# The Importance of Explicit Writing Instruction for

# Post-Secondary Students with Learning Disabilities

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Running Head: Explicit Writing Instruction

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Effective writers are strategic. They analyze the requirements of writing tasks, select, adapt, or even invent strategies to achieve their objectives, monitor progress, manage intrusive emotions and waning motivation, and adjust strategic approaches adaptively to foster success (Butler & Winne, 1995; Corno, 1993; Zimmerman, 1989; 1994). In contrast, students with learning disabilities have been characterized as actively inefficient in their approaches to tasks (Swanson, 1990). For example, although these students often invest considerable effort in writing, they appear to have difficulty focusing their efforts effectively (Butler, 1998-d). This paper presents evidence suggesting that the writing problems of adult students with learning disabilities derive, at least in part, from problems in how they self-regulate their writing activities. More specifically, evidence accumulated across seven studies suggests that students' writing performance often is undermined by a combination of inaccurate metacognitive knowledge, negative motivational beliefs, intrusive emotions such as frustration and anxiety, and faulty self-regulated processing. This paper also presents evidence for the efficacy of an instructional model that has been shown to promote self-regulated learning by adult students with learning disabilities, the Strategic Content Learning (SCL) approach. Thus, this paper presents two types of data related to students' writing performance: The first documents the kinds of strategic problems students encounter while working through writing tasks; the second demonstrates that interventions designed to promote strategic writing performance can be associated with writing improvements. Taken together, these two sources of evidence underline the need for explicit writing instruction for post-secondary students with learning disabilities.

## A Simplified Model of Self-Regulated Learning

To provide a framework for characterizing students' difficulties with self-regulated writing (and for explaining the SCL approach), a simplified model of self-regulated learning is presented in Figure 1 (Butler, 1998-a; Butler & Winne, 1995; Carver & Scheier, 1990; Corno, 1986, 1993, 1994; Zimmerman, 1989, 1994, 1995). This model suggests that, when faced with an academic task, self-regulated learners start by analyzing the demands of the task. For example, when given a writing assignment in a post-secondary classroom, self-regulated learners start by reading and interpreting assignment descriptions in light of what they understand about typical expectations for writing assignments. Next, strategic writers select, adapt, or even invent strategic approaches to meet task demands. In essence, effective writing requires coordinating strategy use in light of perceived task requirements (Butler, 1998-a; Wong, 1985, 1991). Once they have implemented strategies, self-regulated writers self-monitor progress. They do this by comparing outcomes to goals and generating internal feedback about discrepancies (Butler & Winne, 1995). Based on their perceptions of progress, self-regulated writers make deliberate decisions about how to proceed. Finally, self-regulated learners also have developed strategies for managing their writing activities and for preventing and/or overcoming negative emotions and waning motivation (Corno, 1993, 1994; Graham, Harris, MacArthur, & Schwartz, 1998).

Students' approaches to writing also are influenced by knowledge and beliefs that they bring to learning tasks. These include students' metacognitive knowledge about the demands of writing tasks, writing strategies, monitoring, and themselves as writers (Butler, 1998-c; Wong, 1991), and motivational beliefs such as attributions for successful and unsuccessful performance and perceptions of self-efficacy (Bandura, 1993; Borkowski, 1992; Schunk, 1994). It follows, then, that effective writing requires that students flexibly and recursively engage in a cycle of cognitive activities (e.g., analyzing tasks, setting goals, implementing strategies, self-evaluating, self-monitoring), informed by a range of knowledge and beliefs (e.g., conceptions about writing, knowledge about writing strategies, attributions, perceptions of self-efficacy), to manage cognition, motivation, and volition.

It also follows that, if students experience difficulties with any of these aspects of self-regulation, then their successful writing may be undermined. For example, inaccurate analysis of task demands has the potential to derail the effectiveness of writing activities (Butler, 1995; Wong, 1985). This is because learners' perceptions of task requirements influence the goals that they set, their choice of strategic approaches, and the criteria they set for judging their success (Butler & Winne, 1995). If students misinterpret a task's purpose, even active and reflective learners will self-direct writing activities inefficiently. And, students' effective task analysis can be threatened if they do not invest effort to decipher task requirements, possess inaccurate metacognitive understandings about writing, and/or have difficulty interpreting assignment demands. Unfortunately, prior research suggests that students with learning disabilities are likely to experience difficulties in one or more of these areas (Baker & Brown, 1984; Butler, 1998-c; Englert, 1990; O'Shea & O'Shea, 1994; Wong, 1985, 1991).

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Insert Figure 1 about here

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Students' writing also can be undermined if they do not select and implement effective cognitive or metacognitive strategies. This is again a difficulty that has been observed for writers with learning disabilities (see Butler, 1998-c; Englert, 1990; Englert, Raphael, Anderson, Gregg, & Anthony, 1989; Montague, Maddux, & Dereshiwsky, 1990; Swanson, 1990). Problems with students' use of strategies may be linked to incomplete metacognitive knowledge about writing, difficulties in selecting strategies that match task demands, and/or a lack of effort invested in implementing strategies (Butler & Winne, 1995). Students' willingness to invest effort in writing may be threatened by low-confidence or by students' beliefs that they have little control over outcomes (Bandura, 1993; Schunk, 1994).

As a final example, ineffective self-monitoring, like task analysis, can thwart students' success. Butler and Winne (1995) have argued that monitoring is the "hub" about which successive cycles of self-regulated processing turn, because it is when students judge outcomes in relation to goals that they make decisions about how to guide further learning activities. Unfortunately, research suggests that students with learning disabilities may be at risk for ineffective monitoring as well (e.g., Baker & Brown, 1984). These difficulties can stem from a lack of awareness of the importance of monitoring, adopting ineffective criteria for evaluating performance (often linked to poor task analysis), or having little sense of how to refocus efforts if problems are encountered (Butler & Winne, 1995).

This brief summary emphasizes that understanding students' writing difficulties requires more than assessing problems in the kinds of lower level skills that are often problematic for students with learning disabilities (e.g., problems in spelling, word choice, or sentence construction). It also is critical to identify problems in students' self-regulated approaches to writing tasks and in the metacognitive knowledge and motivational beliefs that can either support and/or undermine writing performance (Butler & Winne, 1995; Campione, Brown, & O'Connell, 1988; Harris & Graham, 1996; Zimmerman, 1995).

To highlight the importance of explicit instruction in writing processes for post-secondary students with learning disabilities, this paper summarizes two types of evidence. Both types were derived from a set of 7 studies conducted to evaluate the efficacy of the SCL instructional model across a range of tasks. Of the ninety students who participated across the 7 studies, 24 selected to work on writing, and the data summarized in this paper describe the performance of these 24 writing students (see Butler, 1999 for a parallel paper describing the problems experienced by the complete group of 90 students). First, the kinds of problems in self-regulated writing that were experienced by students prior to

intervention will be described. Second, evidence will be summarized showing that SCL resulted in substantial gains for writing students across a variety of measures. Finally, implications for understanding and remediating students' writing difficulties will be discussed.

## A Summary of SCL Research

To date, SCL has been adapted for use in the three most common service delivery models employed in post-secondary settings. In four studies, SCL was implemented as a model for individualized tutoring by learning specialists, counsellors, or teachers (see Butler, 1992, 1993, 1995, 1998-a, 1998-d). In another two studies, SCL served as a model for peer tutor training (see Butler, Poole, MacLeod, & Syer, 1997). The seventh study investigated SCL when adapted for use within small group discussions as part of a study skills course (see Butler, Poole, Elaschuk, Cuddy, & Novak, 1999). Across these studies, 19 students have received support targeting their performance of writing tasks. Fifteen of these students received individualized tutoring from learning specialists, counsellors, or teachers; four participated in the peer tutor studies. The group study focused on reading and studying, rather than writing tasks (so no students are included in these analyses from the 7th SCL study). In addition, across all 7 studies, pretest data have been collected from 28 additional students who did not participate in SCL interventions. Five of these students were assessed for writing performance. Thus, for the purposes of describing students' pretest writing problems, data from 24 participants were available. When summarizing outcomes associated with SCL intervention, data were available for 19.

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Insert Figure 2 about here

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In each study on SCL efficacy, a common research design was employed (see Figure 2). First, to trace the relationship between instructional activities and students' development of self-regulation, in-depth case study data were collected for each participant (Merriam, 1988; Yin, 1994). At the same time, multiple case studies were embedded within a pre-post design. During pre- and posttest sessions, parallel questionnaires, observations, and interviews were employed to measure common effects across students (see Butler, 1993, 1995, 1998-d).

Participants in all studies were students enrolled in colleges or universities. Psycho-educational assessments verified that students had learning disabilities (based on discrepancy definitions used at the various institutions), although students' specific learning disabilities affected different aspects of their performance. Writing participants were enrolled in a range of programs. Some students, enrolled at local colleges for academic upgrading, worked on developing high-school level writing skills (e.g., learning to write narrative or expository paragraphs). Other students, enrolled in vocational programs, completed more practical writing tasks (e.g., writing a proposal for funding, writing business letters). Finally, other students selected to work on academic writing assignments typically found in university settings (e.g., writing essays for 1st year University courses).

In postsecondary settings, SCL instruction has been 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 (here we focus on students who chose writing), and the assignments addressed were drawn from individuals' programs of study. At each meeting, students priorized assignments based on current course requirements, and SCL tutors provided calibrated assistance as students self-regulated completion of those tasks. Instructors (or tutors) met individually with students roughly two to

three times per week (for two to four hours per week) over the course of at least a single semester. Information on writing participants' ages, gender, and, where applicable, participation in SCL interventions (i.e., number of intervention sessions, total time involved) is presented in Table 1.

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Insert Table 1 about here

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## Inefficiencies in Students' Self-Regulated Approaches to Writing

In this section, analyses of pretest data for the 24 writing students are summarized to characterize inefficiencies in students' self-regulated approaches to writing. At pretest, data on students' metacognitive knowledge, motivational beliefs, emotional responses, and self-regulated approaches were gathered using a variety of complementary strategies. An overview of data collection strategies is provided below (detailed descriptions are available elsewhere; see Butler 1993, 1995, 1998-d).

Metacognitive Knowledge. Students' metacognitive knowledge about writing was assessed in three ways: (1) using a Metacognitive Questionnaire (adapted from Graham & Harris, 1989; Wong, Wong, & Blenkinsop, 1989, see Butler, 1995), (2) within a Strategy Interview, and (3) during observations of students' completion of writing tasks (see below). For the questionnaire and interview measures, common criteria were used to evaluate students' metacognitive understandings across four dimensions: (a) task description (students' conceptions of writing tasks), (b) strategy description (the clarity of students' descriptions of writing strategies), (c) strategy focus (the degree to which described strategies were focused, personalized, and *connected to task demands*), and (d) monitoring (students' descriptions of how they self-evaluate progress and manage writing activities accordingly). Scores were also generated for two additional metacognitive dimensions when students spontaneously made comments relevant to them (since questions on both measures were open enough to allow for comments in these areas, but did not target them specifically). These additional dimensions were (e) expressed confidence and (f) volition control (knowledge of emotional or motivation challenges and of possible volition control strategies) (see MacLeod, Butler, & Syer, 1996; Butler, 1998-d for details regarding scoring criteria).

Self-Efficacy. In each study, multiple questionnaires were used to assess students' perceptions of self-efficacy (note that the scales included within some questionnaires differed across studies). The Self-Efficacy Questionnaire (adapted from Graham & Harris, 1989; Wong et al., 1989, see Butler, 1995, 1998-d) contained scales that assessed students': (1) perceptions of general self-efficacy (e.g., "I am a self-reliant person"); (2) confidence in their ability to complete task-specific writing skills (e.g., the ability to organize ideas while writing); (3) self-perceptions of competence on task-specific writing skills (i.e., how easy or difficult they found organizing their ideas to be); and/or (4) preferences for a targeted task (e.g., how much they like writing). The Metacognitive Questionnaire contained one item that asked students to rate their writing ability. Finally, the Self-Efficacy Across Tasks Questionnaire asked students to rate (1) how much difficulty they experienced with writing; and (2) how much difficulty they experienced across a range of other academic tasks.

Attributions. Students' attributions for successful and unsuccessful writing performance were assessed using one questionnaire with two sections. Students were asked to think of "the last time" they were successful (or, in the next section, unsuccessful) at completing a writing task (like those selected for intervention), and to rate the relative importance of a number of factors to their level of performance:

ability, strategy use, effort, relying on others, the ability to seek help when needed, and luck (Groteluschen & Hale, 1990; Relich, Debus, & Walker, 1986; Schunk & Rice, 1986; Weiner, 1974).

Students' Self-Regulated Approaches to Tasks. Students' self-regulated approaches to writing were assessed during pretest interviews and initial intervention sessions. During the pretest strategy interview, students were asked to start working on a writing assignment (drawn from their coursework) "as they normally would" and to think-aloud in the process. Students' descriptions of their approaches to those tasks were transcribed, and their approaches to writing were documented. Similarly, during early intervention sessions, students were initially observed completing writing tasks without assistance in order to gauge students' problem areas and build on their current approaches to writing. All interactions were tape recorded, traces of students' performance were collected (e.g., notes, outlines, drafts), field notes were maintained to document instructors' observations, and students' verbal descriptions of strategies were transcribed verbatim.

For the purposes of this paper, these data were systematically analyzed. To begin, a table was constructed for each study that listed each student's data in a separate row. The first column of the table included the student's name. The second column included a set of codes designed to cue researchers to look systematically in five areas while reviewing students' files. These areas matched the dimensions scored in the metacognitive measures and included (1) task analysis and understanding, (2) strategy understanding and implementation, (3) monitoring, (4) motivational beliefs, and (5) emotions and volition control. Next, one researcher examined responses to the metacognitive questionnaires, transcripts of strategy interviews, field notes, students' strategy records, and traces of students' strategy use to identify problem areas experienced by students as they self-regulated their writing performance. She recorded a general description of each area of difficulty in one column, and then used the next column to record the specific evidence on which the problem description was based (e.g., a specific quote from a field note or an excerpt from a questionnaire). Next, a second researcher independently added another column to the table that cross-referenced quantitative scores on the metacognitive questionnaire and strategy interview to the description of problems derived from the qualitative review of the data. This researcher also carefully examined each student's file to double check and flesh out the first researcher's entries, considering all dimensions of self-regulated processing, but with particular attention to dimensions on which students received low scores on the quantitative metacognitive measures. This combination of approaches was used to insure that the qualitative summary of students' problems in self-regulated processing was reliable, valid, and comprehensive. Finally, a third researcher reviewed and categorized the data from the summary tables to characterize the types of difficulties students experienced within each of the five general areas.

## Results

Mean scores and standard deviations from pretest questionnaires and interviews are presented in Table 2. More specific analyses focused on each aspect of students' self-regulated performance are described in more detail below.

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Insert Table 2 about here

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Motivational Beliefs: Self-Efficacy and Attributions

Self-Efficacy. In order to uncover the qualities of students' perceptions of self-efficacy, distributions of students' mean scores were examined. Note that students' subscale scores generally represented an average rating across 6 to 10 items per scale. (The one exception was students' ability ratings, which were assessed with just one item on the metacognitive questionnaire). For each scale, responses were scored on a scale from 1 to 5, where 5 represented the most positive feelings of self-efficacy (e.g., "very confident", "not a problem", "very good ability") and scores of 3 generally represented an average rating (e.g., "somewhat confident", "somewhat of a problem", or "average ability").

Figure 3 graphically presents the distribution of individuals' scores. Note that, for this measure, we used conservative criteria for categorizing students' data as reflecting high or low self-efficacy. Positive perceptions of self-efficacy were associated with means of 3.25 or above. This cut-off was selected based on a comparison with data from another study wherein a sample of 186 1st- and 2nd-year undergraduate students completed the confidence and self-perceptions subscales from the Self-Efficacy Questionnaire for Reading and Studying (see Poole & Butler, 1999; Poole, 1999). In that study, the mean score across students (on the two scales combined) was 3.28 (SD = .62). In contrast, we judged self-efficacy to be low if mean scores were 2.50 or below (given the qualitative meaning of the scores). To illustrate that many students had even more serious problems with self-efficacy, in Figure 3 we also present the percentage of students whose *average* scores on each scale were less than or equal to 2.00.

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Insert Figure 3 about here

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Interpretation of Figure 3 suggests that relatively few of the writing students experienced low general self-efficacy (54% of students had mean scores greater than 3.25; only 7% had scores less than 2.5). Many participants also reported liking writing, even though they presumably found writing difficult (as evidenced by their selection of writing for intervention). Sixty percent of students gave mean preference ratings that were 3.25 or greater, although 20% of students' means were 2.0 or below. Interestingly, 40% of students expressed considerable confidence in their ability to complete task-specific requirements (e.g., organizing ideas while writing, constructing clear sentences). This differed from the pattern observed across the entire sample of 90 SCL students who worked across a variety of tasks (suggesting that writing students expressed more confidence that SCL participants did overall). In contrast, similar to their counterparts working on other tasks, writing students rated their writing ability as below or very below average (46% gave ratings of 2.0 or below). Similarly, 30% of students indicated that they found task-specific requirements to be difficult (mean ratings on the self-perceptions scale of 2.5 or below), while only 15% of students rated the ease of completing task requirements in the same range as a normative sample of peers (i.e., mean ratings of 3.25 or above). Finally, on the Self-Efficacy across Tasks measure, 42% of students suggested they had considerable difficulty with writing tasks, and 47% rated themselves as having significant difficulties across a range of academic tasks (mean ratings of 2.5 or below on the latter two subscales).

In sum, it was encouraging to find that many postsecondary students with learning disabilities had solid general perceptions of self-efficacy and expressed confidence in their ability to meet task requirements when writing. However, many students also found writing processes to be difficult and

self-evaluated their writing performance as problematic. Given that students had selected writing for intervention, these self-judgments may well have been realistic. At the same time, negative self-perceptions of competence have the potential to interfere with effective writing performance (Bandura, 1993; Paris & Byrnes, 1989; Schunk, 1994; Zimmerman, 1995). Thus, these data suggest that instructional interventions should help students build fluency with writing processes and recognize performance improvements associated with strategy use (to build self-perceptions of competence).

Attributions. At pretest, students rated the importance of 6 factors (on a scale from 1 to 5) for successful and unsuccessful writing performance, respectively. These factors were ability, effort, strategy use, availability of help from others when needed (i.e., strategic help-seeking), dependence on others, and luck. Across all studies, students' ratings were highly variable. This variability is reflected in the large standard deviations reported in Table 2. They are also apparent in Figures 4 and 5, which depict the distribution of students' attributional ratings for successful and unsuccessful writing performance. For the purposes of characterizing students' beliefs about causal influences related to writing, students' ratings were clustered to reflect students' perceptions of whether each factor was of low importance (ratings of 1 or 2), some importance (ratings of 3), or high importance (ratings of 4 or 5).

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Insert Figures 4 & 5 about here

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One clear trend in these data is that postsecondary students with learning disabilities are not likely to credit ability for successful performance (only 9% of writing students rated ability as an important causal factor when doing well, while 55% rated ability as of little or no importance). In contrast, 72% of students attributed at least some importance to low ability when they did not do well (with 45% of those giving ratings greater than or equal to 4). This pattern is consistent with previous research showing that students with learning disabilities possess unproductive attributional patterns (see Borkowski, 1992; Bryan, 1998; Paris & Byrnes, 1989). This pattern also suggests that changing students' perceptions of their low writing ability may require intensive intervention (i.e., to change attributional patterns that reinforce students' construction of low ability perceptions) (Borkowski, Weyhing, & Carr, 1988; Groteluschen & Hale, 1990; Paris & Byrnes, 1989).

Most participants recognized the contributions of effort to doing well (70% credited effort for successful performance). In contrast, only 27% felt that low effort was an important causal factor when they did not succeed. This suggests that most students felt that exerting effort did help improve performance, but that effort alone was insufficient to ensure success. In other words, most students did not consider their lack of success a result of failure to try. In contrast, students generally recognized the importance of strategy use for successful performance (82% attributed some to a great deal of importance to strategy use, with 36% of students giving ratings of 4 or above). Similarly, 59% attributed poor performance to a lack of effective task approach strategies. This pattern suggests that, when judging causes for unsuccessful performance, students often felt they were trying (so that low effort was not the problem), but recognized that they lacked effective strategic approaches (i.e., ideas for how to profitably direct effort). This pattern indicates that most students possessed important metacognitive knowledge about the importance of effortful strategy use to success when writing. This finding is perhaps not surprising, however, given that these students had self-selected themselves for inclusion in a project focused on promoting strategy development.

Finally, adult students with learning disabilities appeared unlikely to attribute either successful or unsuccessful writing performance to luck. However, the majority of writing students felt that their success was dependent on the assistance of others. Eighty-two percent of writing students rated opportunities to seek help when needed as at least somewhat important to successful performance (i.e., ratings of 3 and above), and 50% rated help-seeking as highly important (i.e., ratings of 4 and above). Further, 72% of writing students felt some dependence on others for success (i.e., ratings of 3 or above). In contrast, across the entire sample of 90 students in SCL studies, 59% of students rated opportunities to seek help as at least somewhat important for successful performance (i.e., ratings of 3 or greater). Thus, as a subset of the entire group, writing students appeared to depend more on obtaining help in order to succeed.

## Metacognitive Knowledge

Students' responses to the metacognitive questionnaire were scored on a scale from 0 to 3, where scores of 0 or 1 reflected no or clearly deficient metacognitive understandings, scores of 2 reflected some degree of metacognitive knowledge, and scores of 3 reflected articulated and complete metacognitive descriptions. Mean scores on all of the metacognitive dimensions are presented in Table 2. The distribution of students scores for four dimensions are represented in Figure 6 (the n's were too small for the confidence and emotion/volition control dimensions to be depicted meaningfully).

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Insert Figure 6 about here

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When examining the distributions of scores for the entire sample across studies (N = 90), it was clear that a significant number of students had deficient metacognitive understandings on the task definition, strategy description, strategy focus, and monitoring dimensions (38%, 32%, 41%, and 18% of students received scores of 0 or 1 on these dimensions, respectively). In contrast, when data from the 24 writing students were examined separately, the majority of students appeared to have at least some metacognitive knowledge in each area. Only 27%, 19%, 19%, and 5% received scores of 0 or 1 for the same four dimensions, respectively. At the same time, very few writing students received ratings of 3 on any of the four dimensions (5%, 18%, 5%, and 5%, respectively). These data suggest that post-secondary students with learning disabilities are not self-regulating "blank slates" (Butler & Winne, 1995). For example, 82% of students could provide some reasonable descriptions of strategic approaches (scores of 2 or 3). At the same time, these data suggest that students do not possess sufficiently specific metacognitive knowledge to self-direct writing performance. For example, most students had difficulty articulating the requirements of writing tasks (i.e., 27% with scores of 0 or 1, and only 5% with scores of 3). This finding is significant given the importance of task analysis to effective self-regulation.

Only a subset of writing students mentioned their level of confidence and/or motivational or emotional challenges in their responses to the Metacognitive Questionnaire (see Table 2). This renders these data difficult to interpret. However, it does appear that, when students elected to describe emotional responses to tasks, they were clearly experiencing difficulties. Of the 5 writing students who described experiencing motivational or emotional challenges, 4 appeared to have poor metacognitive awareness of possible volition control strategies. This is consistent with the pattern in the larger SCL

sample (of 90 students). In the entire sample, 28 students described emotional challenges when working on tasks, and 86% of those students failed to describe emotion or motivation control strategies. In other words, these students were likely to express difficulties sustaining motivation or handling frustration, stress, or anxiety, but without corresponding descriptions of how they might handle those challenges.

Self-Regulated Processes

Table 3 presents an overview of results from the qualitative analyses of students' pretest approaches to tasks. Concurrent analyses of interview, questionnaire, and observational data suggested that postsecondary students with learning disabilities have difficulty across all of the cognitive activities central to self-regulation (see Figure 1). Of the five key components listed in Table 3 (task analysis, strategy use, monitoring, confidence, and emotions/volition control), every student had difficulty with at least one component, and the majority of students had problems in 2 to 4 areas (the mean number of areas in which students experienced difficulty was 2.79; SD = .88).

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Insert Table 3 about here

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Task Analysis. It was argued earlier that task analysis is a key process in self-regulated learning because students self-direct learning efforts based on their perceptions of task demands. It is therefore notable that 19 (79%) of the 24 writing students experienced difficulties with task analysis (see Table 3). In early sessions, 11 students (46%) described task demands in limited, vague, or inaccurate terms. For example, one student described her purpose when writing as to "improve sentence structure and spelling". Another explained: "Writing is expressing feelings, thoughts, expressions on paper". A third explained that writing research papers is about "reading notes and organization of the paper [sic]". Consistent with prior research (see Butler, 1998-c; Campione et al., 1988; Englert, 1990; Wong, 1991), these data suggest that a majority of students possessed inadequate or inaccurate metacognitive knowledge about writing tasks.

Further, 11 students (46%) either failed to attend to explicit assignment directions and/or had difficulty interpreting their meaning. For example, one student (Hope) was observed to write a paragraph based on the game 20 questions when her task was to write a narrative paragraph. Before writing, she failed to read the instruction booklet that explained what a narrative paragraph was. Another student (Nancy) wrote a chronological description of her observations at a daycare, although she had been asked to write a targeted response to a series of particular questions (based on her observations). She had read her two-page, detailed assignment sheet once before she went to the daycare, but then failed to return to the instructions again prior to completing her assignment.

Monitoring. Only 3 students (13%) approached writing tasks with little evidence of self-monitoring (i.e., comparing progress to specified criteria or goals). However, students commonly had difficulty defining criteria for self-evaluation (10 students, or 42%). Five students explicitly stated that they relied on others to let them know when they had done a good job. Consistent with the attributional data (where students often attributed success to help from others), these writing students described seeking assistance for checking their work. For example, one student noted: "I write OK as long as I am able to do a few rough drafts and have somebody go over them with me". Another said that, while writing, she wonders "how much of my essay will my boyfriend need to correct". A third student explained that, when writing "I ... try to get as much done as I can and then he'll [her tutor] just correct

it from there." Another student said "[I do] the best to my ability ... but it's hard without a proofreader." Several students (13%) expressed concern about their abilities to judge how well they were doing while writing. For example, one student stated "Sometimes I don't know if I am writing down the things that have to do with the topic".

Clearly, task analysis and monitoring are interdependent activities and students' ability to set criteria for monitoring is dependent on adequate knowledge about tasks. Thus, not surprisingly, in this study 9 students (38%) had deficiencies in task analysis *and* problems with monitoring. Further, an important finding was that 21 out of the 24 students (88%) experienced difficulties in one or both of these areas. Thus, these data suggest that a major problem for postsecondary students with learning disabilities is in efficiently orchestrating their writing activities based on a clear understanding of task demands. How can students self-regulate their performance efficiently if they misperceive task requirements and/or are not certain of criteria for generating judgments about progress (and therefore for adjusting writing efforts adaptively)?

Strategy Use. Overall, 15 students (63%) had difficulty describing and/or implementing focused and effective strategies for completing targeted tasks. Fifty-eight percent of students identified strategies that were vague, limited, or ineffective (during interviews or when working on tasks in early intervention sessions). Examples of these students' strategy descriptions included "I write my thoughts as they flow through my mind, in sentences (for writing)" When asked what goes on in her head when writing, one student responded: "I'd love to know...everything in my head for the essay. I write down my point and at the end I have a mess."

Out of these 15 students, 8 described problem areas and/or what they wanted to achieve but recognized that their strategies were not effective (consistent with the attributional data). For example, one student said directly, "I still have a little trouble writing essays because I don't use the right method". Another described her writing as "very below average... because I haven't learned how yet." A third recognized that he needed to "learn a technique that will make [me] a better writer". Sometimes these students suggested ideas for what they might try, but their solutions were hypothetical, not worked out, or non-specific. For example, one student recognized her difficulties: "I have lots of thoughts in my head, but when it comes to writing them down on paper, I forget. And it never comes down the same as what the thoughts in my head were." But, to be a better writer, she just explained that she needed "better memory of my thoughts, style of writing, clear flowing sentences". This showed that she had some sense of desirable outcomes, but was unclear on how to achieve them. Finally, 2 students (8%) articulated potentially effective strategies, but were observed to implement them ineffectively.

Motivational Beliefs. In early discussions with students, 10 students (42%) expressed motivational beliefs (attributions or low perceptions of self-efficacy) that seemed to undermine their self-regulated learning. Eight of these students (a third of the writing group) either indicated that their confidence was low or described their task performance as very poor. For example, one student explained that her lack of confidence in her writing abilities led her to seek help from others for editing. Another said: "I really get down on myself and it's really hard turning out quality stuff". Other students explicitly attributed performance problems to low ability. For example, one student's explanation for her poor performance was: "I'm no good at putting things in my own words ... I try to get organized but I can't". Overall, 4 students explicitly described attributions for poor performance that could undermine their strategic approaches to tasks.

Emotions and Volition Control. In early sessions, 8 students (33%) described experiencing unpleasant emotional reactions while working through tasks, particularly frustration (5 students) or worry, stress, anxiety, or panic (3 students). Of these students, 7 students described emotional reactions (particularly frustration) as arising from difficulties they experienced when completing tasks. For example, one student paused while writing to observe: "This is really frustrating for me because this is where I have blockage and focusing my ideas [sic]". Several students also described ways in which negative emotions (particularly worry, stress, anxiety, or panic) interfered with their ability to complete tasks. For example, one student described how he worries too much and that sometimes "stress gets overbearing". As a result, he finds it hard to "get motivated" and he "gets easily discouraged". Another explained: "I had to write a researched 500 word ... essay [ for a scholarship application]... I couldn't organize it at all. I couldn't get any organization flow going. I kept jumping from point to point. So I got frustrated with it and didn't apply." A third student described how she panics, gets stressed, and experiences anxiety so that all her thoughts "speed in her head" and she loses focus on the task. As in the case of this latter student, two students reported having difficulties maintaining concentration or focus while working on writing tasks (8%). Two students (8%) also reported difficulties with procrastination. None of these latter four students could describe strategic approaches that helped them manage their concentration or motivation.

Case Study Examples

These qualitative analyses clearly suggest that postsecondary students with learning disabilities experience a range of difficulties that interfere with their successful completion of writing tasks. Further, it should be noted that these various difficulties were not independent. Problems in task analysis were linked with difficulties with monitoring. Students' lack of confidence and emotional reactions arose from a lack of academic success and in turn served to undermine further achievement. To illustrate the interconnectedness among these aspects of self-regulated processing, integrated descriptions of two students' difficulties are provided below.

Jennifer[1]. Jennifer was an 18 year-old 1st year university student who participated in the first SCL study. In early intervention sessions, Jennifer described how she writes: "Not very well, unorganized, choppy would be the best way to describe it". She recognized that her writing wasn't organized and jumped from point to point, and that she wanted to create a good "flow". But she also recognized that her current strategies weren't working ("I write down my point and in the end I have a mess"). She was the student (described above) who became so frustrated while trying to write that she often abandoned the task (e.g., she didn't submit a scholarship application). Although she had learned about some writing strategies in secondary school, she did not know how to use them effectively. For example, she complained that she had been told repeatedly to make "outlines", but that she did not like making outlines and did not see how they helped.

Brent. Brent was a 28 year old student taking Grade 11 and 12 level upgrading courses at a local college in order to obtain a high school equivalency degree. Brent's task was to learn how to write narrative, expository, and descriptive paragraphs. In early sessions, it was clear that Brent had considerable difficulty interpreting the writing assignments he was given (e.g., a three or four sentence description of a topic taken from sample high school equivalency exams). As a result, he often wrote paragraphs that did not address the central points asked for in writing assignments. Brent's understanding of criteria for effective writing also was limited, as were the writing strategies he used as a result. For example, Brent rigidly expected every paragraph to have a topic sentence, three main points, and a conclusion that repeated the first sentence. He mechanically and rigidly structured all of his

paragraphs accordingly, regardless of theme, the question asked, or the kind of paragraph he was expected to write. Taken together, his problems in task analysis and limited conceptions about writing undermined Brent's ability to write focused paragraphs that addressed an assigned theme at a conceptual level (although his paragraphs always were very organized). Brent also had considerable difficulties with some of the mechanics of writing, especially spelling. Brent had little difficulty with motivation or procrastination. He worked hard to produce multiple drafts of each paragraph. However, because the criteria he used for judging the quality of each draft were limited (i.e., to editing mechanical errors and making sure "three points" were represented), and because he had difficulty identifying mechanical errors, his modifications to paragraphs were not generally effective.

## Remediating Students' Writing Difficulties: The SCL Approach

Given the range of difficulties experienced by adult students with learning disabilities, promoting more "efficient" approaches to writing clearly requires supporting students to (1) engage effectively in the complete cycle of cognitive activities central to self-regulation while writing, including task analysis, strategy selection and implementation, and monitoring (see Figure 1); (2) construct metacognitive knowledge about writing tasks, writing strategies, and themselves as writers, as well as motivational beliefs supportive of self-regulation, and (3) develop volition control strategies to manage potentially intrusive emotions and/or distractions (Butler & Winne, 1995; Corno, 1994; Groteluschen, Borkowski, & Hale, 1990; Harris & Graham, 1996; Pressley & Associates, 1992; Schunk, 1996; Zimmerman, 1995)

The SCL instruction model was designed to achieve these objectives (Butler, 1993, 1995, 1998). To promote students' flexible self-regulation of writing activities, in SCL students are provided with calibrated assistance to engage in each of the cognitive processes central to self-regulation in the context of meaningful work (Palincsar & Klenk, 1992). This support is provided within interactive discussions focused alternately on task completion (e.g., generating ideas while writing) and on the process of completing the task (e.g., whether a particular writing strategy is working) (see Butler, 1998-e; Kamann & Butler, 1996). To support students' construction of metacognitive knowledge, students are asked to articulate emerging understandings about learning (i.e., about tasks, strategies, monitoring, their learning strengths and preferences as well as the challenges they face as learners, the link between strategy use and outcomes) (Butler, 1998-b; Paris & Byrnes, 1989; Wong, 1994). Students' development of positive motivational beliefs is supported by building from what students already do well, so as to emphasize competencies (not just problems), and by directing students' attention to the connection between effortful strategy use and improvements in task performance, thereby bolstering confidence and students' attributions for success to the effortful use of strategies (Reid & Borkowski, 1987; Schunk, 1994; Schunk & Cox, 1986). Finally, when students are confident, possess an enhanced repertoire of cognitive, metacognitive, and volition control strategies, and are actually more successful, they are also less likely to experience levels of frustration, stress, or anxiety that interfere with their completion of tasks.

### SCL in Post Secondary Settings: An Overview

Recall that, to date, SCL instruction has been provided as an adjunct to regular classroom instruction in postsecondary settings. In the individualized tutoring and peer tutor studies, students chose tasks to work on and then brought assignments to sessions, and instruction was provided in the context of that meaningful work. In each of these SCL applications, instructors guided students to self-regulate performance adaptively, flexibly, and reflectively.

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 writing tasks, the instructor supported the student to scrutinize assignment instructions and/or writing exemplars to abstract more accurate conceptions. Next, instructors supported students to select, adapt, or even invent strategies in light of task goals. A central characteristic of the SCL model is that, instead of teaching pre-identified strategies as the starting point for instruction, instructors assist students to problem-solve strategies building from strategies they already know and a clear understanding of task requirements. So, for example, a student (like Jennifer) who recognized that her writing needed to be more organized would be assisted to identify strategies (e.g., for preplanning) that might improve her organization. Thus, in these studies, students were initially supported to evaluate known strategies in light of what they were trying to achieve. This sometimes entailed asking students to implement their current strategies, monitor outcomes associated with strategy use, and maintain, revise, or replace strategies based on discrepancies between progress and goals. In cases where 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' writing performance and supported their cognitive processing "on-line". 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 criteria set the standards against which progress towards learning goals was judged. Thus, within each intervention session, students were assisted to diagnose problems (cognitive, motivational, or volitional), to build on what they already did well, and to revise strategies that were not working. Over 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 build not only better task-specific strategies, but also metacognitive and volitional strategies for managing learning activities.

## A Summary of Outcomes

This section provides a summary of outcomes for the 19 writing students who participated in SCL interventions. In general (across studies and tasks), SCL intervention has been associated with improvements in students' task performance, metacognitive knowledge about tasks, strategies, and self-monitoring, perceptions of self-efficacy, and patterns of attributions. Students have developed personalized strategies that address their individual needs. Students also have been observed to take an active role in strategy development and to transfer strategic performance across contexts and across tasks (see Butler, 1993, 1995, 1998-d; Butler et al., 1999).

A summary of findings related to changes in metacognitive knowledge and motivational beliefs for writing students is presented in Table 2. The table presents pretest data across all 24 writing students (including students in the control condition), posttest means for students who participated in interventions ($n$ = 19), and a summary of pre-posttest comparisons on a series of quantitative measures (i.e., measures of metacognitive knowledge, self-efficacy, attributions, and task performance). These results show, first, that students' writing improved between pre- and posttest in terms of thematic salience, organization, sentence to sentence flow of ideas, and clarity (effect sizes ranging from .82 to 1.63). This suggests that participation in SCL interventions could be associated with improvements in the quality of students' writing.

Second, improvements were found in students' metacognitive knowledge related to key self-regulated processes. Specifically, students made substantial gains on the task description, strategy description, strategy focus, and monitoring dimensions (effect sizes ranging from .61 to .70). (Note that sufficient within-subject data were not available to complete similar analyses on the confidence and action control dimensions). Recall that at pretest, only 5%, 18%, 5%, and 5% of students provided articulated and complete metacognitive descriptions (and so received scores of 3) on the task description, strategy description, strategy focus, and monitoring dimensions, respectively. In contrast, at posttest, 17%, 61%, 56%, and 33% of students did so, on those same dimensions, respectively.

Third, although no statistically reliable improvements were noted for students' perceptions of general self-efficacy , task-specific confidence, and task-preference (the three scales where students had relatively positive perceptions at pretest), students did improve substantially in their self-perceptions of the ease/difficulty they experienced with task-specific skills, ratings of their writing competence, and in their estimations of their difficulties completing writing and other academic tasks (effect sizes ranging from .68 to 1.05). Recall that at pretest, 46% of students rated their writing ability as below average, 30% gave self-perception ratings suggesting that they found task-specific requirements to be difficult, 42% suggested they had considerable difficulty with writing tasks, and 47% rated themselves as having significant difficulties across a range of academic tasks. In contrast, at posttest, only 24%, 24%, 29%, and 21% of students gave similarly low ratings on the same set of measures, respectively.

Finally, no statistically reliable shifts were observed in students' attributions for unsuccessful performance. However, gains were observed in students' causal explanations for successful writing. Specifically, at posttest, students were more likely to attribute success to their writing ability (a marginally significant finding), effort, and strategy use. They were also less likely to attribute successful performance to help from others or luck (the latter was also a marginally significant finding). At pretest, only 9% of students rated writing ability as a factor highly important to success (ratings of 4 or 5), while, at posttest 44% of students rated writing ability as an important factor. At posttest, 95% of students rated effort as highly important, compared to 70% of students who rated effort as highly important at pretest. Finally, at posttest, 78% of students rated strategy use as highly important, compared to 36% who rated strategies as highly important at pretest. These shifts suggest that, when accounting for successful performance, SCL participants shifted their attributions from external (i.e., help, luck) to internal factors (i.e., positive perceptions of their ability, strategy use, and effort).

These results, coupled with observed gains in students' self-regulated processing described elsewhere (i.e., development of personalized strategies; transfer of strategy use across contexts; adaptation of strategies for use across tasks; see Butler, 1995, 1998-d; Butler et al., 1997) suggest that SCL instruction can be associated with significant gains across several types of outcomes. This is particularly notable given that these gains were achieved in a relatively short period of time by students with long-standing academic difficulties.

Case Study Example

Although these quantitative analyses provide a good summary of the outcomes observed across students, they do not provide a sense of how multiple, interrelated gains were achieved by individuals. Just as participants experienced a range of interdependent difficulties in their self-regulated approaches to tasks, so, too, did they experience gains that built on one another. To illustrate the interconnectedness among the gains students experienced, an integrated description of one student's progress is provided below.

Jennifer. Jennifer was the 18 year-old 1st year university student who participated in the first SCL study who wanted to write more organized and flowing essays but didn't like outlining, who became easily frustrated while writing, and who judged her writing abilities to be very poor. During intervention sessions, Jennifer and her tutor worked together on a subset of Jennifer's writing assignments. In that context, they co-constructed a pre-writing/writing strategy that involved making a series of progressively more detailed "plans" (Jennifer's terminology). First, Jennifer decided she should make a general plan for what she wanted to say (so that she could be more organized in advance). She accomplished this by writing down her topic and making a list of the main points that she wanted to address. Then, in a series of more detailed plans, she elaborated on her points, reordered them so that they made sense, and ultimately converted them into sentences that "flowed" one to the other. When she was satisfied with the content and flow, she simply reformatted the document to produce her final essay (in text rather than outline-like form). Over time, Jennifer's writing performance improved, both on tasks completed with her tutor and on writing she did independently. Throughout the study (and at the end of the intervention), Jennifer frequently described how happy she was with her planning strategy (and reiterated how much she hated making outlines). Jennifer also described how she adapted her writing strategy for use on a different task: "It's helped me in my note taking too, just helped me pick out, like, because I'm so concentrating on flow, I can pick up on other people's flow now. So like, you know, the teacher's going on, I no longer write down like, scribbling madly about every single point he makes, but I can almost summarize and just ... my note-taking is better now." Her confidence also clearly increased as she observed her marks improving. As she explained: "And then just the marks are a lot different. That, I feel like, you know, like, when you're walking around the class and we're getting our essays back, my marks are average or above average. So I feel better about it. Like, I don't feel like I'm such a dunce."

## Conclusions and Implications

The data presented in this paper underline the importance of supporting the development of self-regulated learning by students with learning disabilities. Clearly students' lack of success in educational contexts derives not just from problems with basic academic skills such as decoding, spelling, or computation (though students often experience persistent problems in these areas; Adelman, O'Connell, Konrad, & Vogel, 1993; Adelman & Vogel, 1990; Vogel & Moran, 1982). Students' task performance also is clearly undermined by inadequate metacognitive knowledge, unproductive motivational beliefs, and inefficient approaches to tasks. Further, results from SCL research suggest that this point is applicable across a range of academic tasks (i.e., reading, writing, math; see Butler, 1999).

The findings presented in this paper also illuminate how and why students' approaches to writing are inefficient. An important finding is that the vast majority of students experience difficulties in deciphering the demands of writing tasks and/or establishing criteria for monitoring. Yet, effective self-regulation requires adaptively and flexibly selecting strategies that match task demands and then monitoring outcomes and adjusting strategies based on observed progress towards goals (Swanson, 1990). Students who misperceive task demands and lack productive criteria for judging performance are not in a position to self-direct writing efforts effectively (Butler & Winne, 1995), regardless of how much effort is expended in implementing strategies. Thus, assisting students to write effectively requires supporting them to construct metacognitive knowledge about writing and, relatedly, criteria for judging progress. At the same time, students also need to learn the importance of analyzing tasks and to develop strategies for interpreting assignments.

Results reported in this paper also suggest that students need support to help them develop better strategic approaches, both for completing writing tasks and for managing learning activities. Students

need to learn how to focus strategic efforts flexibly based on fluctuating task demands (Swanson, 1990). Results also underline the interconnectedness between cognition, motivation, and volition. Supporting self-regulation requires attending to students' development of positive motivational beliefs, helping prevent potentially debilitating emotions that can be associated with low-confidence and a lack of success, and supporting students to develop volition control strategies to manage motivation and emotions (Corno, 1993, 1994).

Finally, results also suggest that SCL instruction has the potential to remediate students' ineffective approaches to writing. These findings are important in two respects. Practically speaking, they suggest that SCL might be profitably used by practitioners to support the success of students with learning disabilities, at least in postsecondary settings. More generally, findings that students' writing can be enhanced by an intervention designed to promote self-regulation provides evidence for a causal connection between students' pretest learning inefficiencies and performance deficits. Coupled with the descriptive data documenting the types of problems students experience, outcome data reinforce the importance of assessing and remediating deficiencies in students' self-regulated approaches to writing. Instruction that explicitly supports students' self-regulated approaches to writing is needed to support students' academic success.

## Notes

[1] All names are fictional.

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Table 1. Overview of Writing Participants across Seven Studies (1993 to 1999).[1]

| Study | n | Age<br>Median (min-max) | Gender<br>Male | Gender<br>Female | Number of intervention sessions<br>Median (min-max) | Total time spent (hours)<br>Median (min-max) |
|---|---|---|---|---|---|---|
| Studies 1 to 4[2] | 15 | 28.00 (18 - 47) | 5 | 10 | 15.00 (4 - 31) | 14.50 (2.50 - 43.50) |
| Studies 5 and 6[3] | 4 | 33.50 (29 - 49) | 2 | 2 | 8.00 (2 - 14) | 10.88 (3.25 - 14.00) |
| INTERVENTION STUDENTS | 19 | 28.00 (18 - 49) | 7 | 12 | 14.00 (2 - 31) | 14.00 (2.50 - 43.50) |
| CONTROL STUDENTS | 5 | 27.00 (20 - 34) | 2 | 3 | n/a | n/a |
| TOTAL | 24 | 28.00 (18 - 49) | 9 | 15 | n/a | n/a |

[1] No writing students participated in Study #7, the Group Project.

[2] Individualized tutoring was provided by learning specialists, counsellors, or teachers;

[3] Individualized tutoring was provided by peer tutors.

Table 2. Scores from Questionnaires and Interviews at Pretest & Posttest

| Measure | Pretest Score | | | Posttest Score | | | Pre-post comparisons across studies | | |
|---|---|---|---|---|---|---|---|---|---|
| | n[1] | M | SD | n[1] | M | SD | t (df) | p <[2] | Effect Size[3] |
| Metacognitive Knowledge[4] | | | | | | | | | |
| Task description | 22 | 1.77 | .53 | 18 | 2.06 | .54 | -2.78 (15) | .01 | .70 |
| Strategy description | 22 | 1.86 | .89 | 18 | 2.56 | .62 | -2.82 (15) | .01 | .70 |
| Strategy focus | 22 | 1.73 | .77 | 18 | 2.50 | .62 | -2.55 (15) | .05 | .64 |
| Monitoring | 22 | 2.00 | .31 | 18 | 2.33 | .49 | -2.42 (15) | .05 | .61 |
| Overall (average) | 22 | 1.84 | .63 | 18 | 2.24 | .41 | -3.46 (15) | .01 | .86 |
| Confidence | 11 | 1.82 | .75 .48 | 13 | n/a | n/a | n/a | n/a | n/a |
| Action Control | 05 | 1.20 | | 8 | n/a | n/a | n/a | n/a | n/a |
| Self-Efficacy[5] | | | | | | | | | |
| Global self-efficacy | 15 | 3.58 | .75 | 10 | 3.63 | .78 | .20 (08) | n.s. | -.07 |
| Task specific confidence | 15 | 3.15 | .62 | 10 | 3.30 | .72 | -.87 (08) | n.s. | .29 |
| Perceived competence | 20 | 2.71 | .56 | 17 | 3.00 | .69 | -4.00 (15) | .01 | 1.00 |
| Task Preference | 05 | 3.33 | .98 | 07 | 3.33 | .94 | -.89 (06) | n.s. | .34 |
| Ability Rating | 22 | 2.64 | .80 | 17 | 2.88 | .80 | -2.74 (15) | .01 | .68 |
| On targeted task | 19 | 2.68 | .93 | 14 | 3.06 | 1.09 | -3.32 (12) | .01 | .92 |
| On other academic tasks | 19 | 2.42 | .74 | 14 | 2.95 | .80 | -3.79 (12) | .01 | 1.05 |
| Attributions[5] | | | | | | | | | |
| Successful Performance | | | | | | | | | |
| Ability | 22 | 2.36 | .90 | 18 | 2.94 | 1.29 | -1.71 (15) | .06 | .43 |
| Effort | 22 | 3.96 | 1.10 | 18 | 4.53 | .78 | -2.70 (15) | .01 | .67 |
| Strategy use | 22 | 3.23 | 1.10 | 18 | 4.11 | .90 | -2.93 (15) | .01 | .73 |
| Help available | 22 | 3.59 | 1.10 | 17 | 2.85 | 1.25 | 2.09 15) | .05 | .52 |
| Luck | 22 | 1.84 | 1.00 | 18 | 1.61 | .98 | 1.45 (15) | .10 | .36 |
| Depended on others | 14 | 3.21 | 1.50 | 11 | 3.05 | 1.27 | .58 (08) | n.s. | .19 |
| Unsuccessful Performance | | | | | | | | | |
| Ability | 22 | 3.48 | 1.30 | 18 | 3.36 | 1.37 | 1.05 (15) | n.s. | .26 |
| Effort | 22 | 2.48 | 1.40 | 18 | 2.64 | 1.63 | .77 (15) | n.s. | -.19 |
| Strategy use | 22 | 3.61 | 1.40 | 18 | 4.14 | 1.11 | -.49 (15) | n.s. | .12 |
| Help available | 22 | 3.16 | 1.30 | 18 | 2.86 | 1.63 | .00 (15) | n.s. | .00 |
| Luck | 22 | 1.30 | .60 | 18 | 1.42 | .97 | -.22 (15) | n.s. | -.06 |
| Depended on others | 15 | 2.57 | 1.30 | 11 | 2.95 | 1.71 | -1.00 (08) | n.s. | -.33 |
| Task Performance[5] | | | | | | | | | |
| Theme | 15 | 3.60 | .95 | 15 | 4.46 | .63 | -4.06 (14) | .01 | 1.05 |
| Organization | 15 | 3.56 | .59 | 15 | 4.29 | .54 | -6.29 (14) | .01 | 1.63 |
| Idea Flow | 15 | 3.31 | .58 | 15 | 3.81 | .72 | -3.49 (14) | .01 | .90 |
| Clarity | 15 | 3.29 | .60 | 15 | 3.84 | .62 | -3.19 (14) | .01 | .82 |
| Average | 15 | 3.44 | .51 | 15 | 4.10 | .48 | -6.19 (14) | .01 | 1.60 |

Notes: [1] scales included in questionnaires differed across studies, so that the n varies across scales; [2] one-tailed; [3] Effect size calculated using a pooled standard deviation based on correlated t-tests for intervention participants (excluding control participants), and where a limited amount of data was missing (so that the means on which effect sizes were derived differed slightly from those reported in this table); [4] on a scale from 1 to 3; [5] on a scale from 1 to 5.

Table 3. Qualitative Analysis of Students' Problems with Self-Regulated Processing.

| Component of Self-Regulation | n out of 24 | (%)[1] | Students' Areas of Difficulty | n [1] |
|---|---|---|---|---|
| Task Analysis | 19 | (79%) | • Describing task demands in limited, vague, or inaccurate terms | 11 (46%) |
| | | | • Failing to attend to assignment descriptions or difficulty interpreting assignments or problems | 11 (46%) |
| Monitoring | 12 | (50%) | • Problems in defining criteria for monitoring performance: articulating no or limited criteria (n = 2), relying on externally provided criteria (n = 5), or expressing uncertainty in terms of how to judge performance (n = 3) | 10 (42%) |
| | | | • Little or no evidence of engaging in monitoring | 3 (13%) |
| Strategy Use | 15 | (63%) | • Describing limited, vague, or ineffective strategies for completing tasks | 14 (58%) |
| | | | • Describing areas needing improvement, but having little idea of what to do about it | 8 (33%) |
| | | | • Problems implementing strategies that might be effective, if students knew how to use them | 2 (8%) |
| Motivational Beliefs | 10 | (42%) | • Evidence of low confidence, negative self-evaluations, or attributions to low ability | 8 (33%) |
| | | | • Other unproductive attributional patterns (e.g., external attributions) | 2 (8%) |
| Emotions and/or Volition Control | 11 | (46%) | • Expressing negative emotions (frustration, anxiety, worry, panic) that arise because of difficulties with the task | 7 (29%) |
| | | | • Expressing negative emotions (frustration, anxiety, worry, panic) that interfere with task performance | 3 (13%) |
| | | | • Problems with task avoidance or procrastination | 2 (8%) |
| | | | • Problems maintaining focus or concentration | 1 (4%) |

[1] Note that many students experienced more than one problem, both within and across these areas. The n's reported in this table identify all students who experienced the targeted problem, without accounting for overlaps (i.e., the same student could be counted more than once).

Figure 1. A simplified model of self-regulated learning.

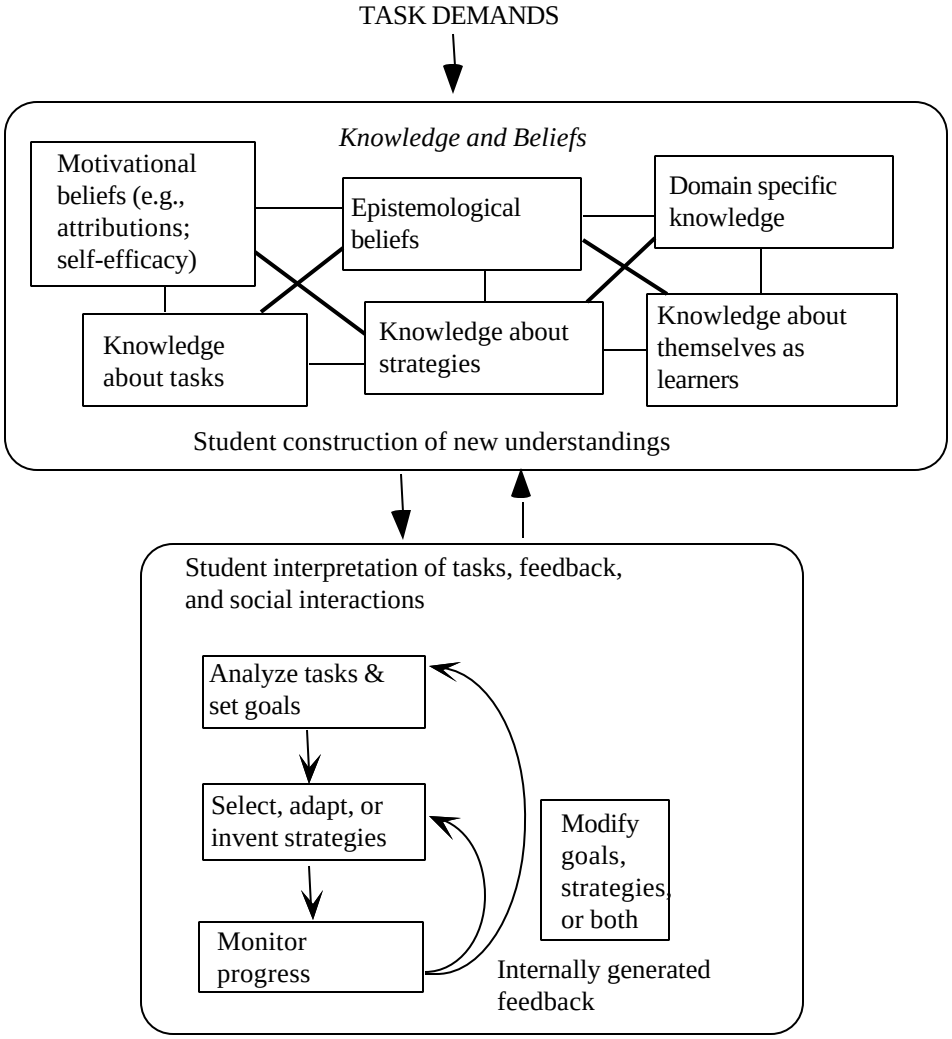

Figure 2. Study Design: Multiple Parallel Case Studies Across Studies

Each Case Study:

| Pretest | Intervention Period | Posttest |
|---|---|---|
| Questionnaires<br>Interview<br>Observations | Task Performance Records<br>Strategy Records<br>Field Notes & Audio Tapes | Questionnaires<br>Interviews<br>Observations |

| OUTCOMES |
|---|
| • Task Performance<br>• Metacognition<br>• Self-Efficacy<br>• Attributions<br>• Strategy Development<br>• Transfer of Strategy Use |

**Figure 3. Percentage of students whose mean scores fell below 2.00, below 2.50, or above 3.25 on the Self-Efficacy Scales.**

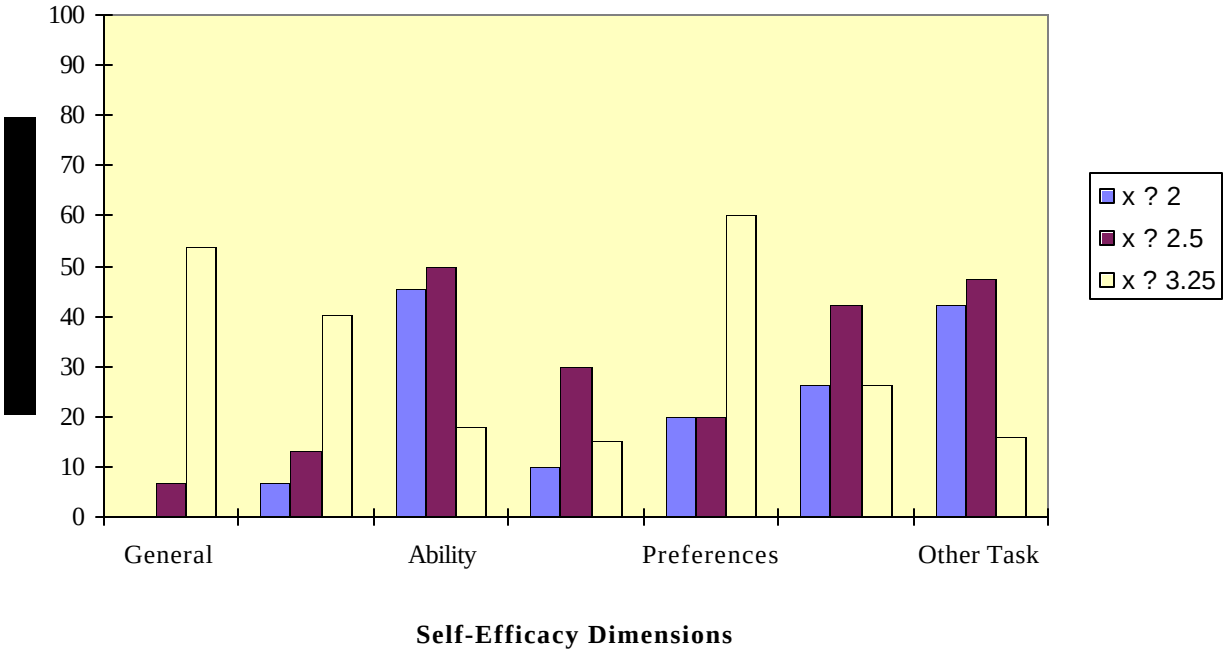


**Figure 4. Percentage of students with ratings below 2.00, at 3.00, or above 4.00 when judging causes of successful performance**

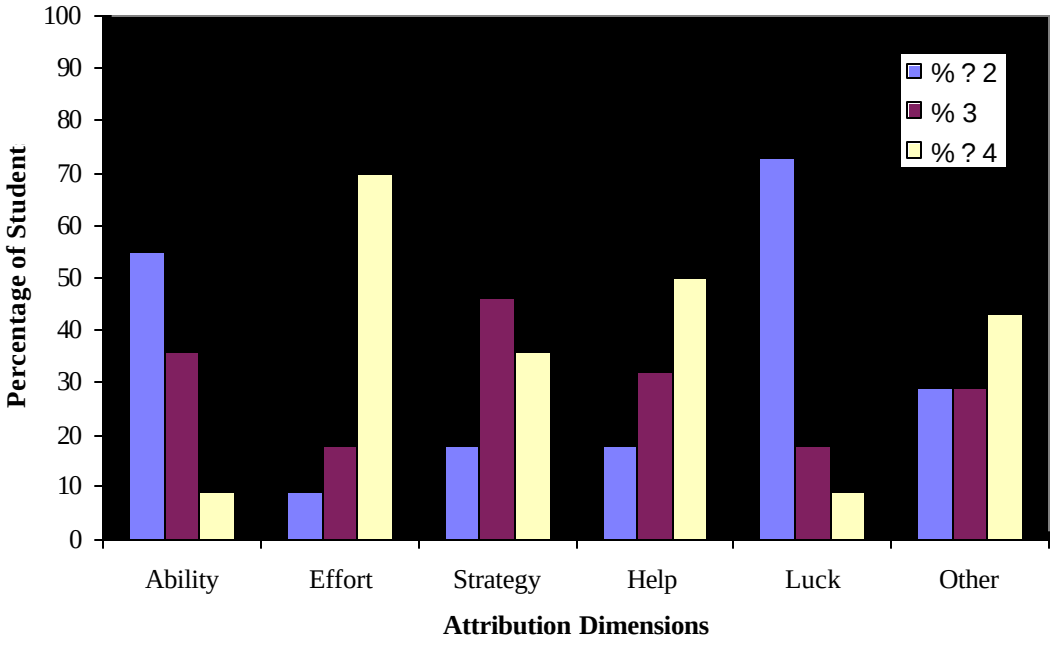

**Figure 5. Percentage of students with ratings below 2.00, at 3.00, or above 4.00 when judging causes of unsuccessful performance..**

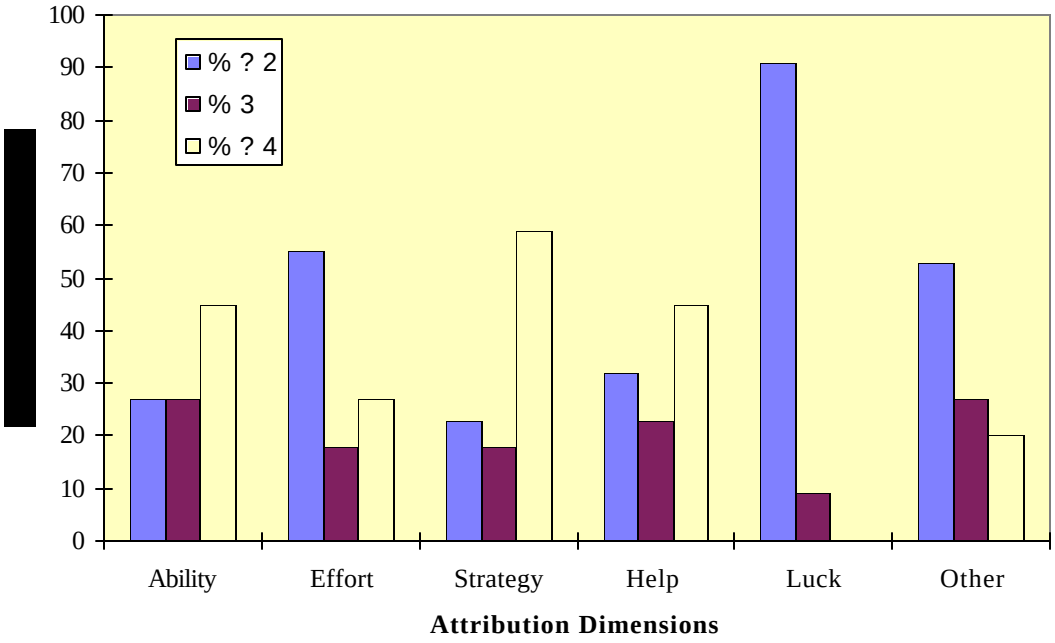


**Figure 6. Percentage of students with scores of 0.00 or 1.00, 2.00, or 3.00 on each of the metacognitive dimensions (all students).**