

## CHAPTER 9

### INSIGHTS: Exploring conceptual and pedagogical boundaries of information literacy : Cycle 6

#### Introduction

Having completed the four teacher action research cycles (5 A, B, C, D), and acknowledging the limitations of the analysis imposed by the decision to analyse the data within the parameters of the Framework itself, the researcher subsequently compared the evidence of these cycles with the evidence from Cycles 1 and 2 - the exploratory phase and literature review, with Cycle 3 - the development of the conceptual framework, and Cycle 4 - the development of the pedagogic framework, and derived insights grounded in the analysis of this data.

To confirm and strengthen the validity of these insights, a further detailed analysis of the coded NUD\*IST data was undertaken using a framework of questions, along with thematic searches of the annotated Endnote bibliographic database compiled in Cycles 1 - 4 (indexed with the controlled vocabulary the researcher developed to reflect the CILL assumptions and propositions - Appendix 6). The same indexing in terms were used in constructing the NUD\*IST coding framework. In combination they facilitated in-depth systematic 'criss-crossing the landscape' (Spiro et al., 1991b). This analysis of NUD\*IST data and Endnote data (Cycle 1 - 4) covered questions related to :

- the assumptions: context, coaching and control;
- use of propositions;
- Framework use, and changes made to the Framework;
- differences between the researcher's and teachers' perceptions;
- constructivist learning design concerns and emphases.

A re-analysis of the theoretical, epistemological and pedagogical insights which evolved from Cycles 1 - 4 was informed by this deeper analysis of Cycle 1 - 5 data (presented in tabular form in Appendix 2) and led to the development of nine major insights.

#### Theoretical insights

The central concepts - context, control, coach - were more than alliterative conveniences. They were demonstrably effective in Cycles 5 C and D as a focal point for teachers' teaching and shared reflection. In Cycle 5A and B teachers struggled with the word 'control', confusing it, at times with the concept of teacher control in the classroom. However, as illustrated in Chapter 8, the *concept* of giving students control of their learning increasingly underpinned teachers' coaching efforts, and emerging ideas, like proactive coaching, recognised the efficacy of emphasising the complex network of factors which contributed to control. This included establishing a better sense of purpose for the learning, more background knowledge, ensuring that students found (or were encouraged to find) the topic and the purpose for learning compelling and interesting, and ensuring that students were self-efficacious - could describe the skills and evaluate their use of them. Turning the negatives from the Cycle 2 analysis (Appendix 1) into positive constructivist propositions proved an effective framework for promoting a positive pedagogy which allowed *teachers* as well as students more control of the teaching and learning (Appendix 3b), ie:

1. Helping learners to authenticate learning;
2. Helping learners to establish prior knowledge;
3. Helping learners to establish ownership of learning;
4. Helping learners to define knowledge needs;
5. Coaching selection of information;
6. Coaching working with information;
7. Coaching construction of knowledge from information;
8. Coaching communication of knowledge;
9. Coaching skills proactively throughout the process
10. Evaluating formatively throughout ; evaluating collaboratively with students.

Propositions 1 - 4, in particular provided evidence that the theoretical underpinnings established in Chapter 4 are sustainable in practice, particularly in relation to the constructivist concept of control. Recognition of the need for student control was mirrored in recognition of the need for coaching. Teachers' recognised that they had assumed a level of student skill and that modelling skills proactively paid dividends in terms of greater student confidence and competence.

Where *the need* for a supportive context for the learning became particularly evident by its absence was in the provision of sufficient time to achieve this type of learning. In Chapter 4 lack of time was identified as a constraint impeding constructivist learning. In this study time assumed even more significance as a barrier than the literature had indicated. It was seen as the biggest constraint at all levels, with 120 separate NUD\*IST entries, a combination of factors including the burgeoning , interruptions and Education Review Office expectations at primary, conflicting curriculum and various examination and assessment requirements and timetabling at secondary, and, at tertiary, the shrinking amount of teaching time in relation to content to be covered and lack of time to teach requisite skills.

Other significant contextual constraints which coincided in these retrospective analyses (Appendix 1 and 2) included students' inadequate skill and literacy levels.

While Cycle 5 indicated that New Zealand teachers recognised that systemic constraints were the major impediment to information literacy learning, it was only in Cycle 5C that they felt sufficiently confident to see that, while some constraints were systemic and insuperable, others (like students' inadequate skill and literacy levels) were soluble, at least in part, through their efforts.

The benefit of this is the recognition that constructivist concepts can inform a robust pedagogic base but that, while these concepts can be sustained theoretically (as in Chapter 4), to be theory-in-practice requires a far more sustained and systematic analysis of constraints than has, to date, been undertaken.

Many of these constraints emerged as persistent explanatory themes early in the research, but the shift in teacher attitude from 'why we can't' to 'how we can' only emerged after six months of what, in retrospect' seemed like endlessly 'naming and blaming' - iterating through cycles of listing reasons why this type of learning did not, could not, might not 'work'. It appeared to the researcher that the 'naming of the devil' - the detailed description by each teacher at each level of how the constraints affected her/ him - was a *prerequisite* for the 'can do' change in Cycle 5 B and C. Given that we had met for an hour a week, and that teachers had put significant time, in addition, into shaping lessons, responding to transcripts and summaries, and recording students' reactions in more depth, this provides both an explanation for why (as in Appendix 1) so many teachers *and students* have had so much difficulty with 'enquiry'/RBL approaches to learning, and an indication of what might be needed to translate fundamentally sound theory into classroom practice.

In asking, in Cycle 6, whether the teachers' accounts mirrored concerns and issues in constructivist learning design (see Appendix 2 Table 11), the researcher concluded that concerns additional to time, for example, transfer, the entry level of students, over-full curricula, assessment requirements and teachers' own skill level were all reflected as issues, but, through the use of the Framework, were all discussed and resolved or seen, finally, as systemic and insoluble.

### **Epistemological insights**

While the shared Cycle 5 analysis in Chapters 7 and 8 focused on positive benefits and uses of the study, in the Cycle 6 retrospective analysis, the same 'negative analysis' was applied that had been applied to the RBL literature (see Appendix 1), using questions like, 'So what does this say about what teachers/ students CAN'T do? What are the gaps? What is missing? What are the negative comments?' This proved interesting and fruitful (see Appendix 2, Table 3, 4, 5 trends/ emphases).

What emerged was a category called 'View of learning' which highlighted an epistemological dimension which the researcher suggests has been insufficiently explored in the literature as a factor influencing the transformation of theory into practice, and is particularly significant in transforming constructivism into pedagogy, given the significance of the concept of learner control. The analysis suggests that student attitudes/ expectations were the secondly most frequently mentioned factor determining information literacy learning at all levels, but for different reasons at various levels. However, by inference, teachers' own views of learning, shaped their attitude to teaching in a constructivist learning environment as much as that of students.

Primary teachers tended to have a broad and undifferentiated view of learning which saw learning in vague, general terms of personal/ social (rather than cognitive) development, and they were sympathetic to the notion of enquiry to construct. These primary teachers, initially, had a 'skills-focus' but, beyond the rhetoric, an insufficiently differentiated view of the learning skills required for effective constructivist learning. One of the positive achievements of Cycle 5 was the degree to which the specificity of the Framework provided these teachers with the conceptual and technical vocabulary to differentiate and deepen their view of learning. This was mirrored in the growing commitment to and excitement engendered as the project progressed, reflected in Chapter 8 comments.

Secondary teachers' view of learning tended to reflect the pervasive feeling that recurred frequently in the transcripts that the secondary system would never accommodate this type of learning, and the best they could do was to improve specific skills within the context of the current system. This was only level where systemic constraints shaped a view of learning and teaching which deepened during the research, but remained consistent with their initial views.

Both tertiary teachers embraced a view of learning which, like that of the primary teachers, coincided with constructivist principles, but was better differentiated than that of the primary teachers (although neither was a trained teacher). Possibly because of this, their frustration was greater at the contrast with their students' view of learning which tended to be more narrowly vocational and instrumental than their view.

Of significance was the recurrent phenomenon in discussions between secondary and tertiary teachers, and to a lesser extent primary, which does not appear to feature in the earlier accounts of practitioner research (RBL and TBL) and constructivist literature. This was the implicit conflict between their view of learning (and commitment to the consequent pedagogy) and that held by their managers and colleagues. There were frequent mentions of institutional 'lip-service' paid to 'self-directed learning' at the same time as driving down (expensive) teacher-student contact hours and increasing the quota of independent student work irrespective of whether students had the skills to use that independence productively. The feeling of being marginalised by more 'traditional' staff

was reinforced by the extent to which this disparate group coalesced through these meetings into a *learning* group who valued the weekly/ fortnightly companionship, and whose sense of developing into a learning community changed the focus of the research from foregrounding the use of the Framework it to backgrounding it in favour of teacher-directed, narrative-based lengthy discussions about classroom practice, conditions and constraints (as explained in Chapter 1) which often explored areas far wider than the parameters of the research.

Students' views of learning, in retrospect, were no less significant a component in translating constructivist information literacy theory into practice.

Primary students' views of learning, not unexpectedly, were shaped by teacher expectations. What *was* unexpected was the evidence of the early age at which the 'project' model had consolidated as 'Teacher gives us a topic. We find a few facts and paste them up, manually or electronically.' This 'cognitive-bypass', 'collectomania', 'information pastiche' model of resource-based learning, explored at length in Chapter 2 and Appendix 1, was evident in the early phases of this study. What was evident from all four primary teachers was that, when they ceased to model, coach and insist on the use of analytical and metacognitive skills, students reverted to the 'project model' which had become an internalised view of learning. The extent of the need for this ongoing modelling, coaching, monitoring and reminding indicated that student models of learning are established early and are remarkably resistant to change even at primary. However, where teachers succeeded, students demonstrated a passion for learning and building knowledge (even when the topic appeared not immediately authentic in terms of students' interests) which was encouraging to all of us. This has been reflected in Chapter 7 and 8 transcripts.

Secondary students' views of learning, according to these teachers, were influenced by the secondary system and the pressures of content coverage determined by examination requirements. Even the toughest primary students (see Chapter 8) could be encouraged to commit to the learning, whereas at secondary the phenomenon of students, turned off learning and school, 'hardened' and resistant to *any* pedagogies emerged. Their view of learning stood in marked contrast to those students who wanted *knowledge* and liked to learn (even by taught) more than they enjoyed 'vague projects'. Teachers found it hard to accommodate these contrasting views of learning but noted that all students preferred spoonfeeding and structure, and responded well when they saw topics as relevant, and when they were given clear guidance.

The 'hardened' students could be assumed not to have continued on to tertiary education, and tertiary students were seen to have a far more instrumental and vocationally-shaped view of learning. Differences were seen between older and younger tertiary students. Younger students frequently imported secondary views of learning (teacher-driven, content-focused) and wanted the type of learning which allowed them to get the 'bit of paper' as quickly and easily as possible. This contrasted with the views of older and more mature students who used life experience to contextualise a practical and committed approach to learning, seeing it as a privilege and a means to probable vocational and economic longterm gains. Both views have significant implications for translating constructivist principles into pedagogy.

While, in Chapter 2, a contrast in world views or ontologies was suggested as one of the reasons for the separate and parallel development of information literacy concepts in RBL (largely librarian-focused) and TBL (largely teacher-focused) literatures, and it was suggested that librarians were information focused while teachers were learner-focused, this retrospective Cycle 6 analysis reveals a more complex reality.

These teachers were *teaching*-focused, and, while this did not preclude being learner-focused, their teaching was shaped more by systemic constraints and demands than it was

either by their personal epistemologies or their appreciation of their students' learning views, learning needs and learning skills.

In fact, one of the most significant insights, from the researcher's perspective, to emerge from the study was the extent to which the Framework allowed teachers to explore and articulate and reflect on (often, it seemed, for the first time) their own theories of learning and teaching and the implicit convergences and conflicts between their views and what was officially (and implicitly) mandated and sanctioned. This, in turn, seemed to give them lenses and frames of reference for expanding and deepening their ability to discuss student learning. This was an unexpected discovery, recognised retrospectively, by using NUD\*IST searching to reveal ongoing narratives - stories which started in Cycle 5A and continued through to Cycle 5D becoming more conceptually differentiated and offering far deeper and more probing explanations for student learning behaviours which revealed significant growth in their own ability to articulate views of learning and knowledge, and, in turn, their ability to offer students the ability to explore and articulate their own views of learning and knowledge.

In effect, the links between epistemological insights developed by teachers as the study progressed, and their ability to explore the pedagogical implications signalled one of the most exciting dimensions for future research.

Of interest, in relation to the dichotomy noted in RBL studies (see Chapter 2 and Appendix 1) between information retrieval and analysis of and reflection on that information - the suggested gap between 'information pastiche' and knowledge construction - it was interesting that teachers appeared to understand the difference, but lacked the knowledge of the skills needed to *teach* and encourage students to be critical and analytical users of the information they retrieved.

Likewise, knowledge of how information is organised and knowledge of information sources and resources and the tools and strategies needed to locate and extract information from an increasingly complex range of print and electronic sources, could be seen to be an increasingly important characteristic of the information literate teacher (and learner). These teachers did not see their view of knowledge and information retrieval as inadequate as usefully supplemented by the knowledge of the librarian. In contrast, while libraries and libraries were seen as an essential part of the 'mix' by tertiary teachers, primary and secondary were satisfied that the provision of information, and their knowledge of what was available, was more than adequate to guide students. There was more concern about the level of the available resources in relation to students' literacy levels than there was concern for the demands on learners posed by access to what Beswick characterised as the world of knowledge at their fingertips.

One of the researcher's expectations was that teachers' views of learning and knowledge would have reflected the impact of information technology. This seemed not to be so. In their discussions IT, like knowledge of how information sources are organised, seemed to be regarded as a 'non event'. There was, as with knowledge of organisation of information sources and resources, a 'just in time' approach where most teachers felt that they had the knowledge and skills to do what was currently required in the classroom, and there was no evidence of their own views of learning or epistemologies changing to accommodate the exponential increase of information and information and communication technologies. There was a firm commitment to the need for information technologies to be used (and guided) as *tools* for learning, but this view of learning seemed to have, by and large, remained uninfluenced by the 'information age'.

### **Pedagogical insights**

Because the purpose of the research was to develop a theoretically grounded pedagogy for information literacy learning which would improve the quality of that learning in the New Zealand classroom, the pedagogical insights were a more explicit analytic focus

throughout the study, evidenced in Cycle 5 C and D (Chapter 8) in particular. The pedagogic propositions had emerged from exhaustive distillation and synthesis of a formidable body of existing theory and practice (see Appendix 1) and, as Chapter 8 reveals, they proved useful signposts and guides for improving teachers' ability to teach and students' ability to learn. This progress has been examined under propositions in Chapter 8 and in Appendix 2 Table 2.

Cycle 6 provided the opportunity to probe further and distil some of these pedagogic insights further. The insights that follow represent pedagogic insights distilled from the re-analysis of RBL and TBL studies (summarised in Appendix 1) and the iteration back through Cycle 5 and preceding cycles (summarised in Appendix 2). It was suggested in Chapter 1 that a major contribution of the study was the analysis and synthesis of previously discrete bodies of research and theory. It is also suggested that this painstaking iteration between theory and practice produced some significant pedagogic insights which have advanced the development of a pedagogy of information literacy but also warrant further investigation.

**Pedagogic insight 1: The CILL Framework establishes conditions for successful information literacy learning. It provides a way of predicting success and analysing reasons for the failure.**

Studies carried out in resource-based learning (RBL) and related fields for several decades produced consistent evidence about how difficult students find these approaches to learning, and how difficult teachers find the teaching (Cycle 2). The three CILL assumptions and ten propositions were derived by analysing this body of studies (Cycle 3). Consistent and persistent negative characteristics were hypothesised as positive competencies. These hypothetical competencies were related to positive characteristics of 'technology-based learning' (TBL), to constructivist and related theories, and to constructivist learning design principles (Cycle 4). The resulting assumptions and propositions were trialled, as the CILL framework, in Cycle 5 of the action research.

**To the extent that the teachers participating in the research demonstrated that they and their students could achieve some success in all of the elements related to the propositions, it is suggested that these propositions might constitute some of the *conditions* required for effective information literacy learning.**

Applied retrospectively as conditions of learning, these propositions explain the largely negative findings about student learning in the significant body of British and American resource-based learning studies from the 70's, 80's (see Appendix 1) and New Zealand studies (1995a; Moore & St George, 1989). Many of these studies described problems honestly, but seldom analysed them in depth. The Thomson and Meek (1985) and Tabberer (1987) studies were exceptions. Here reasons suggested for the problems correspond to propositions/ conditions *not* met.

Applied retrospectively as conditions of learning these propositions also explain 'success' (Bruce, 1999; Curwood, 1995; Rankin, 1992a; Tallman, 1995; Todd, McNicholas, & Sivanesarajah, 1991; 1992). Here most of the CILL propositions/ conditions were met to a degree. In the two 'constructivist' studies outlined in Chapter 5, by Kuhlthau (1993a) and Moore (1998), the propositions/ conditions were not met, in the first instance because the process remained library-centred, and in the second because the related competencies were not coached effectively.

Applied as conditions of learning to the technology-based learning studies outlined in Chapter 2, there is correspondence between the conditions provided for successful TBL and the propositions/ conditions. This is more predictable because these studies were designed using constructivist learning design principles. In particular, the constructivist features underpinning the FCL project were demonstrated as conditions of successfully

coached CILL learning (Lamon et al., 1995, p. 4). The design of the FCL project, where students developed questions, sorted them into categories and then applied four key literacy activities (summarising, clarifying, questioning and predicting), mirrored the success encountered by the primary CILL participants when their students iterated between knowledge map, questions, applying and making sense of the information.

**Pedagogic insight 2: The three conceptual assumptions - context-coach-control - are sustained as pedagogical underpinnings of successful information literacy learning.**

Cycle 5 demonstrated that these three conceptual assumptions provide a powerful pedagogic model which has explanatory, diagnostic and predictive power. Cycle 5 ratified the interdependence of the assumptions - if any of the three is severely compromised, what results will not be constructivist information literacy learning as defined in this study.

CONTEXT (especially factors such as time, timetabling, curriculum coverage, resources, class size, teachers' models of learning, student models of learning and expectations) demonstrably influenced teachers' opportunity to COACH skills needed by students to CONTROL their learning. Students' transmissive/ instrumental models of learning (revealed at all levels), their skill and literacy levels, as well as CONTEXT factors (economic and time pressures, how students expected teachers to teach), demonstrably compromised their CONTROL of learning - self-efficacy and self-regulation - and attempts made by teachers to COACH metacognitive and metalearning strategies.

While the importance of many of these factors has long been recognised, the simple recognition of the *interdependence and balance* between them refines our understanding of key elements of an information literacy pedagogy.

Contextual constraints emerging in this study are not new: **lack of time** (for example, Baird & Northfield, 1992; Berliner, 1992; Carter, 1987; Cognition and Technology Group at Vanderbilt, 1993a; 1994a; 1994b; Gardner, 1993; Irving, 1985, pp. 36, 116; Juchau, 1984, p. ii; Laurillard, 1994; Mercer, 1992; Newsom, 1996; Perkins, 1992; Reusser, 1996; Rowbottom, 1983; Rudduck, 1991, p. 92), what Rudduck and Hopkins (1984, p. 114) called the "**tyranny of exams**" (see also, Ausubel, 1968; Biggs, 1993; Bjorner, 1991; Cognition and Technology Group at Vanderbilt, 1992; Norris & Sanger, 1984, p. 98), **transfer** (Hopkins, 1987; Irving, 1985; Lawson, 1991; Perkins, 1989; 1993; Winkworth, 1977; Zimmerman & Martinez-Pons, 1992), **curriculum overload** (Scardamalia & Bereiter, 1996). These contextual constraints, combined with coaching constraints, **teachers' inexperience in coaching cognitive skills** (for example, Brake, 1984; Brake, 1985; Hall, 1985; Hertfordshire Library Services, 1986; Hounsell & Martin, 1983; Irving & Snape, 1979; Rudduck & Hopkins, 1984; Sanger, 1989; Streatfield & Markless, 1994; Tabberer, 1987, p. 48; Thomson & Meek, 1985; UNESCO, 1981) were, initially, crippling.

The fact that the CILL teachers *did*, over time and to some extent, overcome the constraints helps to identify a more precise and contextualised pedagogy. It also invites us to look again at school-wide implementation of information literacy policies. Teachers have often expressed a need for a 'master plan' for teaching information skills across the curriculum (Hounsell & Martin, 1983, p. 65; Irving, 1985; Tabberer, 1987, p. 39). The CILL teachers were no exception. Stenhouse's (1975) process curriculum and Wellington's (1985) horizontal/ vertical differentiation were considered in Chapter 1. For secondary teachers, in particular, the challenge of integrating process objectives into a horizontal skills-based strands approach alongside vertical subject differentiation (for examinations) was daunting. D'Hainaut (1981) suggests three approaches: intra-disciplinary, interdisciplinary and multidisciplinary. These link to the notions of vertical, horizontal and transverse (or thematic) approaches to teaching and provide a visual menu which allow teachers to select an optimum teaching approach related to curriculum area,

curriculum objectives, and learning strategies. This might support the development of transparent school-wide planning for sequential information literacy strategy development - the 'master plan' that has so far proved elusive (Haycock, 1999).

It might also provide the 'missing link' between the coach-control dimensions by developing a strategy 'toolkit' which could be used for school-wide curriculum planning, and by teachers *and* students for co-directing the learning. As this study shows, where teachers co-directing learning, students *did* develop self-efficacy, enhanced motivation, skills for self-regulation, metalearning and metacognition.

The context-control-coach model is seen as providing a powerful conceptual underpinning for information literacy learning. It provides theoretically coherent links to constructivist (and related) approaches to learning (outlined in Chapter 4), and a powerful underpinning to information literacy pedagogy which has been demonstrated to 'work' for both teachers and students in the eyes of these teachers.

**Pedagogic insight 3: Self-directed learning is an unachievable myth. Co-directed learning better describes the interdependent relationship between 'coach' and 'control' assumptions in information literacy learning.**

Candy (1993; 1994; 1991) examines the relationship between self-directed and resource-based/ information literacy learning. Underpinning much of literature and research is the assumption that resource-based learning will be self-directed by the student (the degree depending on age), and lead to 'lifelong learning' (Bruce, 1994; Cleaver, 1987; Todd, 1993). This study challenges this assumption, demonstrating that 'open-ended' project-equivalents, for inexperienced and unmotivated learners at *all* ages, need to be carefully structured and guided to achieve significant learning. Independent 'inquiry' learning was seen as a way for students to learn content knowledge in a more self-directed way than the traditional lecture-tutorial-essay-exam format (Irving, 1991, p.21; 1992, p. 43). In this study, even with exceptionally able and experienced teachers, at *all* levels there was recognition of the degree to which skills were *assumed* by teachers, and inadequately *taught*.

The extent to which the influence of context differed in primary, secondary and tertiary systems suggests that too little attention is paid to the contextual requirements needed to support this type of learning, particularly in secondary and tertiary systems. It also suggests that the rush to online 'self-directed' learning courses dictated, as the tertiary teachers suggest, as much by economics as educational ideology, might need close examination. Tertiary constraints such as timetabling, minimal 'contact' time and maximum 'independent' study, large class sizes and lecture-format classes all challenge institutional rhetoric about self-directed lifelong learning.

It also points to needs in teacher training and development which were beyond the scope of this study. Only the trained teacher-librarian (course graduate) had training in designing resource-based learning. Only the primary teachers (notably the trained teacher-librarian and the teacher concurrently doing the 12 week course) had had training in methods for teaching information or cognitive skills.

Teachers had difficulty distinguishing between planning teaching and designing learning. Planning focused on *what* would be taught to meet curriculum objectives. They had difficulty recognising that "(m)ental plans are richer and more complete" (Lovat & Smith, 1995, p. 149). The researcher's account of *designing learning* as visualising how *learners* could go about the learning was viewed initially as 'subversive'. Planning was synonymous with written lesson plans, based on selecting topics in relation to curricula. Students then developed questions which enabled them to self-direct their learning *and* achieve (the teacher's planned) *content* objectives even if students did not know what these were!



This study demonstrated that even outstanding, committed teachers who believed in self-directed learning as a way for students to attain information literacy, and actively sought ways to achieve it, struggled in the face of substantial systemic and climatic constraints, at all levels. Two concepts, evolved in the course of the study, helped:

1. The idea of **co-directed learning** - 'co' standing for coaching - closely monitoring students, providing direct teaching, peer tutoring or other forms of 'support' when needed. It is also congruent with the constructivist notion of co-construction (McNaughton, 1996) and the role described by McNicholas (1994, p. 22).
2. The idea of **designing learning**, 'front end loading' in the head by analysing *in advance* the contextual factors - curriculum, time, timetabling, resources, student skills.

The concept of co-direction was welcomed by the teachers as making students at all levels *more* self-directed and less teacher-dependent. They agreed that, even at tertiary level, co-direction was a more useful concept than self-direction. Co-direction was seen as a continuum. The coach co-directed continuously. Responses to student need ranged from direct teaching to indirect methods of mediation. These might include online/ printed study guides, software, or peer tutoring.

Proactive mediation

Indirect mediation

---

**Co-direction of learning as an ongoing continuum**

**Fig. 5: Co-directing learning**

One of the primary teachers illustrates the relationship between co-direction and student control of the learning:

*T: It was more structured. And now the children are taking a bit more responsibility for their learning... It's less control for me... I think they feel more responsible 'cos they actually know what to do, and also, you know, there are skills that come up that have to be taught when they need to be taught, and they feel good about that... If I'm observing I'll note it in their book when I work with that group and I notice they can't do that then I consciously will work with that group, a couple of groups, on that skill... I think that makes them feel better because it's related to something they're wanting to know, cos it's something they cannot do, and also, having a small group, they don't feel like... especially some of my children, they're a bit reluctant to participate if there's a big group, but in a smaller group they feel safe - like I'm talking about groups of 4 or 5 - it's a bit safer and they will talk about it, and they will say, "yes, I'm having trouble here", so you can help them, but, whereas with the class, they sort of withdraw and sort of get hidden in the woodwork.*

The rhetoric of learning is often not matched in reality. Beswick says, "teachers held what can best be described as uninformed notions of the use of text and the nature of reading" (1987, p.69). Lunzer and Gardner found little evidence of extended reading or reading for 'depth' (1979). The sacrifice of depth for breadth has been noted as a national trend in New Zealand (Crooks & Flockton, 1998). The expansion of the curriculum with new 'disciplines' like technology has led to what D'Hainaut describes as 'window dressing':

*...we have only to think of the numerous statements of intent made by mathematics teachers to the effect that mathematical education is intended to teach the learner to solve problems, to use his critical faculties and his imagination, to abstract, to apply and invent models, etc. But beyond these common statements of intent, what actually happens in the classroom?"* (1981, pp. 212 - 213).

He suggests that the consequence of the thematic approach is often "the distortion of the internal structures of subjects", with prerequisites not mastered (*ibid.*, p. 208). Tabberer talks about teachers knowing about but not knowing how to do (1987, p. 48), while Rudduck and Hopkins talk about a "rhetoric of independence" (1984, p. 113).

Co-direction proved an easy concept to grasp. Co-direction became a frame of reference for teachers to 'walk the learning talk', to model, to become partners in learning, and for re-framing their role within this partnership. Meichenbaum and Biemiller discuss the value of students and teachers co-owning a self-directed learning model (1998, p. 75), while, for example Dudley-Marling discusses the dangers of confusing autonomy with ownership (1995). It was notable that, for the CILL teachers, the notion of co-direction provided a focus for a more overt focus on deeper learning. But this is not enough. 'Co-direction' and 'coaching' were terms which resonated with teachers, but they relate to teaching. Terms which related to *learners and learning*, like self-efficacy, authentication, self-regulation, heuristics, metacognition and metalearning met more resistance. Teachers liked 'reflective conversations' but secondary and tertiary teachers were less likely than primary to achieve sufficient reflection to achieve critical literacy:

*If literacy includes, as I believe it must, reflection on what is written to be read, then irrespective of changes in the technologies of the new literacies, the composers and receivers of communications and texts, of words and images, will have to be more critically literate, not least because of the amount of information that will circulate simply to justify the existence of the machines* (Meek, 1991, p. 208).

The fact that teachers did not differentiate between Props 5-8, and resisted new strategies like the 'heuristic framework' even when they recognised that students had problems, signals a need to focus on coaching teachers how to coach *strategies*, rather than allowing them to think that *ideas* like keywords and questions, or skills like skimming and notemaking taught once or twice will, somehow, develop into critical literacy. The fact that progress *was* made, however, signals that the direction set by the CILL propositions was positive.

#### **Pedagogic insight 4: Learning environments must be designed if information literacy learning is to be effective**

Jonassen's (1994) idea of Knowledge Construction Environments (KCEs), developed in the context of technology-enhanced learning, provided a persuasive focus for encouraging teachers to regard planning the learning environment as something different from traditional curriculum planning. 'Knowledge construction' was easily transferred to information literacy learning whether or not information technology was used. In this study, where technology *was* used, it was used to extend and enhance the learning potential of the topic and of the students, not as an end in itself. There was support, in this study, for the researcher's suggestion that the design of the learning environment, not the technology, determines the quantity and quality of student learning. The term 'knowledge construction' helped to focus the key distinction between 'information-pastiche-collectomania', and constructing meaningful knowledge. What was *not* seen as realistic, at any level, was the design of specific KCE's like Jasper (Cognition and Technology Group at Vanderbilt, 1991a). It was a more subtle shift for some teachers from the notion of teaching environments to *planning and rehearsing* how students would learn - learning environments.

In designing learning environments the contextual constraints illustrated in the context map (Appendix 3) became potential problems for teachers to circumvent by thinking through constraints *in advance*. Teachers used the Framework overview, and this context map in particular, as a catalyst for this ‘front end loaded’ thinking.

Banathy (1991, p. 49) talks about ‘designing within’. This aptly describes what successful CILL experiences demonstrated - that learning was a dynamic, reflexive process with teachers *and* students iterating around the props. Props became signposts and checkpoints in the ‘knowledge construction environment’. It was significant that this did not happen at secondary and tertiary to the same degree. However, having embraced the concept of co-direction, tertiary teachers demonstrated that they *could* think of innovative ways of designing learning which provided for co-direction within tertiary constraints.

When teachers incorporated this notion planning a learning environment, they demonstrated ability to design, monitor and evaluate learning which embraced the characteristics of constructivist learning design outlined in Chapter 5 :

- complex, authentic environments;
- student-centred, learner-controlled, multiple perspectives, dialogue-rich;
- emphasis on metacognitive and metalearning strategies;
- emphasis on teacher mediation , coaching, guidance.

At the start of the project all liked the *idea* of self-directed information literacy learning, but most were not convinced that it was really viable, given the constraints and their prior attempts to implement it. They were eventually able, as their accounts demonstrate, to iterate flexibly round the props and assumptions, internalising them to the point where pedagogy reflected epistemology, or their ‘espoused theory’ became *more* congruent with ‘theory in action’ (Schon, 1983).

A key insight for the researcher was the extent to which the focus on contextual factors in the context ‘narrative map’ (Appendix 2) allowed teachers to ‘name to devil’ and, where possible, design the learning to bypass or overcome the constraint. The more specifically they could name, frame and discuss the constraints to this type of learning, the more effective they were in overcoming the constraints. This took time. It also took time for teachers to see the *learners* themselves as major players in the learning environments they were designing, and that factors like the student’s self-efficacy, self-regulation, model of learning, prior knowledge of the topic were key to issues like motivation, ownership and confidence. Initially, these were seen as existing ‘out there’ - independent variables.

### **Pedagogic insight 5: ‘Conferencing’ emphasises reactive teaching and teacher dependency**

The concept of **proactive coaching** is integral to emerging notions of constructivist learning design (see Chapter 5). It was emphasised in the revised framework, described as getting students to say what they are going to do, and how *before* they do it, coaching skills proactively if needed. It came into conflict with two practices cherished by primary teachers - ‘conferencing’ and ‘support’. Both, in effect, were *reactive*. Teachers kept students on task by walking around, ‘conferencing’ with individuals and groups, ‘supporting’ as needed. This reflected the extent to which school-level teachers are not just teachers of learning, but teachers of *children*. Teaching is shaping behaviour, not just shaping thinking. Within ‘conferencing’ control of learning and diagnosis of learning needs remains the teacher’s prerogative.

Gradually most teachers came to see that investing more effort in planning for *learner* control paid off. Checkpoints were a practical strategy. Tertiary teachers recognised that proactive coaching could be embedded as checkpoints in assignment guidelines or

software. Secondary teachers were slower to consider that moving from *reactive* marking and feedback to *proactive* coaching might help students' low level of skills.

It was three primary teachers who, towards the end, subsumed the proactive coaching concept into existing conferencing and support practices, bringing students together as a class or in small groups, getting feedback on what they had been doing (reactive) and asking them what they were going to do next, how they were going to do it, offering suggestions in the form of direct or indirect teaching (proactive). The term 'setting students up for success' meant more than 'proactive'. 'Cognitive coaching' supported the emerging recognition of the need to *teach* critical thinking. 'Modelling' was meaningful, but 'cognitive apprenticeship' was not, possibly because few teachers had previously attempted to model *their* thinking processes.

Authentication of learning should logically include getting learners to negotiate and articulate learning goals and criteria - what they think 'good' (notemaking, questioning, and the like) might *look* and *feel* like. Only the primary teachers embraced this to any degree. The breakthrough came in Cycle C discussions of how *exactly* the role of the coach should be interpreted, and what co-direction constituted. It was part of a move by all the teachers to being more comfortable with a far higher level of skills coaching. 'Support' was replaced with more confident discussion of coaching particular strategies. This, in turn, reflected teachers' growing comfort with a new vocabulary of skills teaching.

By the end of the year what had emerged in the group was a consensus recognition that they needed to give more time to planning the whole learning environment; that this planning needed to include far more precise thinking through of the learning process from the learners' perspective, far more rigorous checking of resources (like bookmarking Internet sites), and the designing of specific checkpoints for proactive coaching.

The challenge remains that what is considered *best* practice, responding to student needs as and where they arise by 'conferencing' and providing 'support' and 'feedback' is *reactive*. There was evidence that it encouraged teacher-dependency and militated against the development of self efficacy, self-regulation, metacognition and metalearning, feeding a teacher-centred model that teachers rejected in theory. This suggests that developing a precise constructivist information literacy learning pedagogy within the Vygotskian ZPD metaphor is possible, but involves supplementing existing teaching with an experienced vocabulary of *proactive* strategies.

**Pedagogic insight 6: There is a paradigm conflict between information literacy learning and teachers' question-answer 'project' models.**

A persistent thread emerging from all four teacher cycles was that, for all teachers at all levels, students' inability to ask and apply relevant questions remained a vexing issue, despite demonstrated improvement (noted in Chapter 7) when questions were focused by knowledge maps. There were 22 comments about students ignoring questions, losing focus and going off at a tangent. There was some evidence of what Sheingold observed - adding a question marks to statements: "The dog has four legs?" (1987). There is a substantial literature on questioning but the researcher has found nothing that suggests, as this study does, that a significant challenge to effective information literacy learning is *teachers'* confidence in a project-question-answer model as its fundamental underpinning.

The researcher's recognition of the limited value of the question-answer model underpinned her suggestion that students should develop questions from their map categories, categorise them into 'fact' and 'thinking' (inferential) questions, asking factual questions first to develop some knowledge from which inferences might later be made. She also suggested that question-asking became better focused if used within a 'detective' model, 'interviewing' information for 'clues'. The primary teacher who embraced this detective model achieved significantly better results. Using the metaphor of sailing down

a river also helped another primary teacher (and his students) to contextualise the ‘rapids’ of the far more difficult stage of *understanding* the information retrieved:

*T: It's at that stage I find things seem to come unstuck - when children find it quite difficult - trying to process that information into something that they can understand themselves... I guess like sailing down a river. You start off nice and placidly and then you come to this almighty series of rapids which they find quite difficult to negotiate, and once they come out through that, and they come out with a product which they're reasonably happy with, and which I'm happy with, then we can go back to the calm, simple process of publishing that, and turning it into a form that other people can relate to and understand.*

‘Reflective conversations’ by implication would involve critical questioning (Brookfield, 1987, p. 93). Lipman uses the term ‘deliberative dialogue’ and the metaphor of a jury for weighing and assessing information (1985). What this study revealed was that deeper, more flexible questioning resulted in deeper thinking about the information retrieved, but that this happened to a greater extent within a context of a linking metaphor which had meaning for the students. Where it did not happen, the study yielded evidence that students were looking for finite *answers*, not ‘deliberative dialogue’ with ideas. This seemed to proceed from teachers’ deeply held belief that students who generate (any) questions will be *motivated* to find answers; that questions prevent projects from becoming ‘information pastiches’. Despite widespread recognition that it was important to help learners to frame better questions, the only strategy volunteered was the ‘wh’ prompt strategy. ‘Good’ questions were equated with ‘open’ questions - even when students had an inadequate base of knowledge. Answering questions was the **ONLY** strategy discussed by teachers for gaining information *despite* acknowledging that:

*T 1: They haven't got enough knowledge to build up that big picture. They are very sketchy on background knowledge and world change and...*

*T 2: Yes, I think you're right, that we don't actually present a global perspective enough...*

*T 1: Or huge historical changes (T2: Yes) Yes, and where are continents, where are rivers, and those sorts of things. They are basic facts of knowledge that the kids need...*

*T 3: Which they don't know... (T. 2 No, they don't)...*

*T 1: They don't have the hooks (T2 and T3 agreeing). They don't pick up... They don't read as much and they don't watch the TV...*

*T 2: And because we teach them facts in isolation from each other too...*

*T1: But their general knowledge is not wonderful, is it? (Lots of agreement).*

This is not a new problem. In 1987 Beswick talked about teachers who “encourage pupil autonomy, who nonetheless show insufficient personal understanding of the process to carry this properly through” and added:

*All the enquiry, the seeking out of sources and the comparing of data amount to very little if there is not an incentive to ‘reflect on what is being read’, and to make from it not just a project report but also meaning (1987, p. 71).*

The insight into how ‘proactive’ strategies infiltrated and enhanced primary teachers’ reactive ‘conferencing’ model suggests that *experientially* evocative metaphors built into the process, like the rapids, the food blender or jury, may eventually supplant the question-answer-project’ model, but that this takes sustained effort over time. The

primary teachers' successful 'projects' which ran as narrative links throughout the year illustrated this. Here the interdependence of authentic learning purpose, authentic learning topic and learning methods with *focused* questioning and analysis, underpinned with a driving metaphor, helped students to construct meaning and knowledge.

Secondary teachers indicated that many students were hungry for deeper knowledge than the superficial fare the crowded, fractured curriculum was capable of delivering. They did not necessarily want to find it out for themselves. They wanted to *know* 'things'. This might reflect their internalisation of the secondary model, their exposure to 'traditional' primary projects, or their expanding view of the world. In this regard the study yielded speculations, not explanations.

**Pedagogic insight 7: While students' mental models of information literacy learning go unchallenged, paper-based and electronic 'information pastiches' will continue to substitute for knowledge construction.**

Evidence that primary students were able to be more self-directed, more self efficacious and self-regulated when they used a metaphor-based model illustrates the need for similar models at secondary and tertiary levels. It also highlights the insight that students themselves need to be encouraged to *articulate* models of learning.

Rushkoff's (1996) provocative contention is that 'screenagers' have sophisticated visual literacy skills, demonstrated by their ability to 'surf' television channels and the Internet. Their "(f)acility with iconographic representations", portends new ways of thinking and understanding in an age of chaos:

*Meanwhile, the ability to process visual information quickly will enable the worker of the future to cope with the "information overload" our data highway nay-sayers are busy warning us about. If we are about to enter an age of information glut, those who can wade through it will be people with the ability to inspect, evaluate, and discard a screen of data immediately. This information skimming will need to be practiced on many different levels, and sometimes simultaneously (ibid., p. 51).*

Curriculum documents imply that visual literacy is something new to be taught to students who lack it. Teachers' slowness to embrace the concept of authenticating learning by discussing learning with students suggests unintentional support for this deficit model of student learning. Rushkoff claims that students are already more visually literate than adults, but that this is a superficial, 'surfing' literacy (ibid., p. 49). The challenge involves getting *students themselves* to make links between scanning television channels and websites, building coherent narrative from discontinuous flashes, and constructing knowledge from print and visual text using analytical and reflective skills (ibid., p. 213).

Farnham-Diggory says, "Children will learn spontaneously. What they need help in, from experts, is how to learn better..." (1990, p. 49). Meek talks about 'powerful literates' and says "(t)he significant shift in literacy... is that the confident literates know what they needn't read" (Meek, 1991, p.25). Learning behaviours reported on in this study indicated that students were not 'powerful literates'. Most failed to demonstrate selectivity, discrimination, flexibility or self-efficacy. Meek says elsewhere "The most important lesson children learn by becoming literate is that they can *learn*, in the way that the school endorses learning" (1983, p. 1).

There were frequent comments highlighting students' dependent, instrumental, unmotivated, 'empty-bucket' approaches to learning, poor skills and standards (reading, comprehension and spelling) and to students reverting to 'project mode'. One tertiary teacher mentioned that students' verbal skills had improved in recent years. Others agreed, but on the whole, negative attributions abounded, even in the face of evidence of significant progress when learning approaches were explained to students, modelled and

guided. But there was little evidence of teachers *teaching* strategies of critical literacy or, beyond primary, *wanting* to take responsibility for students' critical literacy.

The researcher's conclusion was that many students, particularly primary, *were* willing to embrace new models of learning if they understood what was expected and *why*, but that some teachers found it hard to talk to their students about *learning* as opposed to assignment requirements. Insight 9 expands this speculation.

If teachers are to address the need highlighted by Beeby (cited in Beswick, 1977), that new ways of learning and teaching must be found, there is a need to scrutinise, not only teachers' own models of learning and the consequences of applying them to teaching, but the models of learning, and the competencies which *students* possess, and make links to what we would like them to possess, as Rushkoff (1996) suggests. This begs a re-examination of the Vygotskian concept of ZPD mediation. The use of metaphors and narratives in this study to bridge the realities of students' worlds and the world of classroom learning provides new insights into *simple* mediation strategies for articulating and expanding existing models.

**Pedagogic insight 8: Teachers need to challenge their pedagogical beliefs. To do so they need a more sophisticated educational vocabulary.**

One of the phenomena highlighted by the study was teachers' reluctance to take on new concepts unless these concepts could be subsumed into their existing vocabulary. Teachers incorporated 'authentication' into their understanding by simplifying it to 'topic relevance'. However, "I think that 'reflective conversation is a really good term. It eases it, and makes it more... takes the formality away from it." No one used the terms self-efficacy or self-regulation although these were written into the model, defined, and used throughout the year by the researcher. One teacher suggested that they emphasised individuality and undermined inclusiveness. 'Confidence' and 'motivation' described both self efficacy and self-regulation.

Accommodating new concepts is fundamental to learning. There is a point where it becomes self defeating to ignore the fact that new terminology may describe *new* concepts. No one accepted 'heuristics' although (as evidenced above) teachers were aware of the need to improve student questioning skills. By not seeing key concepts, key search terms, and key questions as a heuristic framework ('the keys') some limited their learning. By collapsing Propositions 5 - 7 teachers limited their own schema for differentiating coaching strategies needed for different aspects of the learning.

At all levels general terms like 'support' substituted for a precise educational vocabulary. This would not have mattered in general conversation if there had been a shared specialist educational vocabulary for diagnosing and describing students' learning precisely when needed. The researcher noted in her journal, "It feels like hearing heart surgeons trying to describe a heart operation limited to the words 'patient, chest and heart'."

This raises the issue of the interdependence of semantic and conceptual vocabularies. These experienced teachers had a vast, effective, instinctive, internalised repertoire of *teaching* strategies, but they could name or describe few *learning* strategies with precision. The two tertiary teachers acknowledged this. All were hungry for learning but most appeared comfortable with their existing semantic and conceptual vocabularies. They absorbed most readily those ideas that could be accommodated immediately within their existing *teaching* schemata. The restrictions this placed on their learning were highlighted in their apparent reluctance to help learners to authenticate their *learning*. Tabberer (1987, p. 199), Stenhouse (1975, p. 157) and Norris and Sanger (1984) all comment on the extent to which teachers take learning for granted. Retrospective analysis of the tapes provided clear evidence, that, if there was one thing that changed for teachers during the year, it was how their enhanced vocabulary (conceptual and experiential) for describing *learning* skills and processes influenced their ability to teach these skills and processes.

Teachers must be taught how to coach metacognitive and metalearning skills if information literacy learning is to be successful.

In Chapter 2 several issues were identified as challenges in constructivist learning:

- the authenticity of learning environments;
- teaching and teaching skills;
- entry/ skill level of learners;
- transfer;
- assessment.

The evidence supported the insight that, while these issues tended to be interdependent in the sense that if one was the focus, there were flow-on benefits in the other areas. However, teachers' ability to coach learning skills emerged as the single most significant determinant of the success of the remaining three.

Initially these experienced teachers simply did not have the strategies needed for using a cognitive apprenticeship model (cognitive, metacognitive and metalearning). While the Framework was not seen as a teaching programme and the researcher studiously avoided teaching, the trained teacher-librarian and teacher currently doing the *Infolink* course talked 'skills'. Gradually other teachers identified and shared strategies, and discussion moved from *whether* to *HOW*.

As they developed and applied a repertoire of skills and strategies, particularly at the primary level, and particularly in Cycles 5, there was clear evidence of more:

- skills transfer by students;
- negotiated criteria being used to achieve in-depth formative and summative self-and co-assessment with 'official' requirements;
- transfer of skills being facilitated, for students, by participating in this ongoing evaluation of their learning; greater self efficacy;
- the entry level of students (particularly with regard to their reading skills) being seen as less of a barrier than it was initially (see, for example, the comments in Chapter 7 about the boy who knew he was not good at reading or writing, but delighted in his newfound questioning, analysis and synthesis skills).

This move from *whether* to *how* was one of the significant achievements of this study. It signals the need for a fundamental rethinking of preservice and inservice teacher education. Ten percent of New Zealand's teachers have completed the 175 hour *Infolink* information literacy paper (Gawith, 1998). This paper, as evidenced by the work of the teacher-librarian graduate, and the teacher who did the paper concurrently, provides a deeper understanding the information process and information skills. However, in the researcher's opinion, even this provides inadequate preparation for implementing constructivist information literacy learning.

The need for greater teacher knowledge of skills teaching has been extensively documented (see Insight 2, above, and Appendix 1). If this need has been demonstrated for 25 years, why has so little progress been made? Where efforts have been made to work on an ongoing basis *with* teachers in the context of their curricular teaching, using a process framework as scaffolding, and integrating as-needed coaching, for example, in this study, and in studies by Todd, McNicholas and Sivanesarajah (1992), Curwood (1995), Bruce (1999) and Gawith (1998), results have been significantly *better* than where information process frameworks have been used but not coached in context, for example, Kuhlthau (1993a) and Moore (1998) (Chapter 5). This signals clearly that progress lies in the constructivist notion of contextualised coaching within designed learning environments. Teachers need to be coached to coach. Standalone skills



programmes in the course of initial teacher training are unlikely to be applied (Squirrell, Gilroy, Jones, & Rudduck, 1990). The key lies in the notion of *cognitive* coaching rather than the traditional teacher-librarianship notion of collaborative planning (CPPT) although team planning within a school wide information literacy policy provides a necessary context (Bruce, 1999; Haycock, 1999).

### **Pedagogic insight 9: The ‘information process’ is a mixed blessing**

Information process frameworks have been challenged by Thomson and Meek (1985) and Hopkins (1987) and, more recently by McKenzie (1998) and Hyerle (1998).

While the New Zealand information process model on which the *Infolink* course is based provides a useful scaffold in that each stage is modelled for teachers prior to their applying it with their students, it has all the disadvantages of linearity identified by critics of the framework approach. The ten years in which the researcher developed, coordinated and moderated the national programme yielded abundant evidence of this. At worst it produced better projects; ‘knowledge construction’ seldom evident; ‘collectomania’ frequently sanctioned; ‘question-answer’ the driving model.

This is *not* a new problem. Norris and Sanger suggest that “Project work places a premium on the teacher’s diagnostic ability,” but also confirm that lack of the sustained time needed to do justice to a complex process is not a new phenomenon, “The naturally inquiring mind does not display the same rhythm as the school timetable” (1984, p. 98).

The CILL Framework was a deliberate attempt to seek an alternative to linear interpretations of the researcher’s information process framework; to provide structure and choice without prescription - a menu rather than a recipe. She underestimated teachers’ need for systematic strategies. Where CILL teachers used the Framework selectively rather than in a linear fashion, they tended to avoid precisely those areas in Prop 5 - 8 that related to coaching for critical literacy and ‘knowledge construction.’

Despite stated satisfaction with the revised Framework, teachers wanted more prompts and strategies - and prompts that students could use independently. There was tension between their request for more specificity, and their comments that other teachers would need something simpler and more ‘user friendly’. This tension remained unresolved.

Although, as illustrated, over the year, teachers internalised the ‘props’ and iterated confidently around them, the researcher also recognised that, in all likelihood, the CILL ‘props’ would become de facto stages in the hands of less experienced teachers:

*T: It’s very important to be quite definite about the steps in the process. I’ve found the children really starting to take on board - and I’m quite unashamedly quite linear about this, at least in the initial stages - because I find that they need to work through the identification of the topic, and the key questions and key words and so on, but once we start getting into the actual research itself and the business of decoding fairly advanced language into a form which they can understand, that’s ...where all of the linear steps go out of the window and we pull in lots of props from all sort of different places.*

Cycles 5 A-D ended with the teachers expressing satisfaction with how the CILL framework had provided them with both structure and skills. The researcher rejoiced in their successes but remained unconvinced. It led her, in the course of the following year to return again and again to the recorded data to search for deeper insights, particularly where issues that had emerged related, negatively or positively, to RBL and TBL projects, to the CILL pedagogy, and to the emerging insights from the field of constructivist learning design. It ended in the re-design of the CILL Framework, acknowledging the feedback and insights generated by teachers in Cycles 5 A - D, but also the deeper analysis in Cycle 6.

## CHAPTER 10

### CONTRIBUTIONS OF THIS STUDY TO THE FIELD OF INFORMATION LITERACY LEARNING.

#### Developing the SILL Framework

The final insight, that a realistic pedagogy of constructivist information literacy learning is achievable, was accomplished through the rethinking and reformulating the CILL Framework.

Insight into how to resolve the tension between specificity and complexity, flexibility and linearity, simplicity and structure was arrived at in the course of the retrospective NUD\*IST analysis and through informal discussions with David Hyerle. (1998). Hyerle's recognition that teachers need an experienced vocabulary of strategies, 'Thinking Maps', to teach students resonated with the researcher's growing recognition (see insight no. 8 above) that teachers needed to be taught to use specific strategies so that they could teach students to manage learning, construct knowledge and communicate it. Understanding *about* these things often did not translate into pedagogy.

Teachers all liked the CILL Framework, but suggested that something simpler was needed as an introduction. They liked the idea of stages for students, and, undaunted by the researcher's hesitation, developed their own.

It became obvious that *students* at all levels did need an overview of the information literacy process and that stages represented a simple narrative logic: "I work out what I need to know and do, and where I could go; I select the best information; I wrestle with ideas and build my knowledge; then I usually have to communicate this knowledge in some way."

It became clear that the **stages** could be reduced to three:

- |                                     |                                |
|-------------------------------------|--------------------------------|
| 1. <b>Designing learning</b>        | (incorporating Props 1 2 3 4 ) |
| 2. <b>Understanding information</b> | (incorporating Props 5 6 )     |
| 3. <b>Performing knowledge</b>      | (incorporating Props 7 8 )     |

It was also clear that this would tap back into the 'project' model unless there was significant change involving:

- empowering learners by training them in the use of a strategy toolkit - supplanting teachers' covertly (primary) or overtly (secondary) disempowering pedagogies, as described above, by providing *students* with a conceptual and experienced *learning* strategy vocabulary to increase self-efficacy and self-regulation.
- *re-empowering* teachers by *coaching* them to coach these strategies in an age-appropriate manner.
- *re-empowering* teachers by *teaching* them to design 'knowledge construction environments' (Jonassen, 1994), beginning with a systematic analysis of systemic and climatic contextual constraints (This analysis could use diagnostic software based on an expansion of the CILL context map).
- *re-empowering* teachers by translating Vygotsky's ZPD into methods of co-directed mediation which may well be electronic, in the form of interactive computer based 'mindtools' (Hyerle, 1996; Jonassen, 1996; Novak, 1998) and emphasise the teacher's 'co' role as coach in:
  - ensuring that students are set up with the skills to be successful;

- working alongside students articulating the learning, coaching as needed;
- co-evaluating the process and product of their learning formatively and summatively.

It became obvious that an approach developed by David Hyerle based on teaching students *and* teachers a core vocabulary of ‘mindtools’ could be adapted (1996). Hyerle groups his tools into three categories: ‘brainstorming webs’, ‘task specific organizers’ and ‘thinking process maps’. This study suggested that, irrespective of level, in the area of information literacy learning students only needed three types of tools:

- tools for **recognising** learning needs (skills, topic scope, purpose, planning);
- tools for **summarising** ideas from information (analysis, organisation, synthesis);
- tools for **explaining** knowledge (reflecting, constructing, communicating meaning).

Such tools already exist (Gawith, 1996). Hyerle’s ‘thinking tools’ (1996) and Jonassen’s ‘mindtools’ (1996) are particularly valuable, but earlier tools, like Buzan’s mindmaps (1993) Novak and Gowin’s Vee diagram (1984) also contribute to a powerful cognitive toolkit for students. Teachers often know *about* them but fail to integrate them into processes, as the study demonstrated.

What the data from the study suggests is the need for a **co-directed** model of **strategic learning**. The teacher’s coaching role would involve modelling and coaching the use of appropriate grapho-cognitive tools, and ‘talking the walk’ by verbalising the thinking processes used in applying these tools strategically within any or all of the three information stages. Age is no barrier. This study demonstrated that younger, less able students used grapho-cognitive devices (brainstorming, knowledge mapping) flexibly and enthusiastically *when* these were modelled by the teacher. Hyerle’s software, and other programs like *Inspirations* (see also Jonassen, 1996), STELLA, or even Powerpoint, make it possible for students to submit work (at face-to-face or online checkpoints) providing evidence of using these structuring, explaining and linking processes. Process sheets could be assessed against explicit criteria as part of portfolio assessment requirements. In other words, thinking, keeping a record of one’s thinking, and knowledge-building, is designed into the learning environment.

**Recognising, summarising and explaining** are tools for implementing a simplified information process which has three focus points:

1. **Designing** (teacher coaching the learner to use tools to design and plan )
2. **Analysing** (teacher coaching the learner to use finding and analysing tools )
3. **Constructing** (teacher coaching the learner to use knowledge building tools)

In the new **Strategic Information Literacy Learning Framework** (SILL) the learning model is integrated with the teaching model, exemplifying the notion of co-direction. Props 9 and 10 (proactive coaching and formative co-evaluation) are built in as before and after components at each of the three focus points. Props 1 - 4 support the **designing** focus; props 5 - 6 support the **analysing** focus, and props 7 - 8 support the **constructing or performing** focus. (The term ‘performing’ as it is being used by David Perkins (1997) to describe performing knowledge will be trialled with teachers as an alternative to constructing). The framework provides nine cells which represent areas where learners need to use skills strategically. Together they represent a logical sequence for ‘doing’ a project or inquiry, but each column represents distinct self-regulation/metalearning, metacognitive or communication strategies and each strategic step could be done independently of the others. For example, students could construct or perform knowledge from information provided through lecture mode by teachers.

The essentials of earlier CILL Framework are retained and the revised SILL Framework is seen as a simpler introduction to the full Framework:

- The **props** become **conditions** for successful information literacy learning.
- The **teacher prompts** are linked to items in the Strategy Toolkit.
- The **strategies** are easy to find because they relate to one of the nine cells.

The simplified framework and Strategy Toolkit could be used by all teachers without training, but the fuller framework would need to be embedded in a course which had some of the features of the current action research process, notably providing teachers with a 'safe' environment and enough time to relate the terminology and concepts to their own philosophies and practices, and to develop their understanding through 'reflective conversations'. It is anticipated that the shorter framework will provide a bridge into the fuller framework, and that exploring the fuller framework will still be necessary to develop deep and enduring information literacy learning. In retrospect, the researcher feels that this simpler framework would have made the teachers' learning during Cycle 5 A and B less protracted and painful.

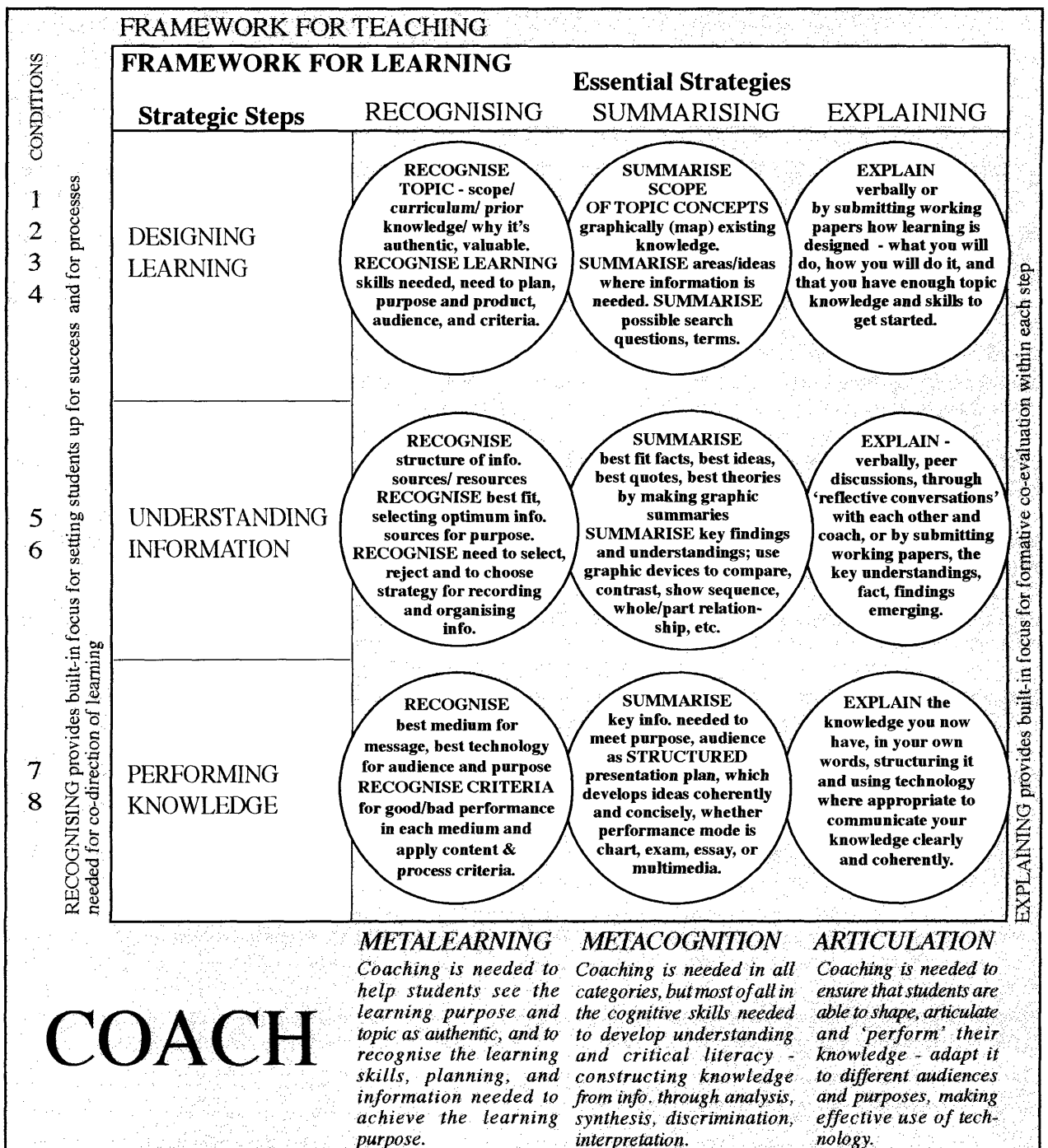


Fig. 6: Strategic Information Literacy Learning model.

## Implications

Gagne talks about “strategic learning” (1993, p. 196). Nisbet and Shucksmith define strategies as “the executive processes which choose, co-ordinate and apply skills” (1986, p. vii). Rohwer and Thomas summarise the areas of ‘strategic learning’ where the CILL teachers needed to grow in terms of helping students (Props 5 - 8), and where the Framework needed to serve them better:

*... providing students with systematic assistance in acquiring (a) prior knowledge of specific relevance to the information presented in text form; (b) rhetorical knowledge structures, including embedded procedures for detecting and representing the structures of texts, for discriminating more and less important information, and for integrating or building internal connections among text information; (c) deliberate strategies of summarizing and questioning; and (d) strategies that build external connections between text information and prior knowledge (Rohwer & Thomas, 1989, p. 109).*

Candy suggests that approaches that aim to increase the depth of learning or move learners toward meaningful learning usually take one of two forms, “those that try to increase the learner’s understanding of what it means to learn, and those that strengthen an understanding of what knowledge is and how it is created” (1990a, p. 32).

The CILL experience suggests that both are needed, and that information literacy learning requires both teachers and students to understand how the world of information is structured (for example Tuman, 1992, p. p. 18), how knowledge is structured (for example Alexander et al., 1994, p. 223), and how the processes of problem solving, analysis, critical evaluation, hypothesis making, invention, investigation and experiment (Beyer, 1987, p. 55) are applied strategically to construct knowledge.

Repeated iteration through the five action research cycles seeking theoretically coherent explanations for decades of unsuccessful information literacy learning yielded insights which undergird the development of a radically different model which has the potential to overcome the limitations of the 6-stage information process models which have become a global norm.

The purpose of this study was to address Beeby’s (cited in Beswick, 1977) comment about new ways of learning and teaching needed in an age of information. Three decades of studies revealed how challenging students and teachers find resource-based learning. More recent studies of technology-based learning suggest that adopting a constructivist approach might support the development of more coherent, theoretically-grounded conceptual and pedagogic frameworks for information literacy learning in New Zealand education.

The study demonstrated that the CILL assumptions and propositions are sustainable as pedagogic tools but that sustained teacher development is necessary to exploit the full potential of the original and revised frameworks.

It is suggested that, by developing and evaluating such a framework, this study advances scholarship in the field of information literacy in three directions, theoretical, epistemological and pedagogical.

While the evaluation of the framework (Cycle 5) was small scale (eight teachers), and, while action research precludes generalisations, the study yielded deeper information than most earlier studies. These data, related (Cycle 6) to the findings of the earlier resource-based and technology-based learning studies, supported the pedagogy derived from the new study, but also offered new insight into teachers’ and students’ difficulties with this kind of learning over a century.

Within the teacher evaluation action research cycle, feeding back, not just transcripts of weekly (Cycle 5 A and B) or fortnightly (Cycle C) and individual (Cycle D) audioconference meetings, but the researcher's weekly explanation of aspects of the original and revised framework, along with summaries of the threads arising, and issues fed in by individuals (email, phone calls, letters), ensured that data were verified and validated from a number of perspectives. Comparing the emerging threads against findings of the earlier studies provided a further point of validation.

In the sense that the 'threads' from Cycle 5 were consistent with the earlier findings, the study yielded few surprises. However, the iteration between Cycles 1 and 2 (contextual), Cycle 3 (conceptual/ theoretical) and Cycle 4 (pedagogical) and Cycle 5 (field data) yielded a depth of insight into and understanding of the pedagogy of information literacy which would not have been possible had the study not achieved the integrative focus which was one of its purposes. This attempt to identify and examine key and related characteristics and principles in four fields which are discrete in terms of their literature, research and professional bases - curriculum, information literacy, constructivism and learning design, provided yet another frame of reference for testing and analysing emerging insights.

Iterating through the action research cycles, constantly checking understandings against teachers' understandings, against previous findings and the evolving multidisciplinary synthesis; attempting to retain the transparency, integrity and rigour of the process; trying to 'capture' the threads as they emerged but to stop them from solidifying into self-fulfilling 'givens'; keeping the process moving forward for the teachers while wanting them to reach deeper levels of understanding all proved dynamic, exciting, time-consuming and challenging. It became, in effect, information literacy learning within a study of information literacy learning - cycles of information selection and synthesis followed by cycles of knowledge construction in a 'knowledge construction environment' populated with past experiences and writings, present teachers, and emerging insights from conceptual and theoretical syntheses.

Action research is, by definition, subjective, not replicable and, therefore, original. Many of the insights in Chapter 9 are both speculative and subjective - the purpose of the study was exploratory - but they confirm the value of exploration grounded in the integration of theory and practice, past and present.

### **Theoretical contribution**

The study has progressed the circular and static debate about what information literacy is by taking a situative/ constructive perspective which contextualises it in learning. While library/ information-centred or technology-centred perspectives are valid and valuable in their own right, how it is situated determines the definition of information literacy. This perspective makes it both inevitable and desirable that the boundaries between using information and learning become inseparable. In fact, the whole information process is not discrete but embedded firmly in the climate and culture and 'mucky flux' of classroom life and learning.

From a theoretical perspective this shift to an embedded, situated learning-focus has significant implications. Most first generation studies were firmly library/ information-centred. Shifting to a focus on situated information literacy *learning* implies a shift to a *learner-centred* conception of information literacy. This in turn shifts the whole ontological and epistemological focus and sets it in the humanist/ constructivist, rather than the behaviourist or cognitivist paradigms that have characterised previous library-centred work.

This shift of paradigm in turn has significant implications in terms of setting information literacy as a pedagogy, into a theoretically coherent conceptual framework. It provides a

context for examining factors characterising successful/ unsuccessful resource-based and technology-based learning; for deriving assumptions and propositions which can be related to a variety of constructivist-related theories and theorists, notably Vygotsky.

While there have been several summaries of the existing research, none proceeded from a learner-centred constructive/ situative perspective. This attempt enabled design parameters for successful information literacy learning to be extrapolated as assumptions and propositions. The assumptions and propositions also yield a powerful, conceptually coherent device for predicting, explaining and diagnosing constructivist information literacy learning.

This, in turn, provides a coherent framework for harnessing key pedagogical insights emerging from the field of technology-based learning (knowledge construction environments) and the emerging field of constructivist learning design.

### **Epistemological contribution**

No other study has reflected so consistently and in such depth the existence of fundamental tensions between the epistemological underpinnings of constructivist information literacy learning, and the models of learning that teachers and students hold in their heads - their epistemologies. Given teachers' reasons for joining the study - an interest in information literacy and commitment to self-directed and resource-based learning - it was an unsought and unwelcome recognition. In retrospect, it is valuable. Seeing teachers' year-long struggle in the web of the question-answer model that reinforced the 'project habit', and seeing students using the question-answer model to reinforce their comfort within this internalised project model, highlighted the need for different mental models for both teachers and students.

### **Pedagogical contribution**

The study provides evidence that these different mental models are not likely to emerge top (theory) down for teachers *or* students, but can, and *do*, evolve from bottom up, from being helped to *implement* new ways of teaching and learning, new pedagogies, in the classroom, and from being helped to talk about learning - teacher-to-teacher, teacher-to-student, student-to-student - using semi-structured protocols, like the 'reflective conversations' of this study. The evolution was painfully slow, but, for all of the teachers, it *was* happening.

As a pedagogical tool the CILL framework breaks new ground.

It achieved Greeno's 'educational utility criterion' (Donmoyer, 1997, p. 34). It 'works' for teachers, and, significantly, teachers can make it work for and with their students. Every teacher succeeded to some extent in:

- identifying constraints to this type of learning and identifying at least partial solutions;
- identifying characteristics of successful information literacy learning;
- identifying areas where students attitudes or skill levels would be barriers;
- beginning to identify precisely what skills were needed for success;
- beginning to identify methods by which they could be coached and evaluated;
- beginning to involve students in co-directing this learning.

'Utilitarian criteria like adoption or improvement of practice' which seemed unrealistic in teachers' first cycles, 5 A and B, were met to an extent unexpected by the researcher, as reflected in Cycle 5 C and D responses.

The researcher is not aware of any published studies that have recorded the same level of success. In fact, the two explicitly constructivist information literacy studies discussed in Chapter 5 recorded failure, not success. Teachers, over the year, demonstrably used the framework with increasing confidence to:

- identify contextual and climatic constraints which compromised this type of learning;
- expand their concept of planning from written lesson plans to mentally rehearsed 'front end loaded' design of complex, authentic 'knowledge construction environments';
- develop and trial a repertoire of strategies for coaching cognitive strategies;
- develop a greatly enhanced technical and conceptual vocabulary for discussing *learning*;
- expand teaching practices to include new approaches, like 'proactive' coaching;
- demonstrate that constructivist learning challenges, like entry/ skill level of students, transfer of skills and assessment were problems of little significance when teachers coached continuously, consciously using the notion of 'co-direction' to help students to a greater level of 'control' - self efficacy and self-regulation of learning.

To the extent that the iteration, in Cycle 6, from these Cycle 5 findings back to Cycles 1 - 4, confirmed that the CILL assumptions and propositions could be used for explanatory, diagnostic and predictive purposes, it is suggested that these assumptions and propositions could, with confidence, be hypothesised as **conditions** for effective constructivist information literacy learning.

Clearly there could be more conditions - the list is not exhaustive - and clearly these conditions need to be thoroughly tested, but it may, nevertheless, signal a significant advance in our ability to develop theoretically coherent pedagogical approaches.

In summary, the development and evaluation of conceptual and pedagogic frameworks for constructivist information literacy learning has demonstrably:

- provided a viable alternative to the 6-stage information process models that have become a de facto world standard;
- suggested further developments for enhanced constructivist information literacy pedagogies which have the potential to resolve some of the unresolved tensions recognised by the researcher;
- provided the beginnings of a pragmatic diagnostic, explanatory and predictive tool to analyse factors determining effective/ ineffective constructivist information literacy learning;
- established tentative and contestable conditions for successful information literacy learning which, in turn,
- provided a menu of prompts for teachers to use to:
  - co-design
  - co-monitor, and
  - co-evaluate
 constructivist information literacy learning *with* students, which students demonstrated that they had begun to understand and practice with increased self efficacy and self regulation, and, not least, enjoyment;
- provided, by their accounts, the richest and most interesting professional development some of these teachers had undertaken;



- provided, for the researcher, the richest and most interesting experience in 25 years of learning and teaching in the field of information literacy.

Hoggart comments:

*The literacy given to most people is insufficient for the needs of increasingly complex societies and, more important, inadequate in ways essential to a democracy. Most leave school critically, culturally and imaginatively sub-literate (1991, p. 1700).*

This study has demonstrated that this need not be so, but that it is likely to be so unless we address systemic constraints, and encourage teachers and students alike to explore views of learning and pedagogies substantially different from those currently in operation in every sector of New Zealand education:

*Discovery learning, project-based learning, independent learning, situated learning, experiential learning, problem-based learning - all these are innovative ideas designed to undermine the traditional teacher role of 'telling', to replace it by 'facilitating learning'. Advances have been made over the decades, but slowly because these methods are much more difficult to train, and require more pedagogical understanding of the professional teacher (Laurillard, 1994, p. 21).*

One of the CILL teachers sums up the project:

*You've got excitement in the subject, plus confidence in themselves and their skills, plus structure or learning framework, then you've got ownership ... and they feel they can go on on their own. But they've really got to have that excitement or motivation. You've got to give them those skills and the confidence they can do it.*

## References

- Abbott, J. (1994). *Learning makes sense: Re-creating education for a changing future*. Letchworth, Herts.: Education 2000.
- Abbott, J. (1995). Education 2000 holds "Learning makes sense" seminars. *Education 2000 News*, 1.
- Abbott, J. (1997). "Upside down and inside out": Why good schools alone will never be good enough to meet the challenges of the 21st Century. *Education 2000 News* (June), 1-12.
- Alexander, P. A., Kulikowich, J. M., & Jetton, T. L. (1994). The role of subject matter knowledge and interest in the processing of linear and nonlinear texts. *Review of Educational Research*, 64(2), 201-251.
- Allen, B. S. (1992). Constructive criticisms. In T. M. Duffy & D. Jonassen, H. (Eds.), *Constructivism and the technology of instruction: A conversation*. (pp. 183-204). Hillsdale, NJ: Erlbaum.
- Alton-Lee, A. (1983). Organizing for learning. *SET* (no.2, item 5).
- Altricher, H., Posch, P., & Somekh, B. (1993). *Teachers investigate their work: An introduction to the methods of action research*. London: Routledge.
- American Association of School Librarians (AASL). (1995). Information literacy: A position paper on information problem solving. *Emergency Librarian*, 23, 20-23.
- American Association of School Librarians (AASL). (1998). *Information power: The nine information literacy standards*. [http://www.ala.org/aasl/ip\\_nine.html](http://www.ala.org/aasl/ip_nine.html).
- American Library Association Presidential Committee on Information Literacy. (1989). *Final report*. Chicago: ALA.
- Ames, C. (1992). Perceptions of efficacy and strategy use in the self-regulation of learning. In D. H. Schunk & J. L. Meece (Eds.), *Student perceptions in the classroom*. (pp. 327-348). Hillsdale, NJ: Erlbaum.
- Ames, R., & Ames, C. (1991). Motivation and effective teaching. In L. Idol & B. F. Jones (Eds.), *Educational values and cognitive instruction: Implications for reform*. (pp. 247-272). Hillsdale, NJ: Erlbaum.
- Andresen, L. (1993), On becoming makers of teachers: Journey down a long hall of mirrors. In D. Boud, R. Cohen, & D. Walker (Eds.), *Using experience for learning*. (pp. 59-70). Ballmoor, Bucks.: SRHE/ Open University Press
- Argyris, C. (1991). Teaching smart people how to learn. *Harvard Business Review* (May - June), 99 - 109.
- Argyris, C., & Schon, D. (1974). *Theory in practice*. San Francisco: Jossey Bass.
- Assessment of Performance Unit. (1993). Learning through design and technology. In R. McCormick, P. Murphy, & M. Harrison (Eds.), *Teaching and learning technology*. (pp. 58-67). Wokingham: Addison Wesley/ Open University.
- Atkins, M., & Blissett, G. (1989). Learning activities and interactive videodisc: An exploratory study. *British Journal of Educational Technology*, 20(1), 47-56.
- Australian School Library Association (ASLA)/ Australian Library and Information Association (ALIA). (1993). *Learning for the future: Developing information services in Australian schools*. Carlton, Vic.: Curriculum Corporation.
- Avann, P. (1984). Information skills in primary schools. *Education Libraries Bulletin*, 27(1, Spring), 1-14.
- Bagley, C., & Hunter, B. (1992). Restructuring constructivism and technology: Forging a new relationship. *Educational Technology* (July), 22-27.
- Baird, J. R., & Mitchell, I. J. (1987). *Improving the quality of teaching and learning: An Australian case study - the Peel Project*. Melbourne: Peel Group, Monash University.

- Baird, J. R., & Northfield, J. R. (Eds.). (1992). *Learning from the PEEL experience*. Melbourne: Monash University.
- Bamberger, J. (1991). The laboratory for making things: Developing multiple representations of knowledge. In D. A. Schon (Ed.), *The reflective turn: Case studies in and on educational practice* (pp. 37-62). New York: Teachers College Press.
- Banathy, B. (1991). Who should be the designers? *Educational Technology* (September), 49-51.
- Banathy, B. (1993). Selecting the scope of design inquiry. *Educational Technology* (April), 33-35.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2, February), 122-147.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist*, 44(9, September), 1175-1184.
- Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology*, 41(3), 586-598.
- Barron, A., & Baumbach, D. (1990). A CD-ROM tutorial: Training for a new technology. *Educational Technology* (June), 47-49.
- Barron, B., Vye, N., Zech, L., Schwartz, D., & Bransford, J. D. (1994, ). *Creating contexts for community based problem solving: The Jasper Challenge Series*. Paper presented at the American Educational Research Association, April 1994, New Orleans, LA.
- Barron, L. C., & Goldman, E. S. (1994). Integrating technology with teacher preparation. In B. Means (Ed.), *Technology and education reform: The reality behind the promise* (pp. 81-110). San Francisco: Jossey-Bass.
- Becker, H. J. (1992a). Computer-based integrated learning systems in the elementary and middle grades: A critical review and synthesis of evaluation reports. *Journal of Educational Computing Research*, 8(1), 1-41.
- Becker, H. J. (1992b). A model for improving the performance of integrated learning systems. *Educational Technology* (September), 6-15.
- Bell, B., & Gilbert, J. (1994). Teacher development as professional, personal, and social development. *Teaching and Teacher Education*, 10(5), 483-497.
- Bell, D. (1977). Welcome to the post-industrial society. In L. Estabrook (Ed.), *Libraries in a post-industrial society*. (pp. 3-7). Phoenix: Oryx.
- Bell, G. (1984). *SIR and teacher based research*. (BLR & DD Report no 5629). London: British Library Board.
- Bereiter, C. (1991). Implications of connectionism for thinking about rules. *Educational Researcher*, 20(3), 10-16.
- Bereiter, C. (1992). Referent-centred and problem-centred knowledge: Elements of an educational epistemology. *Interchange*, 23(4), 337-361.
- Bereiter, C. (1994). Constructivism, socioculturalism and Popper's world 3. *Educational Researcher*, 27(3, October), 21-23.
- Bereiter, C., & Scardamalia, M. (1985). Cognitive coping strategies and the problem of 'inert knowledge'. In C. F. Chipman, J. W. Segal, & R. Glaser (Eds.), *Thinking and learning skills: Vol 2: Research and open questions*. (pp. 65-80). Hillsdale, NJ: Erlbaum.
- Bereiter, C., & Scardamalia, M. (1989). Intentional learning as a goal of instruction. In L. B. Resnick (Ed.), *Knowing, learning and instruction: Essays in honor of Robert Glaser*. (pp. 361-392). Hillsdale, NJ: Erlbaum.
- Berliner, D. C. (1992). Redesigning classroom activities for the future. *Educational Technology* (October), 7-13.

- Berndt, T. J., & Keefe, K. (1992). Friends' influence on adolescents' perceptions of themselves at school. In D. H. Schunk & J. L. Meece (Eds.), *Student perceptions in the classroom*. (pp. 51-74). Hillsdale, NJ: Erlbaum.
- Best, R., Abbott, F., & Taylor, M. (1990). *Teaching skills for learning: Information skills in initial teacher education*. (LIR Report 78). London: British Library.
- Best, R., Heyes, S. H., & Taylor, M. (1988). *Library provision and curriculum planning: An evaluation of the Essex Secondary Schools Education/Library Project*. (LIR Report 61). London: British Library.
- Beswick, N. (1977). *Resource-based learning*. London: Heinemann Education.
- Beswick, N. (1981). Visual literacy: A vital skill. *Education Libraries Bulletin*, 24(1), 29-37.
- Beswick, N. (1982). Information systems and education: A context of concern. *Education Libraries Bulletin*, 25(2, Summer), 1-14.
- Beswick, N. (1987). *Re-thinking active learning 8-16*. London: Falmer.
- Beyer, L. (1987). What knowledge is of most worth in teacher education? In J. Smyth (Ed.), *Educating teachers: Changing the nature of pedagogical knowledge*. (pp. 19-34). London: Falmer.
- Beynon, J. (1993). Technological literacy: Where do we all go from here? In J. Beynon & H. Mackay (Eds.), *Computers into classrooms*. (pp. 212-228). London: Falmer.
- Biggs, J. (1987a). Reflective thinking and school learning: An introduction to the theory and practice of metacognition. *SET*(2, item 10), 1-4.
- Biggs, J. B. (1987b). *Student approaches to learning and studying*. Melbourne: ACER.
- Biggs, J. B. (1991). Student learning in the context of school. In J. B. Biggs (Ed.), *Teaching for learning: The view from cognitive psychology*. (pp. 7-29). Hawthorn, Vic.: ACER.
- Biggs, J. B., & Moore, P. J. (1993). *The process of learning*. (3rd ed.). New York: Prentice Hall.
- Biggs, J. B., & Telfer, R. (1987). *The process of learning*. (2nd ed.). Sydney: Prentice Hall.
- Bjorklund, D. F. (1990). *Children's strategies: Contemporary views of cognitive development*. Hillsdale, NJ: Erlbaum.
- Bjorner, S. (1991). The information literacy curriculum: A working model. *IATUL Quarterly*, 5(2), 150-160.
- Board of Education. (1928). *Memorandum on libraries in State-aided secondary schools in England*. London: HMSO.
- Borkowski, J., Carr, M., Rellinger, E., & Pressley, M. (1990). Self-regulated cognition: Interdependence of metacognition, attributions and self-esteem. In B. F. Jones & L. Idol (Eds.), *Dimensions of thinking and cognitive instruction*. (pp. 53-92). Hillsdale, NJ: Erlbaum/ NCREL.
- Boud, D., Cohen, R., & Walker, D. (1993). Introduction: Understanding learning through experience. In D. Boud, R. Cohen, & D. Walker (Eds.), *Using experience for learning*. (pp. 1-17). Ballmoor, Bucks.: SRHE/ Open University Press.
- Boud, D., & Walker, D. (1992). In the midst of experience: Developing a model to aid learners and facilitators. In J. Mulligan & C. Griffin (Eds.), *Empowerment through experiential learning*. London: Kogan Page.
- Brake, T. (1980). *The need to know: Teaching the importance of information: Final report for the period Jan. 1978-March 1979*. (BLR & DD Report no 5511). London: British Library Board.
- Brake, T. (1984). *Information Skills in the Curriculum Research Unit: Final report*. (BLR & DD Report 5815). London: British Library Board.
- Brake, T. (1985). *Lessons from 'INSCRU': Information Skills in the Curriculum Research Unit final report*. (BLR & DD Report 5815). London: British Library Board.
- Branch, R. C. (1994). Common instructional design practices employed by secondary school teachers. *Educational Technology*(March), 25-34.
- Bransford, J., Vye, N., Kinzer, C., & Risko, V. (1990). Teaching thinking and content knowledge: Towards an integrated approach. In B. F. Jones & L. Idol (Eds.),

- Dimensions of thinking and cognitive instruction.* (pp. 381-414). Hillsdale, NJ: Erlbaum/ NCREL.
- Bransford, J. e. a. (1996). MOST environments for accelerating literacy development. In S. Vosniadou, E. de Corte, R. Glaser, & H. Mandl (Eds.), *International perspectives on the design of technology-supported learning environments.* (pp. 223-255). Mahwah, NJ: Erlbaum.
- Breivik, P. S. (1993). *Information literacy: What's it all about.* Paper presented at the Information literacy: The Australian agenda, Adelaide College of TAFE 2-4 December 1992.
- Breivik, P. S. (1995). A signal for the need to restructure the learning process. *Lines*, 7(5), 22-26.
- Breivik, P. S. & Gee, E. G. (1989). *Information literacy: Revolution in the library.* New York: American Council on Education/ Macmillan.
- Brew, A. (1993), Unlearning through experience. In D. Boud, R. Cohen, & D. Walker (Eds.), *Using experience for learning.* (pp. 87-98). Ballmoor, Bucks.: SRHE/ Open University Press.
- British Library. (1990). *Information skills in education.* London: British Library Research & Development Department.
- Brookfield, S. (1987). *Developing critical thinkers.* San Francisco: Jossey Bass.
- Brookfield, S. (1993). Through the lens of learning: How the visceral experience of learning reframes teaching. In D. Boud, R. Cohen, & D. Walker (Eds.), *Using experience for learning.* (pp. 21-32). Ballmoor, Bucks.: SRHE/ Open University Press.
- Brown, A. (1994a). The advancement of learning. *Educational Researcher*, 23(8), 4-12.
- Brown, A. (1994b). Processes to support the use of information technology to support learning. *Computer Education*, 22(1 2), 145-153.
- Brown, A., Campione, J., & Day, J. D. (1981). Learning to learn: On training students to learn from texts. *Educational Researcher* (Feb.), 14-21.
- Brown, A. L., & Campione, J. C. (1996). Psychological theory and the design of innovative learning environments: On procedures, principles and systems. In L. Schauble & R. Glaser (Eds.), *Innovations in learning: New environments for education.* (pp. 289-325). Hillsdale, NJ: Erlbaum.
- Brown, A. L., & Palinscar, A. S. (1989). Guided, cooperative learning and individual knowledge acquisition. In L. B. Resnick (Ed.), *Knowing, learning and instruction: Essays in honor of Robert Glaser.* (pp. 393-452). Hillsdale, NJ: Erlbaum.
- Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1, Jan-Feb), 32-42.
- Brown, J. S., & Duguid, P. (1993). Stolen knowledge. *Educational Technology* (March), 10-15.
- Brown, M. (1995). What is the role of information and communication technology in the New Zealand curriculum? *Computers in New Zealand Schools* (July), 7-14.
- Bruce, C. (1994). Portrait of an information literate person. *HERDSA News*, 16(3, November), 9-11.
- Bruce, C. (1996a). Information literacy: A framework for higher education. *Australian Library Journal* (44), 158-169.
- Bruce, C. (1996b). *Information literacy: A phenomenography.* University of New England, Armidale, NSW.
- Bruce, C. (1998). The phenomenon of information literacy. *Higher Education Research & Development*, 17(1), 25-43.
- Bruce, J. (1999). Teaching information literacy skills. *National Education: Information Technology* (pp. 8-12). Wellington: New Zealand Educational Institute (NZEI).
- Bruer, J. T. (1993). *Schools for thought: A science of learning in the classroom.* Cambridge, MA: MIT Press.
- Bruner, J. (1965). Learning and thinking. In R. C. Anderson & D. P. Ausubel (Eds.), *Readings in the psychology of cognition.* (pp. 76-86). New York: Holt Rinehart.

- Bruner, J. (1966). *Toward a theory of instruction*. Cambridge, MA: Harvard University Press.
- Bruner, J. (1974). *Beyond the information given*. London: Allen and Unwin.
- Bruner, J. S. (1972). *The relevance of education*. Harmondsworth: Penguin.
- Bruner, J. S., Goodnow, J., & Austin, G. (1956). *A study of thinking*. New York: Wiley.
- Bunning, C. (1994). Some action research core beliefs. *NZ Action Research Network (NZARN) Newsletter* (October).
- Burwell, L. B. (1991). The interaction of learning styles with learner control treatments in an interactive videodisc lesson. *Educational Technology* (March), 37-43.
- Butler, G. (1996). *Impact 2001: How information technology will change New Zealand*. Wellington: Information Technology Association of New Zealand (ITANZ)/ Information Technology Advisory Group (ITAG).
- Butterworth, M. (1992). Online searching and CD-Rom in British schools. *Education for Information 10*, 35-48.
- Buzan, T., & Buzan, B. (1993). *The mind map book*. London: BBC.
- California Library Media and Educators Association. (1994). *From library skills to information literacy: A handbook for the 21st Century*. Castle Rock, Col: Hi Willow.
- Callison, D. (1986). School library media programs and free inquiry learning. *School Library Journal* (February), 20-24.
- Cameron, J., & Pierce, W. D. (1994). Reinforcement, reward and intrinsic motivation: A meta-analysis. *Review of Educational Research*, 64(3), 363-423.
- Candy, P. (1990a). How people learn to learn. In R. Smith (Ed.), *Learning to learn across the life span*. (pp. 30-63). San Francisco: Jossey Bass.
- Candy, P. (1993). *The learning society*. Paper presented at the Information literacy: The Australian agenda, Adelaide College of TAFE, 2-4 December 1992.
- Candy, P., Crebert, G., & O'Leary, J. (1994). *Developing lifelong learners through undergraduate education*. Canberra: National Board of Employment Education and Training (NBEET)/ Australian Government Publishing Service (AGPS).
- Candy, P. C. (1990b). How people learn to learn. In R. Smith (Ed.), *Learning to learn across the life span*. (pp. 30-63): San Francisco: Jossey-Bass.
- Candy, P. C. (1991). *Self-direction for lifelong learning: A comprehensive guide to the theory and practice*. San Francisco: Jossey-Bass.
- Carpinter, A. (1991). *Managing data, knowledge and know-how*. Wellington: National Library/ Institute of Policy Studies.
- Carr, T. (1997). Turning experience into learning: Guidelines for graduate action research Masters and PhD candidates. In T. Carr (Ed.), *Broadening perspectives in action research*. (pp. 79-101). Brisbane: ALAPRM.
- Carr, W., & Kemmis, S. (1986). *Becoming critical: Education knowledge and action research*. London: Falmer Press.
- Carter, C., & Monaco, J. (1987). *Learning information technology skills*. (LIR Report 54). London: British Library.
- Carter, K. (1998). Action research n partnership: Establishing teachers as key players on the school effectiveness stage. *Educational Action Research 6*(2), 275-303.
- Cavalier, R. (1993). *Information literacy: Why worry?* Paper presented at the Information literacy: The Australian agenda., Adelaide College of TAFE 2-4 December 1992.
- CERI. (1991). *Thinking to learn*. Paper presented at the The proceedings of the 1989 OECD Conference organized by the Centre for Educational Research and Innovation, Oxford.
- Cervone, D. (1993). The role of self-referent cognitions in goal setting, motivation, and performance. In M. Rabinowitz (Ed.), *Cognitive science: Foundations of instruction*. (pp. 33-56). Hillsdale, NJ: Erlbaum.
- Chalmers, A., & Slyfield, H. (1993). *Contributions to learning: Libraries and New Zealand schools*. Wellington: National Library of New Zealand.

- Chan, C. K. K., Burtis, P. J., Scardamalia, M., & Bereiter, C. (1992). Constructive activity in learning from text. *American Educational Research Journal*, 29(1, Spring), 97-118.
- Chiou, G.-F. (1992). Situated learning, metaphors, and computer-based learning environments. *Educational Technology* (August), 7-10.
- Chipman, S. F., & Segal, J. W. (1985). Higher cognitive goals for education: an introduction. In J. W. Segal, C. S. F., & R. Glaser (Eds.), *Thinking and learning skills: Relating instruction to research* (pp. 1- 19). Hillsdale, NJ: Erlbaum.
- Chung, J., & Reigeluth, C. M. (1992). Instructional prescriptions for learner control. *Educational Technology* (October), 14-20.
- Clark, E. T. (1992). The search for a new educational paradigm. In A. Costa, J. Bellanca, & R. Fogarty (Eds.), *If mind matters: A foreword to the future*. (pp. 25-40). Cheltenham, Vic.: Hawker Brownlow.
- Clark, W. B. (1994). Constructing an integrated model for professional education. *Educational Technology* (July-August), 38-43.
- Clay, M., & Cazden, C. B. (1990). A Vygotskian interpretation of Reading Recovery. In L. C. Moll (Ed.), *Vygotsky and education: Instructional implications and applications of sociohistorical psychology*. (pp. 206-223). Cambridge: Cambridge University Press.
- Cleaver, B. (1987). Thinking about information: Skills for lifelong learning. *School Library Media Quarterly* (Fall), 29-31.
- Cobb, P. (1994). Constructivism in mathematics and science education. *Educational Researcher*, 23(7), 4.
- Cognition and Technology Group at Vanderbilt. (1991a). Designing learning environments that support thinking: The Jasper series as a case study. In T. M. Duffy, J. Lowyck, & D. Jonassen (Eds.), *Designing environments for complex learning*. (pp. 9-36). Berlin: Springer Verlag.
- Cognition and Technology Group at Vanderbilt. (1991b). Some thoughts about constructivism and instructional design. *Educational Technology* (September), 16-18.
- Cognition and Technology Group at Vanderbilt. (1991c). Technology and the design of generative learning environments. *Educational Technology* (May), 34-40.
- Cognition and Technology Group at Vanderbilt. (1992). The Jasper experiment: An exploration of issues in learning and instructional design. *ETR&D*, 40(1), 65-80.
- Cognition and Technology Group at Vanderbilt. (1993a). Anchored instruction and situated cognition revisited. *Educational Technology* (March), 52-69.
- Cognition and Technology Group at Vanderbilt. (1993b). Toward integrated curricula: Possibilities from anchored instruction. In M. Rabinowitz (Ed.), *Cognitive science and foundations of instruction*. (pp. 33-56). Hillsdale, NJ: Lawrence Erlbaum.
- Cognition and Technology Group at Vanderbilt. (1994a). From visual word problems to learning communities: Changing conceptions of cognitive research. In K. McGilly (Ed.), *Classroom lessons: Integrating cognitive theory and classroom practice*. (pp. 157-200). Cambridge, Mass.: MIT Press.
- Cognition and Technology Group at Vanderbilt. (1994b). Multimedia environments for developing literacy in at-risk students. In B. Means (Ed.), *Technology and education reform: The reality behind the promise*. (pp. 23-56). San Francisco: Jossey Bass.
- Cole, P. (1992). Constructionism revisited: A search for common ground. *Educational Technology* (February), 27-34.
- Collins, A. (1991). Cognitive apprenticeship and instructional technology. In L. Idol & B. F. Jones (Eds.), *Educational values and cognitive instruction: Implications for reform*. (pp. 121-138). Hillsdale, NJ: Erlbaum.
- Collins, A. (1996). Design issues for learning environments. In S. Vosniadou, E. de Corte, R. Glaser, & H. Mandl (Eds.), *International perspectives on the design of technology-supported learning environments*. (pp. 347-361). Mahwah, NJ: Erlbaum.
- Collins, A., Brown, A., & Newman, S. E. (1989). Cognitive apprenticeship: Teaching the craft of reading, writing and math. In L. B. Resnick (Ed.), *Knowing, learning and instruction: Essays in honor of Robert Glaser*. (pp. 453-494). Hillsdale, NJ: Erlbaum.

- Cook, P. (1995). Independent learning. *Educational Computing & Technology* (April/May), 15-18.
- Cooper, P. (1993). Paradigm shifts in designed instruction: From behaviorism to cognitivism to constructivism. *Educational Technology* (May), 13-19.
- Corno, L., & Mandinach, E. B. (1983). The role of cognitive engagement in classroom learning and motivation. *Educational Psychologist*, 18(2), 88-108.
- Costa, A. L. (1984). Mediating the metacognitive. *Educational Leadership*, 42(3), 57-62.
- Costa, A. L. (1992). The learning community. In A. Costa, J. Bellanca, & R. Fogarty (Eds.), *If mind matters: A foreword to the future*. (pp. 93-102). Cheltenham, Vic.: Hawker Brownlow.
- Covington, M. (1987). The planning construct in the psychological literature. In S. L. Friedman, E. K. Scholnick, & R. R. Cocking (Eds.), *Blueprints for thinking: The role of planning in cognitive development*. (pp. 469-511). Cambridge: Cambridge University Press.
- Covington, M. (1992). *Making the grade: A self-worth perspective on motivation and school reform*. Cambridge: Cambridge University Press.
- Cowley, J. (1990). *Post-induction information skills teaching in United Kingdom higher education*. (BLR Paper 47). London: British Library.
- Criticos, C. (1993). Experiential learning and social transformation for a post-apartheid learning future. In D. Boud, R. Cohen, & D. Walker (Eds.), *Using experience for learning*. (pp. 157-168). Ballmoor, Bucks.: SRHE/ Open University Press
- Cronin, B. (1983). Adaption, extinction or genetic drift? *Aslib Proceedings*, 35(6/7 June/July), 278-289.
- Crook, C. (1994). *Computers and the collaborative experience of learning*. London: Routledge.
- Crooks, T., & Flockton, L. (1997). *Reading and speaking, music, technology: National Education Monitoring Project 1996 assessment reports*. Dunedin: University of Otago, Educational Assessment Research Unit.
- Crooks, T., & Flockton, L. (1998). *Information skills: Assessment results, 1997: National Education Monitoring Report 7*. (National Education Monitoring Report 7). Dunedin: University of Otago, Educational Assessment Research Unit.
- CSILE. (1998). *CSILE*. <http://csile.oise.on.ca>.
- Cunningham, D. J. (1991). In defense of extremism. *Educational Technology* (September), 26,27.
- Curwood, E. (1995). *Developing a course for trainee teachers to teach information skills: A case study using action research*. Unpublished Master of Education thesis, University of Otago, Dunedin.
- D'Hainaut, L. (1981). Interdisciplinarity and integration. In L. D'Hainaut e. a. (Ed.), *Curricula and lifelong education* (pp. 201-229). Paris: UNESCO.
- Dadds, M. (1995). *Passionate enquiry and school development: A story about teacher action research*. London: Falmer Press.
- Dawson, M. (1989). Cooperative program planning and teaching: What's all the fuss about? In Library Services Directorate, *Readings in CPPT: A compilation of articles about cooperative program planning and teaching from Scan vol 7 and 8*. Sydney: Library Services, Services Directorate.
- Dawson, M., & Kallenberger, N. (1989). *Information skills in the school*. Sydney: NSW Department of Education.
- Dede, C. (1992). The future of multimedia: Bridging to virtual worlds. *Educational Technology* (May), 54-60.
- Dede, C. (1995). The evolution of constructivist learning environments: Immersion in virtual distributed worlds. *Educational Technology*(September), 46-52.
- Dembo, M. H., & Gibson, S. (1985). Teachers' sense of efficacy: An important factor in school improvement. *Elementary School Journal*, 2, 173-184.



- Department of Education. (1987). *The curriculum review: Report of the Committee to Review the Curriculum for Schools*. . Wellington: Department of Education.
- DePorter, B. (1993). *Quantum Learning: Unleash the genius within you*. London: Piatkus.
- Dick, W. (1991). An instructional designer's view of constructivism. *Educational Technology* (May), 41-44.
- Dick, W. (1993). Enhanced ISD: A response to changing environments for learning and performance. *Educational Technology* (February), 12-15.
- Dick, W. (1995). Instructional design and creativity: A response to the critics. *Educational Technology* (July-August), 5-11.
- Doiron, R. (1993). Teachers and teacher-librarians exploring curriculum potential. *Emergency Librarian*, 21(1, September-October), 9-16.
- Donmoyer, R. (1997). Refocusing on learning. *Educational Researcher*, 26(1, Jan/Feb), 4, 34.
- Dordick, H. (1987). *Information technology and the New Zealand economy*. Wellington: Victoria University Press.
- Doyle, C. (1992). *Outcome measures for information literacy within the national education goals of 1990: Final report to National Forum on Information Literacy: Summary findings*. (ERIC Clearinghouse on Information Resources (ED 351033)). New York.
- Doyle, C. (1995). Information literacy in an information society. *Emergency Librarian*, 22(4, March-April), 30-32.
- Driscoll, M. P., Klein, J. D., & Sherman, G. P. (1994). Perspectives on instructional planning: How do teachers and instructional designers conceive of ISD planning practices? *Educational Technology* (March), 34-42.
- Driver, R., Asoko, H., Leach, J., Mortimer, E., & Scott, P. (1994). Constructing scientific knowledge in the classroom. *Educational Researcher*, 23(7, October), 5-12.
- Dryden, G., & Vos, J. (1993). *The learning revolution...* Auckland: Profile.
- Dudley-Marling, C. (1995). Complicating ownership. In C. Dudley-Marling & D. Searle (Eds.), *Who owns learning?: Questions of autonomy, choice, and control*. (pp. 1 - 15). Portsmouth, NH: Heinemann.
- Duffy, T. M. (In press). Strategic teaching framework: An instructional model for learning complex, interactive skills. To appear in C. Dills & A. Romiszowski (Eds.) *Instructional development state of the art*. Educational Technology Publications.
- Duffy, T. M., & Cunningham, D. J. (1996). Constructivism: Implications for design and delivery of instruction. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology*. (pp. 170-198). New York: Macmillan.
- Duffy, T. M., & Jonassen, D., H. (1992a). Constructivism: New implications for instructional technology. In T. M. Duffy & D. Jonassen, H. (Eds.), *Constructivism and the technology of instruction: A conversation*. (pp. 1-16). Hillsdale, NJ: Lawrence Erlbaum.
- Duffy, T. M., & Jonassen, D. H. (1991). Constructivism: New implications for instructional technology. *Educational Technology* (May), 7-11.
- Duffy, T. M., & Jonassen, D. H. (Eds.). (1992b). *Constructivism and the technology of instruction: A conversation*. Hillsdale, NJ: Lawrence Erlbaum.
- Duffy, T. M., Lowyck, J., & Jonassen, D. (Eds.). (1991). *Designing environments for complex learning*. Berlin: Springer Verlag.
- Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist*, 41(10), 1040-1048.
- Earle, R. S. (1994). Instructional design and the classroom teacher: Looking back and moving ahead. *Educational Technology* (March), 6-10.
- Eden, M. (1989). Cooperative program planning and teaching at Mt Kuring-gai Public School. In Library Services Directorate, *Readings in CPPT: A compilation of articles about cooperative program planning and teaching from Scan vol 7 and 8*. Sydney: Library Services, Services Directorate.

- Education Review Office. (1995). *Assessing student achievement* (National Education Evaluation Reports 3). Wellington: ERO.
- Edwards, J. (1991). The direct teaching of thinking skills. In G. Evans (Ed.), *Learning and teaching cognitive skills*. (pp. 87-105). Hawthorne, Vic.: ACER.
- Ehrmann, S. C., & Balestri, D. P. (1992). Learning to design, designing to learn: A more creative role for technology. In D. P. Balestri, S. C. Ehrmann, & D. L. Ferguson (Eds.), *Designing to learn: Using technology to transform the curriculum*. (pp. 1-22). Washington: Taylor & Francis.
- Eisenberg, M., & Small, R. V. (1993). Information-based education: An investigation of the nature and role of information attributes in education. *Information Processing & Management*, 29(2), 263-275.
- Eisenberg, M. B., & Berkowitz, R. E. (1988). *Curriculum initiative: An agenda and strategy for library media programs*. Norwood, NJ: Ablex.
- Eisenberg, M. B., & Berkowitz, R. E. (1990). *Information problem-solving: The big six skills approach to library and information skills instruction*. Norwood, NJ: Ablex.
- Elliott, J. (1984). Improving the quality of teaching through action research. *Forum*, 26(3), 74-77.
- Elliott, J. (1990). Teachers as researchers: Implications for supervision and teacher education. *Teaching and Teacher Education*, 6(1), 1-26.
- Elliott, J. (1993). The relationship between "understanding" and "developing" teachers' thinking. In J. Elliott (Ed.), *Reconstructing teacher education* (pp. 193 - 207). London: Falmer.
- Elliott, J. & Adelman, C. (1973) Reflecting where the action is: The design of the Ford Teaching Project. *Education for teaching*, 92, 8-20
- Ellis, A. (1971). *Library services for young people in England and Wales 1830-1970*. Oxford: Pergamon.
- Emihovich, C. (1998). Beyond teaching: Learning to lead through action research. In S.L. Jacobson, C. Emihovich, J. Helfrich, H.G. Petrie & R.B. Stevenson, *Transforming schools and schools of education: A new vision for preparing educators*. (pp. 47-69). Thousand Oaks, CA: Sage.
- Entwistle, N. (1988). Motivational factors in students' approaches to learning. In R. R. Schmeck (Ed.), *Learning strategies and learning styles*. (pp. 21-49). New York: Plenum Press.
- Entwistle, N., Entwistle, A., & Tait, H. (1991). Academic understanding and contexts to enhance it: A perspective from research on student learning. In T. M. Duffy, J. Lowyck, & D. Jonassen (Eds.), *Designing environments for complex learning*. (pp. 331-359). Berlin: Springer Verlag.
- Entwistle, N., & Ramsden, P. (1983). *Understanding student learning*. London: Croom Helm.
- Entwistle, N. J. (1991). Cognitive style and learning. In K. Marjoribanks (Ed.), *The foundations of learning*. (pp. 139-145). Oxford: Pergamon.
- Erickson, G. L., & MacKinnon, A. M. (1991). Seeing classrooms in new ways: On becoming a science teacher. In D. Schon, A. (Ed.), *The reflective turn: Case studies in and on educational practice* (pp. 15-36). New York: Teachers College Press.
- Ernest, P. (1995). The one and the many. In L. P. Steffe & J. Gale (Eds.), *Constructivism in education*. (pp. 459-486). Hillsdale NJ: Lawrence Erlbaum.
- Farmer, D. W. (1992). Information literacy: Overcoming barriers to implementation. In D. W. Farmer & T. E. Mech (Eds.), *Information literacy: Developing students as independent learners*. (pp. 103-112). San Francisco: Jossey Bass.
- Farmer, D. W., & Mech, T. E. (1992). Editors' notes. In D. W. Farmer & T. E. Mech (Eds.), *Information literacy: Developing students as independent learners*. (pp. 1-4). San Francisco: Jossey Bass.
- Farnham-Diggory, S. (1990). *Schooling*. Cambridge, MA.: Harvard University Press.
- Farnham-Diggory, S. (1992). *Cognitive processes in education*. New York: Harper Collins.

- Farnham-Diggory, S. (1994). Paradigms of knowledge and instruction. *Review of Educational Research*, 64(3), 463-477.
- Fernie, D. E. (1995). Profile: Howard Gardner. In R. Fogarty & J. Bellanca (Eds.), *Multiple intelligences: A collection*. (pp. 25-39). Cheltenham, Vic.: Hawker Brownlow.
- Fiske, E. B. (1991). *Smart schools, smart kids: Why do some schools work?* New York: Simon & Schuster.
- Flavell, J. H. (1977). *Cognitive development*. (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.
- Fleming, R. (1989). Literacy for a technological age. *Science Education*, 73(4), 391-404.
- Fletcher, J. D., Hawley, D. E., & Piele, P. K. (1990). Costs, effect, and utility of microcomputer assisted instruction in the classroom. *American Educational Research Journal*, 27(4), 463-477.
- Fletcher-Flynn, C. M., & Gravatt, B. (1995). The effectiveness of computer aided instruction (CAI): A meta-analysis. *Journal of Educational Computing Research*, 12(3), 219-242.
- Fogarty, R., & Bellanca, J. (1992). Capture the vision: Future world, future school. In A. Costa, J. Bellanca, & R. Fogarty (Eds.), *If mind matters: A foreword to the future*. (pp. 13-24). Cheltenham, Vic.: Hawker Brownlow.
- Fosnot, C. (1992). Constructing constructivism. In T. M. Duffy & D. Jonassen (Eds.), *Constructivism and the technology of instruction: A conversation*. (pp. 167-176). Hillsdale, NJ: Erlbaum.
- Fosnot, C. T. (1984). Media and technology in education: A constructivist view. *Educational Communication and Technology Journal*, 32, 195-205.
- Fosnot, C. T. (Ed.). (1996). *Constructivism: Theory and perspectives*. New York: Teachers College Press.
- Fowler, J. H. (1915). *School Libraries*. (Pamphlet no 33.). London: The English Association.
- Fox, P. (Ed.). (1980). *Library user education: New approaches needed?* (BLR & DD Report 5503). London: British Library Board.
- Frederiksen, N. (1984). Implications of cognitive theory for instruction in problem solving. *Review of Educational Research*, 54(3), 363-407.
- Fusco, E., & Fountain, G. (1992). Reflective teacher, reflective learner. In A. Costa, J. Bellanca, & R. Fogarty (Eds.), *If mind matters: A foreword to the future*. (Vol. 1, pp. 239-256). Cheltenham, Vic.: Hawker Brownlow.
- Gagne, E. D., Yekovich, C. W., & Yekovich, F. R. (1993). *The cognitive psychology of school learning*. (2nd ed.). New York: Harper Collins.
- Gagne, R. M. (1972). Instruction and the conditions of learning. In I. K. Davies & J. Hartley (Eds.), *Contributions to an educational technology*. (pp. 44-50). London: Butterworth.
- Galpin, B., & Schilling, M. (1989). *Computers, topic work and young children: Learning to use information in the primary classroom*. ( British Library Research Report 68). London: British Library.
- Gapper, S., & Styles. (1993). *Information illiteracy - changing roles for information professionals*. Paper presented at the Information literacy: The Australian agenda., Adelaide College of TAFE 2-4 December 1992.
- Gardner, H. (1993). *Multiple intelligences: The theory in practice*. New York: Basic Books.
- Gardner, H., & Boix-Mansilla, V. (1994). The unschooled mind: How children think and how school should teach. *Teachers College Record*, 96(2, Winter), 199-217.
- Gardner, H., & Hatch, T. (1990). *Multiple intelligences go to school: Educational implication of the theory of multiple intelligences*. (CTE Technical Report Issue no.4): Education Development Center, Center for Children and Technology.
- Garner, R. (1987). *Metacognition and reading comprehension*. Norwood, NJ: Ablex.

- Garrett, D. (1970). 1984 and all that: Some issues in education and social development. In R. J. Bates (Ed.), *Prospects in New Zealand education*. (pp. 11-29). Auckland: Hodder & Stoughton/ University of London Press.
- Gawith, G. (1984). *The AL Framework*. Paper presented at the New Zealand Reading Association Annual Conference, Wanganui.
- Gawith, G. (1987). *Information alive: Information skills for research and reading*. Auckland: Longman Paul.
- Gawith, G. (1988). *Action learning: Student guide to research and information skills*. Auckland: Longman Paul.
- Gawith, G. (1993). *IT and learning: Course guide*. Auckland: Centre for Information Studies, Auckland College of Education.
- Gawith, G. (1996). *Learning alive*. Auckland: Longman Paul.
- Gawith, G. (1998). Information literacy at the grassroots in New Zealand. *School Libraries Worldwide*, 4(1), 50-58.
- Gellatly, B., & Heeks, P. (Eds.). (1987). *Information technology and the school library*. London: British Library.
- Gerber, R., Boulton-Lewis, G., & Bruce, C. (1995). Children's understanding of graphic representations of quantitative data. *Learning and Instruction*, 5, 77-100.
- Gibbs, G. (1977). Can students be taught how to study? *Higher Education Bulletin*, 5(2, Summer), 107-118.
- Glaser, R. (1993). Education and thinking: The role of knowledge. In R. McCormick, P. Murphy, & M. Harrison (Eds.), *Teaching and learning technology*. (pp. 91-111). Wokingham: Addison Wesley/ Open University.
- Gosling, W. (1981). *The kingdom of sand*. London: Council for Educational Technology.
- Graesser, A. C., Person, N. K., & Huber, J. (1993). Question asking during tutoring and in the design of educational software. In M. Rabinowitz (Ed.), *Cognitive science: Foundations of instruction*. (pp. 149-171). Hillsdale, NJ: Erlbaum.
- Graham, S., Donaldson, P., & Sommerville, P. (1997). Putting the curriculum on ice. *Computers in New Zealand Schools* (July), 3-8.
- Gredler, M. E. (1992). *Learning and instruction: Theory into practice*. (2nd ed.). New York: Macmillan.
- Green, B. (1997) *Literacy, informaton and the learning society or swimming against the data stream*. Paper presented at the Joint Conference of the Australian Association for the Teaching of English, the Australian Literacy Educators' Association and the Australian School Library Association, Darwin, Northern Territory, Australia July 8 - 11, 1997.
- Greeno, J. G. (1997). On claims that answer the wrong questions. *Educational Researcher*, 26(1), 5-17.
- Griffin, M. (1983). *Study and information skills in the primary school*. (BLR & DD Report 5784). London: NFER/ British Library.
- Grundy, S., & Kemmis, S. (1982). Educational action research in Australia: The state of the art (an overview). In S. Kemmis (Ed.), *The action research reader*. (pp. 83-97). Melbourne: Deakin University Press.
- Gustafson, K. L. (1993). Instructional design fundamentals: Clouds on the horizon. *Educational Technology* (February), 27-32.
- Haines-Stiles, G. (1998). Passport to knowledge. *Good Teacher* (August), 7.
- Halford, G. S. (1993). *Children's understanding: The development of mental models*. Hillsdale, NJ: Lawrence Erlbaum.
- Hall, N. (Ed.). (1985). *Teachers, information and school libraries*. Paris: IFLA/ UNESCO.
- Hannafin, M. J. (1992). Emerging technologies, ISD, and learning environments: Critical perspectives. *ETR&D*, 40(1), 49-63.
- Hannafin, R. D., & Savenye, W. C. (1993). Technology in the classroom: The teacher's new role and resistance to it. *Educational Technology* (June), 26-31.

- Harel, I., & Papert, S. (1992). Software design as a learning environment. In D. P. Balestri, S. C. Ehrmann, & D. L. Ferguson (Eds.), *Designing to learn: Using technology to transform the curriculum*. (pp. 35-74). Washington: Taylor & Francis.
- Hargreaves, A. (1994). *Changing teachers, changing times: Teachers work and culture in the postmodern age*. London: Cassell.
- Harley, S. (1993). Situated learning and classroom instruction. *Educational Technology* (March), 46-51.
- Harris, J. (1993). Using Internet know-how to plan how students will know. *Computing Teacher* (May), 35-40.
- Harrison, C. (1993). *Open and flexible learning: Information literacy as a key competency*. Paper presented at the Information literacy: The Australian agenda, Adelaide College of TAFE 2-4 December 1992.
- Hawkins, J., & Collins, A. (1992). Design - experiments for infusing technology into learning. *Educational Technology* (September), 63-67.
- Hay, K. E. (1993). Legitimate peripheral participation, instructionism and constructivism: Whose situation is it anyway? *Educational Technology* (March), 33-38.
- Haycock, K. (1999). Fostering collaboration, leadership and information literacy: Common behaviors of uncommon principals and faculties. *National Association of Secondary School Principals Bulletin*, 83(607), 82-87.
- Healy, J., M. (1998). *Failure to connect: How computers affect our children's minds - for better and worse*. New York: Simon & Schuster.
- Heather, P. (1984a). *A study of the use of books and libraries by children in primary schools*. (CRUS Occasional Paper no 11): CRUS/ British Library.
- Heather, P. (1984b). *Teaching methods and the use of books and libraries in primary schools: A review*. (CRUS Occasional Paper no 10): CRUS/ British Library.
- Heeks, P. (1988). *Assessing school libraries: Case studies of six Berkshire secondary schools*. (BLR Paper 42). London: British Library.
- Heeks, P. (1989). *Perspectives on a partnership: information skills and school libraries 1983-1988*. (British Library Research Reviews no. 13). London: British Library.
- Herman, J. L. (1994). Evaluating the effects of technology in school reform. In B. Means (Ed.), *Technology and education reform: The reality behind the promise* (pp. 133-168). San Francisco: Jossey-Bass.
- Herring, J. E. (1996). *Teaching information skills in schools*. London: Library Association Publishing.
- Herring, J. E., & Williams, D. A., & Bain, L. M. (1987). MISLIP: New directions for school librarians and teachers. *Library Association Record* 89(10), 524-525.
- Hertfordshire Library Services. (1986). *School libraries: The challenge*.
- HMI. (1989). *Reading policy and practice at ages 5- 14*. Department of Education and Science/ HMI.
- Hoerr, T. R. (1994). How the new city school applies the multiple intelligences. *Educational Leadership*, 52(3), 29-31.
- Hogan, K., & Pressley, M. (Eds.). (1997). *Scaffolding student learning: Instructional approaches and issues*. Cambridge, MA: Brookline.
- Hoggart, R. (1991). The pursuit of quality. *The Bookseller* (14 June), 1700-1703.
- Honebein, P. C., Duffy, T. M., & Fishman, B. M. (1991). Constructivism and the design of learning environments: Context and authentic activities for learning. In T. M. Duffy, J. Lowyck, & D. Jonassen (Eds.), *Designing environments for complex learning*. (pp. 87-108). Berlin: Springer Verlag.
- Hopkins, D. E. (1987). *Knowledge, information skills and the curriculum*. (LIR Report 46). London: British Library.
- Hounsell, D., & Martin, E. (1983). *Developing information skills in secondary schools: A dissemination project*. (LIR Report 9). London: British Library.
- Hounsell, D., & Ward, P. (1983). *Information skills and the non-academic 16-19 year old*. (BLR & D Report 5767). London: British Library/ University of Lancaster.

- Howard, J. (1989). Teachers and training: On teaching, knowledge and "middle ground". *Harvard Educational Review*, 59(2, May), 226-239.
- Howard, J. (1991). *Information skills and the secondary curriculum*. (British Library Research Report 84). London: British Library
- Hyerle, D. (1996). *Visual tools for constructing knowledge*. Alexandria, Virginia: ASCD.
- Idol, L., & Jones, B. F. (Eds.). (1991). *Educational values and cognitive instruction: Implications for reform*. Hillsdale, NJ: Lawrence Erlbaum.
- Idol, L., Jones, B. F., & Mayer, R. E. (Eds.). (1991). *Classroom instruction: The teaching of thinking*. Hillsdale, NJ: Lawrence Erlbaum.
- Information Technology Action Group (ITAG). (1998). *Towards 2001: Information and communications technology in New Zealand schools 1993-1998*. Wellington: ITAG.
- Irving, A. (1981). *Some impressions of library user education in US schools: Report of a visit*. Loughborough: Loughborough University Department of Library and Information Studies.
- Irving, A. (1982). Crossing the boundaries: Study skills across the curriculum. In A. Irving (Ed.), *Starting to teach study skills*. (pp. 90-93). London: Arnold.
- Irving, A. (1983). *Educating information users in schools*. (BL Research Review No. 4). London: British Library.
- Irving, A. (1985). *Study and information skills across the curriculum*. London: Heinemann Educational.
- Irving, A. (1990a). Educating information users in schools: An overview of the research and its implications. In A. Irving e. a. (Ed.), *Seminar on educating information users in schools*. (pp. 3-10). London: British Library.
- Irving, A. (1990b). *Wider horizons: Online information services in schools*. (LIR Report 80). London: British Library.
- Irving, A. (1991). The educational value and use of online information services in schools. *Computers in Education*, 17(3), 213-255.
- Irving, A. (1992). Information skills across the curriculum. *School Library Media Annual* (10), 38-45.
- Irving, A., & Snape, W. H. (1979). *Educating library users in secondary schools*. (BLR & DD Report 5467). London: British Library.
- Irving, A. e. a. (1990c). *Seminar on educating information users in schools*. (British Library Research Paper 34). London: British Library.
- Isaksen, S. G., & Parnes, S. J. (1985). Curriculum planning for creative thinking and problem solving. *Journal of Creative Behaviour*, 19(1), 1-29.
- Jacobson, F. F., & Jacobson, M. J. (1993). Representative cognitive learning theories and BI: A case study of end user searching. *Research Strategies*, 11(3), 124-137.
- Jesson, B. (1999). *Only their purpose is mad: The money men take over New Zealand*. Palmerston North: Dunmore Press.
- Jesson, J. (1995). Curriculum in New Zealand: Is it policy by dodgems? *Educational Review*, 47(2), 143-155.
- Johnson, F. (1990). *Fourth formers learning to learn: An experiment in enhancing classroom learning strategies*. (Report no. 90-1). Christchurch: Education Department, University of Canterbury.
- Johnson-Laird, P. N. (1983). *Mental models: Towards a cognitive science of language, inference, and consciousness*. Cambridge, Mass.: Harvard University Press.
- Jonassen, D. (1996). *Computers in the classroom: Mindtools for critical thinking*. Englewood Cliffs, CO: Merrill.
- Jonassen, D., & Reeves, T. (1996). Learning with technology: Using computers as cognitive tools. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology*. (pp. 693 - 719). New York: Macmillan.
- Jonassen, D. H. (1990). Towards a constructivist view of instructional design. *Educational Technology* (September), 32-34.

- Jonassen, D. H. (1991). Evaluating constructivistic learning. *Educational Technology* (September), 28-33.
- Jonassen, D. H. (1993). The trouble with learning environments. *Educational Technology* (January), 35-37.
- Jonassen, D. H. (1994). Towards a constructivist design model. *Educational Technology* (April), 34-37.
- Jonassen, D. H. (1995). Supporting communities of learners with technology: A vision for integrating technology with learning in schools. *Educational Technology* (July-August), 60-63.
- Jonassen, D. H., Beissner, K., & Yacci, M. (1993). *Structural knowledge: Techniques for representing, conveying, and acquiring structural knowledge*. Hillsdale, NJ: Erlbaum.
- Jonassen, D. H., & Grabowski, B. L. (1993). *Handbook of individual differences, learning, and instruction*. Hillsdale, NJ: Erlbaum.
- Jones, B. (1983). *Sleepers wake!: technology and the future of work*. (2nd ed.). Melbourne: Oxford University Press.
- Jones, B. (1984). *Facing the brave new world: Will the sleepers wake in time?* Paper presented at the The human face of technological change: Australian College of Education, Silver Jubilee Conference., Canberra, ACT.
- Jones, B. F., & Idol, L. (1990). Introduction. In B. F. Jones & L. Idol (Eds.), *Dimensions of thinking and cognitive instruction*. (pp. 1-14). Hillsdale, NJ: Erlbaum/ NCREL.
- Jones, B. F., & Pierce, J. (1992). Restructuring educational reform for students at risk. In A. Costa, J. Bellanca, & R. Fogarty (Eds.), *If mind matters: A foreword to the future*. (pp. 63-82). Cheltenham, Vic.: Hawker Brownlow.
- Jones, E. (1997). *Perspectives on information literacy in New Zealand: An overview*. Paper presented at the Information literacy: The professional issue. Proceedings of the third national information literacy conference conducted by the University of South Australia Library and the Australian Library and Information Association Information Literacy Taskforce, Adelaide 8, 9 December, 1997.
- Juchau, M. (1984). *Teacher's information needs and the school library*. Sydney: Library Association of Australia, NSW Group.
- Kallenberger, N. (1989a). CPPT in the secondary school. In Library Services Directorate, *Readings in CPPT: A compilation of articles about cooperative program planning and teaching from Scan vol 7 and 8*. Sydney: Library Services, Services Directorate.
- Kallenberger, N. (1989b). Experience is the best teacher: evaluating cooperative ventures. In Library Services Directorate, *Readings in CPPT: A compilation of articles about cooperative program planning and teaching from Scan vol 7 and 8*. Sydney: Library Services, Services Directorate.
- Kay, A. (1991). Computers, networks and education. *Scientific American* (September), 100-107.
- Kember, D., & Murphy, D. (1990). Alternative new directions for instructional design. *Educational technology* (August), 42-47.
- Kemmis, S., & McTaggart, R. (1988). *The action research planner*. (3rd ed.). Melbourne: Deakin University.
- Kennedy, M., Fischer, M. B., & Ennis, R. H. (1991). Critical thinking: Literature review and needed research. In L. Idol & B. F. Jones (Eds.), *Educational values and cognitive instruction: Implications for reform*. (pp. 11-35). Hillsdale, NJ: Erlbaum.
- Kennedy, M. F. (1994). Instructional design or personal heuristics in classroom instructional planning. *Educational Technology* (March), 17-25.
- Kerwin, A. (1993). None too solid: Medical ignorance. *Knowledge, Creation, Diffusion, Utilization*, 15(2), 166-185.
- Kinnell, M., & Pains-Lewins, H. (1988). *School libraries and curriculum initiatives*. London: Taylor Graham.
- Kinnell, M., (Ed.). (1992). *Learning resources in schools: Library Association guidelines for school libraries*. London: Library Association.

- Kirby, D., & Kuykendall, C. (1991). *Mind matters: Teaching for thinking*. Portsmouth, New Hampshire: Boynton/Cook Publishers.
- Kirby, J. R. (1988). Style, strategy, and skill in reading. In R. R. Schmeck (Ed.), *Learning strategies and learning styles*. (pp. 229-275). New York: Plenum Press.
- Kirk, J., Poston-Anderson, B., & Yerbury, H. (1990). Learning how to learn and school library and informaton services. In M. Nimon & A. Hazell (Eds.), *Promoting learning: Challenges in teacher-librarianship*. (pp. 5-14). Adelaide: Auslib Press.
- Kirk, J., & Todd, R. (1993). *Information illiteracy - changing roles for information professionals*. Paper presented at the Information literacy: The Australian agenda., Adelaide College of TAFE 2-4 December 1992.
- Knapp, L. R., & Glenn, A. D. (1996). *Restructuring schools with technology*. Boston: Allyn & Bacon.
- Knapp, P. (1966). *The Montith College Library experiment*. New York: Scarecrow.
- Knuth, R. A., & Cunningham, D. (1991). Tools for constructivism. In T. M. Duffy, J. Lowyck, & D. Jonassen (Eds.), *Designing environments for complex learning*. (pp. 163-188). Berlin: Springer Verlag.
- Kohn, A. (1993). Choices for children: Why and how to let students decide. *Phi Delta Kappan* (September), 8-20.
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ.: Prentice-Hall.
- Krupp, J.-A. (1992). Self-esteem and the willingness to change. In A. Costa, J. Bellanca, & R. Fogarty (Eds.), *If mind matters: A foreword to the future*. (Vol. 1, pp. 163-172). Cheltenham, Vic.: Hawker Brownlow.
- Kuhlthau, C. (1989). *A process approach to library skills instruction* (ED 254 233).
- Kuhlthau, C. (1993a). Implementing a process approach to information skills: A study identifying indicators of success in library media programs. *School Library Media Quarterly* (Fall), 11-18.
- Kuhlthau, C. (1993b). *Seeking meaning: A process approach to library and information services*. Norwood, NJ.: Ablex.
- Kuhlthau, C. (1987a). An emerging theory of library instruction. *School Library Media Quarterly* (Fall), 23-28.
- Kuhlthau, C. (1987b). Information skills: Tools for learning: An introduction. *School Library Media Quarterly* (Fall), 22.
- Kuhlthau, C. (1988a). Developing a model of the library search process: Cognitive and affective aspects. *Research Quarterly*, 28(2, Winter), 232-242.
- Kuhlthau, C. (1988b). Longitudinal case studies of the information search process of users in libraries. *LISR*, 10, 257-304.
- Kuhlthau, C. (1990). Information skills for an information society: A review of research. *Information Reports & Bibliographies*, 19(3), 14-26.
- Kulik, C.-L. C., & Kulik, J. (1991). Effectiveness of computer-based instruction: The updated analysis. *Computers in human behavior*, 7, 75-94.
- Kulik, C.-L. C., Kulik, J., & Bangert Drowns, R. L. (1985). Effectiveness of computer-based education in elementary schools. *Computers in human behavior*, 1, 59-74.
- Kulleseid, E. (1985). *Beyond survival to power for school library media professionals*. Hamden, CT: Library Professional Publications.
- Kurshan, B. (1991). Creating the global classroom for the 21st Century. *Educational Technology* (April), 47-50.
- Lai, K.-W. (1999). Teaching, learning and professional development: The teacher matters most. In K.-W. Lai (Ed.), *Networking: Teaching, learning and professional development with the Internet* (pp. 7-24). Dunedin: Otago University Press.
- Lamon, M., Secules, T., Petrosino, A. J., Hackett, R., Bransford, J. D., & Goldman, S. R. (1995). Schools for thought: Overview of the project and lessons learned from one of the sites. In L. Schauble & R. Glaser (Eds.), *Contributions of instructional innovation in understanding learning*. Hillsdale, NJ: Erlbaum.



- Landa, L. N. (1983). The algo-heuristic theory of instruction. In C. M. Reigeluth (Ed.), *Instructional-design theories and models: An overview of their current status*. (pp. 163-212). Hillsdale, NJ: Erlbaum.
- Langford, L. (1998). Information literacy: A clarification. *School Libraries Worldwide*, 4(1), 59-72.
- Language Development & Hypermedia Research Group (LDHRG). (1992). "Open" software design: A case study. *Educational Technology* (February), 43-55.
- Lanham, R. A. (1995). Digital literacy: Multimedia will require equal facility in word, image and sound. *Scientific American* (September), 198.
- Laszlo, A., & Castro, K. (1995). Technology and values: Interactive learning environments for future generations. *Educational Technology* (March-April), 7-13.
- Laurillard, D. (1987). The different forms of learning in psychology and education. In J. T. E. Richardson, M. W. Eysenck, & D. W. Piper (Eds.), *Student learning; research in education and cognitive psychology*. (pp. 198-207). Milton Keynes: Society for Research into Higher Education/ Open University Press.
- Laurillard, D. (1990). Computers and the emancipation of students: Giving control to the learner. In O. Boyd-Barrett & E. Scanlon (Eds.), *Computers and learning: A reader*. (pp. 64 - 80). Wokingham: Addison-Wesley/ Open University.
- Laurillard, D. (1993). *Rethinking university teaching: A framework for the effective use of educational technology*. London: Routledge.
- Laurillard, D. (1994). *Multimedia and the changing experience of the learner*. Paper presented at the APITITE '94 Conference, October 1994, Adelaide.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.
- Lawson, M. J. (1991). Testing for transfer following strategy learning. In G. Evans (Ed.), *Learning and teaching cognitive skills*. (pp. 208-228). Hawthorne, Vic.: ACER.
- Layton, D. (1993). Science education and praxis: The relationship of school science to practical action (II). In R. McCormick, P. Murphy, & M. Harrison (Eds.), *Teaching and learning technology*. (pp. 68-78). Wokingham: Addison Wesley/ Open University.
- Lealand, G. (1991). Teacher-librarians: successful and effective. *NZEI Rourou*(June).
- Lee, B. (1998). *Education children for a global information society: A framework for action*. (Prepared for Australian Parents Council Inc and Australian Council of State School Organisations Inc.). Hughes, ACT/ Sydney: APC/ ASSCO.
- Lee, I.-S., & Reigeluth, C. M. (1994). Empowering teachers for new roles in a new educational system. *Educational Technology* (January), 61-71.
- Lee, W. B., & Kazlauskas, E. J. (1995). The Ecole Moderne: Another perspective on educational technology. *Educational Technology* (March-April), 14-20.
- Lefrancois, G. R. (1994). *Psychology for teaching*. Belmont, CA: Wadsworth.
- Lenox, M. F., & Walker, M. L. (1992). Information literacy: Challenge for the future. *International Journal of Information and Library Research*, 4(1), 1-18.
- Leskin, C. B., Pollock, J., & Reigeluth, C. M. (1992). *Instructional design strategies and tactics*. Englewood Cliffs, NJ: Educational Technology Publications.
- Leslie, S. (1989). Cooperative program planning and teaching in a Canadian primary school. In Library Services Directorate, *Readings in CPPT: A compilation of articles about cooperative program planning and teaching from Scan vol 7 and 8*. Sydney: Library Services, Services Directorate.
- Levin, B. (1994). Improving educational productivity through a focus on learners. *Studies in Educational Administration*, 60(Winter), 15-21.
- Library Services Directorate. (1989). *Readings in CPPT: A compilation of articles about cooperation program planning and teaching from Scan Vol. 7 and 8*. Sydney: NSW Department of Education.
- Limerick, D., Passfield, R., & Cunnington, B. (1994). Transformational change: Towards and action learning organization. *The Learning Organization*, 1(2), 29-40.
- Lincoln, P. (1987). *The learning school* (LIR Report 62). London: British Library.

- Lipman, M. (1985). Thinking skills fostered by philosophy for children. In J. W. Segal, C. S. F., & R. Glaser (Eds.), *Thinking and learning skills: Relating instruction to research* (pp. 83-108). Hillsdale, NJ: Erlbaum.
- Lomax, P. (Ed.). (1991). *Managing better schools and colleges: The action research way*. (Vol. 5). Clevedon, England: BERA Dialogues.
- Lovat, T. J., & Smith, D. L. (1995). *Curriculum: Action on reflection revisited*. (3rd ed.). Wentworth Falls, NSW: Social Science Press.
- Lowrie, J., & Nagakura, M. (Eds.). (1991). *School libraries; International developments* (2nd ed.). Metuchen, NJ.: Scarecrow Press.
- Lowyck, J., & Elen, J. (1991). Transitions in the theoretical foundation of instructional design. In T. M. Duffy, J. Lowyck, & D. Jonassen (Eds.), *Designing environments for complex learning*. (pp. 213-230). Berlin: Springer Verlag.
- Lunzer, E. e. a. (1984). *Learning from the written word*. London: Oliver & Boyd/ Schools Council.
- Lunzer, E., & Gardner, K. (1979). *The effective uses of reading*. London: Heinemann Educational.
- Lynn, L. (1995). Computers and equity: Will poor kids be left behind on the information highway? *Rethinking Schools* (Summer), 16-17.
- Macpherson, C. (1996). The overt language of learning: A metacognitive instructional approach... *Computers in New Zealand Schools* (July), 7-11.
- Maddux, C. D., Lamont-Johnson, D., & Willis, J., W. (1992). *Educational computing: learning with tomorrow's technologies*. Boston: Allyn & Bacon.
- Main, R. G. (1993). Integrating motivation into the instructional design process. *Educational Technology* (December), 37-41.
- Malley, I. (1984). *The basics of information skills teaching*. London: Bingley.
- Mancall, J. C., Aaron, S. L., & Walker, S. (1986). Educating students to think: The role of the school library media program. *School Library Media Quarterly* (Fall), 18-27.
- Markless, S., & Streatfield, D. (1990). *Report on the 'Information Skills in Schools Project'*. London: NFER/ British Library Board.
- Marland, M. (Ed.). (1977) *Language and the curriculum*. London: Heinemann Educational.
- Marland, M. E. (Ed.). (1981). *Information skills in the secondary curriculum: Recommendations of a working group sponsored by the British Library and the Schools Council*. London: Methuen Educational.
- Marlowe, B., & Page, M., A. (1998). *Creating and sustaining the constructivist classroom*. Thousand Oaks, CA: Sage.
- Martin, B. L. (1991). What do teachers say about their planning processes? *Educational Technology* (April), 56-57.
- Martin, D., & Buck, P. (1982). Bridging the gap between primary and secondary schools. In A. Irving (Ed.), *Starting to teach study skills*. (pp. 81-89). London: Arnold.
- Martin, E., & Ramsden, P. (1987). Learning skills or skills in learning? In J. T. E. Richardson, M. W. Eysenck, & D. W. Piper (Eds.), *Student learning; research in education and cognitive psychology*. (pp. 155-167). Milton Keynes: Society for Research into Higher Education/ Open University Press.
- Martin, R. (1987). Research projects. Auckland: Department of Education, Office of the DSI.
- Martin, W. (1988). *The information society*. London: ASLIB.
- Matthews, M. (1995). *Challenging New Zealand science education*. Palmerston North: Dunmore Press.
- McGarry, K. J. (1981). *The changing context of information*. London: Bingley.
- McGee, C. (1994). The teacher and curriculum development. In C. McGee, & D. Fraser (Eds.), *The professional practice of teaching*. (pp. 57 - 830). Palmerston North: Dunmore.

- McGill, I., & Beaty, L. (1992). *Action learning: A practitioner's guide*. London: Kogan Page.
- McGuinness, C. (1993). Teaching thinking: New signs for theories of cognition. *Educational Psychology*, 13(3 and 4), 305-316.
- McKenzie, J. (1998). Information literacy and frameworks. *Good Teacher* (October), 10.
- McKernan, J. (1991). *Curriculum action research: A handbook of methods and resources for the reflective practitioner*. London: Kogan Page.
- McLellan, H. (1993). Evaluation in a situated learning environment. *Educational Technology* (March), 39-45.
- McLellan, H. (1994). Situated learning: Continuing the conversation: Introduction. *Educational Technology* (October), 7.
- McLellan, H. (Ed.). (1996a). *Situated learning perspectives*. Englewood Cliffs, NJ: Educational Technology Publications.
- McLellan, H. (1996b). Situated learning: Multiple perspectives. In H. McLellan (Ed.), *Situated learning perspectives*. (pp. 5 - 17). Englewood Cliffs, NJ: Educational Technology Publications.
- McMillan, B. (1993). Deconstructing "literacy" in the computer age. *Computers in New Zealand Schools* (May), 45-47.
- McMillan, B. (1995). Teaching with a curriculum: Learning with technology. *Computers in New Zealand Schools*(July), 15-21.
- McNaughton, S. (1996). Co-constructing curricula: A comment on two curricula (Te whariki and the English curriculum) and their developmental bases. *New Zealand Journal of Education Studies*, 31(2), 189-196.
- McNicholas, C. (1994). At the cutting edge: A profile of Celeste McNicholas. *Scan*, 13(3), 20-26.
- McRae, M. (1994). Establishing an information skills framework. *ACCESS*, 8(1, March), 14-19.
- Means, B. (1994). Introduction: Using technology to advance educational goals. In B. Means (Ed.), *Technology and education reform: The reality behind the promise* (pp. 1-22). San Francisco: Jossey-Bass.
- Meek, M. (1983). *Achieving literacy: Longitudinal studies of adolescents learning to read*. London: Routledge & Kegan Paul.
- Meek, M. (1991). *On being literate*. London: Bodley Head.
- Meichenbaum, D., & Biemiller, A. (1998). *Nurturing independent learners: Helping students take charge of their learning*. Cambridge, Mass.: Brookline.
- Melchior, T. e. a. (1995). New technologies: New learning. In A. L. Costa & R. Liebmann (Eds.), *When process is content: Towards Renaissance learning*. Thousand Oaks, CA.: Sage.
- Mercer, N., & Fisher, E. (1992). How do teachers help children to learn?: An analysis of teachers' interventions in computer-based activities. *Learning and instruction*, 2, 339-355.
- Merrill, D. M. (1992). Constructivism and instructional design. In T. M. Duffy & D. H. Jonassen (Eds.), *Constructivism and the technology of instruction: A conversation* (pp. 99-119). Hillsdale, NJ: Erlbaum.
- Merrill, D. M. (1993). Instructional transaction theory: Knowledge relationships among processes, entities, and activities. *Educational Technology* (April), 5-16.
- Merrill, D. M., Zhongmin, L., & Jones, M. K. (1990). Limitations of first generation ID. *Educational Technology* (January), 26-32.
- Metcalfe, J., & Shimamura, A. P. (Eds.). (1994). *Metacognition: Knowing about knowing*. Cambridge, MA: MIT Press.
- Ministry of Education. (1993a). *The New Zealand curriculum framework: Te anga Mauautanga O Aotearoa*. Wellington: Learning Media.
- Ministry of Education. (1993b). *Review of the Information Studies and Teacher-Librarianship Programme at Auckland College of Education* (Unpublished report).

- Ministry of Education. (1994). *Assessment: Policy to practice*. Wellington: Learning Media.
- Ministry of Education. (1998). *Interactive education: An information and communication technologies strategy for schools*. Wellington: Ministry of Education.
- Moll, L. C. (1990a). Introduction. In L. C. Moll (Ed.), *Vygotsky and education: Instructional implications and applications of sociohistorical psychology*. (pp. 1-30). Cambridge: Cambridge University Press.
- Moll, L. C. (Ed.). (1990b). *Vygotsky and education: Instructional implications and applications of sociohistorical psychology*. Cambridge: Cambridge University Press.
- Moore, J., & CTGV. (1994). The relationship between situated cognition and anchored instruction: A response to Tripp. *Educational Technology* (October), 28-32.
- Moore, P. (1995a). Information literacy: Past approaches and present challenges. In I. Livingstone (Ed.), *New Zealand Annual Review of Education*. (Vol. 5, pp. 137-151). Wellington: Faculty of Education, Victoria University of Wellington.
- Moore, P. (1995b). Information problem solving: A wider view of library skills. *Contemporary Educational Psychology*, 20(1), 1-31.
- Moore, P. (1997). Information literacy: Perspectives and challenges. *New Zealand Libraries*, 48(9/10, June), 166-173.
- Moore, P. (1998). *Teaching information problem solving in primary schools*. Wellington: Open Polytechnic.
- Moore, P. (1999). *Information literate school communities: Beyond teacher-librarians*. In J. Henri & K. Bonnano (Eds.) *The information literate school community: Best practice*. (pp. 1 - 21). Wagga Wagga, NSW: Centre for Information Studies, Charles Sturt University.
- Moore, P. A., & St George, A. (1989). The information quest: A look at children as information seekers. *SET*, 2(Item 9), 1-4.
- Morgan, A. (1993). *Improving your students' learning: Reflections on the experience of study*. London: Kogan Page.
- Morgan, M. (1990). Encouraging critical thinking in the language arts. *Language Arts*, 67(November), 780-782.
- Morris, A., & Stewart-Dore, N. (1984). *Learning to learn from text: Effective reading in the content areas*. Sydney: Addison Wesley.
- Morrison, D., & Collins, A. (1995). Epistemic fluency and constructivist learning environments. *Educational Technology* (September-October), 39-51.
- Mulcahy, R. F., Short, R. H., & Andrews, J. (Eds.). (1991). *Enhancing learning and thinking*. New York: Praeger.
- Naisbitt, J. (1994). *Global paradox: The bigger the world economy, the more powerful its smallest players*. London: Nicholas Brealey.
- National Council for Educational Technology. (1989). *Information skills and the national curriculum: A summary sheet*. Coventry: NCET.
- Neisser, U. (Ed.). (1987). *Concepts and conceptual development: Ecological and intellectual features in categorization*. Cambridge: Cambridge University Press.
- Nelson, T. O., & Narens, L. (1994). Why investigate metacognition? In J. Metcalfe & A. P. Shimamura (Eds.), *Metacognition: Knowing about knowing*. (pp. 1-26). Cambridge, MA: MIT Press.
- Nervig, N. N. (1990). Instructional systems development: A reconstructed ISD model. *Educational Technology* (November), 40-46.
- New Zealand Educational Institute. (1999). *Information technology*. Wellington: New Zealand Educational Institute.
- New Zealand Qualifications Authority (NZQA), & Ministry of Education (MOE). (1999). *Achievement 2001: Qualifications for 16 to 19 year olds*. Wellington: NZQA.
- Newman, D., Griffin, P., & Cole, M. (1989). *The construction zone: Working for cognitive change in the school*. Cambridge: Cambridge University Press.

- Nimon, M. (1990). The role of the teacher-librarian. In M. Nimon & A. Hazell (Eds.), *Promoting learning: Challenges in teacher-librarianship*. (pp. 32-36). Adelaide: Auslib Press.
- Nisbet, J., & Shucksmith, J. (1986). *Learning strategies*. London: Routledge Kegan Paul.
- Norman, J. (1987). *Information skills and IT: Case studies and training material*. London: Council for Educational Technology.
- Norris, N., & Sanger, J. (1984). *Inside information: Evaluating curriculum innovation*. (BLR & D Report 5816/ CARE Occasional Publication 13). London: British Library.
- Novak, J. D., & Gowin, D. B. (1984). *Learning how to learn*. Cambridge: Cambridge University Press.
- Novak, J. D. (1985). Metalearning and metaknowledge strategies to help students learn how to learn. In L. H. T. West & A. L. Pines (Eds.), *Cognitive structure and conceptual change* (pp. 189-207). Orlando: Academic Press.
- Novak, J. D. (1990). *Human constructivism: A collection of psychological and epistemological phenomena in meaning making*. Paper presented at the Fourth North American Conference on Personal Construct Psychology, July 18-20 1990, San Antonio, Texas.
- Novak, J. D. (1998). *Learning, creating, and using knowledge: Concept Maps as facilitative tools in schools and corporations*. Mahwah, NJ: Lawrence Erlbaum.
- Office of Arts and Libraries. (1984). *School Libraries: The foundations of the curriculum*. (LISC Report). London: HMSO.
- Ormrod, J. E. (1995). *Human learning*. (2nd ed.). Englewood Cliffs, NJ: Prentice hall.
- Palinscar, A. S., & Brown, A. L. (1984). Reciprocal teacher of comprehension-fostering and comprehension-monitoring activities. In L. B. Resnick & L. E. Klopfer (Eds.), *Towards the thinking curriculum: Current cognitive research*. (pp. 19-39). Alexandria VA: ASCD.
- Palinscar, A. S., Brown, A. L., & Martin, S. M. (1987). Peer interaction in reading comprehension instruction. *Educational Psychologist*, 22(3, July), 231-253.
- Paris, S. G., Cross, D., & Lipson, M. Y. (1984). Informed strategies for learning: A program to improve children's reading awareness and comprehension. *Journal of Educational Psychology*, 76(6), 1239-1252.
- Paris, S. G., Lipson, M., & Wixson, K. K. (1983). Becoming a strategic reader. *Contemporary Educational Psychology*, 8(3, July), 293-316.
- Paris, S. G., & Oka, E. R. (1986). Children's reading strategies, metacognition, and motivation. *Developmental Review*, 6(25), 25-56.
- Paris, S. G., & Winograd, P. (1990). How metacognition can promote academic learning and instruction. In B. F. Jones & L. Idol (Eds.), *Dimensions of thinking and cognitive instruction*. (pp. 15-52). Hillsdale, NJ: Erlbaum/ NCREL.
- Parks, L. R., & Sorrow, B. (1994). *Teachers and librarians working together*. Jefferson, NC: McFarland.
- Passfield, R. (1992). From vicious to virtuous circles: Improving the quality of education through action research. In T. Carr & O. Zuber-Skerritt (Eds.), *Working together for quality management: Action research in management and education*. (pp. 29-61). St Lucia, Brisbane: The Tertiary Institute.
- Patterson, L., Santa, C. M., Short, K. G., & Smith, K. (Eds.). (1993). *Teachers are researchers: Reflection in action*. Delaware, NY: International Reading Association.
- Pea, R., & Brown, J. S. (1991). Series foreword. In J. Lave & E. Wenger (Eds.), *Situated learning: Legitimate peripheral participation*. (pp. 11-12). Cambridge: Cambridge University Press.
- Pearson, P. D., & Raphael, T. E. (1990). Reading comprehension as a dimension of thinking. In B. F. Jones & L. Idol (Eds.), *Dimensions of thinking and cognitive instruction*. (pp. 209-240). Hillsdale, NJ: Erlbaum/ NCREL.
- Peled, E., Peled, Z., & Alexander, G. (1989). Project Comptown: Educational intervention and action research. *British Journal of Educational Technology*, 20(2), 84-105.

- Perelman, L. (1992). *School's out: Hyperlearning, the new technology and the end of education*. New York: Morrow.
- Perkins, D. (1992). *Smart schools: From training memories to educating minds*. New York: Free Press.
- Perkins, D. (1997). What is understanding? In M. S. Wiske (Ed.), *Teaching for understanding: Linking research with practice*. (pp. 39-57). San Francisco: Jossey Bass.
- Perkins, D., & Salomon, G. (1989). Rocky roads to transfer: Rethinking mechanisms of a neglected phenomenon. *Educational Psychologist*, 24(2), 113-142.
- Perkins, D. N. (1991a). Technology meets constructivism: Do they make a marriage? *Educational Technology* (May), 18-23.
- Perkins, D. N. (1991b). What constructivism demands of the learner. *Educational Technology* (September), 19-21.
- Perkins, D. N., Jay, E., & Tishman, S. (1993). Beyond abilities: A disposition theory of thinking. *Merrill-Palmer Quarterly*, 39(1), 1-21.
- Perris, L. (1995). More time for implementing curriculum. *New Zealand Education Gazette*, 74(1), 1.
- Petterson, R. (1989). *Visuals for information: Research and practice*. Englewood Cliffs, NJ: Educational Technology Publications.
- Phillips, D. C. (1995). The good, the bad, and the ugly: The many faces of constructivism. *Educational Researcher*, 24(7, October), 5-12.
- Piller, C. (1992). Separate realities: The creation of the technological underclass in America's public schools. *Macworld* (September), 218-236.
- Pintrich, P. R., & Schrauben, B. (1992). Students' motivational beliefs and their cognitive engagement in classroom academic tasks. In D. H. Schunk & J. L. Meece (Eds.), *Student perceptions in the classroom*. (pp. 149-183). Hillsdale, NJ: Erlbaum.
- Planck, J. (1996). A pilot project on resource based learning. *Access* 10(4), 17-20.
- Posner, G. J. (1991). Curriculum knowledge. In K. Marjoribanks (Ed.), *The foundations of learning*. (pp. 127-133). Oxford: Pergamon.
- Pournelle, J. E., & Pournelle, R. J. (1994). Technology for the little red schoolhouse. *World & I* (May), 359-371.
- Prawat, R. (1997). Problematizing Dewey's views of problem solving. *Educational Researcher*, 26(2), 19-21.
- Rankin, V. (1988). One route to critical thinking. *School Library Journal* (January), 28-31.
- Rankin, V. (1992a). Pre-search: Intellectual access to information. *School Library Journal* (March), 168-170.
- Rankin, V. (1992b). R Task analysis: Or relief for the major discomfort of research assignments. *School Library Journal* (November), 29-32.
- Reeves, T. C. (1992). Evaluating interactive multimedia. *Educational Technology*(May), 47-53.
- Reibel, J. H., & Wood, B. D. (1991). The institute for learning technologies: A discussion paper. <http://www.ilt.columbia.edu/academic/papers/ILTPedagogy.html>.
- Reichel, M., & Ramey, M. A. (Eds.). (1987). *Conceptual frameworks for bibliographic education*. Littleton, Col: Libraries Unlimited.
- Reigeluth, C. M. (1983). Instructional design: What is it and why is it? In C. M. Reigeluth (Ed.), *Instructional-design theories and models: An overview of their current status*. (pp. 3-36). Hillsdale, NJ: Erlbaum.
- Reigeluth, C. M., & Stein, F. S. (1983). The elaboration theory of instruction. In C. M. Reigeluth (Ed.), *Instructional-design theories and models: An overview of their current status*. (pp. 335-382). Hillsdale, NJ: Erlbaum.
- Reigeluth, C. R., & Garfinkle, R. J. (1992). Envisioning a new system of education. *Educational Technology* (November), 17-23.
- Resnick, L., Levine, J. M., & Teasley, S. D. (1991). *Shared cognition: Thinking as social practices: Perspectives on socially shared cognition*. Washington: APA.

- Resnick, L. B. (1989a). Introduction. In L. B. Resnick (Ed.), *Knowing, learning and instruction: Essays in honor of Robert Glaser*. (pp. 1-24). Hillsdale, NJ: Lawrence Erlbaum.
- Resnick, L. B. (Ed.). (1989b). *Knowing, learning and instruction: Essays in honor of Robert Glaser*. Hillsdale, NJ: Erlbaum.
- Reusser, K. (1996). From cognitive modelling to the design of pedagogical tools. In S. Vosniadou, E. de Corte, R. Glaser, & H. Mandl (Eds.), *International perspectives on the design of technology-supported learning environments*. (pp. 81-104). Mahwah, NJ: Erlbaum.
- Revans, R. (1982). *The origins and growth of action learning*. Bromley: Chartwell.
- Revans, R. (1991). Action learning: Its origins and nature. In M. Pedler (Ed.), *Action learning in practice*. Aldershot: Gower.
- Richardson, V. (Ed.). (1997a). *Constructivist teacher education: Building a world of new understandings*. London: Falmer.
- Richardson, V. (1997b). Constructivist teaching and teacher education: Theory and practice. In V. Richardson (Ed.), *Constructivist teacher education: Building a world of new understandings*. (pp. 3-14). London: Falmer.
- Richey, R. C. (1993). Instructional design theory and a changing field. *Educational Technology* (February), 16-21.
- Robertson, M. (1991). Repackaging in the post-microwave society. *Scan*, 10(3, July), 13-15.
- Robins, K., & Webster, F. (1987). Dangers of information technology and responsibilities of education. In R. Finnegan, G. Salaman, & K. Thompson (Eds.), *IT: Social issues: A reader*. (pp. 145-162). Milton Keynes: Open University/ Hodder & Stoughton.
- Robinson, V. (1993). *Problem-based methodology: Research for the improvement of practice*. Oxford: Pergamon.
- Rogers, C. (1983). *Freedom to learn for the 80's*. Columbus, OH: Merrill.
- Rogers, R. (1994). *Teaching information skills: A review of the research and its impact on education*. London: Bowker Saur/ British Library Research.
- Rogoff, B. (1990). *Apprenticeship in thinking*. New York: Oxford University Press.
- Rohwer, W. D., & Thomas, J. W. (1989). Domain-specific knowledge, metacognition and the promise of instructional reform. In C. B. McCormick, G. Miller, & M. Pressley (Eds.), *Cognitive strategy research: From basic research to educational applications*. (pp. 104-132). New York: Springer Verlag.
- Romiszowski, A. (1994). Educational systems design implications of electronic publishing. *Educational Technology* (March), 6-12.
- Rosenholtz, S. J., & Rosenholtz, S. H. (1981). Classroom organization and the perception of ability. *Sociology of Education*, 54(April), 132-140.
- Rothenberg, D. (1994). Information technology in education. *Annual Review of Information Science and Technology (ARIST)*, 29, 277-307.
- Rowbottom, M., Payne, A.W., & Cronin, B. (1983). *The Schools Information Retrieval (SIR) Project*. (LIR Report no 15). London: British Library.
- Rowe, H. (1991). 'Observing' thinking and learning processes. In G. Evans (Ed.), *Learning and teaching cognitive skills*. (pp. 9-25). Hawthorne, Vic.: ACER.
- Royer, J. M., Cisero, C., & Carlo, M. (1993). Techniques and procedures for assessing cognitive skills. *Review of Educational Research*, 63(2), 201-243.
- Rudduck, J. (1985). Implementer or innovator: A teacher's challenge to the restrictive paradigm of traditional research. In M. Gurney (Ed.), *The management of change*. Clevedon: Multilingual Matters.
- Rudduck, J. (1991). *Innovation and change: Developing involvement and understanding*. Milton Keynes: Open University Press.
- Rudduck, J., & Hopkins, D. (1984). *The sixth form and libraries: Problems of access to knowledge*. (LIR Report 24). London: British Library.

- Rudduck, J., & Hopkins, D. (1985). *Research as a basis for teaching: Readings from the work of Lawrence Stenhouse*. London: Heinemann Educational.
- Rudduck, J., Hopkins, D., Sanger, J., & Lincoln, P. (1987). *Collaborative inquiry and information skills*. (BL Research Paper 16). London: British Library.
- Rushkoff, D. (1996). *Playing the future: How kids' culture can teach us to thrive in an age of chaos*. New York: Harper Collins.
- Rushton, S. (1996). Integration of information skills into the school curriculum. *Access*, 10(3), 21-23.
- Russell, T., & Munby, H. (1991). Reframing: The role of experience in developing teachers' professional knowledge. In D. A. Schon (Ed.), *The reflective turn: Case studies in and on educational practice*. (Vol. 164-188, ). New York: Teachers College Press.
- Salomon, G. (1996). Studying novel learning environments as patterns of change. In S. Vosniadou, E. de Corte, R. Glaser, & H. Mandl (Eds.), *International perspectives on the design of technology-supported learning environments*. (pp. 363-377). Mahwah, NJ: Lawrence Erlbaum.
- Salomon, G., & Perkins, D. (1996). Learning in wonderland: What do computers really offer education? In S. T. Kerr (Ed.), *Technology and the future of schooling: Ninety-fifth yearbook of the National Society for the Study of Education : Part II*. (pp. 111 - 130). Chicago: National Society for the Study of Education.
- Sanger, J. (1989). *The teaching, handling information and learning project*. (LIR Report 67). London: British Library.
- Savery, J. R., & Duffy, T. M. (1995). Problem based learning: An instructional model and its constructivist framework. *Educational Technology* (November-December), 31-37.
- Scardamalia, M., & Bereiter, C. (1996). Adaption and understanding: A case for new cultures of schooling. In S. Vosniadou, E. de Corte, R. Glaser, & H. Mandl (Eds.), *International perspectives on the design of technology-supported learning environments*. (pp. 149-163). Mahwah, NJ: Erlbaum.
- Scholnick, E. K., & Friedman, S. L. (1987). The planning construct in the psychological literature. In S. L. Friedman, E. K. Scholnick, & R. R. Cocking (Eds.), *Blueprints for thinking: The role of planning in cognitive development*. (pp. 3-38). Cambridge: Cambridge University Press.
- Schon, D. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.
- School Library Association of South Australia (1993) Role statement : For teacher-librarians. *Access*, 7 (3), 29-30.
- Schunk, D. (1984, August 1982). *Self-efficacy perspective on achievement behavior*. Paper presented at the Meeting of the American Psychological Association, Washington, DC.
- Schunk, D. H. (1981). Modeling and attributional effects on children's achievement: A self-efficacy analysis. *Journal of Educational Psychology*, 73(1), 93-105.
- Schunk, D. H. (1989a). Self-efficacy and cognitive skill learning. In C. Ames & R. Ames (Eds.), *Goals and cognitions*. (pp. 1-47). San Diego: Academic Press.
- Schunk, D. H. (1989b). Social cognitive theory and self-regulated learning. In Zimmerman & D.H. Schunk (Eds.), *Self-regulated learning and academic achievement*. (pp. 83-110). New York Springer Verlag.
- Schunk, D. H. (1992). Theory and research on student perceptions in the classroom. In D. H. Schunk & J. L. Meece (Eds.), *Student perceptions in the classroom*. (pp. 3-23). Hillsdale, NJ: Erlbaum.
- Schunk, D. H., & Meece, J. L. (Eds.). (1992). *Student perceptions in the classroom*. Hillsdale, NJ: Erlbaum.
- Scriven, M., & Fisher, A. (1993). *Critical thinking: Defining and assessment*. Paper presented at the Sixth International Conference on Thinking, MIT July 17-22, 1994.
- Senge, P. M. (1990). The leader's new work: Building learning organizations. *Sloan Management Review*, 7(Fall), 7-23.



- Sharples, J. (1989). Learning how to learn: Investigating effective learning strategies. Melbourne, Vic.: Office of Schools Administration, Ministry of Education.
- Sheingold, K. (1987). Keeping children's knowledge alive through enquiry. *School Library Media Quarterly* (Winter), 80-85.
- Silver, D. J. (1995). Computers and their discontents. *Commentary*(July), 31-35.
- Simon, J. (1994). Historical perspectives on education in New Zealand. In C. e. al (Ed.), *The politics of learning and teaching in Aotearoa-New Zealand*. (Vol. 34-81, ). Palmerston North: Dunmore.
- Simons, R.-J. (1991). Constructive learning: The role of the learner. In T. M. Duffy, J. Lowyck, & D. Jonassen (Eds.), *Designing environments for complex learning*. (pp. 291-314). Berlin: Springer Verlag.
- Slavin, R. E. (1991). *Educational psychology: Theory into practice*. (3rd ed.). Englewood Cliffs, NJ: Prentice Hall.
- Smith, R. E. (1990). *Learning to learn across the life span*. San Francisco: Jossey-Bass.
- Snelbecker, G. E. (1983). Is instructional theory alive and well? In C. M. Reigeluth (Ed.), *Instructional-design theories and models: An overview of their current status*. (pp. 437-472). Hillsdale, NJ: Erlbaum.
- Southgate, V., Arnold, H., & Johnson, S. (1981). *Extending beginning reading*. London: Schools Council/ Heinemann Educational.
- Spiro, R., Feltovich, P. J., Jacobson, M. J., & Coulson, R. L. (1995). Cognitive flexibility, constructivism, and Hypertext: Random access instruction for advanced knowledge acquisition n ill-structured domains. In L. P. Steffe & J. Gale (Eds.), *Constructivism in education* (pp. 67-85). Hillsdale, NJ: Lawrence Erlbaum.
- Spiro, R. J., Feltovich, P. J., Jacobson, M. J., & Coulson, R. L. (1991a). Cognitive flexibility, constructivism, and hypertext: Random access instruction for advanced knowledge acquisition in ill-structured domains. *Educational Technology* (May), 24-33.
- Spiro, R. J., Feltovich, P. J., Jacobson, M. J., & Coulson, R. L. (1991b). Knowledge representation, content specification, and the development of skill in situation-specific knowledge assembly. *Educational Technology* (September), 22-25.
- Sprinthall, R. C., Schmutte, G. T., & Sirois, L. (1991). *Understanding educational research*. Englewood Cliffs: Prentice Hall.
- Squirrell, G., Gilroy, P., Jones, D., & Rudduck, J. (1990). *Acquiring knowledge in initial teacher education: Reading, writing, practice and the PGCE course* (LIR Report 79 ). London: British Library.
- Steffe, L. P., & Gale, J. (Eds.). (1995). *Constructivism in education*. Hillsdale, NJ: Erlbaum.
- Stenhouse, L. (1975). *An introduction to curriculum development and research*. London: Heinemann.
- Sternberg, R. J. (1984). How can we teach intelligence? *Educational Leadership* (September), 38-48.
- Sternberg, R. J. (1987). The triarchic theory of human intelligence. In J. T. E. Richardson, M. W. Eysenck, & D. W. Piper (Eds.), *Student learning; research in education and cognitive psychology*. (pp. 49-65). Milton Keynes: Society for Research into Higher Education/ Open University Press.
- Sternberg, R. J. (1990). *Metaphors of mind: Conceptions of the nature of intelligence*. Cambridge: Cambridge University Press.
- Sternberg, R. J. (1998). What does it mean to be smart? *Our Gifted Children*, 4(4), 21-24.
- Stott, C. A. (1951). *Using the library in the work of the school*. (SLA Leaflet 3): School Library Association.
- Streatfield, D., & Markless, S. (1994). *Invisible learning?: The contribution of school libraries to teaching and learning: Report to the British Library Research and Development Department on the 'Effective School Library Research Project'*. (LIR Report 98). London: British Library.

- Stevenson, M. B. (1976). *User education programmes...* (British Library R & D Report no522040) London: British Library Board.
- Styles, J. (Ed.).(1993). *Resource based learning: Informaion literacy exemplars*. Millswood, S.A.: School Libraries Association of South Australia.
- Sweller, J. (1989). Cognitive technology: Some problems for facilitating learning and problem solving in masthematics and science. *Journal of Educational Psychology*, 81(4), 457-466.
- Tabberer, R. (1987). *Study and information skills in schools* (British Library R & D Report 5870). Windsor, Berks.: NFER/ Nelson.
- Tabberer, R. E., & Allman, J. (1983). *Introducing study skills: An appraisal of initiatives at 16+*. Windsor, Berks.: NFER-Nelson.
- Tallman, J. (1995). Connecting writing and research through the I-Search paper. *Emergency Librarian*, 23(1, September-October), 20-23.
- Taylor, J. C. (1991a). 'Observing' thinking and learning processes. In G. Evans (Ed.), *Learning and teaching cognitive skills*. (pp. 164-183). Hawthorne, Vic.: ACER.
- Taylor, R. P. (1991b). *Communicative technology and the emerging global curriculum*. Paper presented at the First national Greek conference on Computers in Education, November 22-24.
- Tennyson, R. D. (1990). Integrated instructional design theory: Advancements from cognitive science and instructional technology. *Educational Technology* (July), 39-44.
- Thomas, J. W., & Rohwer, W. D. (1993). Proficient autonomous learning: Problems and prospects. In M. Rabinowitz (Ed.), *Cognitive science: Foundations of instruction*. (pp. 1-32). Hillsdale, NJ: Erlbaum.
- Thomson, L., & Meek, M. (1985). *Developing resource-based learning: One school's approach*. London: Longman.
- Tobias, S. (1992). An eclectic examination of some issues in the constructiist-ISD controversy. In T. M. Duffy & D. H. Jonassen (Eds.), *Constructivism and the technology of instructon: A conversation* . Hillsdale, NJ: Erlbaum.
- Todd, R. (1993). Lifelong learning and information skills. *Scan*, 12(3, July).
- Todd, R. (1996). Information literacy research: Charting the landscape and moving beyond the littoral zone. In D. Booker (Ed.), *Learning for life: Information literacy and the autonomous learner*. (pp. 49-60). Adelaide: University of South Australia.
- Todd, R., McNicholas, C., & Sivanesarajah, Y. (1991). The CIA and us: Changing information awareness, useful strategies. *Scan*, 10(4, November), 22-26.
- Todd, R., McNicholas, C., & Sivanesarajah, Y. (1992). Evolution, not revolution: Working to full school participaton with information skills. *Access*, 6(1, March), 16-20.
- Todd, R. J. (1994). Information literacy and learning: IASL report of Australian research. *IASL Newsletter* (March), 3-6.
- Todd, R. J. (1995). Integrated information skills instruction: Does it make a difference? *School Library Media Quarterly* (Winter), 133-138.
- Todd, R. J., Lamb, L., & McNicholas, C. (1993). Information skills and learning: Some research findings. *Access*, 7(1, March), 14-16.
- Toffler, A. (Ed.). (1974). *Learning for tomorrow: The role of the future in education*. New York: Vintage Books.
- Torbe, M. & Medway, P. (1981). *The climate for learning*. London: Ward Lock Educational.
- Toulmin, S. (1996). Is action research really 'research'? *Concepts and Transformation*, 1(1), 51-62.
- Tripp, S. (1993). Theories, traditions, and situated learning. *Educational Technology* (March), 71-77.
- Tucker, R. N. (Ed.). (1987). *The development of resource centres*. (UNESCO Study). London: Kogan Page.
- Tuman, M. (1992). *Word perfect: Literacy in the computer age*. London: Falmer Press.

- UNESCO. (1981). *Instructional materials for developing information concepts and information handling skills in schoolchildren*. Paris: UNESCO.
- Valentine, P., & Nelson, B. (1988). *Sneaky teaching; the role of the school librarian: Teachers' and school librarians' perceptions*. (LIR Report 63). London: British Library.
- Vickers, H. (Ed.). (1988). *Establishing partnership: Teacher-librarians and teachers working together: Proceedings of a seminar... held at Burwood Public School, Sydney August 8 1987*. Sydney: Library Association of Australia (NSW Group).
- von Glasersfeld, E. (Ed.). (1991). *Radical constructivism in mathematics education*. Dordrecht: Kluwer Academic Publishers.
- von Glasersfeld, E. (1995). *Radical constructivism: A way of knowing and learning*. London: Falmer.
- Vygotsky, L. S. (1962). *Thought and language*. Cambridge, Mass.: MIT Press.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Wagner, E. D., & McCombs, B. L. (1995). Learner centred psychological principles in practice: Designs for distance education. *Educational Technology* (March-April), 32-35.
- Wallis, A. (1995). Minister drops clue on spending. *TUANZ Topics*, 5(8), 1.
- Walters, J., & Gardner, H. (1990). *Domain projects as assessment vehicles in a computer-rich environment*. <http://www.edc.org/CCT/ccthome/reports/tr5.html>.
- Waterhouse, P. (1983). Supported self-study in secondary education. (Working Paper 24). London: Council for Educational Technology.
- Webb, R. (1987). *Developing information skills in the middle years of schooling*. Centre for Applied Research in Education, University of East Anglia.
- Weiner, B. (1972). *Theories of motivation: From mechanism to cognition*. Chicago: Markham.
- Weiner, B. (1979). A theory of motivation for some classroom experiences. *Journal of Educational Psychology*, 71(1), 3-25.
- Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York: Springer Verlag.
- Weisburg, H., & Toor, R. (1995). Resource based instruction enters the 21st Century: Creating a new curriculum. *Emergency Librarian* 23(2), 8-10.
- Wellington, J. J. (1985). *Children, computers and the curriculum: An introduction to information technology and education*. London: Harper & Row.
- West, C. K., Farmer, J. A., & Wolff, P. M. (1991). *Instructional design: Implications from cognitive science*. Boston: Allyn & Bacon.
- Whitaker, P. (1995). *Managing to learn: Aspects of reflective and experiential learning in schools*. London: Cassell.
- White, S. (1989). Foreword. In D. Newman, P. Griffin, & M. Cole (Eds.), *The construction zone: Working for cognitive change in school*. Cambridge: Cambridge University Press.
- Williams, D. & Herring, J. (1986). *Keywords and learning: Ideas on information skills and information technology for MISLIP*. Aberdeen: Robert Gordon's Institute of Technology.
- Willis, J. (1995). A recursive, reflective instructional design model based on constructivist-interpretivist theory. *Educational Technology* (November-December), 5-23.
- Wilson, B., & Cole, P. (1996). Cognitive teaching models. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology*. (pp. 601-621). New York: Macmillan.
- Winks, W. E. (1899). *An attempt to solve the school library problem*. A paper read before the annual meeting of the Library Association, September 5 - 9 1899, Manchester.
- Winkworth, F. V. (1977). *User education in schools: A survey of the literature of education for library and information use in schools*. London: British Library.
- Winn, W. (1991a). The assumptions of constructivism and instructional design. *Educational Technology* (September), 38-40.

- Winn, W. (1991b). A constructivist critique of the assumptions of instructional design. In T. M. Duffy, J. Lowyck, & D. Jonassen (Eds.), *Designing environments for complex learning*. (pp. 189-212). Berlin: Springer Verlag.
- Winn, W. (1993). Instructional design and situated learning: Paradox or partnership? *Educational Technology*(March), 16-21.
- Winn, W. (1994). Why I don't want to be an expert sitar player. *Educational Technology* (October), 11-13.
- Winne, P., & Marx, R. W. (1989). The dynamics of intrinsic motivation: A study of adolescents. In C. Ames & R. Ames (Eds.), *Goals and cognitions*. (Vol. 3, pp. 223-257). San Diego: Academic Press.
- Winograd, P., & Gaskins, R. W. (1992). Metacognition: Matters of the mind, matters of the heart. In A. Costa, J. Bellanca, & R. Fogarty (Eds.), *If mind matters: A foreword to the future*. ( pp. 225-238). Cheltenham, Vic.: Hawker Brownlow.
- Wirth, A. G. (1992). *Education and work for the year 2000*. San Francisco: Jossey Bass.
- Wirth, A. G. (1994). A reconstituted general education: The integration of the vocational and the liberal. *J. Curriculum Studies*, 26(6), 593-600.
- Wiske, M. S. (Ed.). (1997). *Teaching for understanding: Linking research with practice*. San Francisco: Jossey Bass.
- Wittrock, M. C. (1974). Learning as a generative process. *Educational Psychologist*, 11(2), 87-95.
- Wittrock, M. C. (1977). The generative processes of memory. In M. C. Wittrock (Ed.), *The human brain*. Englewood Cliffs, NJ.: Prentice-Hall.
- Wittrock, M. C. (1988). A constructive review of research on learning strategies. In C. E. Weinstein, E. T. Goetz, & P. A. Alexander (Eds.), *Learning and study strategies* (pp. 287-297). San Diego: Academic Press.
- Wittrock, M. C. (1991). Models of heuristic teaching. In K. Marjoribanks (Ed.), *The foundations of learning* (pp. 73-88). Oxford: Pergamon.
- Wong, E. D. (1995). Challenges confronting the researcher/ teacher: Conflicts of purpose and conduct. *Educational Researcher*, 24(3), 22-28.
- Young, M. (1993). Instructional design for situated learning. *ETR&D*, 41(1), 43-58.
- Young, M. F., & Kulikowich, J. M. (1992). *Anchored instruction and anchored assessment: Ecological approach to measuring situated learning*. Paper presented at the AERA Annual meeting, session 28.30 "Grounding mathematical problem solving in meaningful context: Research implications and outcomes", San Francisco, Wed. 22 April 1992.
- Zimmerman, B. J., Bandura, A., & Martinez-Pons, M. (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting. *American Educational Research Journal*, 29(3, Fall), 663-676.
- Zimmerman, B. J., & Martinez-Pons, M. (1992). Perceptions of efficacy and strategy use in the self-regulation of learning. In D. H. Schunk & J. L. Meece (Eds.), *Student perceptions in the classroom*. (pp. 185-207). Hillsdale, NJ: Erlbaum.
- Zimmerman, B. J., & Schunk, D. H. (1989). *Self-regulated learning and academic achievement*. New York: Springer Verlag.
- Zuber-Skerritt, O. (1992a). *Action research in higher education : Examples and reflections*. London: Kogan Page.
- Zuber-Skerritt, O. (1992b). *Professional development in higher education: A theoretical framework for action research*. London: Kogan Page.
- Zuber-Skerritt, O. (1993). Improving learning and teaching through action learning and action research. *Higher Education Research and Development*, 12(1), 45-58.
- Zuboff, S. (1988). *In the age of the smart machine: The future of work and power*. Oxford: Heinemann Professional.
- Zucchermaglio, C. (1991). Toward a cognitive ergonomics of educational technology. In T. M. Duffy, J. Lowyck, & D. Jonassen (Eds.), *Designing environments for complex learning*. (pp. 249-260). Berlin: Springer Verlag.