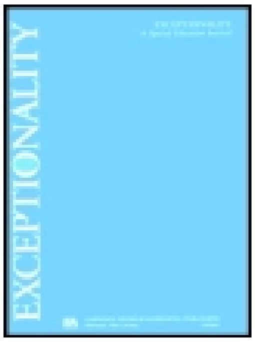

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Structuring Instruction to Promote Self-Regulated Learning by Adolescents and Adults With Learning Disabilities

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When alternative models for teaching strategies for academic tasks such as reading, studying, writing, and math are compared, certain common pedagogical activities stand out as central to effective instruction. For example, in empirically validated models, instruction is contextualized in meaningful work, long term, explicit, and interactive. At the same time, in devising models, researchers draw on different theoretical assumptions to justify instructional practices, and, correspondingly, the models vary in the degree to which direct instruction of strategies is emphasized. In this article, I describe 1 strategies-training model—strategic content learning (SCL)—that integrates cognitive-behavioral, sociocultural, and constructivist learning theories as a way to shift focus away from the direct instruction of predefined strategies. The article begins with a description of the theoretical rationale for SCL. This description is followed by a review of research documenting SCL efficacy for postsecondary students with learning disabilities. Next, a naturalistic, multischool study at the secondary level is described, and preliminary findings are outlined. Finally, conclusions focus on defining theoretical issues in need of further research.

When alternative models for teaching strategies to students for key academic tasks such as reading, studying, writing, and math are compared, certain common pedagogical activities stand out as central to effective instruction. For example, in empirically validated models, instruction is contextualized in meaningful work, long term, explicit, and interactive (e.g., see Ellis, 1993; Harris & Graham, 1996; Palincsar & Brown, 1988; Pressley et al., 1992). However, in creating models, researchers draw on varying theoretical assumptions about teaching and learning associated with instructional practices, and, correspondingly, the models vary in the degree to which direct instruction of task-specific strategies is emphasized (Butler, 1998b; Pressley et al., 1995; Pressley, Snyder, & Carglia-Bull, 1987).

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In this article, I highlight the theoretical assumptions underlying various approaches to strategy training, with the ultimate goal of providing an integrative framework for understanding instructional features.

The strategic content learning (SCL) approach (Butler, 1993, 1995, 1998c), founded on an integration of cognitive-behavioral, sociocultural, and constructivist learning theories, provides an excellent contrast to intervention models wherein direct instruction and modeling of predefined strategies are central (e.g., Borkowski & Muthukrishna, 1992; Ellis, 1993; Schumaker & Deshler, 1992). This article begins with an overview of various approaches to strategy training and the theoretical principles on which they are based. This overview is followed by a description of the rationale for SCL and a review of research documenting SCL efficacy for postsecondary students with learning disabilities (Butler, 1993, 1995, 1998d; Butler, Elaschuk, & Poole, 2000). Next, a naturalistic, multischool study at the secondary level is described, and preliminary findings are outlined. Finally, conclusions focus on defining areas in which further research is needed to clarify the relationship between strategies instruction and desired learning outcomes.

WHAT COUNTS AS STRATEGIES INSTRUCTION?

Gersten and Smith-Johnson (2000) raised the question of what counts as strategy training. They argued that, within strategies instruction, students should learn strategies that are specific and that "break complex cognitive tasks into smaller steps" (p. 172). Further, drawing on Ellis and Lenz's (1987) work, they emphasized that strategies should "consist of brief and simple steps," "employ a remembering system," and "employ cues to implement cognitive strategies, metacognition, and application of rules and to take over action" (Gersten & Smith-Johnson, 2000, p. 172). This description is consistent with the instructional approach that characterized many early approaches to strategy training. Specifically, a teacher or a researcher analyzed a task (e.g., reading or writing) to determine what was required, articulated required cognitive activities as a series of steps, and then taught these steps explicitly to students (in tandem with mnemonic devices). In early models, emerging in the 1970s, methods for teaching strategies focused almost exclusively on direct explanation and modeling, followed by opportunities for guided and independent practice (see Pressley et al., 1987). Teachers and researchers hoped that during and after instruction students would translate the simplified descriptions of cognitive processes (i.e., articulated in strategy steps) into meaningful and situated action, internalize these approaches to learning, and transfer strategy use across contexts.

However, as early as the 1980s, researchers recognized that explicit explanation and modeling of strategy steps alone were insufficient to promote strategic performance (Groteluschen, Borkowski, & Hale, 1990; Pressley et al., 1995). Of concern was the consistent finding that students failed to transfer strategy use across contexts and time (Brown, Campione, & Day, 1981; Wong, 1991b, 1994). As a result, instructional models were elaborated in various ways to address the transfer problem (e.g., Borkowski & Muthukrishna, 1992; Ellis, 1993; Englert, Raphael, Anderson, Anthony, & Stevens, 1991; Harris & Graham, 1996; Palincsar & Brown, 1984, 1988; Pressley et al., 1995; Schumaker & Deshler, 1992). For example, some researchers focused attention on how students' motivational beliefs mediate strategic performance (e.g., Bandura, 1993; Borkowski & Muthukrishna, 1992; Schunk, 1994; Zimmerman, 1989, 1995). Thus, instructional models emerged that promoted positive self-perceptions of control and competence in tandem with knowledge about strategies (e.g., Borkowski, Weyhing, & Carr, 1988). Built from this research, most current strategy-training models incorporate instructional components directly focused on motivation.

Another example of an elaborated model is Ellis's (1993) comprehensive integrative strategies instruction (ISI). In ISI, students are first guided to use effective strategies through a kind of procedural facilitation (i.e., structured cues to guide cognitive processing that mirror strategy steps; see Englert, 1992), before direct explanation about strategies is provided. As a result, students have opportunities to build from rich and contextualized experiences when they are making sense of strategy descriptions, rather than trying to translate simplified descriptions of cognitive processes directly into complex and contextualized action. ISI also includes activities explicitly directed at supporting transfer. For example, in later stages of instruction (once strategies are learned), students are encouraged to "experiment, evaluate, and refine" strategies to meet their individual needs (Ellis, 1993, p. 370).

Many researchers have emphasized the importance of embedding strategy instruction in the context of meaningful work (Ellis, 1993; Harris & Graham, 1996; Palincsar & Brown, 1984, 1988; Palincsar & Klenk, 1992; Pressley et al., 1992). Teaching strategies in context highlights the relevance of strategies and at the same time promotes students' flexible adaptation of strategies given varying task demands. An early model that exemplifies this approach is Palincsar and Brown's (1984) reciprocal teaching. In the original applications of reciprocal teaching, students learned and implemented reading strategies while collaboratively interpreting text (Palincsar & Brown, 1984, 1988).

Finally, in most emerging models, direct instruction and modeling of strategies is extended by providing opportunities for discussion and interaction. In recognition of students' active role in constructing knowledge about tasks, strategies, and themselves as learners (Campione, Brown, & Connell, 1988; Harris & Pressley, 1991; Paris & Byrnes, 1989), students are engaged in activities during which they must use and discuss strategies with others and articulate understandings about learning. Thus, for example, in Palincsar and Brown's (1984, 1988) reciprocal teaching, students work in small groups and read together while applying reading strategies. Students also take turns leading discussions and supporting one anothers' strategic activities. Similarly, in Pressley et al.'s (1992) transactional strategies instruction (TSI), students construct understandings about texts and about reading strategies as they talk together about reading together.

In sum, emerging models for strategies training have become increasingly sophisticated and complex. Although direct instruction about learning strategies remains a mainstay of instruction, models have also incorporated a rich array of instructional practices designed to support students' independent strategic activity. Moreover, consistent with Gersten and Smith-Johnson's (2000) definition of strategies instruction, each retains a focus, to some degree, on directly communicating specific learning strategies comprising a series of simplified steps.

THEORETICAL PRINCIPLES UNDERLYING STRATEGIES INSTRUCTION

Three theoretical perspectives have converged to ground development of these emerging instructional variants. First, approaches to strategy training have been influenced by cognitive-behavioral learning theories (Dole, Duffy, Roehler, & Pearson, 1991). Consistent with a task-analytic approach to instruction, cognitive activities required for task completion are broken down into a series of steps that, when taught to students, provide rules to guide action in the presence of relevant cues (i.e., task demands). Taken to extremes, this theoretical perspective undergirds Gersten and Smith-Johnson's (2000) equating of strategy training with teaching specific cognitive routines. In contrast, while retaining a focus on direct instruction of strategies, most researchers also draw from cognitive-behavioral theories to emphasize students' active role in self-regulation and self-management (e.g., Zimmerman, 1989, 1994). In fact, central to emerging models is an emphasis on students' roles in self-instruction, self-direction, and self-monitoring (e.g., Butler & Winne, 1995; Harris & Graham, 1996).

Second, other strategy-training researchers have emphasized sociocultural models of teaching and learning when describing learning and teaching processes (e.g., Englert, 1992; Palincsar & Brown, 1984, 1988). Researchers have interpreted Vygotsky's (1978) sociocultural theory as suggesting that students become more strategic when they internalize cognitive processes that are first explained or modeled by others (e.g., Borkowski & Muthukrishna, 1992; Englert, 1992; Palincsar & Brown, 1984). The scaffolding metaphor for instructional processes that is currently so prevalent reflects this underlying perspective. The notion is that instructors construct a scaffold by guiding students' learning activities. Then, once students make externally guided cognitive processes their own, the scaffold is deconstructed. As Borkowski and Muthukrishna (1992) explained, "The ultimate goal of scaffolding is to develop student independence through the gradual internalization of the processes that are encouraged during scaffolded instruction" (p. 491).

A third perspective about teaching and learning that has shaped emerging strategy-training models derives from a constructivist position. In constructivist models, students are described as active learners who construct knowledge on the basis of experience (e.g., Harris & Pressley, 1991; Paris & Byrnes, 1989). Drawing on a constructing metaphor rather than an internalizing metaphor allows us to imagine students building situated knowledge that reflects idiosyncratic, even unanticipated, understandings (Butler, 1998b).

These three theoretical perspectives are reflected simultaneously in many emerging instructional models. For example, models that emphasize direct instruction of strategies and the promotion of self-regulation have their roots in cognitive-behavioral theories. Simultaneously, elaborated models include activities derived from sociocultural or constructivist perspectives. For example, reciprocal teaching includes scaffolded support and external guidance for cognitive processing as students start to use strategies (Campione et al., 1988; Palincsar & Brown, 1984, 1988). Interactive discussions about strategies in the context of meaningful work also foster students' active construction of knowledge as students strive to interpret material and then make sense of their cognitive experiences. In fact, many strategy-training researchers in the 1990s emphasized the dual roles of social and constructive processes in students' development of strategic learning (e.g., Harris & Pressley, 1991;

Stone & Reid, 1994). A combination of all three perspectives (cognitive-behavioral, sociocultural, and constructivist) may be necessary for a multidimensional understanding of complex teaching and learning processes.

At the same time, recognizing how theoretical assumptions have an impact on what are considered necessary instructional processes is important. For example, contrast transmission approaches with teaching science with inquiry-based models based on constructivist principles (e.g., Palincsar, Anderson, & David, 1993). Clearly, cognitive-behavioral and constructivist assumptions can be harnessed to promote very different instructional practices. In the context of strategy training, internalizing and constructing metaphors can create different visions of learning, and thus of essential instructional activities (see Butler, 1998b; Stone, 1998). For example, if the internalizing metaphor is interpreted narrowly, it images students as recipients of cultural knowledge. The implication is that instructors must guide student processing externally first, until students internalize the processes first modeled by others. Similarly, a limited interpretation of cognitive-behavioral principles can lead to a restricted focus on knowledge transmission (in this case, knowledge about strategies). In contrast, constructivist theories describe students as active problem solvers who construct knowledge on the basis of experience, building from what they already know (Butler, 1998b). From a constructivist perspective, critical instructional features might include opportunities for students to engage in active inquiry related to authentic problems or issues as an alternative to direct instruction about particular content or strategies (e.g., Palincsar et al., 1993).

In sum, multiple conceptions of teaching and learning coexist in emerging instructional models. Because instructional principles can be associated with alternative instructional practices, the implications of perspectives that researchers adopt need to be clear. At the same time, each perspective likely contributes uniquely to an understanding of teaching and learning. Thus, developing an integrative understanding across cognitive-behavioral, sociocultural, and constructivist perspectives is key to advancing understanding about how and why strategy instruction might work.

THE SCL APPROACH

SCL (Butler, 1993, 1995) evolved from earlier approaches to strategy training (e.g., Palincsar & Brown, 1984; Pressley et al., 1987). As such, SCL builds on previous research and shares features with other instructional models. For example, as in other instructional models, and consistent with Gersten and Smith-Johnson's (2000) prescription, in SCL, discussions about strategies are specific, systematic, and explicit (Butler, 1999b). Attention also focuses on supporting students' construction of metacognitive knowledge as well as positive self-perceptions of competence (e.g., perceptions of self-efficacy; Bandura, 1993; Schunk, 1994; Wong, 1991a). Further, as in Ellis's (1993) ISI, in SCL, instructors provide a form of procedural facilitation, when necessary, by guiding students to complete learning tasks effectively (through questioning) and then helping them derive generalized understandings about cognitive processes on the basis of these experiences. Finally, as in reciprocal teaching (Campione et al., 1988; Palincsar & Brown, 1984) and TSI (Pressley et al., 1992), SCL instruction engages students in interactive discussions about strategic processing as they engage in meaningful work. However, SCL also differs from other instructional models in certain key respects. One is that direct instruction of predefined strategies is not provided (see Butler, 1993, 1994, 1998b).

Several theoretical arguments converged in the development of SCL to suggest this approach to teaching strategies. In this section, some of these arguments are outlined, both to clarify SCL instructional principles and, in light of the issues raised in preceding sections, to highlight how SCL contributes to an understanding of teaching and learning processes. Throughout this discussion, attention focuses on how SCL integrates principles derived from cognitive-behavioral, sociocultural, and constructivist perspectives. Although other instructional models could be analyzed similarly, attention in this section focuses on instructional principles associated with SCL (and not on a comparison of models). Figure 1 provides a summary of SCL theoretical principles in relation to associated instructional activities.

First, SCL instructional methods emerged from an analysis of strategic performance (Brown, 1980, 1987; Butler & Winne, 1995; Resnick & Glaser, 1976; Schoenfeld, 1988; Wong, 1991a; Zimmerman, 1989). Drawing on a cognitive-behavioral perspective (e.g., Zimmerman, 1989, 1994), models of self-regulated learning suggest that strategic learners engage recursively in a cycle of problem-solving activities—namely, analyzing tasks, implementing task-appropriate strategies, monitoring outcomes associated with strategy use, and adjusting strategies accordingly (Butler & Winne, 1995; Zimmerman, 1989, 1994). From this perspective, promoting strategic learning requires much more than just teaching strategies (Butler, 1999a; Harris & Graham, 1996). Students must also learn how to analyze tasks so as to set criteria for guiding and judging performance. Further, students need to know how to monitor outcomes and how to use this information to redirect learning (Butler & Winne, 1995). Thus, the primary instructional goal in SCL is to promote students' self-regulated learning. To accomplish this objective, teachers facilitate students' movement through cycles of task analysis, strategy development, and monitoring. Within this broader context, students are assisted to learn how to select, adapt, or even invent strategies on the basis of an analysis of task requirements (see Butler, 1993, 1995).

Second, theoretical analysis of the origin of self-regulation also influenced the development of SCL (Butler, 1998b; Butler & Winne, 1995; Flavell, 1987; Vygotsky, 1978). In this context, distinguishing between two subcomponents of self-regulation—metacognitive knowledge and self-regulating processes—is important because each may develop differently (Butler, 1998a). *Metacognitive knowledge* refers to students' knowledge about learning and encompasses knowledge about tasks, strategies, and learners (Brown, 1987; Flavell, 1987). Motivational beliefs, like metacognitive knowledge, also reflect students' metacognitive understanding. For example, students' attributional beliefs reflect their knowledge about causal factors related to successful or unsuccessful performance (Borkowski et al., 1988; Weiner, 1974), whereas students' task-specific perceptions of self-efficacy reflect self-perceptions of competence and control (Bandura, 1993; Schunk, 1994). Many researchers argue that students actively construct metacognitive knowledge and motivational beliefs with time on the basis of successive experiences with tasks (e.g., Harris & Pressley, 1991; Paris & Byrnes, 1989). The depth of students' metacognitive understandings may increase with time as developmental changes foster greater self-reflection and analytic thinking in students (Butler, 1998a).

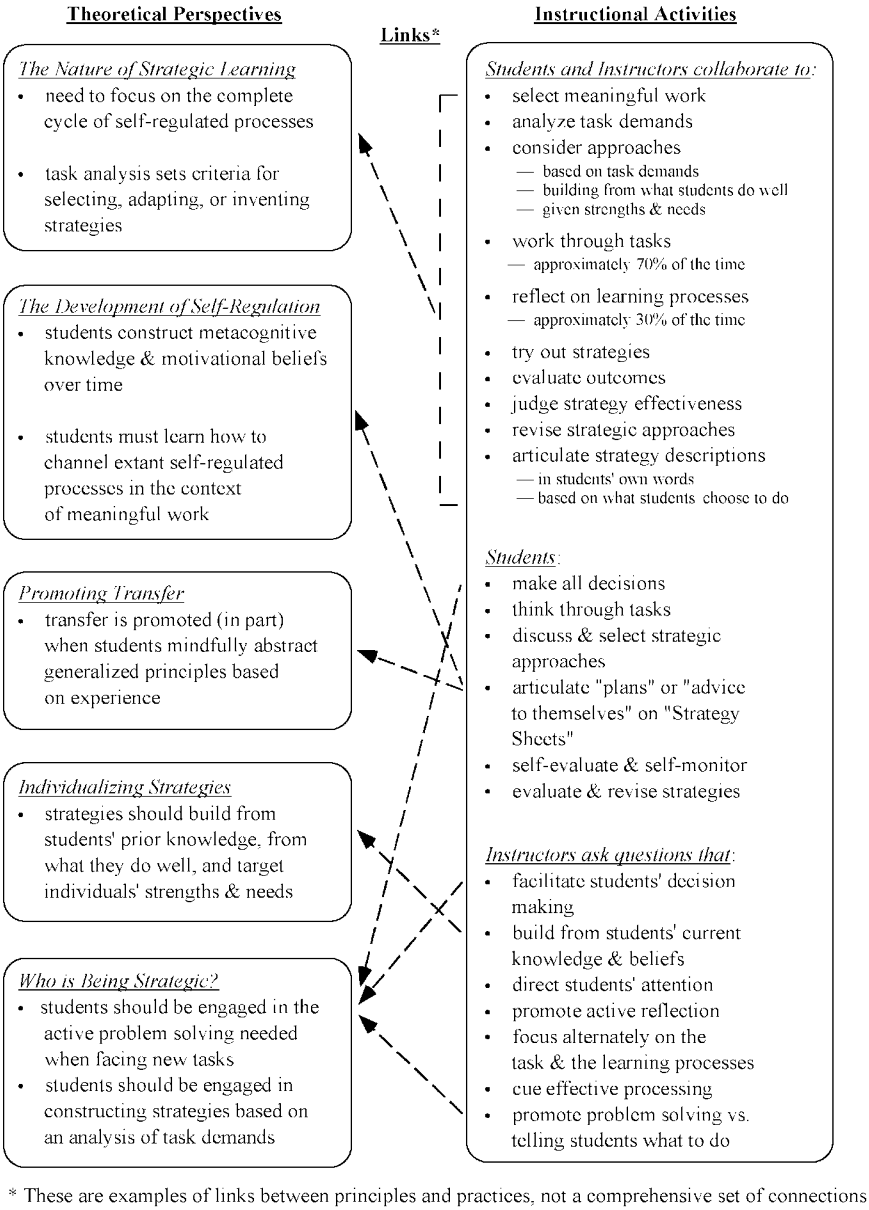

FIGURE 1 Theoretical principles underlying strategic content learning instruction and connections to instructional practices.

In terms of students' engagement in the cycle of self-regulating processes, researchers offer varying descriptions of how effective self-regulation develops. For example, one perspective is that students need to be taught how to self-regulate. This view is consistent with transmission approaches to strategy training that seek to communicate strategic repertoires to students (see Butler & Winne, 1995). A second view, alluded to previously, is that students become independently self-regulating by internalizing learning processes that are first observed in social contexts. This perspective, the most common application of sociocultural principles, underlies approaches that start by guiding students' learning processes externally (i.e., through direct instruction, modeling, or procedural facilitators) and then gradually release control as students independently start to self-direct learning (i.e., the move from other- to self-regulation; e.g., Borkowski & Muthukrishna, 1992; Englert, 1992; Palincsar & Brown, 1984). A final perspective is that even young children are self-regulating in their interactions with the world. For example, consider Vygotsky's (1978) description of a preschooler's obtaining an unreachable cookie with the aid of a stick. From this perspective, instruction in self-regulation per se is unnecessary. Rather, students need to learn how to channel strategic efforts effectively when they are faced with new kinds of tasks (Butler, 1995, 1998b) and then how to construct understandings over time regarding their strategic approaches to learning (Butler, 1998a).

In the SCL theoretical model, the hypothesis is that sociocultural and individual forces interact to shape students' construction of self-regulated approaches to academic work, metacognitive knowledge, and motivational beliefs. For example, drawing on Vygotsky's (1978) original writings and on constructivist theories can yield the hypothesis that students do not enter school as self-regulating blank slates (Butler & Winne, 1995) but are inherently self-regulated in their interactions with the environment. Thus, to shape students' strategic approaches to academic work, SCL instructors help students to decipher academic requirements and then to collaboratively problem solve strategic approaches.

Also built from a constructivist perspective is the hypothesis that students construct metacognitive knowledge as they engage self-regulating processes and reflect on their learning experiences (Paris & Byrnes, 1989). At the same time, SCL reflects the recognition that students are strongly influenced by the cultural contexts in which they learn. Social contexts define the materials (i.e., language and tools) that students use to make sense of experience (Butler, 1998b; Stone & Reid, 1994; Wertsch, 1979). Thus, knowledge construction (by students and teachers) is assumed to be socially situated, coconstructed, and emerging from reflective discourse based on meaningful experience (Butler, 1995; Harris & Pressley, 1991; Paris & Byrnes, 1989). Further, the social interaction with instructors or peers facilitates students' coconstruction of "transactional understandings" that are more elaborate and sophisticated than understandings that any individual might construct alone (see Pressley et al., 1992). These transactional coconstructions may contribute to domain-specific knowledge (e.g., as when students coconstruct transactional understandings about text while reading collaboratively; Pressley et al., 1992) or to students' development of metacognitive knowledge about tasks, strategies, or their respective learning processes. Following these assumptions, SCL instructors engage students in interactive discussions focused alternately on task completion and on the process of completing a task. Within social interactions, students coconstruct better approaches to learning, metacognitive knowledge, and motivational beliefs, all of which are shaped within social and cultural contexts.

A third influence on SCL instructional principles is derived from an analysis of learning mechanisms associated with transfer (e.g., Salomon & Perkins, 1989; Wong, 1991b, 1994). Consistent with a constructivist perspective, one conclusion from this analysis is that transfer is supported, in part, when students approach tasks reflectively, or "mindfully," and abstract generalized principles about learning on the basis of concrete task experiences (Salomon & Perkins, 1989; Wong, 1994). Thus, in SCL, students are not initially required to make sense of learning principles abstracted by teachers or researchers into a sequence of predefined strategy steps. Instead, students are guided to self-regulate performance successfully and then to abstract generalized principles about learning that build from prior knowledge and are formulated in their own words.

A fourth question that drove the development of SCL centered on how strategy instruction could be individualized. Although students with learning disabilities encounter some common difficulties (e.g., decoding words or building comprehension while reading), they nonetheless have multidimensional cognitive profiles along with varying experiences, strengths, and needs (Pintrich, Anderman, & Klobucar, 1994). Thus, strategies that work well for one student may not be effective for another (Montague, 1993; Swanson, 1990). Further, all but the youngest students have a budding knowledge base about strategies for accomplishing academic tasks. As a result, approaches that teach the same strategies to all students, without accounting for prior knowledge, may not be maximally efficient (Butler, 1994, 1995). Thus, SCL was designed to afford opportunities for students to construct personalized strategies that build from what they do well and respond to their individual needs.

A final theoretical argument underlying SCL emerged from evaluating who it is that is strategic in some approaches to strategy training. In some cases, the teacher or the researcher is the person who considers an academic task, identifies associated goals, considers the types of problems that students might encounter, and defines a specific and, it is hoped, effective routine. This routine is conveyed directly to the students. However, in this scenario, students are essentially excluded from the problem-solving process that is at the heart of strategic learning (Butler & Winne, 1995). Students do not necessarily learn how to confront a novel task, identify goals, and brainstorm, try out, and modify various approaches designed to meet task requirements. Thus, SCL students are engaged in the process of defining strategic alternatives, given task goals. The expectation is that students will learn to recognize that they, too, can generate strategic approaches and ultimately control learning outcomes.

In sum, multiple theoretical strands converged to shape SCL instructional principles. As a result, SCL situates strategy instruction in the broader enterprise of promoting self-regulation, fosters students' mindful construction of knowledge about learning processes, and engages students in collaborative problem solving during which they construct individualized strategies that are built from prior knowledge and responsive to how they learn best. Unlike instructional models that emphasize direct instruction, no predefined learning strategies are described in SCL. Instead, instructors provide calibrated support to students—using guiding questions—that assists them to self-regulate learning and to develop more effective strategies in that context. Figure 1 facilitates understanding of how SCL instructional principles are translated into practice by providing an overview of instructional procedures.

A SUMMARY OF SCL RESEARCH AT THE POSTSECONDARY LEVEL

To date, seven intensive intervention studies have been completed that evaluate SCL efficacy for students with learning disabilities in college or university settings. In each study, a common research design was used. First, to trace the relationship between instructional activities and students' development of self-regulation, researchers collected in-depth case study data for each participant (Merriam, 1998; Yin, 1994). At the same time, multiple case studies were embedded within a pre–post design. During pretest and posttest sessions, parallel questionnaires, observations, and interviews were used to measure common effects among students (see Butler, 1993, 1995, 1998d).

Across the seven studies, SCL was adapted for use in the three most common service delivery models used in colleges and universities. In four studies (n = 35), SCL was implemented as a model for individualized tutoring by learning specialists, counselors, or teachers (see Butler, 1993, 1995, 1998c, 1998d). In another two studies (n = 14), SCL served as a model for peer tutor training (see Butler, Elaschuk, Poole, MacLeod, & Syer, 1997). The seventh study (n = 21) investigated SCL adapted for use within small-group discussions as part of a study skills course (see Butler, Elaschuk, Poole, Novak, et al., 2000). Thus, across studies, 70 postsecondary students participated in interventions in which they received support following the SCL model.

Psychoeducational assessments verified that each participant had a learning disability, although students' specific learning disabilities affected different aspects of their performance. Further, many students experienced concomitant disabilities that also affected their learning (e.g., a visual impairment or attention deficit disorder). Participants were enrolled in a broad range of programs. Some of these programs focused on basic academic upgrading (e.g., for math at the fifth-grade level). Other students were enrolled in vocational (e.g., in early childhood education, medical lab technician, or diesel mechanics), academic (e.g., university transfer, first-year university courses), or professional (e.g., law, education) programs. This diversity facilitated evaluating the robustness of the SCL model across students, settings, programs, and tasks.

In postsecondary settings, SCL support was provided as an adjunct to regular classroom instruction. In the individualized tutoring and peer tutor studies, students chose the tasks that they wanted to work on (typically variants of reading, writing, studying, and math tasks), and the assignments were drawn from individuals' programs of study. In the group-based study skills course, small groups worked primarily on either reading and studying or writing, but task examples were drawn from participants' actual work. At each meeting, students prioritized assignments on the basis of current course requirements, and SCL tutors provided calibrated assistance as students self-regulated completion of these tasks. In all studies, instructors met with students (as individuals or in small groups) two to three times a week (for 2–4 hr per week) during at least a single semester. Information on participant age, gender, and participation in SCL interventions (i.e., number of intervention sessions, total time involved) is presented in Table 1.

In each study, instructors began by supporting students to analyze task requirements, articulate performance criteria, and set specific goals. At this (and every other) stage of instruction, support targeted individuals' needs. For example, if a student held misconceptions about a task, the instructor supported the student to scrutinize task descriptions or assignment exemplars to abstract more accurate conceptions. Next, instructors supported students to select, adapt, or even invent strategies in light of task goals. Instead of teaching preidentified strategies, instructors assisted students to problem solve strategies by building from strategies they already knew. Doing so often entailed asking students to implement current strategies, monitor outcomes associated with strategy use, and maintain, revise, or replace strategies on the basis of discrepancies between progress and goals. When students' current strategies were clearly inadequate, students and instructors brainstormed alternatives and evaluated options (given task demands). Both students and instructors contributed suggestions to this discussion, but students ultimately were asked to take responsibility for making decisions about which strategies to use.

Finally, instructors observed students' strategic performance and supported their cognitive processing "online." When obstacles were encountered or at natural breaks in the task, students were encouraged to reflect on their performance, to self-evaluate progress, and to make judgments about how to proceed. As in strategy selection, task

TABLE 1
Overview of Participants Across the Seven Postsecondary Studies (1993–1999)

Study	*n*[a]	*Media Age (Min–Max)*	*Gender*		*Median No. Intervention Sessions (Min–Max)*	*Median Total Time Spent (hr)*[b] *(Min–Max)*
			Male	*Female*		
SCL 1993	8	26.00 (18–36)	3	5	10.50 (7–15)	15.50 (11.00–28.50)
SCL 1994	13	32.00 (21–45)	3	10	14.00 (8–20.50)	18.25 (8.50–25.75)
Innovations years studies, 1 & 2	14	32.00 (19–48)	5	9	18.50 (9–39)	18.75 (11.50–43.50)
Peer tutor projects (2)	14	24.50 (19–49)	8	6	8.00 (2–24)	9.75 (2.50–24.50)
Group study	21	32.00 (19–55)	10	11	13.00 (5–19)	20.00 (7.50–28.25)
Total	70	29.50 (18–55)	29	41	13.75 (2–39)	17.25 (2.50–43.50)

Note. SCL = strategic content learning.
[a]A number of students participated in two consecutive studies. In these totals, the students are counted only once (so they underestimate the number of students per study). Data from these students included their age at the beginning of the first study and the average number of sessions and time spent across the two studies.
[b]rounded to the nearest one-quarter hour.

criteria set the standards against which progress toward learning goals was judged (Butler & Winne, 1995). Thus, within each intervention session, students were assisted to diagnose problems (cognitive, motivational, or volitional; Corno, 1993), to build on what they already did well, and to revise strategies that were not working. With time, students were assisted to build personalized strategies based on their unique processing strengths and weaknesses and in response to their particular difficulties with tasks. Through this process, students were assisted to construct not only better task-specific strategies, but also metacognitive and volitional strategies for managing learning activities (Butler, 1998a; Corno, 1993, 1994).

Analyses of outcome data across the seven studies suggested that, in general, SCL intervention at the postsecondary level is associated with improvement in students' task performance; metacognitive knowledge about tasks, strategies, and self-monitoring; perceptions of self-efficacy (Bandura, 1993; Schunk, 1994); and patterns of attributions (Borkowski & Muthukrishna, 1992; Weiner, 1974). Students developed personalized strategies that addressed their individual needs. They were also observed to take an active role in strategy development and to transfer strategic performance across contexts and tasks (see Butler, 1993, 1995, 1998d; Butler, Elaschuk, Poole, Novak, et al., 2000). A summary of findings from the subset of data related to changes in task performance, metacognitive knowledge, and motivational beliefs is presented in Table 2. This table presents a set of columns that summarize statistically reliable gains across studies (indicated with an asterisk). Columns 2 through 4 summarize outcomes from four studies in which SCL was used as a model for individualized tutoring by learning specialists, counselors, or teachers (see Butler, 1993, 1995, 1998d). Column 5 depicts pooled results from two studies wherein peer tutors were trained to use SCL (see Butler et al., 1997). The final column presents the results from a study in which SCL was used in a group-based study skills course (see Butler, Elaschuk, Poole, Novak, et al., 2000).

The results reported in Table 2, coupled with the findings summarized previously (e.g., improvements in task performance and self-regulated processing), suggest, first, that SCL instruction can be associated with significant gains across several types of outcomes. This finding is particularly notable given that these gains were achieved in a relatively short period by students with long-standing difficulties. Second, the most consistent and powerful gains were achieved by students who received individualized tutoring from learning specialists, counselors, or teachers (see columns 2–4), although students in the group-based study skills courses also appeared to make substantial improvements (see column 6). Finally, results from the two peer tutor studies were more limited. Close scrutiny of the data from the peer-tutoring projects showed that when tutors faithfully implemented the SCL approach, tutees made clear gains (see Butler et al., 1997). However, general effects appeared to be diluted as a result of logistical and administrative barriers (e.g., hiring peer tutors halfway through the semester; difficulties coordinating training for tutors). Additional research is planned to assess SCL efficacy as a model for peer tutor training when these barriers are removed.

Given the evidence for SCL efficacy for students at the postsecondary level, additional analyses were conducted to trace how SCL works (e.g., Duffy, Roehler, & Rackliffe, 1986; Gaskins, Anderson, Pressley, Cunicelli, & Satlow, 1993; Mehan, 1985). For example, in one study (Kamann & Butler, 1996), a discourse analysis was completed to

TABLE 2
Summary of Postsecondary Outcomes: Significant Pretest-to-Posttest Comparisons

	Significant Effects by Study[a]				
Measure	*SCL 1993*	*SCL 1994*	*Innovations Studies*	*Peer Tutor Studies*	*Group Study*
Task performance	*	*	*	n/a	*
Metacognitive knowledge[b]					
Task description	n/a	*	*	—	*
Strategy description	n/a	*	*	—	*
Strategy focus	n/a	*	*	—	*
Monitoring	n/a	*	*	*	—
Overall (average)	*	*	*	—	*
Self-efficacy					
Global self-efficacy	n/a	—	—	—	—
Task-specific confidence	n/a	*	*	—	*
Perceived competence	*	*	*	*	*
Task preference	*	—	n/a	n/a	n/a
Ability rating	*	*	—	—	—
On targeted task	n/a	*	*	*	*
On other academic tasks	n/a	—	*	*	*
Attributions					
Successful performance					
Ability	*	—	*	—	—
Effort	*	—	—	—	—
Strategy use	*	—	*	—	*
Depended on others	—	—	*	—	—
Unsuccessful performance					
Ability	*	*	—	—	—
Effort	—	—	—	—	—
Strategy use	—	—	—	—	—
Depended on others	*	—	—	—	—

Note. * = results that were statistically reliable; — = results that were not statistically reliable; n/a = not assessed in this study.

[a]SCL 1993 (n = 8), see Butler (1993, 1995); SCL 1994 (n = 13), see Butler (1998c, 1998d); innovations studies, years 1 and 2 pooled (n = 21), see Butler (1998c, 1998d); peer tutor studies (n = 14–25, depending on criteria for inclusion), see Butler et al. (1997); group study (n = 21), see Butler, Poole, et al. (2000). [b]As a way to assess changes in metacognitive dimensions, scores from SCL 1994 and the innovations studies were pooled (see Butler, 1998d).

describe the dynamics of student–instructor interactions during one-on-one tutoring. This analysis documented how strategic performance could be supported through facilitative questioning, without direct instruction and modeling of strategies. In another analysis, in-depth case study data were compared for three students who worked on writing (Butler, Elaschuk, & Poole, 2000). The analysis showed how various positive outcomes could be associated with students' strategy development. Further, the analysis showed how the content of students' strategies was a joint function of the demands of writing tasks (e.g., in terms of planning, drafting text, and revising) and students' individual needs. Finally, another analysis described instructor and peer interactions from the group-based study skills classes (Butler, Elaschuk, Poole, Novak, et al., 2000). In this analysis, my coworkers and I documented how students coconstructed strategies in small-group discussions by trading ideas while they were constructing personalized interpretations of strategies. Taken together, these various analyses illuminate the interplay between social and individual processes in students' development of self-regulation (Stone & Reid, 1994).

ADAPTING SCL IN SECONDARY SCHOOLS

Following the postsecondary studies, a multiyear, multischool project was launched at the secondary level. This project emerged from an in-service presentation for learning assistance teachers. Ten teachers expressed a desire to participate in a districtwide, collaborative study of how SCL could be situated in secondary classrooms. Nine teachers chose to use SCL when they were working in learning assistance or resource settings (for students in Grades 8–11), and one teacher used SCL in a whole classroom setting (with her ninth-grade students). A team of five researchers worked collaboratively with these teachers to define strategies for implementing SCL within varying school and classroom cultures and to evaluate benefits for teachers and students.

A summary of findings from the first year of the project is provided next. These findings reflect only a subset of analyses because the project is still underway. Much of the first year was spent developing, implementing, monitoring, and revising systems for situating SCL in classrooms. In fact, one goal of the study has been to evaluate the kinds of collaborative professional development activities that promote meaningful instructional change (Borko & Putnam, 1998; Butler, Novak, Beckingham, Jarvis, & Elaschuk, 2001; Palincsar, 1999; Perry, Walton, & Calder, 1999). Although this longer term development effort was necessary, both to provide time for meaningful collaboration to occur and to define useful strategies for contexualizing SCL, the result was that many students were not consistently engaged in SCL instruction until well into the school year. A more effective test of SCL efficacy came from the second year of the project, wherein SCL implementation was effected more quickly, in part because sample classroom routines were available for both new ($n = 4$) and continuing ($n = 7$) teachers. In fact, by the third week of class in the second year, teams of as many as 10 individuals at each school (including teachers, educational assistants, and peer tutors) had already begun to apply the SCL model and had constructed contextualized classroom routines.

Similar to the blended design used in the postsecondary studies, the design of the secondary project involved multiple, parallel, in-depth case studies embedded within a two-group (intervention group and comparison group), pretest–posttest design (see Butler, Elaschuk, Jarvis, Beckingham, & Novak, 2001). Intervention students received SCL instruction from their teachers as part of the natural flow of instruction. Comparison students in five parallel classrooms received a comparable amount of support from teachers who used their typical teaching methods. Observations of intervention and comparison group classrooms were conducted as a way to document instructional processes and evaluate both the extent of SCL implementation in intervention classrooms and the kind of instruction provided to comparison groups. In all learning assistance or resource settings (intervention and comparison classrooms), teachers met with students in small class settings with a ratio of 4 to 7 students per teacher. Students brought coursework to these classes, and teachers circulated among students to provide individualized support. Blocks typically lasted for 70 to 100 min. Two of the four schools were on a semester schedule, so that support blocks met every day. The other two schools were on a year-long schedule, so that support blocks met every 2 days. The teacher who used SCL in her whole classroom also taught at one of the year-long schools. She met with students in a double block for English and humanities courses combined.

As in the postsecondary studies, pretest and posttest questionnaires and interviews assessed students' metacognitive knowledge about tasks and strategies and motivational beliefs (e.g., causal explanations for successful and unsuccessful performance; perceptions of control over outcomes; task-specific perceptions of self-efficacy; Bandura, 1993; Borkowski, 1992; Schunk, 1994; Weiner, 1974). Case study data included copies of students' classroom assignments and tests, copies of the strategies that students developed, and teachers' reflections on instructional processes and observed outcomes for students (recorded in classroom logs). Teachers participated in three all-schools meetings evenly distributed throughout the year, and minutes were maintained from these meetings. Finally, teachers were interviewed at the end of the year, and their perspectives about SCL, collaborative processes, and outcomes were gathered.

Preliminary findings that emerged from data analyses are highlighted next. These analyses included systematic qualitative analyses of minutes from all-schools meetings and transcripts from teachers' exit interviews (see Merriam, 1998; Miles & Huberman, 1994; Yin, 1994), as well as quantitative analyses of some of the pretest–posttest questionnaire data. Overall, findings suggested that students benefited in several ways from participating in SCL intervention. For example, at all-schools meetings and in exit interviews, teachers reported observing gains for students in terms of their (a) independence and self-directedness; (b) self-confidence, pride, and sense of control over learning; and (c) awareness of the value of their individualized learning strategies to their academic success. Preliminary analyses of questionnaire data provided converging evidence for these observations. For example, comparisons of intervention students ($n = 56$) and comparison group students ($n = 17$) in learning assistance or resource settings showed that, after pretest scores were accounted for, intervention students' posttest perceptions of control over outcomes were significantly higher than those of students in the comparison group, Wilks's $F(4, 63) = 2.86$, $p < .05$. Intervention students were more likely to say that they could control outcomes through effort, $F(1, 66) = 5.63$, $p < .05$, or by using strategies, $F(1, 66) = 4.18$, $p < .05$. A significant interaction effect, $F(1, 70) = 4.85$, $p < .05$, elaborated these findings. At the beginning of the year, both intervention students and comparison students were relatively positive that they could control outcomes (average ratings of about 3.5 of 5). However, by the end of the first year (when exams were looming), the perceptions of intervention students remained positive, whereas the perceptions of comparison students declined. No significant group differences or interaction effects were found in students' scores on the self-efficacy scales, which was contrary to expectations. However, significant interactions were also found in analyses based on the attributional data. Again, although intervention students showed positive shifts in attributional patterns from pretest to posttest, the attributional patterns of comparison students deteriorated.

Finally, students' responses to the metacognitive questionnaire were coded along three dimensions, each on a scale from 0 to 3 (see Butler, 1995; Wong, Wong, & Blenkinsop, 1989). These dimensions were (a) task description (students' description of the demands of tasks such as reading, writing, or math), (b) task quality (students' descriptions of criteria for judging performance quality), and (c) strategy description (the clarity of students' descriptions of task-specific strategies). Results from three univariate 2 (group) × 2 (test time) analyses of variance revealed patterns similar to those found in the motivational data. Specifically, for two of the three dimensions (task description and strategy description), scores for intervention students increased between pre- and posttesting, whereas scores for comparison students decreased. This interaction effect was statistically reliable for the strategy description dimension, $F(1, 70) = 4.5$, $p < .04$, and very close to significant for students' task descriptions, $F(1, 70) = 3.675$, $p < .06$. Thus, overall, participation in classes structured according to SCL principles could be associated with positive changes for students in their metacognitive knowledge and motivational beliefs, even in the first year of the study. Additional analyses are underway to identify potentially mediating variables (e.g., class type, school schedule, gender, and grade) and to evaluate outcomes across various other variables (e.g., task performance, strategy transfer). A full set of analyses from the secondary study, along with complementary case study descriptions, are available elsewhere (Butler & Briard, 2000; Butler, Elaschuk, Jarvis, et al., 2001).

That teachers associated the intervention with positive outcomes for students and enjoyed being part of the study was evident in discussions and observations. For example, when the teachers were asked whether they would recommend the intervention approach to colleagues, every teacher ($n = 10$) said "yes." One teacher responded, "Absolutely. There are too many kids who are spoon fed the information and we need to turn them into independent thinkers. I think this is just a marvelous way of doing it." Their actions were consistent with these statements. For example, teachers recommended the intervention to colleagues, two teachers joined the project midyear, and all teachers expressed a willingness to be part of the project again in the second year.

Teachers also believed that SCL was generally useful and should be used with students across subjects and contexts. As one resource teacher explained, "[SCL could be used] in any kind of classroom in any subject area, because we cover all those subjects down here and we used it effectively in every subject area. A classroom teacher could use it." At the same time, teachers identified factors that reduced some students' responsiveness to the approach. For example, one teacher cautioned, "You won't attain the same level of success with every student.... Some kids will buy into it right away. Some will take longer, or they aren't going to get there at all. You have to accept that." Some of the students who did not do as well were struggling with behavioral, personal, health, or emotional challenges. Teachers described other students as resistant to thinking for themselves after a long history of being told what to do. The teachers thought that these students took longer to accept the changed approach and found it frustrating at first. In contrast, students did well when they were willing to slow down to think about strategies and then observe how their progress improved as a result.

In addition to citing positive outcomes for students, teachers identified personal benefits that they achieved from participating in the project: (a) personal satisfaction from observing student improvement (Ball, 1995); (b) positive opportunities to collaboratively problem solve with students, rather than having to be the "expert" all the time; and most significant, (c) shifts in instructional style and understandings about instructional principles (Perry et al., 1999). For example, one teacher noted that she gained "a totally different perspective of how to teach to students who you would think are lazy. They're not lazy. They're stuck." Another positive shift was that early in the year teachers were afraid to take the time necessary to talk to students about learning processes because they felt obligated to help students complete pressing work. In contrast, by year-end, teachers described the importance of slowing down and helping students proactively problem solve strategies, rather than putting out fires in each class (i.e., crisis management). The teachers also described how they were better able to target their attention to students who really needed help, because students started work independently and were more focused on their studies. Finally, teachers noted that because they really listened to students while they were facilitating learning (in contrast to directly instructing), they were better able to recognize misconceptions, appreciate individual differences, and help students identify personalized strategies. As one teacher explained, "I'm so used to teaching math using the strategies that I have, but I found that students were independently developing strategies that worked better for them" (Ball, 1995).

CONCLUSION

The results overviewed in this article suggest that SCL provides a viable model for supporting postsecondary students with learning disabilities across varying service delivery structures. College and university participants in the SCL studies experienced multifaceted and positive outcomes, including improvement in task performance; metacognitive knowledge about tasks, strategies, and monitoring; perceptions of self-efficacy; and attributions for academic performance (Butler, 1993, 1995, 1998c, 1998d; Butler, Elaschuk, Poole, Novak, et al., 2000). Students were also observed to be actively involved in strategy development and to transfer strategy use across contexts and tasks. Taken together, these results suggest that students not only learned effective task-specific strategies, but also learned how to self-regulate performance across a range of tasks. Similarly, preliminary findings from the first year of the SCL secondary study are encouraging, although additional research is required to thoroughly validate SCL in that context.

On the basis of the theoretical analysis provided in this article, several other areas were identified that require additional research. For example, one question centers on whether direct instruction of specific strategies is a necessary component of strategy training, as Gersten and Smith-Johnson (2000) argued. Although many successful strategy-training interventions incorporate direct instruction as part of a multidimensional instructional program, the success of the SCL intervention suggests that direct instruction is not always essential. Nevertheless, explicit and systematic discussion about strategies is a feature shared across empirically validated models (e.g., Butler, 1993, 1995; Ellis, 1993; Englert, 1992; Harris & Graham, 1996; Palincsar & Brown, 1984, 1988; Pressley et al., 1992; Schumaker & Deshler, 1992). Additional research is required to tease apart the relative contributions of varying instructional activities for students at different ages and different levels.

Another important avenue to explore more fully is the nature of calibrated support. In calibrated support, teachers typically guide students' cognitive processing responsively, building from individuals' current understandings. This key concept is subsumed within the scaffolding instructional metaphor so prevalent across instructional models. However, descriptions of students' internalizing predefined processes may not adequately capture the richness of students' learning experiences. A fuller understanding of instruction–learning relationships might be better captured by integrating sociocultural and constructivist perspectives.

Another critical research direction is to define how strategies instruction fits within the broader enterprise of developing capable learners. Although not always framed in terms of self-regulated processes, most effective instructional models explicitly promote task understanding, adaptive strategy selection, and monitoring, in addition to strategy mastery (e.g., Butler, 1995; Ellis, 1993; Englert, 1992; Harris & Graham, 1996; Palincsar & Brown, 1984). SCL provides another example of how instruction can be structured to promote problem solving and strategic learning rather than simple strategy mastery.

Finally, common activities across many instructional models are those that engage students in active inquiry, collaborative problem solving, and interactive discussions about learning. Within these types of activities, students have opportunities to actively construct personalized understandings that are shaped by sociocultural processes. However, because the joint implications of constructivist and sociocultural theories are only now being appreciated (e.g., Butler, 1998b; Harris & Pressley, 1991; Paris & Byrnes, 1989; Stone & Reid, 1994), further inquiry is required to define how self-regulation is promoted in the content of collaborative and interactive discussions and to uncover the relative roles of social and individual processes in students' development of metacognition, motivation, and self-regulating processes.

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