

Relations Between Approach and Outcome

Presage and process factors interact with one another and relate to performance outcomes. Performance is seen as mediated by how the individual thinks and perceives reality. The three approaches described above generally lead to the outcome categories as described in figure 1. Deep outcomes are exemplified by products of high structural complexity. Typically, surface outcomes are those which are rich in factual detail, but are not inter-related in a complex, conceptual manner. The achieving approach generally correlates with school performance (Biggs, 1985, 1987, 1991a, 1991b; Biggs & Collis, 1982).

The three approaches to learning have, in general terms, differing affective outcomes as well. Students who characteristically use a surface approach tend to feel negative about their learning, see tasks as impositions, resent the time spent, but are afraid of failing. Those employing a deep approach are inclined to feel challenged and involved, while those operating from an achieving perspective, since they are "in it for the grades", feel positive about their achievement, if successful (Biggs, 1991a, 1991b).

The breadth of the 3P Model enables us to view learning as influenced by both the sociology of institutions and the psychology of student learning. The importance of motives and their interaction with the strategies used by students is also evident from the model. The 3P Model is an integrated system, or interconnected set of elements in a state of equilibrium; to "change any one element will bring about change in others, and thus establish a new equilibrium" (Biggs, 1991b, p. 36). It provides a framework that allows us to focus upon what *type* or *kind* of learning approaches and achievement outcomes we might wish to see fostered in students. Once these have been identified, then the task becomes one of choosing corresponding elements of the model which, when changed and applied to the school context, will facilitate the chosen kind of learning.

Promoting a 'Deep' Approach to Learning

The 3P Model, has utility for deriving multiple ways to encourage deep and/or achieving approaches to learning, and to minimize the likelihood that surface approaches will be used. To illustrate this usage, the remaining sections will emphasize encouraging deep approaches to learning in the school context.

The description of students engaged in deep approaches to learning with the resultant high quality outcomes might be considered as an ideal; these students have a well-structured knowledge base and the procedural knowledge to carry out tasks appropriately. According to Biggs (1985), the student choosing to use a deep approach is also at the highest 'metalearning' level. The concept of metacognition[1] , therefore, holds a central position in the 3P Model. Figure 2 is illustrative of students who utilize metacognitive processes in their learning, or in Biggs' terms, operate at the high metalearning level.

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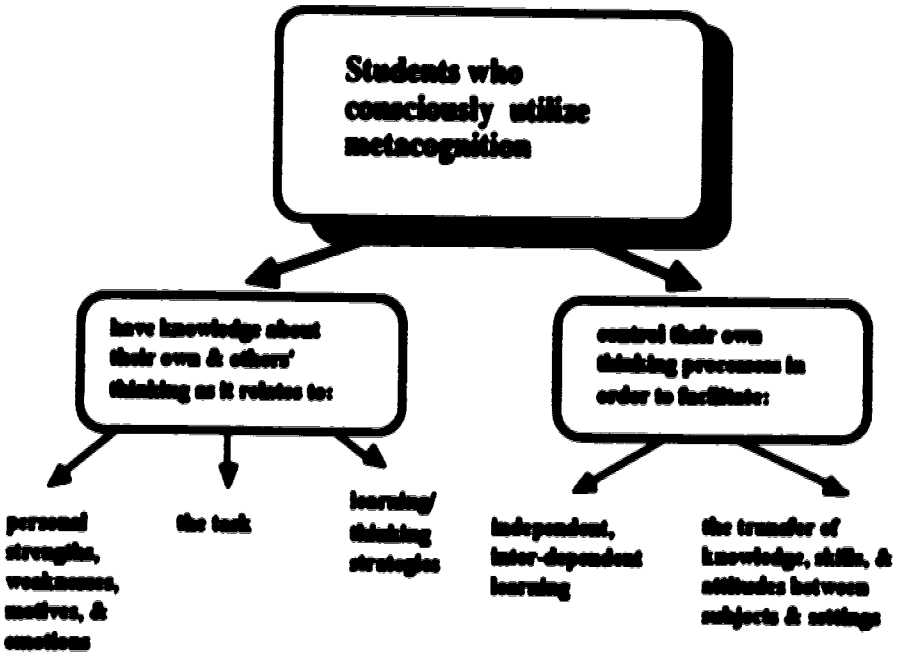
[1]'Metalearning' refers specifically to learning and study processes in institutional settings, and is a "specialised application of metacognition to the area of student learning" (Biggs, 1985, p. 192). Since the broader term 'metacognition' is commonly used in the literature, the term 'metacognition' will be used throughout the rest of the paper.

FIGURE 2: Metacognition Related to Learning



(Adapted from Peat, 1989; Alberta Education, 1990)

In the 3P Model of Learning, the deepening shading illustrates that engaging in a deep approach to learning involves the conscious application of more metacognitive processes than does a surface approach to learning. Students who are highly developed metacognitively are those who are consciously aware of personal and situational factors which influence their learning; they flexibly apply a learning approach (i.e., control the approach) whereby the strategies chosen and executed are consistent with known motives, and, based upon their past experiences, have a strong possibility of achieving a desired outcome.

This is true in a *general* sense; students characteristically approach tasks using either a deep, achieving or surface approach. The way *particular* tasks are approached *is not necessarily* related to level of metacognitive development. For example, a student who consciously chooses, due to an awareness of a lack of personal motivation and a tight time-line, to apply surface strategies to a task in order to 'get it out of the way', is actually highly metacognitive, even though a surface approach is utilized. Although the same student may

characteristically use a deep approach to learning, in some cases it is more appropriate to complete assignments in a rote, surface fashion.

The development of 'self-regulated' and/or 'autonomous' learners is presently being promoted as a goal of education (Mulcahy, 1991; Zimmerman & Schunk, 1989). Figure 2 illustrates that students who consciously utilize metacognition in their learning are not only more autonomous (i.e., independent learners), but also are able to consciously and flexibly choose whether or not it is, instead, advantageous to work interdependently with others. The development of a repertoire of learning/thinking strategies is essential if students are to learn how to learn independently and/or interdependently, depending upon which task approach is most beneficial to them. The term 'interdependent' refers to students' use of cooperative learning strategies such as paired problem-solving (Whimbey & Lochhead, 1985), reciprocal teaching (Palincsar & Brown, 1981), or working in small, mixed-ability learning groups (Johnson & Johnson, 1989; Slavin, 1987). Students who are aware of how they think and of the tools they can use either individually or in groups to facilitate the thinking process, have a choice as to whether to use the tools or not. They can then consciously control available options to improve their own performance. The decision to work cooperatively with others is based upon metacognitive knowledge of *others'* thinking processes (i.e., personal strengths, weaknesses, motives and emotions; the task; and their ability to use various learning/thinking strategies), as well as their own. Students who consciously utilize metacognition can control available options to improve their own performance. In short, they are empowered to become interdependent/independent learners (Mulcahy, 1991).

Instructional Implications of the 3P Model

Since metacognition holds a central position in differentiating between students who employ deep versus surface approaches to learning, it follows that one way of approaching the task of facilitating a deep approach to learning would be to establish an instructional context that paves the way for students to become more metacognitive. Fortunately, recent

theoretical and pedagogical advances have identified some instructional methodologies that facilitate the growth of metacognition in students. Before some of these instructional advances are described, further clarification of the concept of "metacognition" will be presented.

Metacognition Expanded

Metacognition can be thought of as a type of self awareness; a specific type of reflection. It is the "knowledge and control of one's own thinking and learning activities" (Brown, 1982, p. 28.) or, to put it more simply, 'thinking about thinking' (Ashman & Conway, 1989). As evident in the description of students using a deep approach to learning, it is being aware of thinking as certain tasks are performed and using this awareness to control what is being done (Glover, Ronning, & Bruning, 1990; Marzano et al., 1988).

Two types of metacognitive activity seem to be involved in a deep approach to learning. The first regulates and orchestrates various operations that must be carried out for learning to be successful (i.e., planning, monitoring of the learning process, guessing, predicting). This function is concerned with organizing the resources and processes involved in achieving the goal. The second type of metacognitive activity is awareness of what is known and/or not known about the material being learned and the processes involved in learning it (Shuell, 1986).

Bigg's 3P Model contains the three variables that Flavell (1979) suggested are involved in metacognition: a) person variables — knowledge about our own skill and emotional strengths, weaknesses; b) task variables — knowledge about the way the task itself influences performance; c) strategy variables — knowledge about which strategies might enhance and/or detract from performance on a task. As well, metacognition involves knowledge about the way these three variables interact.

It is appropriate to further consider the development of an instructional context which facilitates students' metacognitive development. Approaches which are based upon

the notion of "mediated learning" have the potential to facilitate pupils' metacognitive development, and to improve pupil performance (Brown, 1982; Reid & Stone, 1991). Three instructional methodologies which illustrate mediated learning — teacher questioning, cognitive modeling, and informed metacognitive training — will be described. Mediation as encompassing the explicit and systematic teaching for transfer will be discussed, as will the significant role of emotions and motives.

Mediated Learning

Within the 3P Model, one presage situational factor is the instructional set (See Figure 1). Some teaching approaches, or instructional sets, can indirectly relay messages to students that a deep approach to learning is not valued, expected, or required. By attending multiple, non-interactive classes that utilize only a lecture approach, students come to the realization that school emphasizes the surface learning of content, de-emphasizes their thoughts, and evaluates performance according to their ability to remember by rote. Students become "lesson-learners" — able to learn lessons factually, but unable to process facts intelligently to apply them to new situations (Barell, 1985; Wasserman, 1984).

The methods and materials used in teaching should demonstrate to students that a deep approach is valued, expected and required. In order to foster a deep approach to learning, teachers need to be experts in a wide diversity of teaching skills, particularly those involving teacher-student interaction. The connections between question and responses should be made explicit, with teachers' verbal interactions checking on students' understandings. Teaching practice should illustrate a constructivist conception of teaching (Biggs, 1991a, 1991b; Paris & Byrnes, 1989); the belief that "it is the students who must make the connections in the end" (Biggs, 1991b, p. 46).

The concept of mediated learning is one way of viewing student-teacher interactions (Feuerstein, Rand, Hoffman, & Miller, 1979). It can be considered a measure for determining whether various methods or instructional materials foster students developing a

deep approach to learning. If instructional materials and/or teaching methods are orchestrated to promote the mediational aspects of learning, then students will receive the message that a deep, metacognitive, approach is being emphasized.

Mediated learning occurs when the nature of the interaction between the learner and the environment is intentionally influenced, usually by a supportive person. Mediated learning experiences are the major means by which children develop the thinking skills necessary for learning independently (Brown, 1982; Reid & Stone, 1991). Mediation is a longitudinal process; change occurs gradually over time. Students progressively refine their conceptions of complex processes and concepts as mediation occurs.

In the classroom the mediator is usually the teacher. However, classroom mediation may also include interaction between pupils, and/or between pupils and the instructional material or medium. Mediation involves at least these three factors:

a) The interaction must be meaningful to the learner.

b) There must be an intention on the part of the mediator that the child learn something.

c) Mediation must have a goal beyond the immediate needs of the situation (transcendence) (Feuerstein, Rand, Hoffman, & Miller, 1979; Pace, 1987).

How can mediated learning principles be used in the classroom? Perhaps an example of mediation in the classroom will help to answer this question. A teacher's goal might be for students to perform a given process such as reading independently. The teacher helps the students discover, or construct their views of reading. How the teacher does this is crucial. When a student stumbles over a word while reading aloud, if the teacher supplies the word then no mediation has taken place. The student's immediate need for the word has simply been met; there has been no transcendence. However, if the teacher instructs the student to sound out the word, the student might begin to develop one notion about what reading is. It is sounding out words, or word calling. Suppose, on the

other hand, the teacher suggests that the word can be predicted by determining which word would make sense in that context, the student might acquire a view of reading as "prediction". Further improvement would be to suggest that the student predict and then use sounding out to verify the prediction. In this example, mediated learning encourages the view that there is more than one way to determine the meaning of words, and that these ways can be used concurrently (Pace, 1987).

Mediation can be thought of as verbal ping-pong. It is *interactive*. Teachers interpret tasks as a response to student's interpretations of tasks and processes. The back and forth exchange allows both the teacher and the students to be active in deriving meaning from the situation. Lectures, and one-sided explanations are not mediation. In fact, these approaches rely on students' ability to be self-mediating, that is to supply the meaning wholly, independently. Unfortunately, children are rarely able to do this, and neither are some adults (Alberta Education, 1987; Pace, 1987).

A deep approach to learning is fostered by a mediative approach to teaching. Various teaching methods can be described as involving or augmenting 'mediation'. They can be seen as vehicles for mediation rather than simply a way to teach content. The type of questioning teachers use, cognitive modeling, and informed metacognitive training are three teaching approaches that are mediative. These three approaches are not mutually exclusive, but rather can be integrated in an interactive and supportive manner. For example, as illustrated below, the use of cognitive modeling could also enhance teacher questioning and informed metacognitive training.

Teacher Questioning

Teacher questioning can be a powerful mediation tool; the type of questions teachers use influences student achievement. For example, rephrasing questions and/or giving longer time to answer, tells students that they are expected to think and that they will be provided with the time to do so. In short, thinking is required and important. This approach to questioning facilitates maximum performance for some students, particularly

those who have difficulty thinking through tasks, and/or when material is initially being introduced (Bachor, 1985).

In contrast, if questioning proceeds at a quick pace, and inferior work is periodically criticized, students' perceive the teacher's questioning behavior as challenging them to think quickly, but at a high level. This procedure may be most appropriate for those students who are very competent in a subject area, or as a review mechanism (Bachor, 1985). Both these questioning techniques give information to the students as to the teacher's expectations, which in turn, is a factor in shaping their performance.

The influence of teachers' questioning is also shown by the positive relationship between the level of teachers' verbal behavior and the level of students' thinking. Costa (1991) related various levels of questions and statements to desired cognitive behaviors. Teachers consciously controlling their questioning behavior can be a factor in shaping the cognitive level of student responses. Questions which relate to the meaning of words, or to factual knowledge, facilitate students learning of new information; questions which focus upon students applying or analyzing the content lead students to think in terms of drawing meaningful relationships, and/or applying relationships to hypothetical or novel situations. The use of 'lower level' questions and the resultant thinking has the function of setting the stage for higher level questions and thinking.

The use of 'question chains' is another way of using questions as a vehicle for mediation. Questioning chains are a series of questions which lead students to discover their own answers. Such chains begin with a specific focus using closed-ended questions:

How shall we start to find x?

What do you call this process?

What kind of character is John?

When it is established that the student has noticed the significant bits of information needed to solve the problem, the focus is expanded:

What processes can we use to simplify the equation?

What by-products does this process often lead to?

What do you notice about John's behavior?

As the students' skill improves when questioning chains are used, the focus can be expanded again by asking questions which emphasize student responsibility in the learning process:

What should we do first?

What is the goal of this exercise?

In stories, what is the first kind of question we usually ask?

Questioning chains may begin with closed-ended questions, but should end with a more general, open-ended focus. How? and why? questions are more open-ended than the what? or what next? type, and could be used at the end of a question chain (Feuerstein, Rand, Hoffman, & Miller, 1979; Pace, 1987).

Like most instructional techniques or teaching strategies, different ways of approaching questioning can be taught to pupils as learning strategies; teacher questioning translates into pupils' self-questioning. Teaching students to self-question closely relates to the goal of facilitating students to become independent learners (Palincsar & Brown, 1981).

As teacher-pupil questioning takes place within classrooms, teachers should explicitly explain they are questioning in the manner being modeled, perhaps through the use of cognitive modeling (Meichenbaum, 1986). Pupils can be taught to use and to consciously vary the levels of questions according to the task requirements. They can also be taught to generate their own question chains. This approach facilitates their ability to self-question. When students can self-question during the learning process, they increase their ability to understand the material being presented (Mulcahy, Marfo, Peat, & Andrews, 1987). In short, they become self-mediating, independent learners, who automatically utilize a deep approach to learning.

Cognitive Modeling

Cognitive modeling is one way that mediation can be fine-tuned; a way that teachers can make their mediation to students more explicit and specific. In order to clarify what is meant by "cognitive modeling", a comparison of cognitive modeling with demonstration follows.

Demonstration occurs when a teacher's presentation proceeds according to plan; the chemicals react properly; the math problem is solved; spelling is correct. However, in the "real" world, experiments don't always work; students, like inventors or researchers, sometimes choose the wrong formula to try first; like writers, they make spelling errors.

In contrast, cognitive modeling is "talking-through" the thinking process as actual problems are being solved. This includes false starts, blind alleys and dealing with mistakes. Teachers using cognitive modeling are required to verbally share their thinking processes with their students so that they can gain some insight as to how the process works. It enables them to view how thinking takes place in the real world (Meichenbaum, 1986; Mulcahy, Marfo, Peat, & Andrews, 1987; Pace, 1991).

Students can be encouraged to talk-through learning tasks in order to enhance their clarity of thought. While working in pairs and speaking out loud about what's going on in their minds, students gain insight into the thinking processes of each other. Concentration on a task is also improved for some learners through talking out-loud during task completion (Meichenbaum, 1986; Wimbey & Lochhead, 1985). As well, talking through a task using task-relevant statements has been shown to improve students' use of cognitive strategies (Meichenbaum, 1986).

Informed Metacognitive Training

In the 3P Model, learners using a deep, metacognitive approach to learning are described as being able to generalize components of learning across multiple tasks — in other words, they are able to transfer; to apply what is learned in the classroom to other situations and settings.

Bigg's 3P formulation is consistent with the claims of metacognitive training: it has the potential to not only improve the academic performance of pupils in specific areas (e.g., reading & memory), but when this instruction is *informed*, transfer appears to take place. Informed instruction is "training with awareness" (Brown, 1982; Nickerson, 1988; Pressley, Borkowski, & Schneider, 1987; Pressley, Goodchild, Fleet, Zajchowski, & Evans, 1989). Metacognitive training is highly mediative; learning/thinking strategies are consciously applied to a learning task, and the students are very aware of the reasons for the application (Palincsar & Ransom, 1990; Perkins & Salomon, 1989; Pressley et al., 1990). It includes:

1. detailed instructions on how strategies should be used;
2. consistent use of the strategies across a variety of problems, materials and settings;
3. information about the usefulness of the strategies;
4. extensive practice of the strategies with teacher reminders and prompts gradually being faded out; and
5. explicit teaching for generalization (Meichenbaum, 1986).

Notice that informed metacognitive training involves explicit teaching for generalization. The conscious control of metacognitive skills and strategies is a crucial factor, influencing the process of students transferring their academic learning between subjects and even to their "life-worlds".

How should explicit teaching for generalization be undertaken? Ellis, Lenz, and Sabornie (1987) described systematic instruction for transfer as addressing at least the following four levels of generalization:

1. *Antecedent Generalization*: This is when the attitude of the learner toward the acquisition of the skill or knowledge is addressed. The learner must understand the reasons for learning before meaningful learning can begin.

2. *Concurrent Generalization:* This refers to insuring that the skill is acquired well enough for it to become generalized.

3. *Subsequent Generalization:* The purpose of this stage of generalization is to continue to facilitate the use of learned skills in multiple contexts such as other subject areas, vocational settings, inter-personal relationships, and in the home.

4. *Independent Generalization:* At this stage the responsibility for generalization is shifted away from the teachers and/or peers to the student.

Informed metacognitive training, then, appears to be one way to foster a deep approach to learning in that it increases the metacognitive awareness of students. However, it is important to remember that the goal of instruction is not to produce metacognitive students (i.e., a reified end state), but to foster students engaging in a deep approach to learning because they are consciously utilizing their metacognition (Paris, 1990).

What are strategies?

In the descriptions of the above three mediative approaches to teaching, the term "strategy" was used frequently, but not defined. Strategies include a much broader array of skills than simply the use of various heuristics or study techniques. They can be thought of as a set of tools that enables a learner to more effectively and efficiently obtain, think about, remember, modify and apply new information (Mulcahy, Marfo, Peat, & Andrews, 1987; Paris, 1990). The more comprehensive the tool kit, the better equipped is the student for the learning task.

There are some tools which have very specific purposes and others, such as a screwdriver, which are used for many tasks. The same holds true for learning/thinking strategies. Some strategies, such as a mnemonic for remembering the note names of the treble clef, are useful only for remembering or learning very specific information; others, such as a textbook review strategy, are applicable across many different subjects and situations.

Some tools are used to protect the individual, such as protective eye wear, while others, such as hammers and saws, are to build or repair. Strategies as well, can be tools that apply either to the person, or to the material being learned. The strategies a person uses to approach a learning task, including the control of emotional factors such as stress and attitude, apply chiefly to the individual and are analogous to the eye wear illustration above. Other strategies which operate primarily during the learning process, after initial exposure to material, and in determining how the information is applied in various situations and settings are similar to the hammer and saw (Dansereau, 1985).

A *few* examples of familiar strategies are contained in Figure 3. Notice that these thinking tools are organized according to the framework derived from the notion that most learning requires different skills and strategies at different stages of learning (Jones, Palincsar, Ogle, & Carr, 1987; Marzano et al., 1988; Paris, 1990). The decision as to which strategies to include is arbitrary, as is their position on the continuum; they are presented to illustrate that learning may require different skills and strategies at different stages of learning. However, also note that *it may be appropriate to use the same strategy* at differing stages of learning. As an example, an extremely versatile strategy, **brainstorming**, is shown in bold type within the figure.

FIGURE 3: Strategy Examples

PREPARATION FOR LEARNING	PROCESSING OF INFORMATION	CONSOLIDATING/ EXTENDING NEW INFORMATION
Attending	Brainstorming	
Reading headings	Observing	Classifying	Using precise language
Locating	Visualizing	Role playing
Identifying	Inferring	Speaking
	Labeling	Paraphrasing
Brainstorming	Synthesizing	
Positive self-talk	Concluding	Brainstorming
	Predicting	Graphing
Recalling	Hypothesizing	Self-rewarding
	Discovering or Predicting Relationships	
Relaxation/visual imagery to control stress		Resolving
	Talking through the task	Assessing
		Validating

(Peat, 1989; Alberta Education, 1990)

The Significant Role of Emotion and Motives

Students' strategy choices can be greatly affected by attitudes and motivation. Following the 3P Model (See Figure 1), this is particularly evident in the process component, where emotion and motives (presage factors) combine with strategies to derive an approach to learning. Learning behavior is greatly influenced by how students construe, interpret, and process information about a given situation (Biggs, 1987; Dweck, 1986; Paris & Byrnes, 1989). Students who consciously utilize metacognitive knowledge in their learning, or to use Bigg's terms, use a deep approach, exhibit and increase over time in their independence and control of learning (Brown, 1982). With this increase comes a greater feeling of personal competence in academic settings. Increased personal competence improves feelings of personal worth. Students who feel competent, and who focus on effort as being a major factor in learning, are willing to try new tasks, even when these are difficult (Pace, 1987; Paris & Byrnes, 1989; Paris & Oka, 1986; Paris & Winograd, 1990). In order to foster feelings of competence in academic settings, teachers'

focus of instruction and praise should be on the role of effort and strategy selection in achieving success, rather than solely on performance (Pressley, Borkowski, & Schneider, 1987; Pressley, Goodchild, Fleet, Zajchowski, & Evans, 1989).

Summary

John Biggs' 3P Model of Learning was presented as a comprehensive model that includes an explanation of different kinds or types of learning. Based upon the model, the deep approach to learning was identified as needing to be fostered in the school context. Instructional implications of encouraging a deep approach to learning were outlined. Facilitating the growth of metacognition in students was advanced as a key objective of instruction; it provided the link between students adopting a deep approach to learning and the various methodologies, goals and factors described.

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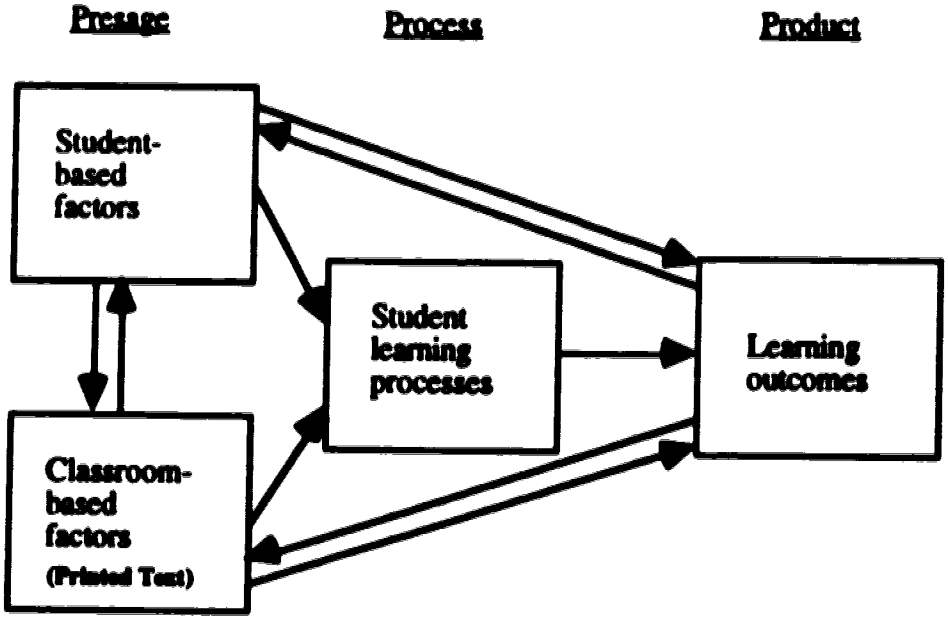
PREAMBLE TO CHAPTER III – VIEWING THE CLASSROOM AS A SYSTEM

The 3P model of learning as described in Chapter II, can be extended to represent the system of a classroom. As Figure 1 illustrates, an instructional environment is also comprised of presage, process and product factors.

FIGURE 1: 3P Model of the Classroom as a System



Adapted from Biggs, 1991

Chapter III, entitled, "Learning Resources Evaluation: A 'Considerate' Framework for Educators", focuses on one classroom-based factor, printed text. The kernel of the argument presented is as follows – print materials are an integral part of instruction; since changing one element in a classroom brings about change in others and establishes a new equilibrium (note the arrows in Figure 1); then it is important that the learning resources utilized in a classroom support, rather than detract from, Cognitive Strategy-based Instruction.

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CHAPTER III — LEARNING RESOURCES EVALUATION: A 'CONSIDERATE' FRAMEWORK FOR EDUCATORS

"Easy reading is damned hard writing".
(Nathaniel Hawthorne)

INTRODUCTION

Printed text remains an integral part of classroom instruction and may even be the dominant medium (Ariav, 1991; Armbruster & Anderson, 1988; Barr, 1987). "Curriculum and the materials that accompany it are the primary forces in determining what a teacher presents to children" (Holahan, McFarland, & Piccilo, 1994, p.88). However, the control over choosing which learning resources are used in classrooms has shifted from teachers to publishers and editors due to the 'basalization' of whole language materials coupled with governments' approval, adoption and funding of commercial series (Malicky, 1991). As well, since the majority of teachers have not been trained to evaluate materials for classroom use (Ariav, 1991; Muther, 1985), decisions concerning which learning resources to use tend to be disorganized and non-systematic (Bailey, 1988) and based upon faulty conventional wisdom (Ariav, 1991). As well, curriculum choice and evaluation does not reflect the wide range of learning, cognitive and developmental characteristics of the heterogenous student population found in 'regular' classes, but rather is targeted only towards 'normally' achieving students (Holohan, Mcfarland & Piccillo, 1994).

The intent of this chapter is to present practical and immediately usable information to teachers concerning curriculum evaluation. In order to accomplish this goal, the *Learning Resources Evaluation Guide* is introduced, including a brief summary of the theoretical background which directed its development. The *Learning Resources Evaluation Guide* is an instrument designed to assist teachers and other educators in the process of choosing instructional materials; its check-list format was selected in order to encourage immediate utilization. The guide reflects current trends in educational service delivery and is consistent with, and supportive of, contemporary advances in instructional methodology and curriculum design.

Trends in Educational Service Delivery

Exclusion of young people from the mainstream of education by virtue of a disability is becoming less and less acceptable to educational systems and society in general (Andrews & Lupart, 1993; McBride, 1990; Presidential Task Force on Psychology in Education, 1993). In some jurisdictions, the responsibility now lies with school boards to defend instances where educational programs for students with special needs are offered in classrooms set apart from their non-disabled peers. More and more instructional approaches and materials for students with special needs are learner-focused rather than directed towards the instruction of self-contained groups of students. Support in the form of curriculum materials, technology and personnel are services directed towards individual students in regular classes to the greatest degree possible. Rather than students with special needs being required to accommodate to established educational programs, teachers, schools and individual classrooms are being asked to flexibly adapt to the needs of individual students (Andrews & Lupart, 1993; Carson & Peat, 1992; Wilgosh, 1992).

These trends — meeting the needs of individuals rather than groups of students and the inclusion of students with physical and intellectual disabilities in "regular" classrooms — have direct implications upon the types of learning resources needed and the way they are utilized. Teachers require "hands-on" knowledge regarding how to choose materials which are "friendly" or "considerate" to the wide range of student needs resident in their classrooms. Classroom teachers are now obligated to acquire in-depth knowledge concerning the attributes of learners that formerly were largely served in "resource room" and/or segregated settings. This includes, but is not limited to, students with mild intellectual disabilities, children with learning disabilities, and students who are gifted.

Guidelines and checklists which presently exist for text and material selection do not offer suggestions as to how they may be applied to the selection of materials for students with special needs (Ariav, 1991; Bailey, 1988; Singer & Dolan, 1989). In order to begin to rectify this situation, *general* developmental and learning characteristics of the

three specific populations previously mentioned (i.e., students with mild intellectual disabilities; children with learning disabilities; and students who are gifted) will be described. Learning resource implications and procedures for selecting materials that are particularly salient to these populations are also discussed.

Viewing the Classroom as a System

The notion of designing and evaluating learning resources for students with particular learning characteristics, as well as considering instructional principles derived from cognitive psychology and instructional methodology in materials development, may have applicability to all forms of instructional media. The operation of entire educational service delivery may require evaluation and re-design (Derry & Murphy, 1986; Henderson, 1986; Mulcahy, Peat, Andrews, Clifford, Darko-Yeboah, Norman, Cheng, Marfo, & Cho, 1993). Biggs' 3P Model of Learning (see Chapter II, this volume) captures the notion that changing one element in a classroom brings about change in others, and establishes a new equilibrium (Biggs, 1991a). Since print materials are an integral part of instruction (Ariav, 1991; Armbruster & Anderson, 1988; Barr, 1987; Holohan, Mcfarland, & Piccillo, 1994), it is vital that the learning resources used support, and are consistent with, the view of learning espoused by the teacher.

To illustrate, a teacher who views learning as a process of understanding, encourages students to use factual knowledge as a means to comprehend their world, and, conversely, discourages their establishing a cumulative base of *inert* factual knowledge (de Corte, 1990; Marzano et al., 1988; Peat & Mulcahy, 1990). If the same teacher utilizes textual material emphasizing *rote* factual knowledge, with an accompanying teacher's manual which provides assessment questions and formats that emphasize acquiring facts, students will receive an opposing message from the text versus the teacher about which aspects of learning are important. "Students read their messages from what teachers actually *do* in their teaching and assessing, not from what they *say*" (Biggs, 1991a, p. 22).

The methods *and* the learning resources used in a classroom should both consistently relay similar messages to the students; specifically that thinking is valued, expected and required. In order to foster this approach to learning, teachers need to be able to flexibly draw on a wide diversity of teaching skills, particularly those involving teacher-student interactions. The connections between questions and responses should be made explicit, with teachers' verbal interactions checking on students' understanding. Teaching practice should illustrate the view that "it is the students who must make the connections in the end" (Biggs, 1991b, p. 46).

The concept of "mediated learning" (Feuerstein, Rand, Hoffman, & Miller, 1979) can be applied to the determination of whether or not various methods *or instructional materials* foster students developing a view of learning as a way of understanding their world. Mediated learning occurs when the nature of the interaction between the learner and the environment is intentionally influenced, usually by a supportive person. Drawing on the Vygotskian notion of the "zone of proximal development", mediated learning is most effective when instruction takes place at a difficulty level just beyond what the learner can do independently, but is not so difficult that the concept cannot be learned with appropriate guidance (Harris & Pressley, 1991; Reid & Stone, 1991; Vygotsky, 1962). Mediated learning experiences are the major means by which children develop the thinking skills necessary for learning independently (Brown, 1982).

In the classroom the mediator is primarily the teacher. However, classroom mediation may also include interaction between pupils, and/or between pupils and the instructional material or medium. Mediation involves at least these three factors:

a) The interaction must be meaningful to the learner.

b) There must be an intention on the part of the mediator that the child learn something.

c) Mediation must have a goal beyond the immediate needs of the situation (transcendence) (Feuerstein, Rand, Hoffman, & Miller,

1979; Pace, 1987).

Mediation Embedded in Learning Resources

As previously indicated, the reality of current classroom teaching requires that teachers deal with a wider range of student needs than was previously the case. Learning resources should, at minimum, support the personal mediation taking place within the classroom, and possibly provide a level of mediation for some students so that the need for teacher mediation is lessened. Phrased another way, considerate learning resources may have the potential to lower the amount of teacher mediation required (Carson & Peat, 1991; Derry & Murphy, 1986; Henderson, 1986). Four general principles that can be used to analyze the level of "curricular" mediation, derived from cognitive psychology and instructional methodology, are: i) the degree of contextualization; ii) the degree of concretization; ii) the use of redundancy; and, iv) the extent that active student engagement with the text is encouraged within the resource.

Context Embedded in the Materials

Contextualization refers to how closely the student's knowledge base (both experiential and factual) relates to what is taking place in the classroom. Heavily contextualized text, through its writing, illustrations, suggested extension activities, and so on, facilitates connections being made by the student to the material. Contextualization also refers to whether or not the material explicitly deacribes connections between 'subject areas'. It can also be thought of as "connectedness" — links between procedural and conceptual knowledge to other curriculum areas and to our daily lives (Cawley, Baker-Kroczynski, & Urban, 1992). Although a master teacher may be able to orchestrate a highly meaningful learning experience using only the simplest learning resources, exemplary text should also, to some degree, provide a context for the learner (Fogarty, 1991; McCarthy, Gilberstad, Miller, O'Henley, Lindquist, Lord, & Peat, 1992). Following Feuerstein et al.'s (1979) view of mediation, heavily contextualized text should increase meaningfulness for the reader; it also illustrates the principle of transcendence.

"Concretization" Embedded in the Materials

Concreteness refers to the degree to which the material relates directly to students in terms of their perceptions. The majority of younger school-age children (K-1), and smaller proportions of students in grades two and three, view their world from a sensory orientation (Hilgard & Bower, 1975). In general terms, all primary students with cognitive disabilities require a high degree of concretization. Their thinking relies on the concrete things they can see, touch, hear, smell and taste. Further, they only focus on one aspect of an object at a time. Concretization in learning resources refers to the degree that these developmental aspects are accounted for in the design of the materials; increased meaning for the reader should result when developmental factors are utilized in the design of a learning resource. As students develop cognitively and are able to think more abstractly, the need for highly concrete textual materials is reduced. However, whenever new or novel concepts are introduced, concrete examples and non-examples may be helpful for all ages of learners, including adults (Alberta Education, 1987; Carson & Peat, 1991).

The concrete-to-abstract notion also applies to graphic systems, for "as a graphic system's ability to abstract increases, the contribution required of the perceiver similarly must increase" (Owen, 1986, p.158). A concrete-to-abstract continuum of graphics includes: i) iconic models; ii) movies; iii) photographs; iv) drawings; v) symbolic diagrams, vi) mathematics, and vii) writing systems (Owen, 1986). The types of questions that are asked by the text about the accompanying graphics also follow a concrete to abstract continuum. For example, "elementary" questions simply involve data extraction; "intermediate" level questions involve inquiry concerning trends in parts of the data; and, "'overall' level questions require an understanding of the deep structure of the data being presented in totality, usually comparing trends and seeing groupings" (Wainer, 1992).

Redundancy Embedded in the Materials

Redundancy refers to the use of controlled repetition to promote learning. The degree of redundancy may be influenced through the use of a variety of representations of

the same content in different modalities, or via the writing style (i.e., saying the same thing in different ways). The use of redundancy should be tailored to intended audiences. For example, students with mild cognitive disabilities may require a great deal of redundancy (Winzer, 1990) in contrast to gifted individuals who would likely respond negatively to a learning resource with much repetition.

Students' Active Engagement with the Materials

Student engagement refers to the degree to which the learner is involved in learning from the text. Both process-outcome researchers (see Brophy, 1988) and those from the constructivist perspective (see Paris & Byrnes, 1989) agree that students learn best when they are actively involved in the learning process. Achievement increases when students succeed as a result of their own efforts. A key question in terms of learning resources then, is "to what degree does the text encourage students to be involved in and take charge of their own learning?" (Carson & Peat, 1991).

Recent Advances in Instructional Methodology and Curriculum Design

Fortunately, a great deal of information exists about the nature of learning resources which can be termed considerate; unfortunately, much of it resides in academic journals seldom read by classroom teachers. Considerate or friendly text simply means that the textual material is designed to "facilitate understanding, learning, and remembering" (Anderson & Armbruster, 1983; Armbruster & Anderson, 1985; Leonard, 1990; Singer & Donlan, 1989). It assumes that the most important purpose of content-area textbooks is to inform the *reader* about the content, and that authors and readers have to cooperate in order for the communication to work (Kantor, Anderson, & Armbruster, 1983).

The *Learning Resources Evaluation Guide* (Figure 1) contains, in checklist form, a summary of information derived from cognitive psychology and instructional methodology about: i) instructional devices that aid reader's comprehension, and; ii) textual features that support students' personal development of learning/thinking strategies. Friendly learning

resources are designed to mediate learning; to support students in their construction of personal meanings, and to facilitate the transfer of what is learned to other situations and settings (Mulcahy, Marfo, Peat, & Andrews, 1987; Pace, 1991).

FIGURE 1: Learning Resources Evaluation Guide

Learning Resources Evaluation Guide

[*Curriculum Resource* :_____]

Overall Perspective of Evaluation: Are materials structured to enhance students' learning and retention? Is there a focus on the thinking processes employed? Does the text enhance strategy acquisition, generalization and transfer of learning/thinking strategies, and facilitate the development of critical and creative thinking?... How?

	Adequate	Not Applicable	Refer to Comments

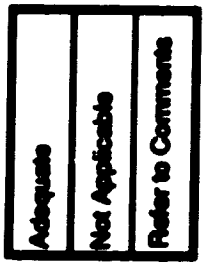
A — IS THE TEXT CONSIDERATE?

Content:

Is at the appropriate content level for the audience.			
Identifies clear objectives.			
Concepts/ideas are linked to and/or developed from previously acquired knowledge (i.e., coherent with logical connections).			
Concepts are presented using both examples and non-examples.			
There are clear subheadings.			
There are clear headings.			
Headings and subheadings reflect the structure of the content.			
There are clear introductions to each major section.			
There are clear summaries after each major section.			

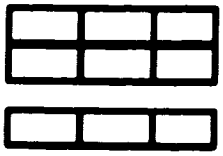
Writing Style:

Is at the appropriate reading level for the audience (i.e., are the words likely to be understood by the reader?)			
Sufficient relation to the students' personal experience using anecdotes, visual or verbal analogies, and/or concrete examples.			
Paragraphs have an obvious main idea.			
Paragraph's supporting details relate to main idea.			
Paragraphs are short (maximum 75 words).			
Vocabulary is concrete and familiar.			
New terms are defined; examples given.			
Verbs are active, present tense.			
"You" is employed in instructions.			
Lists are divided into groups to facilitate remembering.			
Presents opportunities to learn through interaction with environment.			



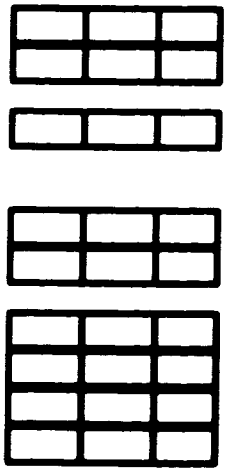
Focusing Techniques:

The reader is told to focus (i.e., "Notice that the lever....").
Questions are used in the text, and for introductory and summary purposes.
Cueing devices are used to attract attention to specific points (variations in typeface, boxes, underlining, spacing).



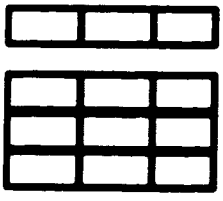
Illustrations:

Visuals are at the appropriate level of abstraction.
Visuals are clear, easily identifiable (e.g., well labeled) and attractive.
Visuals are obviously related to information presented in nearby written text (show spatial relationships, make comparisons, convey quantitative information).
When a process is illustrated, there is one picture per step.
Visual references are used to indicate size of unknown objects (i.e., ruler, penny, etc.).
Lines, blurring or streaking are used to show motion.
Line graphs show quantity changes over time.
Bar graphs compare magnitude or size.
Circle graphs compare parts with the whole.



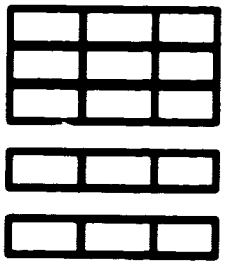
Page Organization:

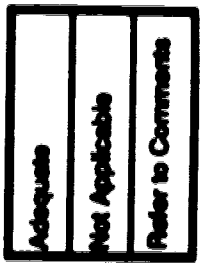
Printed material is limited to 4x6 inches with an ample margin at the top and bottom.
Structure is similar from page to page.
Organization is apparent.
Different ideas are clearly separated using headings or white space.



Accessibility of Information:

There is a detailed Table of Contents.
There is a cross-referenced Index.
Tabs are used to provide physical assistance to get from one section to another.
Colour is used to associate various blocks of information (tabs; header, footer; colour bar on top, side or bottom).
Headers or footers maintain consistency within sections.





Headings or special messages in outside margins.
Sections are paged (i.e., 2-43; (section 2, page 43).

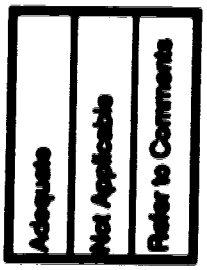
Typography:

Font size is 9-12 point.
Font type has serifs (tails on letters).
Stroke is medium; condensed type is not used.
Capital letter lines are not used.
Numbers are not written out in text.
Arabic rather than Roman numerals are used.
Font variety is used only if the intent is to slow down the reader on key points.
Spacing is consistent between words.
Line spacing is at least equivalent to word spacing.
Dark coloured pages are avoided in order to have moderately high contrast level between background and type.
Line length has a minimum of 26 characters, maximum of 53.
There are approximately 55 lines per page of text.
Right justification is not used.

B — DOES THE TEXT SUPPORT THE EXPLICIT TEACHING OF LEARNING/THINKING STRATEGIES?

Strategy Acquisition:

Presents thinking as requiring considerable mental work.
Promotes problem solving, decision making, curiosity, spontaneity, and risk-taking.
Drill and practice incorporated in meaningful settings and activities.
Explicitly uses a variety of knowledge acquisition strategies (e.g., focusing, information gathering, accessing).
Explicitly uses a variety of knowledge retention strategies (e.g., recall, remembering).
Explicitly uses a variety of knowledge manipulation and reformulation strategies (e.g., strategies emphasizing organizational skills such as comparing, classifying, ordering, representing; summarizing, transforming).



Explicitly uses a variety of knowledge application strategies (e.g., strategies emphasizing analysis, synthesis, evaluation).

Explicitly uses a variety of critical/creative thinking strategies (e.g., constructively questions established ideas, examines and assesses a variety of viewpoints before forming an opinion/making a decision, reflective thinking such as delaying the formation of an opinion, generating alternatives).

Provides opportunities for practice of strategies.

Provides opportunities for feedback of strategies used.

Provides an adequate number of assessment opportunities both for individuals and groups.

Encourages the acceptance of student ideas.

Generalization and Transfer:

Directs the responsibility for learning to the learner.

Presents an increasing degree of self-selection of activities.

Makes explicit reference to overlap of subject material.

Reinforces key concepts and skills at various points in the text.

Promotes discussion about both content and learning/thinking strategies, utilizes open-ended questions, and poses problems that have multiple solutions.

Links with activities outside of school (e.g., with community).

Uses learning/thinking strategies in differing situations and settings (e.g., academic, non-academic, social).

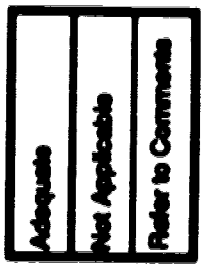
Makes suggestions for cooperative learning activities (e.g., among individuals with different abilities, interests ,...with similar abilities, interests,...).

Makes suggestions for cooperative planning (e.g., between disciplines, school themes).

Represents concepts in a variety of ways.

Utilizes a variety of modalities (verbal, quantitative, spatial/visual, figurative, symbolic, bodily-kinesthetic).

Introduces concepts, processes, systems through using them, analyzing or reflecting on them.



Assists in the development of effective study and research skills.			
Provides a variety of assessment methods — both formal and informal (e.g., chapter/unit tests, observation of students, anecdotal record keeping, project work, progress charts, cloze tasks, fill in the blanks, multiple choice, short answer, essay, oral; getting the facts, drawing conclusions, finding the main idea, stating the implications, further study questions...).			

Comments: _____

_____

_____

_____

(Adapted from McClelland & Peat, 1988)

Very few, if any, learning resources will include all of the features listed in the *Learning Resources Evaluation Guide*. Some of the textual devices shown are more important than others; some are applicable to all students; some only to specific sub-groups of students. Consistent with the notion of learner-focused instruction, keeping a particular student, or a small group of students with similar characteristics in mind while using the checklist may be beneficial. In order to facilitate this application of the *Learning Resources Evaluation Guide* to the selection of materials for exceptional students, *general* learning characteristics of students with mild intellectual disabilities, for children with learning disabilities, and for students who are gifted are described below.

Student Learning Characteristics: Implications for Choosing Curricular Resources

Students With Mild Intellectual Disabilities

It is important to note that although the following characteristics are clustered according to exceptionality, they do not apply to all members of the group and are characteristic of many "average" individuals. These general, pervasive characteristics of each population are presented to encourage the development of a concept of student needs as they apply to choosing curriculum. The following nine learning characteristics are typically found with students with mild intellectual impairments (Andrews & Lupart, 1993; Berdine & Blackhurst, 1985):

i) acquire new information and/or skills (e.g., language) more slowly than peers, and tend to forget sooner;

ii) experience difficulty in isolating and focusing on relevant auditory and visual information;

iii) learn in concrete ways and, conversely, find learning abstract concepts difficult;

iv) generally fail to develop learning/thinking strategies for attacking new problems;

v) tend not to learn incidentally (i.e., they must be specifically taught skills that some other students learn through observation);

vi) once learned, they tend not to generalize concepts and/or learning/thinking strategies to new situations or settings;

vii) require over-learning and repetition in order to retain concepts in long-term memory;

viii) tend towards reticence in attempting new learning due to a lack of previous success; and

ix) display poor self-monitoring and/or evaluation of their own performance.

As illustrated by Figure 2 below, the general learner characteristics of students who are mildly intellectually disabled have numerous and major implications for choosing exemplary materials for these learners.

FIGURE 2: Learning Characteristics of Students with Mild Intellectual Disabilities: Implications for Choosing Curricular Resources

Student Group	Implications for Curriculum Materials
Students who are Mildly Intellectually Disabled	• examples and non-examples should be included. • concepts should be systematically presented one at a time, and at a concrete level. • concept descriptions should include simple objects such as toys, clothing and the children themselves so that the concept is supported by familiar objects. • photographs and realistic drawings should be used to support the text. • the resource should provide for experiential learning. • redundancy within the resource should support over-learning in order to promote retention. • drill and practice should be incorporated into meaningful settings and activities. • sentence patterns should not be overly complex, but should not simplify by omitting needed connections between ideas (be alert for unusual or unpredictable sentence patterns and the use of long, involved sentences which will increase the reading difficulty). • be aware that the use of idiom and dialect increases the reading difficulty. • be aware of signal words (but, although, since) which are associated with contrast, negation, and time and may not be well understood. • pronoun referents should not be ambiguous. • topic sentences should usually be at the beginning or end of paragraphs; paragraphs should be cohesive and have a main point. • objectives should be explicit and clearly identifiable. • appropriate learning strategies including explicit aids for remembering should be embedded within the text. • the resource supports or consists of integrated multi-sensory components. • the learner should be told to focus ("See how the boy..."). • the resource encourages or allows learners to have sufficient processing time. [This is often a concern with video and audio media.] • introductions, headings, and subheadings should help clarify content. In addition, features such as a table of contents, index, glossary, chapter and topic titles which reflect content, are important reading aids. • advance organizers & summaries should help clarify content • devices should be available which assist in interpreting, explaining, or defining terms (alternate representations of the same content should be provided). • cueing devices should be used to attract attention to specific points (variations in typeface, boxes, underlining, spacing). • visuals should not be too dark or cluttered, and should not have competing elements.

- layout should be consistent from page to page.
- a variety of different types of visuals should be used to support and represent concepts (flow charts, webs, diagrams, tables).
- text should provide students with "how to use", "how to read", "how to approach/study information", and study aids.

(Adapted from Carson & Peat, 1991; Leonard, 1990)

Following the information concerning students with mild intellectual disabilities given above, items on the *Learning Resources Evaluation Guide* of particular importance for these students include: a concrete content level; the presentation of concepts using both examples and non-examples; concrete, familiar vocabulary; opportunities to learn through interaction with the environment; visuals at the concrete level of abstraction; and drill and practice incorporated in meaningful settings and activities (Nelson, Cummings, & Boltman, 1991).

Students Who Are Learning Disabled

Although students with learning disabilities are an extremely heterogeneous group, the following five pervasive learning characteristics are typically found with students who are learning disabled (Andrews & Lupart, 1993; Berdine & Blackhurst, 1985):

i) experience difficulties in focusing attention and receiving information;

ii) tend not to learn incidentally — are passive in their approach to learning;

iii) processing and generalizing written and spoken information from one situation or setting to another may be difficult;

iv) may find it laborious to produce written information even though the content is understood; and,

v) may use learning/thinking strategies that are inefficient or may not have developed a repertoire of these strategies, nor the knowledge of when or how to use them (Torgesen, 1980; Wong, 1986).

For students with learning disabilities, textual features described on the *Learning Resources Evaluation Guide* under the headings of "strategy acquisition" and "generalization and transfer" are especially applicable (See Figure 3).

FIGURE 3: Learning Characteristics of Students with Learning Disabilities: Implications for Choosing Curricular Resources

Student Group	Implications for Curriculum Materials
Students with Learning Disabilities	• introductions, headings, and subheadings should help clarify content. In addition, features such as a table of contents, index, glossary, chapter and topic titles which reflect content are important reading aids. • advance organizers & summaries should help clarify content • be aware that the use of idiom and dialect increases the reading difficulty. • devices should be available which assist in interpreting, explaining, or defining terms. Alternate representations of the same content should be provided. • cueing devices should be used to attract attention to specific points (variations in typeface, boxes, underlining, spacing). • visuals should not be too dark or cluttered, and should not have competing elements. • the hierarchy of information and the relationship amongst ideas should be clearly communicated through effective and efficient use of contrasting print size and style. • appropriate learning strategies including explicit aids for remembering should be embedded within the text. • the resource supports or consists of integrated multi-sensory components. • a variety of different types of visuals should be used to support and represent concepts (flow charts, webs, diagrams, tables). • text should provide students with "how to use", "how to read", "how to approach/study information", and study aids. • the learner should be told to focus ("See how the boy..."). • examples and non-examples should be included. • visuals should be placed to effectively support textual content and not interrupt reading orviewing, and should not be used unnecessarily. • font variation should only be used as a cueing device. • layout should feature appropriate use of text, visuals, and backgrounds (they should not be distracting). • appropriate learning strategies, including explicit aids for remembering, should be embedded within the text.

(Adapted from Carson & Peat, 1991; Leonard, 1990)

Students Who are Gifted

The following five learning characteristics are typically found with students who are gifted (Andrews & Lupart, 1993; Berdine & Blackhurst, 1985):

i) have diverse interests (e.g., like to know what makes things and people 'tick');

ii) are drawn to abstract ideas and complex concepts;

iii) need to control amount of time for learning (e.g., quickly learn basic concepts, but require increased time for in-depth study of areas of interest);

iv) enjoy opportunities to display evidence of reasoning (e.g., free-wheeling discussion, role-playing); and,

v) need to control learning situation and topics of study (e.g. thrive in self-directed learning situations; learn best in a student-centred, complex and accepting learning environment that provides for a high degree of mobility).

Some of the above learner characteristics have implications for learning resource selection that would mean that the features of materials chosen for students who are gifted may be directly opposite to those which are chosen to enhance learning for students with mild intellectual disabilities (e.g., compare Figure 4 with Figure 3).

FIGURE 4: Learning Characteristics of Students who are Gifted: Implications for Choosing Curricular Resources

Student Group	Implications for Curriculum Materials
Students who are Gifted	• there should be a low degree of redundancy *(i.e., higher level of difficulty)* • a variety of contexts may be described in the text *(i.e., links with a broad picture)* • discussion should be promoted in order to facilitate generalization and transfer of concepts. • opportunities for discovery should be provided. • questioning, thinking, reacting, and reflection should be promoted. • problems which have multiple solutions should be posed. • a number of decision options should be provided. Decisions may be at varying levels of abstraction, open-ended, and negotiable. • materials should facilitate critical thinking skills. • ideas should be logically developed, presented, and expanded *(perhaps written at a more abstract level than the usual 'graded' materials).* • the text may include idiom and dialect to extend and/or enrich meaning.

(Adapted from Carson & Peat, 1991; Leonard, 1990)

Summary

Comprehension is affected, but not assured by improved organization and appropriate content of texts (Kirby, 1991). As teachers become more familiar with evaluating and choosing classroom learning resources which support student learning, it is hoped that they will begin to construct their own perceptions of considerate classroom materials. The *Learning Resources Evaluation Guide* is designed as a tool to raise awareness about what aspects of text are most helpful to students (Ariav, 1991). Its utilization should help teachers to focus, not upon how useful texts are for their administrative and instructional needs, but rather upon how resources aid *students'* learning. By being more aware of friendly textual features and of the way materials can be designed to enhance students' learning, educators should begin to acquire the knowledge and skills necessary to choose the best of what is commercially available for instructional use. Using considerate textual materials and explaining to students *how* to use the textual

features to improve their own learning are two practical ways teachers can improve the effectiveness of their instruction (Gambrell & Jawitz, 1993; Idol, 1988; McKeown, Beck, Sinatra, & Loxterman, 1992; Peat & Mulcahy, 1990; Piccolo, 1987; Singer & Donlan, 1989).

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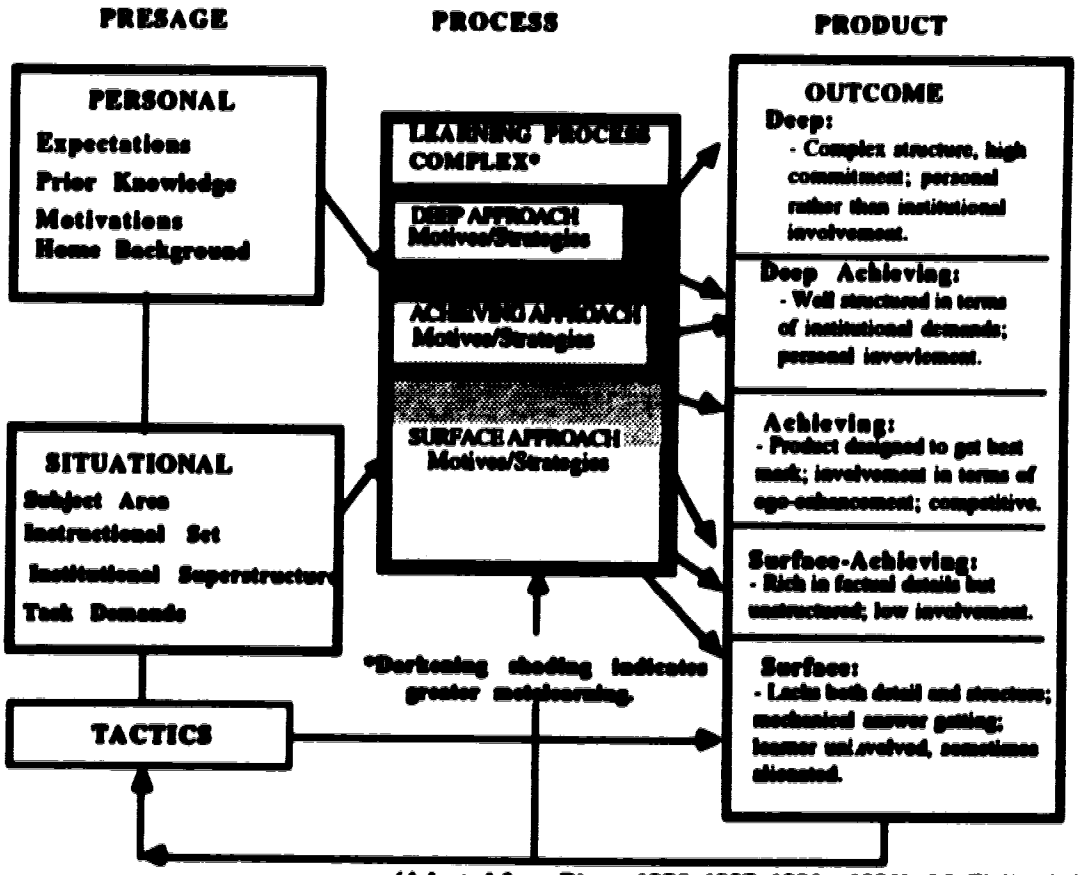
CHAPTER IV — ARE DEEP LEARNERS MORE METACOGNITIVE?

Introduction

The relationships between "deep" versus "surface" learners and metacognitive processes have been comprehensively described by others (Biggs, 1985, 1987, 1991a, 1991b; Biggs & Collis, 1982; de Corte, 1990; Marton and Säljö, 1976). To summarize some of their insights, deep learners are those who try to understand the intention of the material and search for relations within it, as opposed to surface learners who focus on memorizing content. The notion of metacognition is embedded within models of learning which distinguish between deep and surface learners. The 3P Model of Learning (Figure 1) describes this relationship in detail.

FIGURE 1: 3P Model of Learning



(Adapted from Biggs, 1985, 1987, 1991a, 1991b; McClelland, 1988)

The 3P Model views learning as an integrated system comprised of three main components: presage, process, and product, hence the '3P'. Learning is portrayed as an interconnected set of elements in a state of equilibrium; to "change any one element will bring about change in others, and thus establish a new equilibrium" (Biggs, 1991b, p. 36).

Presage factors exist prior to learning and are of two kinds — personal and situational. Personal factors pertain to the student and include abilities, expectations and motivations for learning, conceptions of what learning is, prior knowledge, home background, and the like. Situational factors are those pertaining to the teaching context and include the course structure, curriculum content, methods of teaching, and so on. Situational factors are largely outside students' control due to their being determined by teachers and the educational institution. This context generates the "climate" for learning which has important motivational components (Biggs, 1985, 1991a, 1991b).

The *learning process complex* concerns how the students interpret the teaching context in the light of their own preconceptions, motivations, and strategic repertoire; this interpretation is comprised of a sophisticated kind of metacognitive activity called "metalearning". It is "the rather specialized application of metacognition to the area of student learning. Metalearning, then, is a subprocess of metacognition (in much the same way as are metamemory and metamotivation) that refers specifically to learning and study processes in institutional settings, and more particularly to students' *awareness* of their motives, and *control* over their strategy selection and deployment" (Biggs, 1985, p.192). Metalearning, then, involves the twin components of metacognition evident in the literature: *cognitive self-appraisal* and *self-management* (Biggs, 1991a, 1991b, Brown, 1978; Flavell, 1976, 1979; Mulcahy, Peat, Mancini, Andrews & Marfo, 1989; Paris, Wasik & van der Westhuizen, 1988). Metalearning is the means by which students derive their approaches to learning; the approaches, in turn, determine the learning outcome. Task specific *tactics* do not involve metalearning but are performed purely at the rote learning level and are simply "methods used to gain an end" (Snowman, 1986, p. 244).

The deepening shading of the process component of Figure 1 represents the greater influence of metalearning in deep versus surface learning. It visually illustrates the idea that individuals engaging in a surface approach to learning are often not aware of the motives and strategies in operation during the learning process, but are guided by a "gut-feeling" (Kirby, 1991; Rigney, 1978). In contrast, individuals using a deep approach operate from an awareness of their own perceptions of motives, strategies and the task; they are able to express why they should or should not be using a particular strategy or completing a specific task.

Students' strategies and motives (learning process complex) help determine, through the process of metalearning, how students approach their learning. Three approaches — *deep*, *achieving*, and *surface* (Biggs, 1987, 1991a, 1991b) are described by the 3P Model. A *Deep* approach is characterized by students who are intrinsically motivated; who see the learning task as interesting and personally involving; who focus upon underlying meaning rather than on rote facts or concrete, literal interpretations; and who study to increase knowledge and/or competence in particular subjects. The various task components are integrated with other tasks and with each other. For example, students who display a deep approach to learning read widely, discuss ideas with others, and may theorize and hypothesize about aspects of the task which they find particularly interesting (Biggs, 1985, 1991a, 1991b). They view learning in qualitative terms; as "an interpretive process aimed at understanding reality" (de Corte, 1990, p. 246).

A *surface* approach is indicated by learning that is motivated extrinsically, by factors such as gaining qualifications with pass-only aspirations and a corresponding fear of failure. Learning is viewed as a means to some other end, with the students' foci centering upon concrete and literal aspects of the task (Biggs, 1985, 1991a, 1991b). Surface learners view learning mainly in quantitative terms; as memorizing, acquiring and using an ever-increasing number of facts (de Corte, 1990).

At any given time surface and deep approaches are mutually exclusive. However, the third approach — *achieving* — may be connected to either of the other two. For instance, surface-achievers systematically memorize detail to obtain high grades; deep-achievers are planful and organized in their pursuit of both meaning and high grades. The achieving approach is based upon the extrinsic motive of ego-enhancement that comes from visibly obtaining high grades; marks are seen as important and worthy of competitive effort.

These approaches to learning apply to two levels of generality: i) the way an individual characteristically goes about most academic tasks and, ii) the way a particular task is handled by a student at a certain point in time.

The arrows linking the product factors back to both the process and presage factors in Figure 1, illustrate that although situational presage factors are not controlled by the student, at least some of the personal presage factors appear *not* to be 'relatively stable', particularly those related to motivation, but rather amenable to change.

Presage and process factors interact with one another and relate to performance outcomes. Performance is seen as mediated by how the individual thinks and perceives reality. The three approaches described above generally lead to the outcome categories as described in Figure 1. Deep outcomes are exemplified by products of high structural complexity. Typically, surface outcomes are those which are rich in factual detail, but are not inter-related in a complex, conceptual manner. The achieving approach generally correlates with school performance (Biggs, 1985, 1987, 1991a, 1991b; Biggs & Collis, 1982).

The relationship between deep versus surface learning and metacognition, at least in terms of reading, can be inferred from several studies investigating metacognitive reading awareness. Metacognitive awareness about reading refers to a person's awareness concerning four variables which influence the reading process: i) goal/motive, ii) personal, iii) task, and iv) strategy (Brown, 1982; Flavell, 1979; Garner, 1987; Kirby, 1991).

Based on the results of numerous studies comparing younger and poorer readers with older and better readers, some generalizations can be made. Older and better readers' strategies and motives are largely based upon the conception of reading as "meaning-getting". In contrast, younger and poorer readers tend to focus upon the decoding aspects of reading. As well, younger readers are generally less aware of the broad range of strategy, task and person variables which interact with the reading process (see e.g. Cheng, 1993; Kirby, 1991; Moore & Kirby, 1981; and Myers & Paris, 1978). In one study, these generalizations held whether or not the method of assessing readers' metacognitive knowledge about reading was through verbal interview or questionnaire (Cheng, 1993).

The positive relationship between metacognitive reading awareness and reading comprehension, then, has been firmly established. If, as Figure 1 illustrates, deep learners are more metacognitively aware than surface learners, then younger and poorer readers would more likely approach learning from a surface, rather than a deep, perspective. The question posed by this study relates to whether or not increased metacognitive reading awareness is positively related to how individuals characteristically approach *most* academic tasks, not *just* reading comprehension. In other words, is highly developed metacognitive awareness of the reading process a strong predictor of a deep approach to learning?...and conversely, is poor metacognitive development indicative of a surface approach to learning?

Method

The data used in this analysis is a sub-set from a broader study which took place in Catholic systemic primary schools in the Armidale Diocese of New South Wales, Australia. The larger study was concerned with examining the effects of the implementation of a cognitive/metacognitive approach to education in primary classes on the development of autonomous learners (Paterson, 1993; Wilgosh, Mulcahy, Peat, Patterson, & Knight, 1992). Two of the assessment devices administered to students during the pre-test phase

of the study were the *Learning Process Questionnaire: Elementary Edition* (Mulcahy & Biggs, 1991), and the *Metacognitive Reading Awareness Questionnaire* (Cheng & Mulcahy, 1991, 1992).

Subjects

Schools participating in the study ranged in size from 143 students with 7 teachers, to 539 students with 22 teachers, and were located in rural communities in the north-west region of New South Wales. Students assessed were selected due to their teachers volunteering to participate. The 490 subjects were students in grades four, five, and six, from 17 classrooms and 4 schools. Their age range was from eight to twelve. Although detailed SES analysis of the students was not undertaken, discussions with the school principals suggested that the students represented a broad range of socio-economic backgrounds. Only a small number were reported to be of aboriginal origin (Patterson, 1993). Group administration of the measures for all participating students took place at the beginning of Term One, 1992 (Patterson, 1993; Wilgosh, Mulcahy, Peat, Patterson, & Knight, 1992).

Test Instruments

The data collected from the study, due to the instrumentation [*Learning Process Questionnaire: Elementary Edition* (LPQ-E) (Mulcahy & Biggs, 1991), and the *Metacognitive Reading Awareness Questionnaire* (MRAQ) (Cheng & Mulcahy, 1991)] provided an opportunity for further analysis; the greater influence of metalearning in deep versus 'surface' learning proposed by the 3P Model could be empirically examined.

The LPQ-E (Mulcahy & Biggs, 1991) is a revision of the original *Learning Process Questionnaire* (LPQ) (Biggs, 1987). Retaining the intent of the original 36 LPQ items, all items were revised to the vocabulary and conceptual level of elementary students. The respondents rate themselves on each item using a 5-point Likert scale. Following the 3P model previously described, the items were designed to measure, in

this order: i) surface motives; ii) deep motives; iii) achieving motives; iv) surface strategies; v) deep strategies; and, vi) achieving strategies. Motive and strategy scores are united to produce scores representing three approaches to learning (deep, surface or achieving), which in turn are combined to form two composite scores; "surface-achieving" and "deep-achieving" (Cheng, 1993; Patterson, 1993).

Previous pilot studies using the LPQ-E had taken place in south-central Alberta, Canada, with approximately 600 grade 4-6 students and in Korea with similar numbers and grade levels. The Korean version was translated into Korean, then independently translated back into English in order to confirm the accuracy of the translation. In both of these pilot studies, factor analysis supported a two-factor structure specifically 'deep-achieving' and 'surface-achieving' (R. Mulcahy, personal communication, August, 1992; Cheng, 1993), findings parallel to those of the original Australian LPQ (Biggs, 1987). Statistical data concerning reliability, showed that test-retest reliability coefficients for subscale scores are between .49 and .70, with internal consistency coefficients for the subscales ranging form .45 to .78.

Construct validity for the LPQ has been established through earlier research (Biggs, 1987) which showed that scale scores relate to student performance in consistent ways. For example, scores on the LPQ which indicate a surface approach to learning are negatively correlated with ability and internal locus of control; in contrast, those which indicate a deep approach to learning are positively correlated with internal locus of control (Biggs, 1987).

The *Metacognitive Reading Awareness Questionnaire* (MRAQ) (Cheng & Mulcahy, 1991) was developed to accurately and precisely measure readers' metacognitive knowledge. It is an improvement over the verbal interview approach to assessment inasmuch as verbal ability confounds are minimized by the multiple-choice format, and the instrument is suitable for both individual and group administration. As well, the twenty questions are scored according to a five point scoring scale (See Figure

2), which encompasses a wider range than was previously available on similar instruments (e.g., Jacobs & Paris, 1987). The answers to the twenty multiple-choice questions were generated from interview responses using the same question stems.

FIGURE 2: MRAQ Scoring Scale

Question	10. What does the first sentence usually do for a paragraph or story?	
Score	**Response**	**Category/type**
0	It starts with a capital letter	irrelevant
1	It begins with "once upon a time" or "one day".	no explanation
2	It tells what happens first.	general explanation
3	It describes the people, the setting, the time, etc..	specific explanation
4	It tells what the story will be about.	specific explanation with greatest meta-cognitive awareness

(Cheng, & Mulcahy, 1992)

Construct validity for instruments similar to the MRAQ has been established by earlier research (Myers & Paris, 1978; Jacobs & Paris, 1987; Mulcahy, Peat, Andrews, Clifford, Darko-Yeboah, Norman, Cheng, Marfo, & Cho, 1993) which indicated that this form of assessment is sensitive to changes in awareness related to individual differences in age, sex and reading ability.

Inter-rater reliability for the corresponding interview form of the MRAQ is reported to be at 93% (Cheng & Mulcahy, 1992); reliability for the MRAQ using parallel forms is reported as R = .81 (Patterson, 1993).

Results

The correlational matrix (see Table 1) was generated by using SPSS^X REGRESSION with an assist from SPSS^X FREQUENCIES for evaluation of assumptions. The assumptions of normality, linearity and homoscedasticity of residuals were met for each of the variables used (Tabachnick & Fidell, 1989).

As illustrated by the correlations in Table 1, a significant relationship was demonstrated between the metacognitive awareness of students, as measured by the MRAQ and two scores of the LPQ-E, specifically: i) the "deep motive" sub-scale score; and, ii) the "deep achieving" composite score,. Unexpectedly, there was an indication of motive-strategy incongruence in the results in that the 'deep strategy' subscale score was not significantly correlated to metacognitive reading awareness as measured by the MRAQ.

TABLE 1: Correlation Matrix (MRAQ and LPQ-E)

	SM	DM	AM	SS	DS	AS	SA	DA
SM	1.0000							
DM	.2375**	1.0000						
AM	.3999**	.4608**	1.0000					
SS	.3853**	.3186**	.3813**	1.0000				
DS	.3517**	.4879**	.4898**	.3114**	1.0000			
AS	.2540**	.5090**	.4925**	.3229**	.5610**	1.000		
SA	.8683**	.3263**	.4669**	.7913**	.3964**	.3383**	1.000	
DA	.3819**	.7760**	.7654**	.4184**	.7985**	.8098**	.4730**	1.000
TOT	.6285**	.7142**	.7609**	.6225**	.7608**	.7455**	.7472**	.9409**
MRAQ	.0478	.2038**	.1258	-.0707	-.0095	.1393	-.0059	.1586*

* Significance level <.05 ** Significance level <.01 (2-tailed)

Key i) LPQ-E: SM=surface motive; DM=deep motive; AM=achieving motive; SS=surface strategy; DS=deep strategy; AS=achieving strategy; SA=surface approach; DA=deep achieving approach; TOT=total LPQ score.
ii) MRAQ: Metacognitive Reading Achievement Questionnaire Total Score.

Discussion

The findings in this study are generally what would be predicted following the 3P Model of Learning. As expected, a significant relationship was demonstrated between deep learning, in terms of motives and achievement, and metacognitive reading awareness. The theoretical position that deep learners are more metacognitive was supported.

The results indicate that at the grade 4, 5 and 6 level, motives appear to be more powerfully related to metacognitive awareness than actual strategy use, for, of the six sub-test factors on the LPQ, only 'deep motive' was significantly related to

metacognitive reading awareness. This is consistent with Carr & Borkowski's view (1988) that attributional beliefs play the pivotal role in children's cognitive development and may either impede or enhance the acquisition of strategic and metacognitive knowledge.

'Achieving strategies' were positively correlated with metacognitive reading awareness, unlike 'deep strategies' which were negatively related. This may be more a reflection of the classroom environment than of the metacognitive development of the students. Classroom rewards emphasize achievement (e.g., the obtaining of high grades) more than learning due to intrinsic interest in subject matter. Students consciously aware of this (i.e., more metacognitive), would likely choose to utilize achieving rather than deep strategies.

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CHAPTER V — AN EXAMINATION OF THE EFFICACY OF COGNITIVE STRATEGY-BASED INSTRUCTION WITH ELEMENTARY STUDENTS WHO ARE LEARNING DISABLED

"...nothing in schooling is more noble than the goal of developing learners' skills so that they become independent of us, their teachers, and have the potential to surpass us in knowledge and understanding."
(White & Baird, 1991, p. 146)

Introduction

The data used for this study draws upon and extends the research results of a three-year longitudinal study, the *Cognitive Education Project (CEP).* The CEP was a cooperative venture between the Department of Educational Psychology, University of Alberta, the Department of Education of the Government of Alberta, and various school districts throughout north-central Alberta. The project was established to undertake a long-term evaluation of two cognitive education programs in relation to conventional instruction in terms of their impact on student performance in four major areas: cognitive ability, academic achievement, affect and motivation, and learning/thinking and problem-solving strategies. The two cognitive education programs were the *Strategies Program for Effective Learning/Thinking* (SPELT) (Mulcahy, Marfo, Peat, & Andrews, 1987) and *Instrumental Enrichment* (IE) (Feuerstein, Rand, Hoffman, & Miller, 1980). An overview of the context of data collection used for the present analysis is provided in Figure 1, the *CEP Overall Research Design.*

FIGURE 1: CEP Overall Study Design

	Oct.	June	Oct.	June	June	June
Phase 1:						
Grade 4						
All*	**PRE**	**PT1**	--	**PT2**	**PT3**	--
Grade 7						
IE	**PRE**	**PT1**	--	**PT2**	**PT3**	--
CONTROL	**PRE**	**PT1**	--	**PT2**	**PT3**	--
Phase 2:						
Grade 4						
IE			**PRE**	**PT1**	**PT2**	**PT3**
SPELT			**PRE**	**PT1**	**PT2**	**PT3**
Grade 7						
All*			**PRE**	**PT1**	**PT2**	**PT3**

*All refers to all 3 instructional conditions. (Mulcahy et al., 1993a)

As illustrated above, the study was conducted in two major phases; the first phase began in October, 1984. During Phase 1, at the grade 4 level, there were three types of instructional conditions: IE, SPELT and traditional. At grade 7, only two types of instructional conditions were implemented: IE and traditional. The SPELT condition at grade 7 level was not implemented until Phase 2 in the fall of 1985. Phase 2 began in October 1985, with some new subjects in SPELT and IE at grade 4, and new subjects in IE, SPELT and traditional instruction at grade 7 (Detailed results, including program descriptions, are contained in Marfo, et al., 1991; Mulcahy, 1991; Mulcahy et al., 1991, 1993a, 1993b; Mulcahy, Peat, Mancini, Andrews, & Marfo, 1989; Mulcahy, Wilgosh, & Peat, 1990, 1991).

The differential effects of the programs on gifted, average achieving, and learning disabled students were also investigated. For purposes of the CEP, students with learning disabilities (LD) were defined as:

> those who obtained scores within one standard deviation of the mean on both the verbal and nonverbal sub-scales of the [Canadian Cognitive Abilities Test] CCAT (85-115), (and)

> obtained achievement scores of approximately one standard deviation or more below the mean on the reading sub-scale of the [Canadian Achievement Test] CAT. (Mulcahy et al., 1993b, pp. 8-9)

Average-achieving students were defined as:

> those who obtained scores within one standard deviation of the mean on both the verbal and nonverbal sub-scales of the [Canadian Cognitive Abilities Test] CCAT (85-115), (and) obtained achievement scores on the reading and math sub-scales of the [Canadian Achievement Test] CAT within one standard deviation from the mean. (Mulcahy et al., 1993b, p. 8)

Gifted students were defined as:

> those who obtained scores of 115 or higher on the verbal and the nonverbal sub-scales of the Canadian Cognitive Abilities Test (CCAT), were rated as being above average in achievement in reading and at/or above grade level in math on the Canadian Achievement Test (CAT), (and) were rated as being above the mean (of the total study population) on all three of the Renzulli and Hartman's Scales for the Rating of Behavioral Characteristics of Superior Students (SRBCSS) categories (i.e., motivation, learning, and creativity characteristics). (Mulcahy et al., 1993b, p. 8)

Results as they relate to average-achieving and gifted students are available from Mulcahy et al. (1993a). The initial CEP findings have clear implications regarding the student impact of Cognitive Strategy-based Instruction, particularly with elementary learning disabled students. The statistically significant positive results of implementing

Cognitive Strategy-based Instruction, with respect to students with learning disabilities at the grade four level, are summarized in Table 1.

Table 1
3-year ANOVA Results for Grade 4/LD

Variable	Program Effect
Cognitive Ability	No
Academic Achievement	
a)Math Computation	No
b)Math Concepts and Application	Yes(1,2)
c)Reading Vocabulary	No
d)Reading Comprehension	Yes(2)
Affective Perceptions	
a)Perceived Competence	No
b)Self Concept	No
c)Locus of Control	Yes(1,2)
Cognitive Strategies	
a)Reading Strategies Awareness	Yes(1,2)
b)Reading Cloze Performance	Yes(2)
c)Comprehension Monitoring	Yes(2)
d)Math Problem Solving Strategies	Yes(2)
e)Perceived Problem Solving Ability	No

KEY: 1 = IE; 2 = SPELT (Mulcahy et al, 1993a)

The CEP results summarized above were all derived utilizing the same basic analyses for all variables; it consisted of two-way ANOVAs with the first factor being the experimental group (IE, SPELT, Control) and the second being the testing points (Pre-test and Post-test after maintenance). Experimental students were involved in two years of intervention, then were followed for one year after intervention was discontinued. The changes shown, therefore, were maintained for one year after the withdrawal of Cognitive Strategies-based Instruction (See Mulcahy et al., 1993a, 1993b, for details of the instrumentation).

The univariate analyses used in the CEP clearly demonstrated the program effects for students with learning disabilities in terms of individual variables (Mulcahy et al., 1993a, 1993b). It is particularly significant to note that positive changes in academic achievement, as measured by standardized achievement tests, were shown for the LD students in both experimental conditions. For the SPELT group significant improvement

was noted in math (concepts and applications) and in reading comprehension; for the IE students, significant favorable change was shown in math only. These results add support to the notion that one of the distinguishing characteristics of children with learning disabilities is their passive learning style (Torgesen, 1977, 1982; Wong, 1982). One of the goals of SPELT instruction is not only to engage students in the active use of learning/thinking strategies, but also to encourage them to go beyond the passive acceptance of teacher-imposed strategies to the *active generation* of new ones (Mulcahy, Marfo, Peat, and Andrews, 1987).

As well, Cognitive Strategies-based Instruction was shown to be effective in improving student thinking, particularly in comprehension monitoring skills. Moreover, experimental effects were observed with respect to locus of control: the students involved in Cognitive Strategies-based Instruction displayed an increase in overall internal locus of control after two years of instruction, increasing responsibility for their own success experiences when compared with controls. These results suggest that when this form of instruction is used, it may prevent some students from developing severe learning problems, may decrease their being caught in the vortex of "learned helplessness" (Fincham & Cain, 1986), and may be instrumental in keeping them in mainstreamed classes rather than their requiring Special Education placement (Mulcahy, et al., 1993a, 1993b).

The advantages of the univariate approach were in the neatly structured and relatively straightforward interpretation of research results. Each dependent variable could be viewed separately, with the differential outcomes of the instructional programs on the three categories of students clearly shown at the two grade levels (Mulcahy et al., 1993a).

Method

At the conclusion of the *CEP Final Report*, Mulcahy et al. (1993b, p. 31) stated that "the impact of the teaching of cognitive strategies on the learning disabled students, particularly at grade 4, suggests that if the teaching approaches are used systematically

throughout the elementary school, it may prevent some students from developing severe learning problems, and keep them in the mainstream". Using hierarchical discriminant function analysis, this suggested implication of Mulcahy et al. will be empirically tested. The purpose of this chapter, then, is to present the findings from a further analysis of the data collected concerning LD students at the grade 4 level, expressly focusing upon the SPELT program. Specifically, the following research question is examined:

- For the LD students in both the Control Group and the SPELT Condition: Could students identified as LD at the pre-test point be reliably predicted to remain in LD group three years later (i.e., the final post-test point)?

Discriminant function analysis is most frequently used to "predict group membership from a set of a predictors" (Tabachnick & Fidell, 1989, p. 505). For this study, discriminant function analysis was used for a different purpose; to the author's knowledge, a new and unique application. The main purpose of the analysis was not to test the accuracy of the categories *per se*, but rather as an extremely rigorous test of the effects of the Cognitive Strategy-based intervention. The logic of this approach is as follows.

There were two possible outcomes of the analysis:

i) Students in the SPELT condition originally (pre-test) categorized as LD would no longer be thus labeled three years later (post-test). This result would highlight the intervention as very powerful and positive for those individuals. This finding would be strengthened if the LD category remained stable over time in the control group, or weakened, if the LD category also broke down in the control condition.

ii) Students in the SPELT condition originally (pre-test) categorized as LD would remain so categorized three years later (post-test).

> This result would bring into question the intervention, in practical terms, as either powerful or positive for these LD individuals. Positive intervention claims would be particularly damaged if, as well, the LD group remained stable over time in the control condition (i.e., both control and experimental conditions remain the same over time).

Direct discriminant function analyses were performed using SPSS^{PC} DISCRIMINANT. Evaluation of assumptions of linearity, normality, multicollinearity or singularity, and homogeneity of variance-covariance matrices using SPSS^{PC} FREQUENCIES, revealed no threat to multivariate analysis. Of the original 170 cases, one was dropped from the analysis because of missing data.

The first two discriminant function analyses were applied to determine whether or not the original categorization differentiated between the LD versus average-achieving versus gifted students in the CEP. Based upon the original CEP categorization of student groups, three variables were used as predictors of membership in the three groups for both SPELT and Control conditions: i) pre-test scores on the verbal sub-scale of the CCAT; ii) pre-test scores on the nonverbal sub-scale of the CCAT; and, c) pre-test achievement scores on the reading sub-scale of the CAT. The SRBCSS results could not be applied to this analysis since they were only used in the CEP for the identification of gifted students.

Two further discriminant function analyses were applied to determine whether or not the original categories of students as LD versus average versus gifted, in both SPELT and Control conditions held for the two years of intervention plus one year of maintenance. The same three variables were used to determine group membership. The results of the four analyses are summarized as follows in Tables 2 & 3:

TABLE 2: CLASSIFICATION RESULTS: ACTUAL VERSUS PREDICTED GROUP MEMBERSHIP - CONTROL CONDITION

Actual Group Membership (Pre-test Point)	#/% of Cases	Predicted Group Membership (Post-test Point) LD	Average	Gifted
LD	22/23 95.7%	19 82.6%	4 17.4%	0 0.0%
Average	33/33 100%	5 15.2%	24 72.7%	4 12.1%
Gifted	34/36 94.4%	1 2.8%	3 8.3%	32 88.9%
Percent of 'grouped' cases correctly classified: 96.74%		Percent of 'grouped' cases correctly classified: 81.52%		

TABLE 3: CLASSIFICATION RESULTS: ACTUAL VERSUS PREDICTED GROUP MEMBERSHIP - SPELT CONDITION

Actual Group Membership (Pre-test Point)	#/% of Cases	Predicted Group Membership (Post-test Point) LD	Average	Gifted
LD	22/22 100%	3 61.9%	6 28.6%	12+ 9.5%
Average	28/28 100%	12 42.9%	11 39.3%	5 17.9%
Gifted	24/29 82.8%	1 3.4%	1 3.4%	27 93.1%
Percent of 'grouped' cases correctly classified: 93.67%		Percent of 'grouped' cases correctly classified: 65.38%		

+ One case missing due to missing variable

Discussion

As Tables 2 and 3 illustrate, at the pre-test point, the data supports the use of CAT and CCAT scores to differentiate between students with learning disabilities, versus students with average abilities versus students who are gifted (LD: 95.7-100% accuracy;

Average; 100% accuracy; gifted: 82.8-94.4% accuracy). It was expected that the identification of the gifted would be the least accurate since the third criteria used in the CEP, the SRBCSS scores, could not be used in this analysis. Regression effects (both to and away from the mean for LD and gifted groups, respectively) could account for the classification changes at the post-test point in the control condition.

At the post-test point, the percent of 'grouped' cases correctly classified by the predictors differed greatly for the control versus the SPELT instructional conditions. In the control condition, the accuracy of predicted group membership was 81.52%; for the SPELT group, 65.38%. The lack of accuracy of prediction for students of average ability in both experimental conditions, illustrates the difficulties of using broad measures of achievement and ability to classify students who are not at extreme ends of the normative samples.

However, the difference in accuracy of prediction between the Control versus SPELT conditions was particularly noticeable for both the LD and the gifted diagnostic groups. For the LD group in the SPELT condition, only 61.9% of the students originally classified as LD fit the same category after two years of Cognitive Strategy-based Instruction, and one year of maintenance (i.e., withdrawal of experimental instruction). This is in comparison to 82.6% of LD members of the control condition, a difference of 19.7%. As well, 9.5% of students receiving Cognitive Strategy-based Instruction moved from the LD category to the 'gifted' classification; in the control group none of the LD students exhibited the degree of change necessary to move them to the gifted category. The data concerning the gifted students in the SPELT condition shows that as a group, the gifted students *did not* regress towards the mean, but rather, continued to exhibit increasingly higher academic achievement. This is in direct contrast to gifted students in the control condition.

In summary, the above study highlights the powerful and positive effects of two years of SPELT Cognitive Strategy-based Instruction with both learning disabled and

gifted students. It was shown that a larger percentage of students originally (pre-test) categorized as LD were no longer thus labeled three years later (post-test), as compared to the control condition. The SPELT instructional intervention resulted in gifted students as a group, continuing to improve academically; these results were opposite to those of the gifted control group who, as expected, regressed towards the mean. The results are consistent with comments made by Bransford et al. when they stated, "……it is possible to help students improve considerably their abilities to comprehend and remember information. Clearly, this does not mean that effective training will necessarily eliminate all achievement differences among students. However, the results do suggest that an explicit emphasis on how, when and why to use various strategies can help students reach levels of achievement that they otherwise might never have attained" (Bransford, Vye, Adams, & Perfetto, 1989, pp. 236-237).

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