# EXPLORING TASK DEFINITION AS A FACET OF SELF-REGULATED LEARNING

by

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# Abstract

Task definition theoretically is one of the main components of self-regulated learning because one's representation of the task directs cognitive activities such as setting goals, creating plans, and enacting those plans to create task products. To date, little research has examined students' representations of tasks or how those representations change over time. In this dissertation I characterize students' initial representations of tasks and explore factors influencing how they refine these representations over time.

Fifty-eight undergraduate students taking an undergraduate instructional psychology course participated in a semester-long examination of how students constructed and refined their task understanding. The data source was a studying portfolio consisting of detailed descriptions about and reflections on strategic processes they used to complete two main writing assignments in the course: a think paper and a design project.

Analyses of these data suggest students' representations of tasks varied across two dimensions: breadth and depth. In terms of breadth, students selected information from the design project description of different grain sizes. Students with greater depth not only searched and selected information from the task, but they actively assembled elements of the task and monitored how those components fit with one another. Most students set goals and created plans; however, not all goals or plans were framed in light of criteria that would theoretically foster self-regulated learning.

To revise task understanding, students metacognitively monitored their processes

and outcomes of learning activities, which updated information about task, cognitive, and motivational conditions. This additional information afforded students opportunity to reassess the discrepancy between the initial state and the goal state to determine next steps to reach task goals. Although students may have recognized the need to change their approaches, they often failed to engage in effective metacognitive control to adapt approaches to learning. I interpret this to indicate that control processes require not only the skill for enacting these processes but also the motivational catalyst to sustain these efforts when competing factors are present. Future research should strive to create new measures for task understanding, and to track how students' perceptions and representations of tasks influence self-regulated learning and achievement.

# Dedication

For My Dad who would have loved to see me finish this Degree,

To my Mom who is happy to know that I am finally finished, and

To Russell who has patiently been by my side for all of my Degrees waiting for me to finally say I'm Done!!

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# Chapter 1: Introduction and Rationale

Tasks such as writing essays, exams, or other learning activities such as group discussions are commonly used and central characteristics of instruction (Ames, 1992). The purpose and scope of classroom tasks vary depending on the instructor's purposes for teaching and the nature of the course content. Tasks allow an instructor to assess students' progress in learning the course content; they involve students more directly by asking them to actively process new information, and they provide an opportunity for students to indicate what new knowledge or skills they have acquired (Winne & Marx, 1989). Tasks are problem spaces that should be designed to challenge students to think about and process new content in meaningful and engaging ways. In turn, students are expected to identify and cognitively represent the task so they can enact activities and create products that demonstrate they have acquired new content.

Instructors strive to support students' learning by designing tasks that lead to specific learning outcomes. At the simplest level of analysis, when instructors design tasks they want students either to remember information or to be able to transfer (apply) that information in novel contexts (Anderson & Krathwohl, 2001; Mayer, 1998). Tasks' designs and outcomes vary in complexity and difficulty, ranging from simple, well structured, or convergent tasks to situated, ill-defined, or divergent tasks (Jonassen, Tessmer & Hannum, 1999). For example, students taking a course in Instructional Psychology may be given a well-structured task such as reading through a research article to find the main research questions and findings for a study.

However, they may also be given an ill-defined task such as taking the same research article and generating ideas about the implications of the article for understanding learning or instruction. Each task poses different cognitive demands and may challenge students in different ways.

There is limited time in class. Instructors do not necessarily go over all of the assignment details to make sure students know what they are supposed to do. This means that students are left largely on their own to determine what they should do for an assignment. Pintrich, Marx, and Boyle (1993) state

> given classroom tasks are often not clearly defined, students must often define the tasks for themselves, providing their own goals and structure. Therefore, students may not perceive tasks in the same way that teachers do and may not understand what cognitive resources are appropriate for different tasks (p. 168).

From students' perspectives, they may derive their own purposes for engaging in an assigned task. These purposes determine how much time, effort, and cognitive energy they are willing to expend on the task. The challenge for students is to identify and interpret task demands so they can choose methods to cognitively process new information that they predict will address the task demands. Research suggests that a task's design influences students' perceptions of their ability to learn, their willingness to choose and apply strategies, and how they feel about achievement outcomes (Ames, 1992; Blumenfeld, Mergendoller, & Swarthout, 1987). In other words, the structure of tasks and the overall learning environment may have a large impact on any student's ability to self-regulate learning, "a metacognitively governed

behavior wherein learners adaptively regulate their use of cognitive tactics and strategies in tasks" (Winne, 1996, p. 327).

The dynamic process by which studying creates achievement is complex and influenced by cognitive, motivational, and affective variables. Self-regulated learning (SRL) concerns how students perceive learning tasks, forge goals, and devise plans to reach them, apply tactics, and strategies to learn and, particularly, how they adapt learning based on feedback as they proceed with learning. To date, researchers have identified several key factors that influence achievement outcomes. For example, Hofer, Yu, and Pintrich (1998) argue that "many college students may have an impoverished or inaccurate knowledge base about strategies and tactics. As well, their cognitive and self-regulatory strategies may be relatively ineffective or inefficient" (p. 61).

Furthermore, college students often have entrenched beliefs about what learning is and how it occurs. These implicit beliefs can influence students' approaches to learning and often set up a false sense of confidence in their ability to perform tasks (Hofer et al., 1998). Students often fail to recognize that they need to apply strategies flexibly to meet the demands of a task (Reeve, Palincsar, & Brown, 1987).

Reasons for these aforementioned types of learning difficulties may stem from another factor, namely, being inattentive to elements of the task structure that provide explicit and implicit cues about the nature of the task and the type(s) of information processing required to complete it successfully. Students may also be less likely to monitor appropriate elements of the task structure and the products they have created to determine whether they have adequately addressed all elements of the task

(Zimmerman & Paulsen, 1995).

An important conclusion arises by viewing learning as self-regulated: task difficulty may be an individual difference variable rather than a property of a task per se. Differences in students' interpretations of a task may be mediated by what they perceive about instructional cues in the instructions for a task, or by other factors such as skills for comprehending text materials associated with the task. Specifically, students' perceptions of tasks may vary because of the number and types of instructional cues they choose to examine, and how they interpret and assemble information they gather from resources to create a product they submit for grading. Instructional cues are designed to guide students in this cognitive engagement. However, students may misperceive these cues and elect tactics for studying that, though effective in other contexts, may not be effective for the present one (Winne & Marx, 1982). Little research to date has examined how students process task demands and how this may lead them to (in)effectively identify what they are suppose to do with any particular task.

The present research seeks to clarify models of SRL that are incomplete and in need of better accounting for interrelationships amongst multiple variables (Zeidner, Boekaerts & Pintrich, 2000). This research extends the knowledge base by exploring interactions of instructional design variables—e.g., task type and difficulty and instructions for tasks—in relation to how students self-regulate learning. The research focuses on a "first" phase of self-regulated studying, task definition, by exploring the interaction between design characteristics of tasks and how these design characteristics influence (a) how students initially represent a task and (b) how these

representations of tasks may change over time. In particular, this study investigates the kinds of information students examine or seek out about learning tasks, how they integrate these data to develop task understanding, and how understanding of a task flexes and evolves as a student engages in it and receives feedback. If task structures mediate choices students make in SRL, new research methods are needed to explore what specific task factors can account for differences in how students self-regulate their learning and achievement.

The context for the present study was an undergraduate course in Instructional Psychology. My beliefs about teaching and learning spurred the development and implementation of course activities and assignments. My overall beliefs about learning were that students needed to (a) process information actively, (b) reflect on the importance of course concepts, and (c) build connections between concepts presented in the course and apply this information in specific contexts. Since most of these students were striving for admission to the Professional Development (Teacher Education) Program primarily at Simon Fraser University, I believe that my role as an instructor was to help them understand the important implications of theories and research about teaching and learning for classroom practice. Thus, the overall instructional goals were to help students reconsider what teaching and learning were about, to think about who they were as learners, and who they wanted to become as future instructors.

The tasks within the course were intended to guide students toward constructing an understanding of theories related to teaching and learning. One of the course assignments was to develop a deeper conceptual understanding of a particular theory

presented in the course. More importantly, however, the focus of the course was designed to encourage students to build bridges between theory and practice. Through presenting problems or scenarios, I believed students could generate ideas about how relevant theory maps onto them. A key project within the course was designing a small curricular activity and justifying elements of the activity using theory presented in the course. This type of activity posed unique challenges for students because understanding theory is not enough; they have to know how these theories of teaching and learning could actually be applied in practical settings.

This research strives to examine students' task understanding and changes to that understanding as work on a task ensues. By examining students' perceptions of tasks, I can more clearly outline properties of tasks that may direct forms of cognitive engagement and influence how students self-regulate their learning. When the design project task was assigned, I asked students specific questions designed to tap their understandings of what they were supposed to do for the assignment. I then asked students to track their progress in completing the two main writing assignments in the course: a think paper and a design project. This project, identified as a studying portfolio, provided a mechanism through which students could report types of strategies they were using to complete the assignments, as well as reflect on how effective these strategies were in helping them complete the assignments. In the course I actively encouraged students to think about what SRL is, what it looks like, and how metacognitively monitoring the effectiveness of their approaches to learning within the course can be an important influence on their performance in the course. The studying portfolio activity was a very practical one. It invited students to build

connections between a major theoretical theme covered within the course and their own learning, thus providing a further bridge between theory and practice. Within this assignment, students could use information about themselves as a means of experimenting with ideas associated with SRL. If SRL is a dynamic and recursive process as theory suggests, by understanding elements of tasks that students attend to, and then designing activities to support students self-regulation within tasks, we may capture the dynamic and recursive properties of self-regulated learning.

# Chapter 2: Literature Review

This literature review examines principles of student learning and factors that may influence how students interpret task demands. Within this framework, I examine the role of self-regulated learning (SRL), what we currently know about task design and how students perceive these designs, how task perceptions may influence goal setting, and how constructing and then executing the plan helps students achieve task goals. I examine how being an active participant in the learning environment and how metacognitively monitoring progress are essential ingredients to effective learning. This chapter also examines how teachers' instructional actions influence students' perceptions of tasks. I conclude by examining recommendations for instructional design features to promote greater task awareness and SRL.

The principles described provide a framework for understanding how theory can inform teaching practice and how the activities designed for the Instructional Psychology course, which provided the source of data for the current research, were structured to promote engagement in the classroom. The principles and assumptions in which this course was grounded act as a framework for understanding what occurred in the course.

## Student Learning Principles

### Effective Learners are Self-regulating

An important factor that may influence how students perceive, interpret, and enact task activities is the degree to which they are self-regulated. Models of self-regulated

learning (SRL) posit that this process has four dynamic and recursive phases (Winne & Hadwin, 1998). The task definition phase requires that students read or listen to and then interpret the instructions for a task. Second, during goal setting and planning, students make decisions about what they want to accomplish and then decide which method(s) would be best suited to reach this goal. Third, students then enact the plan formed in phase 2, calling on specific strategies and tactics to reach their goal(s). In the final phase, adaptation may occur as students monitor their progress and make updates to any of the preceding phases as work on the task unfolds (Winne & Hadwin, 1998). Feedback can be either internally or externally generated about either processes (strategies, tactics) or outcomes (e.g., cognitive products, grades) is an integral aspect of any phase of SRL as it directs and re-directs efforts in completing course assignments (Butler & Winne, 1995). Thus, the dynamic and recursive nature of the four phases, whereby information the student constructs in any one phase can feed back or forward to other phases, places significant cognitive demands on students. Within each phase students make decisions about how to self-regulate and monitor their effectiveness within and across phases.

Decisions within SRL are themselves based in metacognition of two sorts. Knowledge of cognition addresses how students coordinate and control their cognitive processes. Regulation of cognition refers to students' "ability to reflect upon both their knowledge and management processes" (Butler, 1998a, p. 278; see also Schraw, 1998; Schraw & Dennison, 1994; Schraw & Moshman, 1995). Knowledge of cognition helps students analyze task demands and determine appropriate strategies and sources of information to complete a task. Regulation of

cognition is an executive process where students plan, implement, monitor, and appraise choices of procedures, strategies, and tactics to determine if they were effective or if alternative processing options need to be activated (Butler, 1998a; Pressley & Ghatala, 1990; Schraw, 1998; Schraw & Dennsion, 1994; Schraw & Moshman, 1995). These phases of studying are interdependent and recursive in nature (Winne & Hadwin, 1998). As students work through a task, they make metacognitive decisions about whether their task definition, goals and plans, and enactment of tactics and strategies for completing a task should be adapted to reach a desired outcome.

Students are effective at SRL when they assume responsibility for and control over their learning (Pintrich, 1995). Researchers suggest there is a developmental progression in students' capacity for SRL (Zimmerman, 2001). Information provided by the instructional environment provides a context for students to engage in SRL and may even support self-regulatory processes (Zimmerman, 2001). Moreover, those high on SRL behaviors are more likely to persist in the face of difficulties and seek to master new knowledge (Zimmerman, 2001). Students who are high in SRL are more likely to successfully monitor when learning outcomes are not being achieved and, because they have developed skills that recognize SRL failures, they are more likely to adapt their approaches to studying to address difficulties that appear (Winne, 1995; Zimmerman, 2002).

Although all students self-regulate, not all students self-regulate to the same degree and, in some circumstances, they may fail to self-regulate when the opportunity arises (Perry & VandeKamp, 2000; Pintrich, 1995; Zimmerman, 2001).

There are a number of reasons why students may fail to self-regulate. First, students may have an insufficient understanding of the learning context and how self-regulation would aid processing of information and achievement. Second, failures to recognize the utility of a strategy or, alternatively failure to produce a strategy appropriate for the learning context or task may result in non-productive forms of SRL (Garner, 1990; Winne, 1995, 1997; Zimmerman, 2001). Third, students may fail to monitor accurately whether their strategic processes are effective in creating desired products. Finally, students may lack a motivational catalyst that would support and perhaps even drive SRL (Zimmerman, 2001). Two additional reasons may explain failures to self-regulate. First, students may fail to recognize key elements of the tasks within the instructional environment, thus suffering an impoverished basis upon which to make decisions about SRL. Second, while moving through the task space, they may not know how to monitor, coordinate, and combine task elements to transform their understanding of newly learned material into successful completion of the task (Zimmerman & Paulsen, 1995).

Tasks, therefore, provide a context in which students can engage in self-regulated learning. The structure of a task shapes what students do with content and the cues embedded within the task may guide student processing. A task's demands and context are the base for cognitive engagement because they affect whether students will set appropriate goals, select appropriate strategies, and accurately monitor their achievement given criteria embedded within the task (Butler, 1998a; Zimmerman, 1995). Moreover, tasks that pose greater demands require more metacognitive and self-regulating behavior to sustain motivation to complete the task. Thus, task

structures may be an important context and mediating factor in how students self-regulate their learning.

**Task structures: A Context and Mediator of SRL**

To contextualize how students may use tasks to mediate how they self-regulate their learning, one first has to understand elements of task design. One of the instructor's roles is to design assignments to meet particular course objectives. Assignments have specific tasks embedded within them. Within tasks instructors can embed cues designed to prompt students to think about how to examine new content. Tasks vary in both the number and types of cues presented. These cues specify the purpose and scope of the task plus provide specific information about products students are expected to create as they engage with the task. Some of these cues may be explicit whereas others may be implicit. The number and types of cues contribute to the type and complexity of the task.

Tasks have been classified on a continuum from being well defined to being ill-defined. Information in well-structured tasks identifies exactly what students should accomplish and provides specific, easily recognized cues for how to accomplish the task (Doyle, 1983; Frederiksen, 1984). An example of a well-structured task is finding the definition of key concepts that are embedded within a text. Ill-structured tasks, on the other hand, are more open-ended, leaving open to interpretation what the final product should look like. These types of tasks allow multiple ways of generating answers. Ill-defined tasks may also present few cues about which processes will help complete the task (Winne & Marx, 1989). Ill-structured tasks may not provide all information necessary to solve a problem and may not have strict criteria for

determining whether the problem has been solved (Frederiksen, 1984). Ill-defined tasks also allow variations in the product format, making it more difficult to identify expectations for the task. An example of an ill-structured task is reading a research article and inferring the implications it has for teaching or for learning.

According to Doyle (1983), two features of well- and ill-structured tasks can be manipulated to make tasks challenging—ambiguity and risk. Ambiguity is "the extent to which a precise answer can be defined to generate an answer" (Doyle, 1983, p. 183). Tasks that are cognitively and procedurally simple call for unambiguous routine procedures requiring a minimal amount of time, involvement, and thought on the part of the learner. These tasks are typically easier to teach and manage. However, more ambiguous tasks require more time and more complex forms of cognitive engagement. Tasks high on ambiguity are often ill-defined with no precise criteria for constructing the final product. Ambiguous tasks are also more difficult to teach and manage because students often need additional support to complete them. Students may continue to apply less productive or lower-level processing tactics when ambiguous tasks do not adequately specify the structure of the product (Reeve et al., 1987).

As tasks become more complex, risk increases. Risk "refers to the stringency of the evaluative criteria a teacher uses and the likelihood that these criteria can be met on a given occasion" (Doyle, 1983, p. 183). Risk increases as the number of potential answers increases. Risk also increases under conditions where the amount of content required to produce a product is large. Under high risk conditions students may need to choose and apply different types of cognitive operations to produce the product. As

the amount of content increases, there is a correspondingly decreased likelihood that students will be able to incorporate all of the required information into their answer. These features of the task structure may influence not only what students understand about it, but also the choices they make with respect to SRL.

Overall, a task's structure can contribute to extraneous cognitive load "defined as any cognitive activity that is engaged in because of the way the task is organized and presented rather than because it is essential to attaining relevant goals" (Sweller, Chandler, Tierney & Cooper, 1990, p. 176). When extraneous cognitive load is high, students are responsible for organizing the task elements into a coherent form that would allow them to work through the task space. However, given limitations of working memory, students may not have enough cognitive resources to identify these elements and then interpret them in developing a plan for effectively reaching the task's goal state (Baddeley & Logie, 1999; Sweller et al., 1990). As a result, students may not define the task appropriately, which may lead to cognitive activities that are not aligned to the objectives for the task. Therefore, memory constraints may limit what students understand about the task (Baddeley & Logie, 1999) and may influence various steps in the task analysis process.

**Elements of Task Understanding**

Ideally, when students are given a task they first assume the role of a task analyst. As a task analyst the question to be addressed is, What type of information can be derived about the task based on how it is structured? This requires that students decompose the structure of a task into its basic elements. I hypothesize there are four essential steps that allow a student to develop a useful understanding of the task. The

first step is to perceive and allocate attentional resources to the instructional cues that are embedded within the structure of the task. The second step is to interpret what each of these instructional cues represents in terms of tactics appropriate to forming a product. Once these two steps have been accomplished, third, students can set goals based on interpretations of the task's cues and then form a plan that reflects strategies or tactics that may be best suited to derive a product. Fourth, after working through these preliminary steps students construct an understanding about the nature of the task.

***Perceiving and attending to elements of the task structure***

In the first step students must perceive and allocate attentional resources to identify specific components of the task space. The role of the student in this first step is to divide the task into its main elements that reflect its demands. The demands indicate the boundaries of the task, an initial state and a goal state. To perceive these boundaries students may use rules to differentiate features of the task and discern what type of product is required given the task description. Conditions can be viewed as a series of IF-THEN statements or condition-action rules that help students determine what they are supposed to do (Winne & Marx, 1989). As students perceive these conditions within the task space they must allocate attentional resources to these elements to grasp a task's intent.

Among the elements that students may perceive and attend to when decomposing the task are conditions specifying three main features of the task: content, setting, and presentation (Winne & Marx, 1989). Content refers to both knowledge of the domain (what content is to be covered) and strategic knowledge (declarative—knowing what

a strategy is, procedural—knowing how to carry out the strategy, and conditional knowledge—knowing when and where to apply strategies). Setting refers to resources that should be examined; for example, the task may only require using the course textbook or may require looking up other library resources. Resources may specify social constraints, whether the task is to be done individually or as part of a group. Finally, presentation refers to the medium or format for the final product. For example, an essay or a class presentation would be examples of ways to present information. When the presentation format is described, the task will usually provide some indication of standards for the product such as a page limit, spacing, or amount of time for an oral presentation. As well, an instructor may provide specific information about the criteria for marking the assignment. These cues may also provide valuable information about how to construct the product and about standards for monitoring whether products meet the criteria for the task. Specifically, the criteria for grading may provide information concerning which types of information should be emphasized within the task. If more marks are allocated to a specific element within the overall task, then students may attend to that element of the task more than other elements included within the task structure.

When analyzing the task, information about content, setting, and presentation are three essential surface features of the task that students should identify. However, other instructional cues, which may be words or phrases, are incorporated into the structure of the task and provide the deep structure of the assignment. The deep structure may be reflected by key words such as compare, evaluate, or justify. Students must perceive and attend to these words or phrases as they provide

additional information about the parameters of the task space, and provide implicit details about the expectations for examining content. Therefore, these deep structure cues will also provide a framework that helps students determine how they may want to prepare a product to submit for grading. Overall, deep structure cues provide information to guide and establish directions for learning new content and provide some indication of the overall purpose of why an activity needs to be completed (Butler & Cartier, in press). Thus, in this first step students must select information from the entire description of the task to determine the purpose(s) for examining new content.

As task complexity increases, a student's ability to interpret details of the assignment may be challenged due to memory constraints. Models of memory suggest that the sensory and working memory stores have a very limited capacity to hold information at any given time (Steele-Johnson, Beauregard, Hoover & Schmidt, 2000; Winne, 2001). This means that students selectively attend to some elements of the task but not the entire task structure. Or, if students do perceive and attend to those instructional cues and, if additional information about the task is provided, students are likely to lose this information as they cannot hold all of this accumulating information within their working memory store. Finally, if students are familiar with some elements of the task but not others, they may focus on those elements at the expense of other features of the task that require more attentional and cognitive resources.

### *Interpreting the structure of the task*

Once students have perceived components of the task space, they develop a

cognitive representation of what these components of the task space mean in terms of examining new content and framing a product. To develop this cognitive representation students must interpret what the selected feature(s) of the task description mean. For surface components of a task, students may not have to exert a lot of effort to interpret the meaning of these elements of the task space. For example, the number specified for the page length for a product, a surface level feature, does not require a lot of interpretation. However, the deep structure cues require much more cognitive effort to extrapolate underlying purposes and expectations for the task. For example, interpreting key words such as justify may provide information about its complexity or difficulty and the task's degree of ambiguity and risk. Students can evaluate what these words mean to determine how they are connected to the information that they will examine as they create the product. Students can also compare these words to the evaluation criteria to help them interpret what they are supposed to do.

Consider an example. A well-structured task may ask students to summarize the main research findings in a research article. Students may interpret this as a simple task that is relatively risk-free. All that is required is examining the text, choosing the appropriate information, and paraphrasing it. However, a task that asks students to generate a sample activity based on a theoretical principle is a cognitively more challenging task. It exposes the student to greater ambiguity and risk, as there are more factors students must think about before they can generate the sample activity. Therefore, in this cognitively more complex task there are a greater number of task conditions students must interpret and coordinate. The number and type of demands

embedded within the task impact how students may interpret the task.

Long-term memory may also influence how students interpret task cues. Information from long-term memory could be information about past successes or failures with similar tasks, knowledge about the content, or beliefs about learning within a content area (Brunning, Schraw, Norby, & Ronning, 2004). Research suggests that both breadth and depth of prior knowledge have a direct and a mediating role on decisions made about what and how to process information (Dochy, Moerkerke & Martens, 1996). Information in long-term memory are schemas about task structures that, according to Butler and Cartier (in press), provide generalized and foundational knowledge about the nature of the task. For example, often students believe that writing is more about form, such as grammatical and sentence structures, than about ways to share and express knowledge (Wong, 1999). Or, I recall one of my own learning experiences concerning how to write a paper using the "hamburger paragraph" approach. In this approach the top of the bun is an introduction, the bottom of the bun is the conclusion, and the ingredients that form the middle section of the hamburger are the main topics that connect the introduction to the conclusion. Our personal knowledge and experiences influence what we may interpret about the nature of the task.

There are two main elements of a task: a surface structure which provides details about the content, setting, and presentation; and a deep structure which provides information concerning the underlying objectives or purpose and scope for completing a task. Students may have fewer problems identifying surface features because these are usually explicitly stated within the description of the task. However,

deep structure details may be tacitly embedded and more difficult for students to discern. Students must identify and interpret these deep structure details to determine how to form a product that meets the grading criteria and expectations for the task. This may require making inferences beyond what is stated in the task description. To form a full and integrated understanding of the learning expectations for the task the deep structural features need to be combined with the surface elements of the task. Interpreting elements of the task structure may also help students adopt goals for the task.

Research suggests students describe learning using a hierarchy of conceptions that vary in sophistication: (a) increasing knowledge, (b) memorizing facts and details, (c) remembering facts and using them in practice, (d) abstracting meaning to understand information rather than (e) interpreting information to understand reality (Saljo, 1979, cited in McCrindle & Christensen, 1995). The implication of this line of reasoning is that the basis for deciding what to do with a task may be driven by conceptions of what it means to learn in a particular task context or domain. This prior knowledge base may directly influence which task cues students perceive and how they interpret them in subsequently addressing the task.

### *Goals reflect task interpretation*

Students' interpretations of implicitly or explicitly stated task goals may determine the type(s) of personal goal(s) set and how the task will be addressed. When students interpret the task's instructional cues, which is the second step in the four-step perception process, they essentially make a decision about what they want to accomplish given what they understand about the task structure. In making their

interpretations of the task they transform the description of the task into specific personal goals. The goals that students set may reflect either the value or utility for completing the task.

Students may choose to set the same goals as the instructor sets. Alternatively, students may interpret the conditions for the task and identify different goals depending on what they wish to learn. Essentially students may ask themselves these types of questions: What can I gain by doing this task that will increase my learning or understanding of the course material? How much cognitive effort must I expend to get what I need out of doing this assignment? Or, what do I have to do to ensure that I get an A on this project? On many occasions, the motivation to complete an assignment is to do better than others or to prove one's competence in front of others as opposed to mastering content (Steele-Johnson et al., 2000). Given these factors, sometimes students do not recognize the value or utility of the task and, as a result, do not engage in the appropriate types of cognitive activity to promote learning. Therefore, students' perceptions of the value or utility of a task may determine whether they choose to become cognitively engaged and, if the task is challenging, persist at completing a task should difficulties should arise (Pintrich et al., 1993).

In the SRL literature, goal setting is a key component of self-regulated learning with goals representing purposeful, self-determined behaviors that reflect one's intentions to enact activities to produce a product (Hadwin & Winne, 1997; Pintrich, 2000; Winne, 1995, 2001). Goals students set often reflect a motivational orientation towards tasks and provide an indication of what needs to be accomplished, when it should be accomplished, and how it should be accomplished (Pintrich, 2000).

Mastery orientated students' view learning as a process where effort needs to be applied to learn new information. Mastery oriented students are more likely to choose activities that are appropriate to achieve a goal, and are likely to persist when faced with challenges (Ames & Archer, 1988; Elliot & Harackiewicz, 1994; Pintrich, 2000). Thus, students who have a mastery orientation are more likely to value learning for its own sake and are more adaptive in their approaches to learning. According to Pintrich (2000), mastery oriented students have "higher levels of efficacy, task value, interest, positive affect, effort and persistence" (p. 544). Students with a predominating mastery orientation have also been found to use more cognitive and metacognitive strategies, which result in better performance (Pintrich, 2000; Pintrich & DeGroot, 1990).

Performance oriented students are concerned with the outcomes of learning and place more emphasis on comparing themselves to others and proving their competence. Getting the grade is more important than learning new information (Ames & Archer, 1988; Philips & Gully, 1997; Pintrich, 2000). Performance oriented students are generally less adaptive in their approaches to learning which impacts "subsequent motivation, affect, strategy use, and performance" (Pintrich, 2000, p. 544). This is especially true for students who adopt avoidance performance goals versus students with a performance approach goal who are more adaptive and achieve similar outcomes to those who are mastery oriented (Harackiewicz, Barron, Tauer, & Carter, 2000; Pintrich, 2000).

In some cases, depending on the task and the classroom environment, students may set multiple goals or shift goals while learning (Pintrich, 2000). Zimmerman and

Kitsantas (1997) performed an experiment where they manipulated goal orientation in a dart-throwing activity. In a 4 X 2 experimental design students were either given (a) process goals—to concentrate on their method of dart throwing, (b) outcome goals—to focus on the score received when a dart was thrown, (c) transformed goals—to note where the dart landed on the board then adjust their method for dart throwing, or (d) shifted goal—to focus on the steps for dart throwing and, after a period of practice, note performance outcomes or the score they received in throwing darts. These represent the four main experimental groups. In the remaining 4 cells that formed the experimental conditions students were asked to set goals as above, but were also asked to self-record specific aspects of either the process or outcome in order to monitor goal progress. In the shifting goal group, students first recorded whether they executed the correct dart throwing steps (process) followed by recording the dart score (outcome). The transformed group recorded what was adjusted about their dart throwing. The outcome group recorded their dart throwing score, and the process group recorded the steps that they did correctly. These eight groups were compared to a ninth control group whose members did not set goals or monitor their progress.

Results suggested main effects for goal type and for monitoring goals, but no interaction between goals and monitoring. When students shifted from process to outcome goals, they not only mastered the dart throwing skills, but they also had the highest self-efficacy, the best performance score, the highest satisfaction, and the greatest interest in dart throwing. Students in the transformed and process goals outperformed the outcome group. All groups outperformed the control group. This

suggests that it may be adaptive to have multiple goals as work on a task unfolds. Furthermore, these results suggest that when asked to monitor progress, students may attend to different elements of the task space, which results in improved performance outcomes. This study demonstrates how students can be guided to attend to and interpret different elements of the task space to maximize learning outcomes. The type(s) of goal(s) set may have an influence on how students choose an approach for completing a task and also on how they adapt or adjust approaches to complete the task.

Based on what students interpret about the task space, they will set goals that reflect their motivational orientation towards the task. The goals set may be based on task cues that specify the "distance" between the initial state and the goal state (the type of product that needs to be produced). Students need to decide the best method to reduce this gap. The path from the initial state to the goal state may be much longer and less "straight" in a more cognitively complex task than an "easier" task. Therefore students must construct a plan that would allow them to move in logical steps to the goal state. One way to reduce this distance is through creating subtasks. Subtasks break the larger task down into more manageable pieces that will be put together over time to frame the final product. The resultant smaller sections of the task space are easier to manage (Catrambone, 1995; Elliot & Harackiewicz, 1994). Determining how to reduce the distance and forming subtasks are factors that may vary across students. Both depend on students' previous experiences with similar tasks, success in completing similar tasks, and whether they see themselves as capable of completing the current task (Winne, 1997, 2001). Thus, how students

interpret task elements and then set goals may influence the plan that they create to complete the task.

***Plans provide a stepping stone for task understanding and SRL***

In the fourth stage of perceiving a task, students make a plan for how they want to accomplish the task. Conditions that students perceived, attended to, and interpreted in the first two stages may help them set proximal goals. Entwined with setting goals is judging what would be the best approach to reach these goals because approaches students take have consequences, such as effort they entail. Goals drive a plan to complete a task and influence the selection of operations (tactics or strategies) applied to carry out an assignment (Winne, 2001; Winne & Marx, 1989).

The plan that students construct to complete a task provides some indication of whether they recognized all relevant components of the task. Steps within the plan could include both methods for moving through the task space, as well as how those intermediate products could be put together to form a product (Butler & Cartier, in press). If students do not attend to all of the features of the task then they are not likely to choose a plan or operations within the plan that satisfy expectations for the task.

Operations are strategies and tactics that transform into products the information presented within the task and available in other resources. Operations manifest as goal directed behaviors that achieve specific purposes in the task (Garner, 1990). Strategies sequence and coordinate tactics that facilitate learning of new information (Garcia, McCann, Turner & Roska, 1998; Kail, & Bisanz, 1982; Wade, Trathen & Schraw, 1990; Winne, Jamieson-Noel & Muis, 2002). Strategy types include

rehearsal, elaboration, and organization (Wade et al., 1990). Each type of strategy has a role to play in facilitating the learning process.

Surface approaches to learning are about "knowing more, memorizing for later reproduction, or acquiring and using facts" (Iran-Nejad, 1990, p. 577; see also Schmeck & Geisler-Brenstein, 1989). Surface approaches can be associated with rehearsal strategies. Rehearsal strategies generally ensure that information has been memorized, which usually requires reciting or repeating information.

Deep approaches to learning afford opportunities for students to think about subject matter in innovative ways, developing new ways to think about reality, and achieving personal growth through learning (Iran-Nejad, 1990; Schmeck & Geisler-Brenstein, 1989). For example, students who actively transform and assemble their own understanding of new content better retain the material compared to those who passively acquire the information (Foos, Mora, & Tkacz, 1994). For example, students who use more complex forms of strategies such as questioning or making their own notes transform new information into something they can understand because they have made that information more personally meaningful. When comparing strategies, students who self-generated questions performed better on a retention test than those who summarized or simply reviewed their lecture notes (King, 1992). In general, elaboration strategies provide an opportunity for students to extend their representation of the information by building connections between different elements of information. Elaboration strategies also make information more personally relevant and meaningful while organizational strategies allow for deeper processing of information by constructing connections among elements of

information. Overall, strategies can be purposefully and deliberately selected to ensure progress towards reaching goals and to help ensure that cues are created to facilitate memory processes (Wade et al., 1990).

Choosing and then enacting a strategy can be mediated by two factors: cue availability and memory processes (Biggs & Collis, 1982). Recognizing that a strategy needs to be used depends on cue availability. Identifying key words that convey what should be done in a task may be difficult—cues may not be provided, the task description may be too general, or descriptions may be too abstract and difficult to operationalize in terms of strategies or tactics. Task descriptions that include words like justify, analyze, or evaluate require in-depth analysis to determine which processes would be appropriate to attain these outcomes. The (mis)interpretation of these words may lead students to inappropriate processing of information. Students may examine irrelevant content that doesn't match the scope or purpose of the assignment; they may identify relevant content, but fail to utilize that content in inappropriate ways. Alternatively, students may make inferences about information that does not support the goal of the assignment.

Students must have cognitive resources available to use a strategy. If the domain presents difficult material, there may not be sufficient cognitive resources to use complex tactics like note taking that allows for elaboration. Instead, students may use a tactic such as highlighting that allows them to merely rehearse, recognize, and potentially recall the material. Highlighting is a less cognitively taxing tactic that still allows information to be examined in relation to goals. However, in this approach to examining material, students may not process information in a manner that allows

them to achieve the overall goal for the project, instead settling for a simpler goal that is perhaps easier to attain. If a student has had an opportunity to extensively practice tactics or strategies that will complete the task, other cognitive resources will not be taxed and it will be easier to complete the task (Steele-Johnson et al., 2000).

The plan that is created represents the fourth step of defining the task. The plan that students develop is framed based on perceiving, attending to, and then interpreting the instructional cues that are embedded within the task structure. The plan that emerges from this interpretation provides a framework for students to think about how they want to engage in task activities and move through the task space in a progressive manner. After these initial steps to developing an understanding of the task, students must then apply effort to enact that chosen plan as the means for striving to achieve the goals they set.

**Task Understanding is a Dynamic and Active Process**

For students to perceive, attend to, and interpret instructional cues; set goals, and then plan activities for a task, they need to be active participants in the learning process (Butler & Cartier, in press; Luyten & Lowyck & Tuerlinckx, 2001). In transmission models of learning, the teacher has the authority and students passively strive to learn and replicate that information. Iran-Nejad (1990) refers to this as a conduit metaphor where self-regulation depends on others as a means to internalize knowledge structures. In contrast, under the constructivist framework learners are active, take control over their own learning, and are driven by the need to manipulate and transform information for the purpose of building new understandings of information (Iran-Nejad, 1990). Tools presented within the environment, task

instructions, textbooks, or other materials such as lab equipment are experimented with as a means of acquiring new knowledge.

Students who are active processors of information are agents. Agency is based on the premise that "people are self-organizing, proactive, and self-regulating not just reactive organisms shaped and shepherded by external events" (Bandura, 1999, p. 186). Through this causal self-system students are empowered to control aspects of their functioning that may influence present and future courses of action. Agency also refers to the ability to evaluate oneself in the course of producing effects by actions (Bandura, 1996, 1999). Self-efficacy has a direct and mediating role in how students engage in everyday functioning. If negative beliefs exist about their ability to perform, these beliefs undermine "productive engagement in academic pursuits" (Bandura, Barbaranelli, Caprara, Pastorelli, 1996, p. 1207). Thus, without strong beliefs in one's capability to produce desired outcomes through actions, the incentive to act may be diminished.

One component of personal agency refers to self-reflection and self-evaluation (Bandura, 1993, 1996). In this instance, individuals judge and monitor the plans produced, actions taken, and the meaning of the produced outcomes with respect to functioning. Self-reflection and self-evaluation are productive processes because they allow individuals to think about the sequence of actions used to produce outcomes. From this reflection and evaluation, individuals may determine whether they were effective in navigating the task space. Through self-reflection and evaluation, students can make judgments about their success in reaching goals. If students are not successful in reaching goals, they must assess processes and products, determine

where there were inefficiencies, and seek to reduce or eliminate these discrepancies. This process of self-reflection and self-evaluation is most closely tied to regulating cognition, and more specifically, metacognitively monitoring progress.

**Effective Learners Monitor Task Progress**

What makes SRL dynamic and recursive are two main features of SRL: metacognitive monitoring and metacognitive control. Metacognitive monitoring refers to (a) allocating attention to actions that are being performed and the products of these actions and (b) discriminating the outcomes of these actions with respect to reaching goals (Zimmerman & Paulsen, 1995). Metacognitive monitoring is believed to be a bottom-up process that provides opportunity for students to become more consciously aware of what and how they are processing information (Plude, Nelson, & Scholnick, 1998). As a result of monitoring these processes students can evaluate whether they are making progress toward reaching goal(s).

Metacognitive control is a top-down process that determines based on the output(s) of metacognitive monitoring which types of processing should be retained, eliminated, or altered (Nelson & Narens, 1990; Plude et al., 1998). Metacognitive control updates allocations of cognitive resources in the service of reaching goals more effectively or efficiently (Winne & Hadwin, 1998). Overall metacognitive monitoring and control are executive processes that activate and deactivate cognitive processes (Pressley & Ghatala, 1990). "Ongoing monitoring and control of one's own cognition is crucial to efficient and effective cognitive processing" (Plude et al., p. 29).

Overall, monitoring progress toward a goal has several advantages. It allows

students to (a) focus attention on a small aspect of the larger goal, (b) discriminate effective and ineffective performance, (c) evaluate the effectiveness of a learning strategy, (d) manage study time, and (e) reflect on learning (Zimmerman & Paulsen, 1995). Students who monitor progress will typically have a more organized and systematic approach to learning. Students may be more motivated to complete the task because they can perceive progress more directly. Also, for each goal achieved, the students may feel they are more capable of achieving the final goal because they can see direct results of their actions.

Without knowledge about what, when, where, and why strategies should be used, students may not effectively process information to meet the demands of a task. The same holds true for developing an initial understanding of tasks. Students need to know what information about the task they should attend to, how to evaluate this information, and why doing this is important. For example, if students simply read and highlight text information to find main ideas or terms, but the task actually asks them to abstract key principles to support a position, then the highlighting tactic may not support that goal. If students are monitoring progress, they may be able to correct this inefficient process and exchange it for a tactic that is more productive. Therefore, monitoring ideally should reveal inadequate, absent, faulty, or inaccurate interpretations of the task (Butler & Cartier, in press). As a result of these task revelations, students may choose to shift or alter their approach to completing a task so task goals are met.

Therefore, metacognitive monitoring and control serve several functions. Monitoring allows students to determine what type of goals, plans and strategies, or

tactics would be best suited to reaching a goal. To perceive the elements of the task, attend to these elements, and then interpret these elements students need some awareness of the instructional environment. Specifically, students need to determine what represents an instructional cue within the instructional environment. This awareness may be the key to helping students discriminate instructional elements and map both the surface and deep structure of an assignment. Based on this, students can then choose goals and set a plan based on the declarative, procedural, and conditional knowledge that coordinate with what the instructional cues represent.

Metacognitive control helps students coordinate and sequence task activities. Ideally, metacognitive control functions to help students move effectively and efficiently through the task space. However, at some point in completing a task, students may experience cognitive or motivational difficulties. At this point students may reassess their perceptions of the task, the goals set, or the plans created, and adapt plans in a manner that is best suited given the difficulties being experienced. This may mean that students persist in the face of difficulties or it may mean that students reduce their standards, setting different tasks to accomplish that may still satisfy the goals of the task, but not to the same degree or with the original desired outcomes. Metacognitive control contributes to the dynamic and recursive processes that help students move through the task space (Winne, 2001; Winne & Hadwin, 1998).

**Summary of Student Learning Principles**

In the above sections I have outlined a method for thinking about how students understand tasks. One of the assumptions about the first phase of task engagement is

that students analyze elements of a task. This may not always be the case. Based on this review of the task analysis process, Table 1 outlines areas of potential problems that may arise when developing an understanding of a task.

**Table 1. Problems associated with the elements of task understanding.**

| Element of Task Understanding | Problems associated with that element |
|---|---|
| Perceive and Attend to Task Cues | • Failure to recognize, attend to elements of the task space<br>• Selectively attend to some elements of the task space over others<br>• Failure to recognize deep structure (implicit) details of task<br>• Insufficient cognitive resources to manage all features of the task space |
| Interpreting Task Structure | • Prior knowledge of task structures (schemas), task success or failures or knowledge of domain may bias how the task is interpreted<br>• Failure to extrapolate purpose and expectations of the assignment<br>• Failure to recognize or misperceive the ambiguity or risk associated with the task<br>• Insufficient cognitive resources to form a fully integrated understanding of the surface and deep features |
| Setting Goals | • Skip the goal setting process<br>• Set goals that are not well matched to the nature of the task<br>• Failure to set goals aligned with specific components of the task space<br>• Failure to monitor goal progress |
| Creating Plans | • Skip the planning process<br>• Failure to recognize key components of the task that should be incorporated into the plan<br>• Choose tactics or strategies that may not be well suited to the task |
| Monitoring Task Progress | • Lack prior experiences in monitoring task progress thus do not know what should be monitored<br>• Fail to make adjustments to task progress despite recognizing difficulties<br>• Make adjustments that do not support meeting goals |

Overall, Table 1 highlights several potential problems that could arise when students attempt to develop an understanding of a task. Previous research has illustrated indirectly how students often adopt inadequate, absent, or faulty understandings of the task (Butler & Cartier, in press). For example, research on misconceptions and self-regulated learning often reveals that students adopt ineffective, inefficient, or nonproductive methods of thinking and learning (Butler, 1998b; Wong, 1999). These potential biases in task understanding may have a large impact on other educational outcomes.

In terms of students' transfer of knowledge, an educational issue arises that needs to be addressed. Specifically, students "are not able to exhibit appreciable understandings" of new content in domains such as physics, mathematics, and even in social studies and humanities (Gardner, 1999, p. 75). Gardner illustrates how students from these disciplines fail to recognize the importance or implications of the knowledge they have acquired and how they can utilize that knowledge in new contexts. If we want students not only to know what is stated in the content, but also know how to use this content in an applied manner, a more integrated theoretical understanding of how students understand tasks and how this understanding affects other aspects of students' functioning needs to be developed.

Ultimately, students may have to infer forms of instructional knowledge that are embedded in the task structure, where instructional knowledge "refers to knowledge learners have about the way in which instructional features may help or hinder them to learn" (Elen & Lowyck, 1999, p. 149). Task interpretations are subjective interpretations of objective characteristics of the task so tasks may indirectly guide

the ways students think about learning new content (Luyten et al., 2001). When constructing these interpretations of the task, students and teachers often do not agree on what a task is supposed to accomplish in helping students acquire new knowledge (Blumenfeld & Meece, 1988; Pintrich et al., 1993; Winne & Marx, 1982). Within the next section I review this research.

## The Misalignment between Task Structures and Learning Outcomes

Despite known factors that would help students move through the task space, research suggests that students are not always successful in defining the task and reaching goals for learning. There often appears to be misalignment between what instructors state as the instructional goals and learning objectives for specific content and what actually happens in the classroom to approach these goals. Of the four main goal types—applying generic skills (i.e., learning strategies, metacognitive skills), applying skills (appropriately use concepts, problem solving), understanding relationships (organizing knowledge to determine relationships, and memorizing (remembering and recalling information)—memorizing information is the most commonly approached instructional goal in classrooms (Reigeluth & Moore, 1999). Although ideally teachers recognize the importance of structuring tasks to support higher level learning outcomes, tasks and assessment formats typically are designed to tap into lower level learning outcomes (Airasian, 1994). Moreover, metacognitive learning and its assessment are not highly emphasized in classrooms. Thus, more could be done to help teachers design tasks and create assessment formats that tap higher level skills. Several research studies have examined the link between teachers' instructional actions and students' perceptions of those actions.

Tasks are designed to signal and guide how students process information. However, previous research has found that there may not be a direct correspondence between teacher's intentions to signal and guide students' processing compared to students' actual cognitive processing of information (Winne & Marx, 1982). A few studies have examined the misalignment between teacher intentions and student processing. This section highlights the main findings of these studies.

Using observations and interviews in a grade 7 class, Winne and Marx (1982) found that the nature of the instructional message, and familiarity with (a) task structure, (b) instructional cues, and (c) content, all mediated choices students made about cognitive operations and behaviors. Furthermore, it was not always clear to students when an instructional cue was presented, suggesting a difference between intentionally cueing students and just providing instructional support. Finally, they also found that in some instances students chose to engage in particular cognitive activities when instructional cues were not present. This illustrates both student agency and that cues do not always function to guide processing.

To determine how task instructions influence learning disabled students' and regular students' engagement with tasks, Wong, Wong, and LeMare (1982) performed an experiment in upper elementary classrooms which either gave students explicit instruction on how to perform a criterion task or no explicit instruction. There were two tasks: a comprehension task and a free recall task. The passages varied in difficulty so as to examine whether passage difficulty also had an influence on task achievement. Students were given explicit written instructions before they read the passage. In the comprehension task students were instructed to pay attention to pre-

paragraph questions. For the recall task the instructions indicated that students needed to study the passage, and a free recall test would follow. The results demonstrated that providing students with explicit instruction about the tasks improved achievement on both tasks. As the difficulty of the passage increased, achievement on the comprehension and recall task decreased. The researchers concluded that explicit knowledge of the task led students to engage in appropriate, task relevant behaviors.

Grade 4 science lessons provided the context for examining the connection between instruction and student behaviors in a study where Blumenfeld and Meece (1988) manipulated the organizational form, cognitive difficulty, and procedural complexity of tasks. Organizational form involved changing the participation structure for the assignment. They also manipulated cognitive complexity by varying the type of products required for each of four lessons. For procedural complexity, they varied the number of steps required to complete the task. Using these task factors, they then determined how involved students were with the tasks and the form(s) of cognitive engagement students used to complete the tasks.

As the procedural complexity of the task increased, students' attention to specific cognitive components of the task decreased. Furthermore, as cognitive difficulty increased, students' use of high-level strategies did not differ, but help-seeking and avoidance strategies increased. Teachers who used instructional cues that prompted students to pay attention to the task and its procedures elicited and maintained task-related behaviors, but these cues did not encourage them to actively participate in learning. However, teachers who used instructional cues that requested students to master content through participatory actions, such as justifying and explaining their

responses to task questions, promoted more active forms of cognitive engagement. Therefore, students of teachers who probed for understanding and encouraged active participation demonstrated higher task involvement and improved achievement outcomes. Thus, the instructional support that instructors may include within their instruction for the duration of the activity may have an influence on the choices students make about how they process information.

In another study, task-relevant information was recalled better than irrelevant information when the instructor explicitly cued students to focus on specific types of information (Schraw, Wade, & Kardash, 1993). These cues can be explicitly embedded within the instructions for a task, emphasized through providing instructional support to students or by embedding implicit cues within instruction. This experiment asked undergraduate students in an Introductory Educational Psychology class to attend to information in an instructional text based on a particular perspective (burglar or home-buyer). Participants recalled more information related to their actual perspective than other information that was key to the text. This study implies that an instructor can cue students to the details of the task in ways that influence how students process information.

Another study examined whether instructional designers could correctly predict how students would cognitively process information in the first three levels (knowledge, comprehension, and application) of Bloom's taxonomy on a grade 7 multiple-choice math test. As students wrote the math test, the researchers asked students to think aloud to describe how they solved each item. Gierl (1997) found that what students actually reported in interviews matched the instructional designers'

intentions only 54% of the time. It was also found that the designers were more likely to anticipate the cognitive processes of higher achieving students. Furthermore, they found response variability across the students in terms of the types of cognitive processes they reported when completing the math questions. Thus, questions that are derived for testing students do not always result in students cognitively processing this information in ways that designers expect.

Broekkamp, van Hout-Wolters, Rijlaarsdam, and van den Bergh (2002) examined 22 teachers and 451 grade 11 students' ratings concerning the instructional importance of 26 sections of an 8000-word history chapter. Importance was judged based on information that might be important to include on a history test. The sections were presented as summaries after students studied the material. The researchers wanted to determine the correspondence between teachers' and students' ratings of text importance, as this would provide some information about whether students and teachers were aligned in their perceptions of task demands. The main results suggest that teachers in general do experience consensus in rating the importance of instructional text for important task demands but experience less agreement for task demands that are less important. Teachers also varied in their ability to effectively relay the task demands to students. Teachers' expectations about testing students for various classes were also different, suggesting that teachers have different purposes when testing students on material.

Students generally experienced difficulties ascertaining the task demands. Importantly, students had "inadequate perceptions of the instructional importance of text sections", suggesting that students have difficulty discerning the nature of this

component of the learning task (Broekkamp et al., 2002, p. 267). If students cannot discern information relevant and important for a test, they may need some assistance from the teacher in helping them construct an adequate understanding of the task demands.

These results describe facets of how students' perceptions of tasks are created and that these perceptions are often misaligned relative to intended instructional goals. This is not an exhaustive list of studies but it does illustrate a strong history of researcher interest in this issue. These studies also illustrate that students and instructors are both agents in the learning process. They influence one another in negotiating meaning concerning expectations for the task and the nature of the task demands (Vermetten, Vermunt & Lodewijks, 2002). Importantly, there appears to be a fine line between assigning students a task and providing support in completing it versus doing the thinking for the student or simplifying the task (Blumenfeld & Meece, 1988).

If instructors want to include more complex tasks within their instructional environments then they may also incorporate particular elements in their instructional design to help students become more task aware. Specifically, students may need support to become more aware of (a) elements of the task space and (b) how they can monitor their approaches to learning while moving through the task space. Given the problems outlined above in terms of instructors and students not being on "the same page," new design principles have emerged in recent research to help students become aware of the task space. In the next section, I review design principles that instructors can incorporate into their instructional designs to provide various prompts

and supports to guide students to become more self-regulated as they complete tasks.

## Design Principles to Promote Task Awareness

The cognitive mediational paradigm (Winne & Marx, 1977) suggests that teachers, students, and instructional design factors such as instructional materials or task types interact to influence learning results. "Learning results are not a mere function of the instructional environment since each student operates as a filter for the possible influence of the environment" (Luyten et al., 2001, p. 204). Instructors must recognize that this misalignment can exist between teacher and students' expectations for learning. Given the multiple factors that influence both instruction and learning, what are the best methods to foster content acquisition and cognitive growth?

### Change the Nature of Tasks

Much of the emphasis in schools is placed on acquiring new content knowledge. These content competencies drive instructional practices in terms of the types of tasks that are designed and implemented. Furthermore, assessment practices are driven by the need to determine how well students can perform. But content competencies only represent part of the picture. Cognitive competencies are just as important if not more important than acquiring content. Without having an in-depth knowledge of the skills associated with learning new content, students may not be able to learn adequately because they have not developed cognitive skills to problem solve effectively and to apply their knowledge in different contexts.

Anderson and Krathwohl (2001) suggest that instructors need to think about how to construct learning objectives that "test" students on a variety of different process

and knowledge levels. They propose a 4 x 6 taxonomic framework for learning objectives that has a cognitive process dimension and a knowledge dimension. The main elements within the cognitive process dimension are to remember (retrieve information); understand (construct meaning of information); apply (carry out or use a procedure); analyze (break information into constituent parts); evaluate (make judgments about information based on criteria or standards); and create (put elements together or restructure information). Within the cognitive process dimension, as one moves up through the taxonomy, the forms of cognitive processing that are required to meet these objectives become more cognitively complex. To engage students in more complex forms of thinking an instructor should design tasks that focus on the upper levels in the taxonomy.

Anderson and Krathwohl (2001) also suggest that there are four types of knowledge that instructors can use to design their instructional tasks. These include (a) factual (basic information; i.e. terms, details); (b) conceptual (interrelationships and functions; i.e. theoretical elements, categories); (c) procedural (how to do something; i.e. algorithms, mnemonics); and (d) metacognitive (knowledge and awareness of cognition). The ways in which students are expected to examine content and process information become more complex as one moves up in the taxonomy.

Of the four types of knowledge, probably the most difficult is designing, implementing, and then assessing tasks for metacognitive processes. Metacognitive knowledge refers to students' knowledge within three different areas: knowledge about themselves as learners, knowledge about the tasks and their structures, and knowledge about the strategic processing that would be most appropriate given the

task demands (Hadwin, Wozney, & Venkatesh, 2003). Metacognitive knowledge is difficult to assess because there are individual differences in one's ability to state what one knows about the self, tasks, and strategic knowledge (Anderson & Krathwohl, 2001). Furthermore, what works for a student in one context may not work to the same degree for another student in another context, so flexibility in assessing this knowledge is important. Instructional designers also need to be concerned with how to develop assessment methods that are suitable for metacognitive objectives.

Anderson and Krathwohl (2001) suggest that transfer of learning requires more focus on having students analyze, evaluate, and create new knowledge structures or build on old ones. In other words, students need to be active processors of information. Furthermore, Anderson and Krathwohl argue that by incorporating metacognitive activities within the structure of classroom tasks, students will develop an awareness not only of what they are learning, but also of how learning affects performance. By making students think about their learning processes and experiment with how they are learning, students may come to recognize the cognitive skill set that is essential to helping them learn content information.

Recent advances in instructional design suggest specific principles to incorporate metacognitive objectives within task designs. These principles for designing instruction place more emphasis on active learning processes where students are expected to indicate concretely not only what they are thinking, but also how they are thinking and why their thinking results in products that are adequate for the task (Lin, 2001). These types of objectives are theorized to foster SRL. Each principle is

designed to maintain emphasis on learning content, but also extends to process-oriented outcomes of learning. These design principles may help teachers build a bridge between content that needs to be taught and helping students develop a stronger awareness of how they are processing information.

**Provide an Opportunity to Explore the Structure of Tasks**

Recent research suggests that tasks with complex and open-ended structures foster SRL to a greater extent than tasks with simple, closed structures that are primarily skills based (Perry & VandeKamp, 2000; Perry, VandeKamp, Mercer & Nordby, 2002). In open-ended task structures, if instructors encourage students to explore the purpose and scope of tasks students may be more likely to adopt a more active approach to learning. Research supports this contention. Perry (1998) suggests that complex and varied tasks in open task environments require students to adapt strategies and to use a range of strategies. Moreover, these types of tasks require greater personal investment, and students became more responsible for their learning (Perry, 1998; Turner, 1995). One example of a way to explore the structure of tasks is for instructors to incorporate class or group discussions about tasks. Discussion may lead students to develop different ideas about how to approach tasks. The resulting increase in task awareness may promote self-regulated learning and better achievement outcomes because teachers have adequately signaled and helped students analyze and interpret relevant cues (Broekkamp et al., 2002; Turner, Meyer, Anderman, Midgley, Gheen, Kange, & Patrick, 2002). These types of discussions may help students understand the underlying rationale behind the task, the importance of learning new content, and how to process information.

**Provide Choice and Opportunities to Control Challenge**

Another design principle that may influence SRL is whether students have options to choose the way to proceed with completing a task or the type of product that can be produced in association with completing the task (Perry et al., 2002). Perry (1998) states that "to develop effective forms of SRL, students need to be involved in complex, meaningful tasks, choosing the products and process that will be evaluated, modifying tasks and assessment criteria to attain optimal challenge, and evaluating their own work" (p. 716). In a university context, an instructor could assign a writing task where students can choose what topic they want to pursue. The instructor can also make the nature of the writing product flexible in terms of its structure. Instructors should design activities to challenge students to think about what they are learning and how they are learning new information. Including these types of elements within the task demands enables students to complete the task because they are given options for ways to pursue the task and ultimately the kind of product that can be created. This allows students to deal with or, as necessary, modify the task demands to effectively deal with the nature of the task (Perry et al., 2002).

**Provide Opportunities to Explore Beliefs about Learning**

Students need to develop knowledge of themselves as learners with respect to their role in the learning environment. All students need to examine their beliefs regarding what they think learning is about, what their role is in the learning context, as well as what the instructor's role is in helping them to learn new content (Lin, 2001). Through understanding their implicit beliefs about learning, students can determine how these implicit beliefs influence how they learn. As a result, they can

find ways to address potential misconceptions about what it means to learn in a particular domain and find more adaptive ways to deal with this content.

**Provide Students Opportunities to Articulate their Thinking**

This principle is designed to encourage students to express what they are thinking and feeling about a task (Lin, 2001). To access metacognitive knowledge, instructors need to provide opportunities for students to "forge explicit, durable, and useful knowledge about whether and how cognitive tools affect learning" (Winne, 1997, p. 397). Through increasing awareness of the cognitive and motivational factors that affect how students are engaging in self-regulated learning, students may be able to address these learning issues more effectively and, as a result, improve learning outcomes. By giving students an opportunity to articulate their thinking in relation to a task, instructors may be able to stimulate students to search for tools or techniques to enable them to complete the task. Furthermore, Paris & Paris (2001) suggest that involving students in the "self-management of thinking, effort and affect promotes flexible approaches to problem solving that are adaptive, persistent, self-controlled, strategic and goal oriented" (p. 97).

McCrindle and Christensen (1995) incorporated learning journals into an introductory biology class. The learning journals were designed to help students reflect on the content of what they had learned, processes they used to learn content, and changes for future learning. They compared students in this group to a group who just wrote weekly scientific reports. Students who kept learning journals (a) developed more sophisticated conceptions of learning, (b) increased overall metacognitive knowledge resulting in detailed accounts of how they learned, (c)

developed greater awareness and control of strategies to learn, (d) made better choices of strategies for learning, (e) created better, more meaningful and complex networks of knowledge, and (f) demonstrated better performance outcomes. Therefore, providing opportunities to reflect on their learning had several benefits for improving how students performed in their instructional environment.

**Provide Students with Opportunities to Self-assess**

This design principle involves students in thinking about what they are learning, how they are learning, and whether the products they have produced meet evaluative criteria. Ley and Young (2001) suggest "learners may not be able to accurately monitor and detect failure if they do not understand how to evaluate their learning" (p. 99). When instructors create and assign tasks, they typically also determine evaluative criteria. If teachers construct the criteria, then they should also design activities that will help students interpret the evaluative criteria and understand what the instructor will be looking for when they grade the product (Lin, 2001; Perry & VandeKamp, 2000). For example, instructors could involve students in peer assessment where they have students in the class provide constructive feedback on each other's papers. In this way attention is given to how the assignment will be graded, which may prompt students to think about the nature of the task, the products they have produced, and whether their products meet the criteria.

One approach to self-assessment may be to help students co-construct criteria with the teacher so the students can develop a better understanding of how they will be graded (Lin, 2001; Perry & VandeKamp, 2000). If students co-construct the criteria from the start then they are involved in creating the standards that the

instructor will use to judge whether they have successfully completed the task. This may increase the chance that students will be able to make more accurate judgments about the outcomes of their learning.

By involving students in thinking about how they will be assessed, they may be able to determine whether they need to adapt their approaches to completing a task or aspects of the products they have produced. Through structuring self-assessment activities, students may focus more attention on aspects of SRL including: (a) what they understand about the task; (b) types of goals they set given the structure of the task; (c) strategies or tactics most suited to reaching task goals; and (d) elements of task products they should include (Hadwin et al., 2003; Lin 2001). As well, self-assessment may provide a more active basis for monitoring how tactics and strategies create products and whether goals have been achieved (Ley & Young, 2001; Paris, 2001). Involving students in self-assessment can develop a deeper understanding of learning and may also lead students to strive for higher standards of performance (Paris, 2001).

**Create Non-threatening Learning Environments**

Perry et al. (2002) suggested that learning environments should challenge students and also encourage students to be accountable for their thinking and learning. However, this should be done in such a way that students are able to maintain motivation to engage in classroom activities. By having students reflect on their approaches to learning, they can think about their personal progress in learning new material and use this feedback to persist in what might be challenging circumstances.

Overall, these design principles suggest that instructors can facilitate more active

forms of cognitive processing by students. Overall, instructors should strive to create instructional environments designed to help students bootstrap learning processes that engage them in increasingly more productive forms of SRL (Winne, 1996). To bootstrap learning, students should strive to attend more directly to the elements of the task as a means to help them alter or improve upon their methods for examining content and producing task products that are more aligned to evaluative criteria.

## The Present Study

Researchers have barely begun to examine task definition as a factor that influences self-regulation or achievement. Thus, there do not yet exist scales that measure task definition or that gauge changes of task definition over time. In this context, I created my own framework to describe task understanding. As a new development, my framework does not yield scores that could be correlated with other data or that define distinctive categories of membership that could be used to examine relations with other measures, such as achievement. My results are a preliminary interpretation, based on comments students made in their portfolios, of what initial task understanding consists and how initial understanding(s) of the task change over time.

In the present study I incorporate design principles for fostering cognitive growth (described above) in the context of an upper level undergraduate course in Instructional Psychology. In particular, this study investigates the kinds of information students examine or seek about learning tasks, how they integrate these data to develop task understanding, and how understanding of a task flexes and evolves as a student engages in the task and receives feedback. Over the 13-week

course, students were given an opportunity to think and articulate what they thought about two major writing assignments, a think paper and a design project. The study examines their initial understandings of the tasks and how those perceptions change over time. Prompts that were provided in the form of questions helped students reveal their understanding of the tasks and factors related to potential changes of those understandings. This information was included in a studying portfolio, which provided the data source for this study.

# Chapter 3: Method

## Participants

Participants in this study were a subset of students enrolled in a 300-level (upper level) Instructional Psychology class that I taught as part of a Sessional lecturer appointment. All research-related activities for this study were regularly scheduled instructional activities required of students enrolled in the course.

At the end of the semester students were asked to allow the studying portfolio assignments and their grades on this and two other assignments to be used as data in the research project (described below). When students completed the course evaluation sheets, students were also handed a consent form to sign and a demographic form to fill out for background information (i.e., age, GPA, etc.; see Appendix A). Those who agreed to participate handed in their evaluation forms with the consent and demographic forms. All of the forms went to the Undergraduate Program office where they were held in confidence until after final marks for the course had been assigned.

A total of 58 out of 87 students agreed to participate in the study, which represented 67% of the total class enrollment. The average age of these students was 22.78 (SD=4.18, min 19, max 42 years). At the end of the semester these students reported spending an average of 13.96 (SD=9.21, min 0.5, max 45) hours studying and 15.75 (SD=10.63, min 0, max 40) hours at jobs. GPA ranged from 2.30 to 3.85 with a mean of 3.03 (SD=0.37). The students were pursuing a variety of majors

including Psychology, English, Linguistics, and others. Most students who took this course were striving for admission to a Teacher Education program.

**Course Context**

For each of 13 weeks, the course consisted of a 1 hour and 50 minute lecture period and a separate 50-minute tutorial. Classes were on Fridays and tutorials occurred either immediately before lectures or on the Tuesday following lectures. The teaching assistant for the course was responsible for three Friday tutorials and I was responsible for three Tuesday tutorials. Lectures examined the main themes from the chapters in the course textbook and provided some practical examples and illustrations that students could use to think about the material. Specific activities were designed for the tutorial periods so students could expand on or clarify their understandings of the course material. All of the students had previously completed the prerequisite Introductory Educational Psychology course. As well, students reported completing a number of other education courses, including research methods in educational psychology, assessment for classroom teaching, classroom management, and learning disabilities.

The course in Instructional Psychology focused on principles of teaching and learning. Students were introduced to theories associated with memory, self-regulated learning, beliefs about knowledge and intelligence, motivation, instructional design, and problem solving. As well, the course also focused on learning in several content areas: learning to read, reading to learn, writing, math, and science. The text used in the course was Bruning, Schraw, and Ronning's *Cognitive Psychology and Instruction* (1999, 3rd ed.).

Three assignments were designed to prompt students to think about the course content. In the first lecture students were provided with an overview of the course assignments, which were a think paper, a design project, and a studying portfolio. An overhead summarizing each of these course assignments (described below) was provided to illustrate the nature of each assignment. Each of these assignments and activities was designed to encourage students to think about the content in the course in an active and constructive manner.

The think paper was designed to encourage students to develop a deeper understanding of a theoretical issue covered in the course. In the first lecture this assignment was introduced in the following manner. "In tutorial we will generate a list of issues from the topics presented in class during the first five weeks of class about both teaching and learning. You will be expected to find five articles that extend readings from class to address the issue. The issue can be related to a topic that you want to pursue for your design project."

The second main assignment was a design project where students were asked to design a small curricular activity and then use theory to justify their design. In the introductory lecture the assignment was described as follows. "You will apply principles and ideas presented in the course, to design and justify a lesson in one of the following areas: learning to read, reading to learn, writing, math, or science." This assignment provided an opportunity for students to think about how theory and research can inform practice. Given that students had a history of educational experiences, it was believed that students would be able to experiment with practical activities and make links to theoretical constructs within the course to develop a

deeper understanding of the course material.

The main focus of the dissertation study and the main data source for this research project was the studying portfolio that connected the think paper and design project assignments. The studying portfolio had two main components. For the first component, students were given four questions to assess their initial perceptions of the design project task given out in week 3 of the course. After students completed these questions, the remainder of the assignment required them to track their progress in completing the other writing projects within the course—the think paper and design project. This second component of the studying portfolio provided an opportunity for students to think about their approaches to learning and creating assignment products. The studying portfolio was designed as an ongoing weekly activity for students to indicate what they did and how effective they were in accomplishing the two main writing tasks (see Appendix B). The studying portfolio was to be handed in at two points, once before their think paper was due and a second time when they handed in the final copy of their design project.

**Procedure**

The design project was introduced to the students in the third week of class during the lecture. To help students start thinking about what they wanted to do for the design project, I decided to provide the instructions for the design project first, and then work backwards to help students begin generating potential issues they could pursue in the think paper.

Students assembled in the classroom and were handed a paper copy of the design project. As students read the instructions, an overhead displayed four questions.

These questions were designed to help students focus attention on key aspects of the assignment: (a) How do you perceive this task? What do you think this task is all about? Try to describe it as analytically as possible. (b) What would you add to the design project to make it more clear and concrete? (c) Describe concretely the activities you plan to accomplish the task. What steps are you going to use to complete the task? What are your goals for the project at this point? (d) How does the outline for the design project help you outline or develop ideas about what issue you might frame for the think paper? The first three questions were similar to questions posed by Luyten et al. (2001) but the context for that study was different. In the Luyten et al. study students were asked to create an essay question. Each question was designed to prompt students to think about the nature of the project and brainstorm some ideas about what they would have to do when they started to work on the project.

After students finished responding to these questions on their own, I asked them to form groups of four. I asked the groups to find a space within or outside the classroom and talk about the design project and their understandings of what they were supposed to do with the design project. I indicated that some of the best ways to learn are through sharing opinions of what a task is about and negotiating an understanding of the task based on everyone's perception. To encourage discussion and keep the discussions on track, I also provided each group with prompt questions that they could consider with respect to key aspects of the project (Appendix C). Students set themselves up in their groups and started discussing the project. I circulated around the classroom to the various groups to determine how the activity

was working and to clarify any group questions.

Students engaged in this activity for the majority of the lecture period. About 15 minutes before lecture time was finished, I asked students to return to the class. We debriefed as a class about the activity and why I had asked the questions about the design project. Given the complexity of the design project assignment, I indicated that I wanted students to really think about how they might put the project together. I also emphasized that this was not a task they could complete without putting a good deal of thought into it. After this debriefing, I handed out the studying portfolio assignment (see Appendix B). I gave students some time to read over the instructions for the assignment and to take a look at what they would have to do for the assignment. I then gave students an opportunity to ask questions about the assignment. I also emphasized that this activity was central to understanding aspects of theory within the course.

In the next week, I sent out an email and then handed out in lecture a paper copy of the think paper assignment so students could begin work on this project. At the bottom of this sheet was an addendum that provided the grading scheme for the studying portfolio (bottom Appendix B). As well, the addendum provided students with additional information about what they could include in their studying portfolio assignment. Again, I used a small bit of lecture time and tutorial that week to clarify any questions students had about the assignments.

At two other points in the course I asked students additional questions about both the think paper and design project instructions. Two weeks before the think paper was due, I asked them to respond to two questions. First, I asked students to indicate

whether their understanding of the think paper had changed over the last few weeks and to explain why it had or had not changed. At the same time, I asked students whether their understanding of the design project had changed and to explain why it had or had not changed since being given the assignment. Responses to these two questions were to be included as part of the first portfolio.

After students handed in the think paper and were ready to move their focus to the design project, I asked them to consider the instructions for the design project. This task required that they (a) remove the "lingo" that I had used to describe the project and (b) rewrite the instructions in their own words. I believed that this type of activity would prompt students to think more directly about the design project requirements and also help them determine if changes had been made to their understanding of the task. The response to this question was to be included in the second installment of the studying portfolio. By prompting students to direct their attention to the design project it was hoped students would develop new or better understandings about the nature of the task.

**Additional Tutorial Activities**

Shortly after handing out the think paper assignment, the teaching assistant and I asked students in our tutorials to report what topic they were going to pursue for their think paper to ensure that students had chosen an issue that was appropriate. This also provided a check to ensure students were on track in starting the think paper. We addressed additional questions in tutorials about both the think paper and the studying portfolio. During this time I indicated that the bulleted list on the studying portfolio assignment provided guidelines to follow, but students could incorporate anything in

the studying portfolio that helped them illustrate and reflect on their processes.

After marking the first studying portfolio assignment, I decided to address some issues that came up with respect to how students completed the first installment of the studying portfolio, and to give students additional feedback about how they could report and reflect on their studying process. In every tutorial, the teaching assistant's and mine, I spent the full period talking about metacognition and the role it plays in learning. We created overheads in each tutorial concerning what metacognition was, what it looked like, and how you could talk about it when completing the studying portfolio assignment. This also provided students with additional information about what they could include in the next installment. I further encouraged students to respond to the feedback I had provided. Their responses to the feedback would be an additional aspect of the grade for the second installment.

I also altered the course slightly to include a peer review activity. I indicated to students that this would contribute to their overall course grade: 20% for the design project per se and 5% for their feedback to two peers about their draft projects. I asked students to bring a completed draft of their design project to class a week before the final design project was due. We spent a full tutorial talking about the nature of feedback—good versus bad feedback and what it meant to provide constructive feedback about a person's work. These discussions provided the basis for creating a feedback rubric that students used to grade their peers on the feedback that they provided to them on their draft design projects.

Finally, I used another tutorial session to have a group discussion about the purpose of the design project and what students were supposed to do for the design

project. For students this provided an additional comprehension check about the purpose and scope of the design project. I led the discussion, focusing the students on particular questions and determining what their responses would be to the questions. If students needed specific examples of how to think of elements of the design project, we worked to co-construct examples. This also provided an opportunity for students to ask any additional questions they might have had about the design project.

**Approach to Data Analysis**

My methodological tack for investigating facets of task understanding was slightly different from traditional methodological approaches. This was an exploratory study to determine whether methods I used to trace and track changes to task understanding would provide an opportunity to enhance our understanding of self-regulated learning. This also provided an opportunity to relate and apply the teaching principles described in Chapter 2 to a classroom context. The analyses represent an interpretive, qualitative account of factors that influence student engagement within the context of the course, specifically in the assignments and activities associated with the assignments (Packer & Addison, 1989).

Interpretive inquiry focuses on "human activity situated in context and the offspring of such activity: institutions, histories, accounts, records, texts, stories, lives" (Packer & Addison, 1989, p. 19). Interpretive inquiry has five key features (Packer & Addison, 1989). First, the domain of inquiry for this study uses action in context—text created by students to reflect on their approaches to producing task products. Second, the methods used to examine task understanding are grounded in a body of knowledge where the starting place for conducting the study was constructed

based on a practical understanding of teaching and learning processes. This practical understanding was articulated in the methods used to collect data—tasks and activities that I incorporated into the classroom context, and modified or adjusted as the semester progressed. Third, the primary source or character of explanation is within narrative texts; a reading of texts was necessary to derive themes and categories based on key questions about task understanding as a facet of self-regulated learning. Fourth, both the students and I participated in a shared culture of understanding based on lecture and tutorial discussions as well as through the feedback provided on the assignments. Finally, the fifth feature concerns the method of justification. Based on the examination of the texts students provided in their portfolios, I justify my interpretation of the texts by evaluating whether the interpretation of the data uncovers "an answer to its motivating concern" (Packer & Addison, 1989, p. 16). The motivating concern is factors associated with task understanding that influence how students approach, enact, and evaluate their approaches to completing tasks. In these ways, my interpretive account establishes a point of view through which texts were examined and then evaluated (Packer & Addison, 1989).

The hermeneutic circle includes a forward arc of projection and a return arc that allows for evaluating the interpretive account (Packer & Addison, 1989). My own theoretical lens provides the fore-structure for capturing emergent themes and categories when examining the students' portfolios. This fore-structure has been outlined within Chapter 2 and in the Procedure pertaining to the study. This fore-structure is key to ensuring that interpretation occurs within an appropriate

framework (Packer & Addison, 1989). Within the context of lectures and tutorials, I provided my own views about teaching and learning processes so students could understand the goals and objectives behind the assignments. Ideally, this would provide standards that students could interpret to help them determine what to include in assignment products. As co-participants in the classroom context, the students, teaching assistant, and I discussed views of the assignments and the course content and thus co-constructed knowledge and understanding of important topics related to teaching and learning.

The instruments used within the study—the four initial task understanding questions as well as the prompts included in the studying portfolio—were grounded within the theoretical lens that framed the study to ensure construct validity. The instruments were loosely structured, but designed to access as much descriptive and contextual information as practical pertaining to the main research questions about task understanding and self-regulated learning. Students could freely express through their writing what, how, and why events were important to them in terms of completing the assignments (Miles & Huberman, 1994). Additional questions were asked throughout the semester to provide additional insight into factors that mediate students' approaches to completing the assignment. Based on this data, I created my own framework for examining the data and interpreting the results.

Data were originally examined by grading the first portfolio assignment. At this point, feedback was provided to students to help construct a better understanding of the portfolio task. As well, based on interactions with the students, the course was adjusted to include activities to help students construct and enhance their

understanding of the assignments and content with the course. One adjustment to the course was to include a tutorial session about the feedback on the first portfolio to help students understand how they could reflect on their learning processes. This also enhanced features of the data analyzed here. Qualitative researchers indicate data analysis should proceed by collecting data to "fill in gaps, or to test new hypotheses that emerge during analysis ... it helps the field worker cycle back and forth between thinking about the existing data and generating strategies for collecting new, often better data" (Miles & Huberman, p, 50). This initial examination of the data provided me some insight into the types of themes or categories that would emerge from the data.

After the course ended, data were transcribed from paper-based to computer-based versions for further analyses. Based on the initial framing of the questions to be addressed in the studying portfolio, data associated with each question were examined for specific themes or recurring patterns (Merriam, 2001, see also Miles & Huberman, 1994). Where possible, a quantitative approach was used to summarize the number of students who had responses belonging to each theme, the number of comments made within that theme, and the contextual information related to each theme. After this initial coding, each question and themes and categories within questions were cross-checked to ensure consistency in the coding framework (Miles & Huberman, 1994).

The studying portfolio provided traces of event-based information about students' understandings and representations of the tasks (Winne, Jamieson-Noel & Muis, 2002). Data, analyses, and interpretations presented within the results chapter are

case-based illustrations that provide a unique lens through which I could track how task understanding emerges and evolves over time and influences other aspects of self-regulated learning. Therefore, the studying portfolio documents how students represented their understandings of the main writing tasks in the course, the think paper, and the design project. Although students varied in terms of the depth and breadth of descriptions, they did provide comparable information about factors that influenced their interpretation of the task and how they self-regulated their learning when completing the assignments. Since the instrumentation for the study was loosely structured, this allowed students freedom to develop their own style for completing the portfolio, although some students opted to adopt the structure that I provided for the assignment. The framework I developed to examine data revealed each student had a complex, multidimensional, and possibly unique profile of activities for completing the task. It is not clear that students could be meaningfully and validly grouped on the basis of these characterizations. This also means that no scores could be constructed or groups formed to examine relations with other measures such as achievement.

My qualitative method was designed to understand and uncover how students construct an understanding of course assignments. My results are a preliminary interpretation, based on comments students made in their portfolios, of what initial task understanding consists and how initial understanding(s) of the task change over time. The process of interpretation involves "working out the possibilities projected in understanding, [and] shows entities explicitly, often for the first time" (Packer & Addison, 1989, p. 278). Internal validity concerns the trustworthiness of the

inferences drawn from the data and whether the themes or constructs that emerge from the data represent or measure categories of human experience that occurred (Eisenhart & Howe, 1992; Merriam, 2002). "The truth of an account will be suited to the perspective adopted in the inquiry... a true interpretive account is one that helps us and the people we study, that furthers our concerns" (Packer & Addison, 1989, p. 279). Valid knowledge is a matter of outlining the relationship between the knower (researcher) and known information contained concerning the question of interest (Packer & Addison, 1989). Within the results I make direct links to existing models of self-regulating learning to highlight consistencies, inconsistencies, or additional elements to be considered in modeling SRL.

Students responded to multiple questions about the assigned tasks and this provides one mechanism to ensure that internal validity has been achieved. I illustrate in each theme/category multiple voices or sample quotes to illustrate the wide-ranging perspectives within the themes and to provide a coherent and comprehensive view of responses to the questions posed in the study (Gergen & Gergen, 2003). Entries in each student's studying portfolio was examined and then compared within the complete sample to develop a full picture of what happened within the context of the course. Themes primarily emerged inductively from the data, however, I also used a deductive approach through using the theoretical lens described in the literature review to examine specific features or parameters of how students construct and revise their understanding of the task (Merriam, 2001; Miles & Huberman, 1994). Due to the longitudinal nature of the data collection process, this allows for rich, thick descriptions of the events and experiences of the students within the course.

External validity concerns whether the "findings from one study can be applied to other situations" (Merriam, 2001, p. 207, see also Miles & Huberman, 1994). This study makes use of multi-case analysis to enhance the generalizability of findings (Merriam, 2001). Individual students have their own unique characteristics that contribute to the interplay between what happened in the course. No two courses would ever be alike because of what each student brings to a course. However, what can be gleaned from the data are elements of organizational features of the classroom environment that may contribute to or enhance ways for creating classroom contexts that help students self-regulate. The practical implications that emerge from the analysis will lend credence to strategies that can be used in classroom practice to help both teachers and students (Packer & Addison, 1989).

Reliability refers to whether the data are consistent and dependable (Merriam, 2001). In this chapter, I have provided a detailed account of the course context, my role within the context, and specific design features of the course context to illustrate and explain why certain findings were constructed from the data (Eisenhart & Howe, 2002; Merriam, 2002, 2001). I initially examined the data as a marked assignment to ensure that students were aware of what they should be incorporating into their studying portfolios (Miles & Huberman, 1994). The data was examined multiple times to arrive at the final themes and categories described in the results chapter (Packer & Addison, 1989). Decisions to include specific activities, such as specific topics for tutorial discussions, were the result of my own active participation within the research context. They represent my attempts to ensure that students understood the purpose and scope of the assignments and to enhance the data collection process

(Merriam, 2002).

Therefore, my own practical and theoretical orientation led to the development of the design features of the course. I wanted specifically to examine the interplay between instructional design features and how students reacted to those elements. I believed the assignments I constructed for the course were essential to understanding theory presented in the course. Through participating in this kind of design experiment, I learned not only a lot about how the students within the course reacted to these elements, but I also learned a great deal about curriculum design. These findings not only can inform theory, but they also provide insight into how theory translates into practice.

# Chapter 4: Results

Of the 58 students who agreed to participate, five did not resubmit the first installment of the studying portfolio at the end of the term. Therefore, these participants' data were not available for the questions about initial task understanding and reflections pertaining to completing the think paper assignment. In this chapter I explore characteristics of tasks students attend to that may influence SRL, specifically, factors that influence how students develop and refine their understanding of assigned tasks over time. I analyzed responses to key questions that were asked throughout the course as outlined in Table 2.

A caveat about the data analysis needs to be addressed. In week 3, I gave out the initial task understanding questions and it was evident through monitoring that students were responding to the questions. However, since I did not require students to hand in responses for these questions at the end of the lecture it is possible they could have added to their responses at any point from the time this activity was completed until they had handed in the first portfolio. From my examination of the data, I strongly suspect students did not add to or revise comments made about their initial task understanding after this lecture period, however, I cannot guarantee this is the case.

A second caveat about the data analysis also needs to be considered. The questions in Table 2 are main features I discuss in this chapter about data extracted from the studying portfolio. However, as is evident in Appendix B there were other questions in the portfolio that addressed other aspects of self-regulated learning. I do

not consider these other questions in this analysis because my focus is examining issues associated with task understanding, problems students perceive that impede their progress on the task, and events where students refine understanding of the task. I judged that the questions listed in Appendix B that are not also listed in Table 2 fell beyond my focus.

**Table 2. Questions designed to assess task understanding.**

| |
|---|
| **Initial Task Understanding Questions Posed in Week 3's lecture.** |
| • Question 1: How do you perceive this task? What do you think this task is all about? Try to describe it as analytically as possible. |
| • Question 2: What would you add to the design project to make it more clear and concrete? |
| • Question 3: Describe concretely the activities you plan to accomplish the task. What steps are you going to use to complete the task? What are your goals for the project at this point? |
| • Question 4: How does the outline for the design project help you outline or develop ideas about what issue you might frame for the think paper? |
| **Change to Task Understanding Week 7's Lecture** |
| • Question 5: How has your understanding of the think paper developed/ changed over the last few weeks? Why? |
| **Monitoring Task Understanding. Given out week 3, answered throughout the duration of the course.** |
| • Question 6: What are the "easy" aspects of the assignment? |
| • Question 7: What are the stumbling blocks to completing the assignment, and how do you overcome these stumbling blocks? |

Although all students responded to the initial questions about task understanding, not all students responded to questions 5-7 in Table 2. Some students missed class when question 5 was assigned. I gave guidelines to students about what they should include in the portfolio, however I did not require them to follow these questions directly on the condition they fully described and reflected on their studying processes. As a result, students responded to questions 6 and 7 in different ways. Questions 6 and 7 were often not explicitly included as sections in students' portfolio entries, but were embedded in other elements of the studying portfolio such as comments made regarding strategies for reading or writing. In light of this, I report the number of students who responded to the main questions listed in Table 2. In future analyses I will investigate the remaining elements of the complete data set to explore other facets of self-regulated learning.

The third caveat concerns the nature of the data collection process. The studying portfolio was meant to be an ongoing activity where students could reflect on the effectiveness of their approaches to studying within the course. Some students made comments throughout the semester as evidenced by dates associated with each entry in their portfolio. Anecdotally, I also know that other students waited until just before the assignment was due to reflect on their approaches to learning.

When considering the data set as a whole, there were very diverse approaches to not only what students wrote about their approaches, but also to how much they wrote and the quality of their responses. For example, Participant 84 wrote entries throughout the course of the semester detailing in great breadth and depth her approaches to studying and learning as well as the effectiveness of her approaches. In

contrast, Participant 40 wrote very little about his approaches or the effectiveness of these approaches. This diversity is also a factor that influenced the number of responses within and across categories. Not all students commented and reflected on their approaches to the same degree, which, in itself, I think is an interesting finding. This may suggest a capacity or willingness to engage in this kind of thinking, or, previous opportunities to engage in this kind of thinking may have influenced the type, quantity, and quality of students' entries.

The purpose of the portfolio was to provide occasion for students to think about, reflect on, and, as they deemed necessary, experiment with their learning approaches. Individual student portfolios varied considerably in depth, breadth, clarity, and specificity. This may be due to a variety of factors. Students' prior experiences with academic tasks and their differing capacities to articulate this kind of thinking in the portfolios may reflect individual differences in preferences to engage in and report on specific learning activities. Previous research also suggests students' memories are fallible and they may be biased in what they report about learning (Winne et al., 2002; Winne & Perry, 2000). As well, I chose not to require that students report on all facets of the task because this might not optimize their learning process. Therefore, students chose elements of the task they judged to be important in working through the task space. As a joint result of these factors, students may not have reported the full range of activities they engaged to complete the assignments.

These individual differences in self-reports occlude full and unerring representation of what students did and perceived about the projects, that is, the information entered in the portfolio, and, as such, invariably influence my

interpretations about emerging themes. Given the number of students who participated in the study, a diverse picture of factors they considered to define and refine their understanding of the task was still achieved. All of the data contributes to piecing together the puzzle of task definition regardless of how much information individual students provided.

For each question, analysis initially involved coding data into broad themes that focused on key terms or phrases in students' responses to questions in Table 2. Based on this initial coding, students' responses were then examined more closely to group conceptually similar responses. I report the number of students who commented in relation to each question, the number of statements that were made within each theme and, as necessary, categories within those themes.

## Initial Task Understanding

With the methodological caveats noted above, initial task understanding was ascertained by four questions as listed in Table 2. Each question reveals different information about how students construct an understanding of the task, as each question appeared to help students monitor different elements of the task space. Based on responses to these four questions, I explored students' task descriptions for properties of the task that helped them understand the task.

**Table 2— Question 1: How do you perceive this task? What do you think it is all about? Try to describe it as analytically as possible.**

Examining responses to this question led to an initial decision to code each participant's response using two main themes: task conditions and cognitive conditions. These main themes were chosen based on the literature surrounding SRL

(Winne & Hadwin, 1998; Winne & Marx, 1989; Zimmerman, 2002) as well as key terms or phrases that were recurrent in students' responses. The *task condition* theme refers to specific task structure elements students perceived and attended to upon receiving the instructions for the task. The *cognitive condition* theme refers to a range of information about motivation, domain knowledge, and strategic knowledge that could be used to frame an understanding of the task. After an initial sort of data according to these themes, the information was coded again to form categories within each main theme.

### *Task Conditions*

Fifty-one students (96%) commented on task conditions. Most comments pertaining to the first question identified specific parameters of the task space that described boundaries of the task—an initial state and a goal state. This resulted in 4 main categories described below. Appendix D provides quotes that illustrate each category.

#### Surface description-low level details.

There were 26 students (49%) who made this type of description. Students typically defined or listed a few features of the task corresponding to factors that, as the instructor, I believed were important to representing the design project task. Students whose descriptions were assigned to this category did not exhibit a strong initial task understanding for the following reasons. Students did identify key large-grained surface elements of the design project, but did not elaborate in any detail the purpose of these components in terms of framing a product. Moreover, there was very little analysis concerning more fine-grained details of the task. Instead, descriptions

were global or framed as repetitions or simple paraphrases of the description of the design project task itself.

There was evidence students understood they had to have a practical element and a theoretical element in their task product. This is a somewhat adequate and accurate description of the goal state. However, there was minimal interpretation detailing the nature of this connection, which is a key standard students must recognize to complete the task successfully. Therefore, students did not infer deep structure (implicit) instructional cue(s). There was little evidence students translated information into a cognitive representation that could help them create standards to monitor their progress in reaching a goal. Thus, in this category students' search of the task space was confined in that they searched and then attended to only a few task cues of a large grain size. There was little evidence they assembled information to form an integrated understanding of the task.

**Surface description-moderate level details.**

There were 17 students (32%) who made this type of description. This category is distinguished from the former in two respects: (a) students' attention was focused on a greater number of instructional cues within the task space and (b) students provided more detailed explanations of the meaning of those task elements. Although there was a slightly greater emphasis on underlying foundations of what the design task was about, there was still strong literal interpretation evidenced by correspondence to language provided in the design project instructions.

When these students searched the task space, this search stimulated a description of more elements of the task structure. Specifically, there was greater emphasis on

explicit instructional cues embedded in the task description. The instructional cues they selected were of a finer grain-size than in the previous category, meaning a greater emphasis was placed on more specific elements of the task description instead of providing a general overview of global points. These students also recognized there was a theoretical and practical component of the task product. Again, this suggests these students recognized a potential goal state. However, as with the previous category there was still very little interpretation of the meaning of this connection. This may prevent students from creating standards to monitor progress towards reaching task goals. Students also did not assemble the explicit task components to form a coherent structure. Instead they tended to list those components as if they were isolated from one another and from other characteristics of the task. Students were still very literal, relying on the simple paraphrases or repetition of description details. Despite describing more features of the task, these students also did not exhibit a strong initial understanding of the task.

**Deep description-low level details.**

In this category I observed evidence in the data of deep descriptions with low-level details. There were only three students (6%) in this category. This category is described as having low level details because there were no direct or explicit references to explicit instructional cues that needed to be incorporated in the frame of the product. However, in translating or interpreting the design project instructions, these students captured greater depth and breadth of the underlying foundation of the project. They went beyond a literal task description and indicated how the task would extend their knowledge, or they thought of ways to relate the design project to a topic

of interest. These students used their own language to transform their understanding of the design project.

The students in this category illustrated a more elaborate understanding about the specific purpose of the task. These students interpreted the design project instructions by providing a framework for thinking about how larger grain sized details of the project needed to be mapped together (assembled) to frame a product. Therefore, these students made more inferences about the purpose of the assignment. They also may have a better framework for thinking about elements of the task structure they should attend to in forming a plan for starting the project. These students framed specific standards for monitoring task progress and judging content in relation to components of the assignment. However, they still did not illustrate a fully integrated understanding of both the implicit and explicit task conditions. Although this reflects a better understanding in terms of the overall purpose of the assignment, I interpret there were too many missing details to capture the full scope of the task.

**Deep description-high level details.**

Five students' (9%) descriptions of the task evidenced deep descriptions with high level details. In this category students provided richer details, describing elements of the task space and also a framework for thinking about how to interpret these elements of the assignment. As with the previous category, they moved beyond literal interpretations by making greater use of their own language to describe the underlying foundation of the assignment. They also provided an analysis of how to examine and build connections between components of the task.

I believe these participants had greater breadth and depth of understanding about

the assignment. In these descriptions they translated and transformed information from the task description. In other words, they did more with the description than listing details of the assignment. They also assembled explicit task conditions together to understand relationships between key components of the assignment. Moreover, these students recognized several implicit details about the assignment such as the need to evaluate whether the product they constructed would lead to student learning or teaching success. Students in this category provided a more fully developed and integrated understanding of both implicit and explicit task conditions. I infer these students were able to develop a more integrated and holistic picture about the purpose of the assignment, and the importance of the relationships between components of the assignment.

### *Cognitive Conditions*

Cognitive conditions are statements students made regarding self-knowledge pertaining to domain knowledge, beliefs or dispositions, motivational factors, prior task knowledge, or strategic knowledge (Winne & Hadwin, 1998). Students made comments in three of these areas. Six students (11%) made statements about strategic knowledge, which primarily identified ways to process task information. Four students (8%) made comments about how domain knowledge may influence producing a task product. Participant 61 had a comment in both the strategic and domain knowledge categories. Sixteen students (30%) made 20 statements that were related to a motivational orientation towards the task. Motivational/affective conditions reflect forms of self-knowledge that students considered when examining the task that could influence how they approach assignments. Motivational/affective

conditions were coded according to five categories: task difficulty/complexity, effort, incentives/interest, utility, and outcome expectancy. Participants 82 and 7 made comments in three different motivational sub-categories. For all of the cognitive conditions I characterize the types of comments students provided in each category and then summarize the implications of these comments for students' initial task understanding.

**Strategic knowledge.**

The students who made strategic comments about approaching the task used key terms such as apply knowledge, enhance understanding, active learning, or demonstrate understanding. These comments reflect general types of operations that may hold utility in completing the design project. Each of these key terms provides an indication of how students could examine information and build new knowledge structures that reflect one of the main purposes of the assignment, to help students recognize the link between theory and practice. The comments also reflect students' awareness of the assignment as an opportunity to not only know the information, but to utilize the information in an actual context, which would make the information more meaningful for them. Overall, these students appeared to recognize the importance of doing more with the information than just memorizing it or transposing information into a product. I interpret such comments may provide a good starting point for these students to think about how they might manage and evaluate what they had to do within the task space. Appendix E provides comments made by students in this category.

**Domain knowledge.**

Four students (8%) made statements directly related to using prior knowledge or building new knowledge to complete the project. Being metacognitively aware of one's conceptions of the teaching and learning process may be an important task element to consider because it may have implications for how students examine information in resources. For example, students may incorrectly examine information in resources so they support initial (faulty) conceptions of a concept. When they frame a product, this incorrect knowledge is transferred to the product. This transfer of incorrect knowledge may have a negative impact on their grade. Overall, these students appeared to be aware of how their epistemological stance towards teaching and learning may influence the type of task product they create, which in terms of later product evaluation might have an influence on their mark for the project. Appendix E also provides sample comments about the role of domain knowledge.

**Motivational/affective condition: Task difficulty/complexity.**

Seven students (44%) included key words in their responses about the task being difficult, having many components, or being challenging. All of the students who made comments in this category appeared to have a positive task motivation. These students realized the nature of the task was complex in terms of the number of components, yet appeared to be open to the many possibilities the task offered in terms of doing something potentially different for an assignment. These students made a preliminary assessment of the degree risk associated with the task and adopted a positive view about the nature of the task.

**Motivational/affective condition: Effort.**

Five students (31%) also made notes about the time and energy required for the task. Four of the comments suggest they recognized the number of elements in the task structure and also perhaps a number of subtasks (components) required for completing the assignment successfully. These comments also provide some insight into perceived risk associated with the assignment. Risk appears to be perceived as low, which may have an impact on how they adopt an approach to complete the task.

The remaining student in this category referred to effort in terms of managing or staying focused on the task at hand, which was reading the design project task description and completing the questions designed to assess her task understanding. This student appears to put her best efforts towards completing the assigned task of describing the design project assignment, however, given her physical state of only 3 hours of sleep it made completing the questions about the task more challenging. This had a direct impact on her ability to develop an understanding of the design project task.

**Motivational/affective condition: Incentives/interest.**

Only two students (13%) made comments about interest in or incentives to do the assignment. The first student's comment reflects a positive attitude, indicating that the task sounds interesting. The second participant framed her interest in terms of the type of topic she wanted to pursue for the two main writing assignments in the project. Neither student offered details about why they were interested in the design project. However, these comments do indicate a positive outlook on the prospect of completing the assignment.

**Motivational/affective condition: Utility.**

I defined utility as a student's perception about the usefulness or purpose of completing the design project task. Four students (20%) made direct comments about how completing the design project task would help them as future instructors with reference to real life teaching, increasing awareness of learning principles, or thinking about the content as a resource for thinking about teaching. In this category, participants referred to the practicality of doing this type of assignment as it provided a way for them to generate ideas about teaching processes. There was a direct connection to how students could use this type of knowledge in "real life" contexts such as classes in which they might volunteer. These students also had a positive motivational orientation towards the task.

**Motivational/affective condition: Outcome expectancy.**

Only two students made reference to outcome expectancies defined as the anticipation concerning outcome(s) of the learning process. The first student mentions the need for creativity in putting the assignment together, whereas the second student comments on the overall final structure of the assignment. These two examples provide evidence students were thinking ahead to the types of processing required to successfully complete the design project. Example quotes for all of the motivational/affective categories are provided in Appendix E.

### *General Confusion*

Two students' data were not categorized into any of the foregoing task or cognitive themes. Both did not provide any description of the nature of the task. The first student ascertained that even choosing a topic within the five main subject areas

would be difficult given the potential topics within each individual area. This student did not specifically refer to any task conditions described in the design project but did refer to finding a topic for the think paper. The second student merely indicated that because the topic for the assignment had not been identified yet, it was not possible to provide further information about her understanding of the design project. I interpret these two students wanted to forego describing their understanding of the task until they defined a topic.

**Summary: Initial Task Understanding**

The initial task understanding question helped students interpret the assignment details. Given this was their first exposure to the task, presented in two full pages of instructions, it is unrealistic to expect students would be able to develop a complete understanding of the task. Students may have experienced some extraneous cognitive overload when asked to complete the initial task understanding questions because I not only gave them the design project instructions to read, but I also asked them four questions about this task at the same time. The instructional presentation may have precluded students from allocating cognitive resources to effectively process the demands of the task (Sweller et al., 1990). As well, the time frame to complete this particular activity was fairly short (20-25 minutes). This may not have been enough time for students to thoroughly read and write their responses to the questions, and contributed to extraneous cognitive load.

Given that students likely had never been asked to complete a task where they were required to write about their understanding of the task, this activity may have posed its own unique challenges and influenced their ability to fully analyze the task.

Students may not have fully articulated their understanding of the task due to the processing demands required for integrating both the explicit and implicit task conditions. This would contribute to germane cognitive load; students would have to exert extra effort and interpret the explicit and implicit instructional cues to construct and store schema about the task (Kirschner, 2002). This also may explain why some students listed elements of the task in some descriptions. However, due to the nature of the portfolio assignment, there was ample opportunity for students to create additional entries in their portfolio that reflected their understanding of the task. As well, group discussions that occurred after they wrote their understanding of the task may have helped them construct and refine their understanding of the task.

What the data reveal across the categories is variability regarding what students perceived about the design project. Key differences emerged in terms of: a) breadth of understanding—the number of elements students were able to identify and describe about the task space, and b) depth of understanding—the richness of descriptions of the underlying foundations, purpose, or scope of the assignment. Richness could be operationally defined as cognitively representing the task in an alternate format accomplished through elaborating the meaning of specific surface or deep structure features of the task. Also, richness can be defined in terms of the complexity and originality of the language used to describe task elements. I interpret students who provided broad, deep descriptions of the assignment may have been able to more effectively use their resources to manage cognitive load and develop a schema for the design project (Kirschner, 2002).

In examining the design project instructions, there were 10 main surface

components of the design project that could have been analyzed and assembled to frame an understanding of the task. None of the students identified all of the main surface conditions of the task. They appeared to selectively attend to some elements of the project. I hypothesize students in the first two groups may have wanted to develop a global large-grained understanding to begin the task, and define a more fine-grained analysis as work progressed. After all, this task was given out very early in the course—week 3 of a 13 week course with the design project due date not until the last day of class. This hypothesis may hold for the first two groups, but students in the last two groups (deep description-low level details and deep description-high level details) focused on deep (implicit) structural details. What may account for differences in the task descriptions?

Across the four categories, the task representations became more cognitively complex with greater recognition of more implicit details of the task. Students in the deep categories actively constructed new information based on the task description, whereas in the first two surface groups they appeared to passively adopt the language of the task and did not take ownership of the task (Iran-Nejad, 1990). This may suggest that the deep description groups had a better foundation from which they could set goals and plan learning activities to reach task goals. Thus, I infer students in the latter two categories were able to stimulate, assemble, and translate information contained within the task space into their own personalized framework (Winne, 2001; Winne & Hadwin, 1998). This may suggest more productive forms of SRL.

Although 96% of the students commented on task conditions, a significantly lower number commented on cognitive conditions associated with strategic or prior

knowledge (17%) and motivational orientations (30%). A working hypothesis may explain differences in what students described about the task. How students interpreted this question may have influenced what they reported about the elements of the task structure. The question only asked students to perceive, describe, and analyze what the task was about, but this may not have prompted students to think about other categories of information they could include in their responses. This would account for the lower percentage of students who commented on cognitive and motivational conditions. Notwithstanding, the results for this category are consistent with prior research that suggests cognitive conditions such as prior domain or task knowledge influence self-regulated learning (Dochy et al., 1996; Winne & Hadwin, 1998) while motivation provides a catalyst for pursuing and persisting to reach task goals (Pintrich, 1995; Zimmerman, 2001).

From a learning skills perspective, the cognitive orientation towards a task may influence the way students choose to process information, which may impact how students subsequently plan, enact, and adapt activities to meet task goals (Winne & Hadwin, 1998). Describing a cognitive orientation towards the task provides information to learners about how they should examine information in the task and may provide a basis for monitoring and evaluating initial conceptions of the task (Hadwin et al., 2003).

Motivational statements were brief comments within larger task descriptions that provided some information about how these students viewed the design project instructions and their overall attitude concerning the assignment. These comments also reflect students' preliminary assessments of the degree of ambiguity and risk

associated with the task (Doyle, 1983). The students appeared, for the most part, to respond favorably to the task's complex structure and open format—two criteria of instructional design that are theorized to promote SRL behaviors (Perry, 1998). Students who made motivational comments about the nature of the assignment may be more likely to choose an approach to completing the task that was adaptive in promoting SRL behaviors because they had a positive motivational orientation. If students had responded negatively in their initial understanding of the task, this may have led to maladaptive approaches to self-regulated learning. Zimmerman (2004) would characterize students in the former case as proactive learners who effectively used their positive motivational stance to drive learning activities, whereas in the latter case negative motivational stances may have led students to react to learning outcomes and this may impede further attempts to learn.

Overall, the comments made about cognitive conditions provide additional insight into how students may interpret the nature of an assignment. As Simpson and Nist (2000) suggest "what students believe about learning and studying has an influence on how they interpret the task and how they interact with text, and ultimately, the strategies they select" (p. 530). Students should consider their strategic and epistemological knowledge. These cognitive conditions serve as a potential foundation for thinking about how they might interpret and later make decisions about how they could approach the task.

Was it necessary to include descriptions that covered all three aspects to develop an initial understanding of the task? From a theoretical perspective it would be advantageous to assess both task and cognitive orientations because this would

provide better grounding for students to plan an approach to complete the task. Moreover, the more information students can generate and understand about their orientation(s) towards the task, the greater the likelihood they will not only be able to assume adaptive approaches to complete the task, but also generate more standards for monitoring and evaluating task progress (Winne & Hadwin, 1998; Zimmerman, 2001, 2002, 2004).

Overall, I interpret that students perceived and attended to different instructional cues within the task space, suggesting they made choices about what they should pay attention to when given a task. Students also varied in their ability to interpret what those instructional features may represent in terms of framing a product or defining an approach to complete the assignment. Considering theory, students may not have cognitive tools (tactics or strategies) in their toolkits to help strategically examine elements from the task space to develop a fully integrated understanding of the task (Butler, 1998b, Butler & Cartier, in press). More importantly, the implication for the long term is that if students fail to develop a clear sense of the purpose of the task, there will be a decreased likelihood they will be able to arrange learning activities in support of reaching task goals (Butler, 1998b; Hadwin, 2000).

It was expected that students' perceptions of the task structure would expand and become more elaborated as they worked through the task space. For example, in the first two groups students did not describe link(s) between theory and practice. However, this was one of the main objectives of the course lectures and assignments. It was expected students would develop means to understand the link between theory and practice as they worked through the material in the course and completed the

activities in tutorials and other class assignments. Future discussion would offer an avenue through which students could explore their understanding of the task and create products to reach goals (Zimmerman, 2001).

**Table 2— Question 2: What would you add to the design project to make it more clear and concrete?**

This question was included as part of the initial task understanding component because the instructions for the design project were complex—it was a multi-faceted project that spanned two pages of text. This question assessed what aspects of this presentation format helped define the task. The question also served an instructional goal: by answering it, students might be led to develop better understanding of the project because they had to think about the frame of the design project itself.

Besides the 5 students who did not resubmit the first portfolio, one other participant did not respond to this question, yielding a total of 52 students in the analysis. To code the data, responses were analyzed in terms of key phrases students included in their responses. A total of 94 statements were coded into 11 categories. Often students had more than one comment that could be mapped into different categories. One student had 6 comments, 1 student had 5 comments, 1 student had 4 comments, 6 students had 3 comments, and 19 students made 2 comments, leaving 24 students with one comment each. The analysis includes the number of people who responded within each category. Appendix F provides specific examples of quotes from students within each of the 11 categories.

***Examples of a format for the design project***

Eleven students (21%) indicated they would like information about how to format

the project. Nine students thought it would be helpful to have a framework to outline sections of the design project. Key terms that students used in their answers to this question were to provide headings, outline sections, provide a layout for content, provide a structural format, or outline a writing style (essay or experimental-write up style). In contrast, the 2 remaining students indicated they might use headings to make each section of the project clear.

Regardless of whether students thought I should provide the structure or if they had a structure in mind, this type of forethought suggests these students recognized the importance of framing a product in ways that would meet certain task expectations (Winne &Hadwin, 1998; Zimmerman, 2002, 2004). As well, by thinking ahead to how they could frame their work, they created standards for monitoring and evaluating whether their products were appropriately structured (Winne & Hadwin, 1998).

***Examples of a finished product***

Twenty-one students (40%) indicated they wanted to see an example of a finished design project. Twelve students simply stated examples would help but provided no explanation for why they thought examples would help. Nine students provided specific reasons for why examples would be useful and included: a) to clarify the goals of the design project (2 students), b) to clarify the expectations of the design project (2 students), c) to provide guidelines for comparing their product to the models with a note that this may hinder creativity (1 student), d) to provide links between elements of the project to ensure their anticipated project would be clear and cohesive (1student), e) to provide hints about how to start the project (1 student), and

f) to provide a model design project to work from (2 students).

Research suggests that students should be provided with choices and opportunities to control challenge (Perry et al., 2002). Most students who asked for examples of finished products thought it would help them define more clearly the nature of the task. If examples were given, students would be able to compare their anticipated product to a completed product, which may provide more explicit standards to monitor and evaluate progress. This is consistent with theoretical models that suggest students seek or create cognitive evaluations to judge whether products meet criteria (Winne & Hadwin, 1998). However, providing examples takes away the responsibility for learning. Instead of constructing their own understanding they may mimic what they see in the example. This would also prevent opportunities for forward-reaching transfer (Salomon & Perkins, 1989) because students would not have opportunities to abstract their interpretation of main concepts from design project into a product. Therefore, I purposely did not provide an explicit example because I wanted students to grapple with the design project and construct their own standards for the best project. Through future discussions of the design project, I expected that the need for this type of example would dissipate.

***Examples of topics***

Seven of 9 students (13 of 17%) commented on topic choice. Three students wanted specific examples of topics to be provided. Participant 70 noted that a list should be provided "not to spoon feed us but help us generate ideas." Two students commented they wanted a concrete context or ideas for an activity. One student wanted more information about how specific the topic needed to be, whereas the

remaining student wanted information about narrowing topics so there were fewer topics to choose from. The two remaining students talked about examples of topics in a different manner. One student commented she needed to define a topic to determine what to do with the project. The final student thought the examples provided in the design project description provided ideas and issues to get started on the project.

Thus, the general consensus for these students was that providing topics would be useful in helping to find a focus for the projects. Choosing a topic would be a key ingredient that defined a key parameter of the task—the goal state (Winne & Hadwin, 1998). If I gave students topics and they passively accepted the topic as one they should pursue, the motivational catalyst to pursue task activities to complete the project may be diminished (Zimmerman, 2001). However, if students found their own topics, they may be more proactive in planning an approach, finding strategies, and persisting with a topic in the face of difficulties (Zimmerman, 2004). In the latter case students have to define both the initial and goal state on their own and would be more likely to monitor task progress to ensure the task was approachable and manageable (Winne & Hadwin, 1998). As well, choosing a topic of interest would be more motivating; students may also be more likely to apply effort to reach task goals. Therefore, I believed that giving students this information would not be conducive to helping them define their own understanding of the task.

***Examples of concepts***

Three students (6%) indicated having examples of concepts from the design project such as theoretical principles, goals, and objectives would help them to develop a better understanding of the design project. One student commented this

would help because she anticipated these would be the most difficult parts of the assignment. The opposite was true for another student in this group. She thought the examples described in the design project instructions were helpful because they provided specific cues for thinking about the assignment.

These students recognized they lacked prior knowledge about these concepts, an important cognitive condition in all models of SRL. Creating a schema for these concepts would be essential to meeting task standards and, as part of the task, students would have to devise a method to acquire this new knowledge. Using conceptual knowledge and developing a representation of the task are two key features of effective problem solving (Mayer, 2003). Defining the meaning of terms in the design project may influence the choices for study tactics or strategies suited to finding information that would address these components of the task.

Given the novelty of concepts described in the design project, I reviewed these concepts by providing examples of theoretical principles and objectives in lectures (with one of them emphasizing instructional design) and through tutorial discussions. I would not be able to give examples for every type of design project that students were pursuing. I believed only through defining the terms on their own would students be able to translate this information to address this component of the project. This also creates an opportunity for forward reaching transfer (Salomon & Perkins, 1989). Once students had interpreted the meaning of the concepts, like theoretical principles, they would have to apply effort to abstract how to include these ideas into their design projects.

***Clarity task expectations***

Thirteen students (25%) made statements discussing the clarity of the task expectations. Of these statements, 6 students (12%) indicated the expectations were not clearly defined. Students varied in why they thought the project was not clear. One student indicated that not having a topic made it difficult to determine what she was expected to do. Three students indicated they did not have a clear understanding of the purpose of the assignment, expressing the need for a more straightforward explanation of the assignment. One student thought the goal of the project should be stated initially followed by more specific details about elements of the task. One student indicated the expectations could be clearer by providing answers to questions she posed such as should she write an outline, use picture aids, or just write a paper.

A total of 7 students (13%) indicated expectations for the design project were clear. Two students indicated having a specific goal stated within the instructions made the expectations for the assignment clear. The remaining students thought the assignment description expressed clear expectations, was carefully detailed, and concrete.

These comments suggest that students had very diverse evaluations of the design project instructions. Students who were not able to derive a clear idea of the task expectations were successful in monitoring this fact. If students did not have a clear understanding of the expectations for the assignment, theoretically the likelihood they would be able to set goals, plan an approach, or metacognitively monitor their success in working through elements of the task space would diminish (Winne & Hadwin, 1998; Zimmerman, 2002). Those who thought the expectations were clear appeared

to recognize several explicit task details that would help them define an approach to complete the task. As well, understanding the expectations would help students metacognitively monitor whether they were achieving task goals. As a result, these students may experience less difficulty in completing the task. Overall, clarity of expectations is an important task condition. If students misunderstood the purpose of the task then it may have implications for the methods devised to complete the task, and ultimately have an impact on academic achievement (Winne & Hadwin, 1998). As well, responses in this category suggest that students made ease of learning judgments about the expectations (Nelson & Narens, 1990; Plude et al., 1998). They could use this information to assess additional information they needed to gather about the task to plan an approach to complete the task.

***Amount of information***

Ten students (19%) indicated the amount of information in the design project instructions made the assignment intimidating or overwhelming. Students also thought the assignment was comprehensive, compact, dense, or detailed (3 students). Two students indicated the design project already contained enough information and no more information should be added. Eight students indicated if the instructions were simplified it would make the project clearer. Students made several suggestions to deal with the amount of information on the outline: (a) to reduce the details and allow for more time to examine the information (1 student), (b) to break down the instructions into subtasks (3 students), (c) to use fewer words or less complex words in the description (2 students), (d) to provide fewer examples as that would allow for greater creativity (1 student), and (e) to provide a less detailed outline with the

marking scheme followed by more details about the assignment (1 student).

Overall, these results suggest that students recognized the complexity of the assignment and the need to develop an effective method of dealing with information to manage the task demands. These statements also reflect judgments about their ability to work with different aspects of the task (Nelson & Narens, 1990; Plude et al., 1998). The structure of the assignment was found to be limiting in terms of gathering the overall purpose of the assignment and, as a result, indicated several potential ways to alleviate the problem. Ultimately students would have to find a way to process task information. Research suggests students who break tasks into subtasks can more effectively deal with the task demands because it eases constraints on memory (Catrambone, 1995). As well, this task breakdown may help students more effectively allocate cognitive resources to manage the task demands (Sweller et al., 1990).

Affective reactions also contributed to students' perceptions of the task instructions. They would have to find a way to overcome countervailing feelings to manage task details. From a theoretical standpoint, if students were self-regulating and proactive as Zimmerman (2004) suggests, they could have used their own suggestions for structuring the handout by transforming these ideas into a strategy to manage the complexities of the assignment and to help them refine their understanding of the task. For example, the suggestion to use simpler terms could have been transformed into a strategy of defining key terms they did not understand within the task. If students recognized their suggestions as potential strategies and used them, they would likely have become more aware of elements of the task structure that they should monitor when examining their own products for the task

(Winne & Hadwin, 1998).

### *Questions about the project*

Nine students (17%) chose to respond to this question by asking questions about the nature of the project. Four asked specific questions about the scope or parameters of the activity, in particular, how specific the learning activity should be "e. g., semester curriculum, homework assignment, in class activity?" (Participant 68) or whether the activity "could realistically [be] performed" (Participant 9). A third question concerned whether the student had the background knowledge to recommend a specific activity in the class. The final student was confused about whether the activity should focus on an instructional episode or a learning environment.

The remaining 5 students asked more specific questions about: resources that should be used (2 students), how much the assignment was worth and the due date (1 student), if principles needed to be linked to each goal and objective (1 student), and how much depth is expected for each of the headings within the instructions (1 student). This question about depth was extended to indicate that this student realized you could determine how much depth to include by looking at the marking scheme, however, the marking scheme was "still very open to interpretation" (Participant 63).

Whether the questions were about specific parameters of the task space or about finer-grained components of the task, students' answers reveal they were monitoring their understanding of the task. This suggests students also perceived inadequacies in their understanding of the task and were able to use their cognitive resources effectively to articulate this lack of understanding. The questions generated provide

opportunities to apply metacognitive control because students could seek answers to these questions to develop a better understanding of the task. This is consistent with previous theorizing that suggesting metacognitive monitoring of task or content information can act as a pivot for guiding future learning activities (Winne, 1997). These students appeared to realize that questions could be used as a cognitive tool to guide further thinking about their understanding of the task. Previous research suggests question generation allows students to organize, elaborate, and when necessary clarify understanding of the material, in this case, task instructions (King, 1992). Also, by identifying the parameters of the topic, they could begin to build connections between elements of the task. This is consistent with previous research that suggests information generated by metacognitive monitoring can be used to direct future cognitive processing information (Butler & Winne, 1995; Winne & Hadwin, 1998). If students could not articulate questions to guide their understanding of the task, students would not be able to establish goals and create plans for the task.

***Need for steps or scaffolds***

Eight students (15%) indicated more information was needed about how to approach the project. Seven students indicated they would have preferred to see steps, guidelines, a method, or a checklist to begin the project. The last student made a recommendation to "make it or allow it to be more sectional in its plan/layout" (Participant 38).

These comments reveal that students recognized the importance of defining an organized approach to completing the assignment. Part of creating a clear definition of the task is to identify the parameters of the task space. These boundaries define

specific components of the task that need to be worked through to complete the task successfully (Winne & Marx, 1989). These components or subtasks not only might help students manage both explicit and implicit details of the task, but also manage the task's ambiguity and risk (Doyle, 1983). These students recognized the importance of having a plan to help them self-regulate during the task process. Models of self-regulated learning indicate planning is a key element of self-regulation which define tactics and strategies that may be useful to complete the task and help break the task into component parts (Winne & Hadwin, 1998; Zimmerman, 2002)

***Use of visual aids in product***

Six students analyzed the question from a different angle by describing what elements they thought would be appropriate to include as part of the task product. Students made direct reference to how graphs, charts, pictures, or photos would enhance their project. These students were thinking ahead to how different mediums of presentation may potentially augment the products they created. Presentation format is another element of the task space that students would have to monitor metacognitively (Winne & Hadwin, 1998). Students would have to evaluate whether the medium they chose for the presentation of the content was well suited to the expectations, and whether all of the task elements were incorporated into the project successfully.

***Motivation***

There were two students who made motivational comments about the assignment. One student stated "this type of assignment is new to me and is quite a challenge

because I am not able to rely on past experiences of assignments to help guide me through" (Participant 49). The second student indicated she was "starting to think about the design project, the juices are starting to flow and ideas are coming to me" (Participant 84). These statements reflect different motivational orientations to the task that students would have to regulate as they complete the tasks in the course. A motivational orientation towards the task may influence whether students adopt purposeful, productive, and efficient methods to work through the task space. Research suggests that under challenging motivational circumstances students have to balance the cognitive requirements of the task with motivational/affective reactions to these elements (Zimmerman, 2001). Allocating resources to effectively deal with the task demands, as will be seen in later results, was often a hard balance to achieve.

***Structure of the initial task understanding session***

Three students made recommendations for how to introduce the design project task. As this was their first exposure to the task (besides the overview provided in the first lecture), two students recommended that a discussion of the project would have been helpful before completing questions about their initial task understanding. The third student indicated there was some confusion about whether the question was about the instructions for the design project or about how their own design project could be more clear and concrete.

**Summary of Perceived Information Necessary to Clarify Assignment**

Overall, responses to question 2 reveal different information about the task space. Students were able to monitor features of the task description they deemed were

insufficient in helping them frame an understanding of the task. Students also recognized several potential areas of difficulty interpreting the instructions. This suggests students recognized they had incomplete understandings of the task. Similar research suggests that students are not fully aware of all of the parameters of the task space, or selectively choose components of the project that may not meet the ultimate purpose of the task (Butler & Cartier, in press; Winne & Hadwin, 1998).

The predominant theme that emerged related to giving examples. A total of 37 students (71%) made a total of 44 statements expressing the need for examples. Overall, I interpret students' comments about the various types of examples may relate to a need to manage ambiguity and risk associated with the project. Tasks high on ambiguity and risk require more cognitive resources to effectively work through the task space (Doyle, 1983).

Students were also able to refine their understanding of the task by allocating attention to different details of the structural format of the design project instructions. Students provided several suggestions about how to reframe the task to make it more manageable so that they could develop a better understanding of it. Despite these recommendations, it is unclear if they recognized how they could use these suggestions to their advantage in refining their understanding of the task. If students used the suggestions, then this would characterize a way to metacognitively control challenging aspects of the task space (Winne & Hadwin, 1998).

I wanted students to ponder the design project instructions before giving them additional information about the task. I believed it was important that students generate ideas about topics and formats so they could take ownership over the task

and their learning. The need for topics and examples may reflect a particular learning style or work ethic. For example, Vermetten et al. (2002) suggest surface level learners have preferences that instructors provide information to students in place of having to construct an understanding of the learning environment. The opposite is true for deep level learners who abstract and construct information and thrive in environments where the can build knowledge. I interpret that students who wanted to have information provided to them may be surface rather than deep learners.

If these students were to become practicing teachers, I would hope they would frame complex activities for their students and recognize the importance and value of having students think on their own. The literature suggests that students should have choices and opportunities to control challenge (Lin, 2001; Perry, 1998). As every individual will have different knowledge, skill, and strategy base, each student's perceptions of the complexity of the assignment will differ. However, by experimenting with different task frameworks for the content, you expose students to a wider range of learning opportunities and enhance their knowledge about task structures and may even change their conceptions about tasks and learning (Butler & Cartier, in press; McCrindle & Christensen, 1995). Students' responses to this question suggest that they sought ways to manage choice and challenge, thereby affecting potential opportunities for SRL.

**Table 2— Question 3: What are your goals for the project at this point?**

Students' responses were examined to determine types of goal(s) they set. For the purposes of coding data I created a rule that the word goal needed to be included in the response to verify that students identified a statement as a goal. This ensured

consistency in the analysis. Besides the 5 students with no first portfolio, there were also 7 additional students who did not identify specific goals for completing the projects. This left a total of 46 students in the analysis. Twelve students set multiple goals for the design project. Three students wrote 3 goals, with the remaining 9 students setting two goals each. There were 7 goal types that were identified for the design project.

***Understand the task***

Nine students (20%) had goals related to developing a better understanding of the task. Six students indicated they wanted a better understanding of what they were supposed to do. "My goal for this project at this time is to understand what to do. I need to narrow down my focus" (Participant 29). Two students' goals were to develop a clearer understanding of the expectations of the assignment. For example, "make sure I fully understand what is expected, and know what the final product should be (Participant 15). The final student indicated that she needed to speak to the teaching assistant to ensure she was on the right track.

These students appeared to need more time to clarify the nature of the assignment. This suggests inadequate or incomplete task understanding. Recognizing this problem needed to be remedied early in the process was also important. If students did not develop a more comprehensive understanding of the task, then learning activities they may pursue to complete the project may result in inefficient and ineffective use of time or poor self-regulated learning (Pintrich, 1995). This goal also revealed an opportunity for metacognitive monitoring and control; students who recognized they had an incomplete representation of the task could allocate resources to address this

difficulty (Winne &Hadwin, 1998).

***Time management***

Seven students (15%) indicated that a goal for them was to manage their time effectively to complete the assignment. Two students made direct reference to not procrastinating. Two students indicated their goals were to work on the project on a regular basis with one participant commenting "so the project criteria stay fresh in my mind" (Participant 15). One student recognized she needed "to begin this assignment as soon as possible, since it is large, consists of many parts and is a huge portion of my 320 final grade" (Participant 7). The final two students indicated they needed to work on the project to finish early so they could get feedback on their work before final grading.

Students chose time management goals for very different reasons. This is an important cognitive condition students recognized would influence their progress in completing the task. Furthermore, these students made judgments about why creating time management goals was important, primarily in terms of dealing with the parameters of the task space. Ideally, students who recognized they were ineffective time managers could use this information to monitor task progress and reach goals. Therefore, these students were able to effectively use their knowledge of prior task experiences to think about how to use their time more productively. However, it is one thing to set a time management goal; it's another to carry out activities in relation to achieving this goal. For example, Participant 82 indicated her goal was to not procrastinate. However, the quote below provides one instance of multiple entries that do not reflect this goal.

> History paper won't be done until Oct. 31 morning. That will give me Wednesday afternoon/evening and Thursday to write my think paper. Yikes! I really wish I wasn't such a procrastinator, but I've come to accept that I am. Strangely a day and a half seems to be for me, enough time to research and write the think paper. I'm not too worried. I'll try to research as much as possible on Wednesday (difficult because of trick or treaters) and Thursday morning and spend Thursday afternoon/ evening/week hours of morning writing the actual paper. It's only 5 pages so it shouldn't take too long.

In this entry, Participant 82 comments on specific task conditions that may constrain her efforts to work on the project just 2 days before the project is due. This results in an ease of learning judgment (Nelson & Narens, 1990; Plude et al., 1998) with the expectation that the parameters of the task space would not be difficult to manage and confidence she could successfully complete the task. Although this student recognized an opportunity to bootstrap a more effective way of self-regulated learning, the volition to reach this goal was diminished under competing circumstances (Corno, 1993; Garcia et al., 1998; Winne, 1997).

***Performance***

Surprisingly there were only three students (7%) who specified performance goals "to do well" (Participant 82), "to receive at least a B (possible B+/A-)" (Participant 14), and "to hand in a project that deserves a good grade" (Participant 4). Perhaps it was too early to frame a specific goal pertaining to performance, however, given that

most university students are driven by the grades they need to achieve, I expected more students would have indicated some type of grade goal. Performance goals have a predominant place in the research literature with these goals typically being associated with less strategic approaches to SRL (Pintrich, 2000). Students may not have been able to make a judgment of this nature without taking time to more fully process the details of the task.

***Find an interesting topic***

Nine students (20%) set goals related to finding a topic but with a particular emphasis on finding topics that were interesting. All of the participants had this key word of interest in their description of topic goals. For example, Participant 10 wrote: "I am basically looking for a topic that interests me personally. I am hoping to learn something that is going to be useful not only to my students in the future, but also to myself in the present." Needing to find an interesting topic is an important motivational condition that students needed to recognize as pursuit of topics that are not interesting may pose more cognitive and motivational challenges as work on the task ensues (Pintrich, 1995; Zimmerman, 2002).

***Find a topic (general)***

Eight students (17%) indicated their goal was just to find a topic. "My goals at this point are to find a topic and get started on my think paper" (Participant 45). I distinguished this goal from the goal of finding an interesting topic because these students may not have recognized the important motivational and cognitive implications of simply choosing a topic with no real reason for pursuing that topic. If

students are not interested in the topic, then this may influence subsequent choices they make about planning, enacting, and adapting tactics and strategies as well as whether these processes are well matched to achieving desired goals (Winne & Hadwin, 1998).

### *Find a focus*

Nine students (20%) indicated their goal for the design project was to find a focus. One student indicated she was going to "generate some questions to determine a focus" (Participant 5). Another student mentioned specific areas where she might find her focus. "I will need to designate several hours (an evening) to comprehensively unpack, understand and outline what area I want to focus this project on (i.e., subject area and theoretical principles, goals, objectives etc)" (Participant 39). In most cases this goal category indirectly made reference to finding a topic, but this goal was much more general than the two previous goal types. Despite the generality of this goal, students offered some ideas for how they could find a focus.

### *Acquiring new knowledge*

Nineteen students (41%) made goals that referred to learning new information or cognitively processing task information. Of the 19, there were 9 students (47%) who made direct reference to learning about lesson planning. Lesson planning goals ranged from being very general to specific, which may suggest that students varied in their ability to articulate what kind of learning outcomes could be achieved by completing the design project. An example of a general goal was to "learn about

lesson planning" (Participant 82). The more specific goals reflected thinking about the nature of learning and instruction. "Goal—to propose a fun, but productive way of encouraging student interaction and overall learning in order to accomplish the desired learning objectives. Facilitating the theory I plan to incorporate (maybe metacognition)" (Participant 33). One participant thought ahead to a topic and framed a potential goal to include within the design project "for students to be creative and to write a clear paragraph" (Participant 57). These goals related to framing an activity is a key task condition included within the design project description.

The 10 students (53%) who made cognitive process goals also ranged from being very general to being specific in terms of what they would have to do to successfully complete the task. An example of a general goal was "to read and understand articles and tie ideas together" (Participant 51). The more specific goals indicated what they wanted to accomplish by completing the design project task. An example of a more specific goal: "I will attempt to link it to concepts in the text/articles that relate in turn to cognition and memory. I will follow the task setting outline and link it to concrete examples and then apply it to an instructional setting/activity" (Participant 88). Both types of goals provide additional insight into the cognitive conditions that these students may have considered for completing the project.

**Summary about Goals**

Students set a variety of goals related to developing a better understanding, with reference to task conditions, cognitive conditions and, to some extent, motivational conditions. Goals are theorized to "represent concrete standards for performance evaluation, and the successful attainment of such standards can enhance competence

perceptions" (Elliot & Harackiewicz, 1994, p. 968). The goals students provided were of a very general nature and do not necessarily provide concrete standards required for judging performance outcomes or enhancing competence. Instead, these goals reflect general purposes and, although they do provide some direction, they do not really specify specific intentions for approaching, engaging in, or responding to the assigned task (Archer, 1994).

General and specific goals may serve different purposes. Specific goals referred directly to task conditions that would help students define and direct cognitive processes, and also provide standards for monitoring task progress. "Proactive learners set goals that are specific, proximal, and challenging" (Zimmerman, 2004, p. 182). Specific goals break the task into more sub-components with each sub-component having a goal. As subgoals are met, processes are more easily transferred to the next sub-component, which sustains motivation to work through the task space (Zimmerman, 2002, 2004).

General goals provide a framework for thinking about task expectations but may not directly guide student processing because the outcomes of these goals are more difficult to define (Zimmerman, 2004). General goals also do not break the task down into specific sub-components, making it more difficult to discern task progress. For example, to understand and tie ideas together may be more metacognitively difficult to monitor because understand could mean any number of different things depending on the individual's perspective. Therefore, general goals may hinder students' ability to reach task goals because they may not provide a clear framework for defining what tactics or strategies would be appropriate to reach the goal (Zimmerman, 2002, 2004).

Alternatively, perceived success in reaching general goals may generate cognitive evaluations that are inaccurate (Winne & Hadwin, 1998). As a result, students may believe they have successfully completed the task when, in contrast, they may have inadequately addressed key task components in their product. Winne and Jamieson-Noel (2002) found students were not well calibrated in their estimates of achievement or strategies. This pattern of results may also hold true for goals. If goals are not well matched to the instructional purpose, it may result in inefficient and ineffective information processing strategies and poorer performance outcomes.

**Table 2—Question 3: Describe concretely the activities you plan to accomplish the task.**

Question 3 also asked students to frame a plan for completing the project. Three students did not provide plans for completing the design project task, leaving 50 students in this analysis. Plans provide a method for students to break the larger task into subtasks. Students' plans generally consisted of two elements: (a) broader learning activities that could be performed to reach task goals, and/or (b) a framework for putting the design project together. In the plans students identified the order in which they would tackle specific components of the task space. Overall, there were 11 main elements that were identified in students' plans. When I coded data, elements in plans were color-coded with each color representing a priority within the task process. Appendix G lists these 11 elements, provides a definition of each element, indicates the priority in the overall plan, and records how many students with that element in their plan.

Overall, the plans in Appendix G illustrate students were able to successfully

outline subtasks associated with completing the writing task. Of 8 steps identified in plans, very few students identified all 8 steps. The plans reveal students were able to identify key components of the design project task and key learning activities that would help them reach task goals, but the sophistication of the plans varied. For example, Participant 51 provided the following plan.

> First, I'm going to pick a topic and go to the library to find articles. Then I'm going to read the articles and try to summarize them and ask questions. Third I will look at the specific problem area in my topic and try to find a solution using the theory presented the articles. Fourth, I will use examples that are my own and that are in the articles to grasp a full view of the issue. The steps that I'm going to follow: read the articles, read the text, take notes, summarize, report, write an elementary draft, think about it and ask questions, write a final draft.

This student provides a plan that reflects a self-regulated approach to completing the task. She makes note of several tactics and strategies she can use to learn new material, she makes indirect references to prior knowledge, and her plan encompasses the entire writing process. In contrast, Participant 76 provided the following plan: "Well I would have to pick a topic or activity to teach and it would have to be at the secondary level since I want to teach high school." This plan is much less sophisticated but does outline a key task condition that must be decided before work on the task can begin.

Plans primarily varied in terms of the number of elements. Students with more detailed plans tended to include planning elements across all main elements of the task space—finding a topic, researching, and writing. Those with more complex plans also identified more specific activities such as the types of strategies they might use in association with researching or writing. However, most plans concentrated on devising initial steps—finding a topic, finding articles, and researching information. These plans may also help keep students on track to ensure that they reach task goals.

**Summary about Plans**

Task representation is one of the key ingredients in solving a problem (Mayer, 2003). A plan represents a tool students can use to manage and control their perceptions of the parameters of the task space. Plans varied in the degree of sophistication, suggesting that students may have different standards for determining what might be an effective plan. Alternatively, students may not have fully articulated their plan. Instead, they just provided an overview of an approach to complete the assignment. Overall, students' plans provide some evidence they were aware of how to plan an approach to complete the task, and that they had some understanding of how these plans would help them self-regulate during the task.

Since this question was their first opportunity to conceptualize what steps might be necessary to complete a task, students with less complex plans may have focused on larger-grained features, instead of detailing everything they might pursue to complete the task. Refinements to task understanding may come from beginning to pursue task activities, which would generate internal feedback for defining a more concrete plan at that point in time.

Research suggests students who develop a better representation of the task space may be more likely to choose tactics and strategies, enact those strategies, and reflect on the effectiveness of these strategies (Mayer, 2003; Winne & Hadwin, 1998; Zimmerman, 2002). Consistent with this finding, some student's plans captured these facets as they recognized and described key elements of all aspects of the writing process. As well, more extensive plans may provide greater opportunities to reduce extraneous cognitive load because subgoals created to complete the task more effectively help students manage their cognitive resources to manage the task demands (Catrambone, 1995; Kirschner, 2002). The breakdown of the task allows students to manage and concentrate their cognitive resources on a specific component within the larger task, therefore not taxing memory resources (Baddeley & Lajoie, 1999). Therefore, a good plan may suggest that students are more likely to identify component parts of the task, monitor those components, and be able to assemble those elements to form larger task products (Winne & Hadwin, 1998).

However, in the face of motivational or cognitive challenges, even the best-laid plans may fail. For example, although Participant 51 appeared to outline a solid plan (see above), she made the following comment and several others like it as she proceeded with the task.

> Feeling perplexed about not being able to read the text. Keep reading words over and over again, but the information is either too dry or too complex to grapple. I resorted to drawing in my sketchbook, but I know this is just wasting time. Will try another day but for now will try to search for a strategy and

make sure my attributions are positive next time around.

In this student's case there were cognitive and motivational problems that prevented her from moving forward with her plan. She also recognized that she needed another strategy to deal with the difficulty, but, in the end, terminated task activities. This type of comment reflects metacognitive awareness of task and cognitive conditions, the need for metacognitive control to adapt approaches to deal with these difficulties, and volition to carry through the intention to self-regulate. All of these processes are theorized to help students manage the task space (Garcia et al, 1998; Plude et al., 1998; Winne & Hadwin, 1998). This student's comment reveals the dynamic and recursive properties of self-regulated learning as assessment of current progress led her to reevaluate her approach and attempt to adapt an alternative approach to learning (Winne & Hadwin, 1998).

Despite Participant 51 recognizing that reading was posing difficulties, and she did persist for a period of time by trying different strategies, the continued lack of progress eventually caused her to give up. Research suggests that if students persist in the face of challenge, this effort typically results in enhanced educational outcomes; however, in this case, the task became too difficult to maintain the effort required to reach task goals (Wolters, 1998).

**Table 2—Question 4: How does the outline for the design project help you develop ideas about what you might want to frame for the think paper?**

Of the 53 students in the sample 52 responded to this question. Students' responses were categorized into 6 main themes and there were a total of 82 statements. Twenty-one students had responses in multiple themes: 14 students with 2

responses, and 7 students with 3 responses.

### *Developing a focus*

Fifteen students (29%) commented on how the design project instructions helped them develop a focus. Focus referred to how the design project instructions provided a general topic area, helped them define a more specific topic, or narrowed their focus to find a topic (10 students). For 3 students, focus referred to how students could structure or organize a product. For one student, focus referred to helping her develop a purpose for reading the articles. The final student referred to focus in terms of how much time and energy she might have to put into the think paper and design project in relation to other course assignments.

Students defined focus in a variety of ways and provided some illustrations of why finding a focus would be an important element to consider. Finding a focus is an important facet of task understanding; it would help students allocate cognitive resources to manage the task demands (Winne & Hadwin, 1998). Finding a focus may direct forms of cognitive engagement, which may provide some guidance to help students regulate their learning during the task (Butler, 1998a; Schraw, 1998). Students identified a variety of task conditions, indicating they were aware of factors that could influence their approach to completing the assignment. This is consistent with previous research that suggests students identify task and cognitive conditions to define the parameters of the task space (Winne & Hadwin, 1998). Focus also requires that students assemble some of the parameters of the task space to begin developing a more integrated picture of the task (Winne & Hadwin, 1998).

***Finding a topic***

Thirty-one students (60%) made specific reference to how the design project instructions helped them find a topic. The difference between this category and the previous category is the direct reference to the word topic in student statements. Thus, these students were making more connections to explicit task conditions. Six sub-categories emerged in this category. Six students indicated the outline provided some direction for them to frame a topic choice. Eleven students indicated the outline provided some concrete examples of problems or issues that could be addressed within the think paper. Five students made direct reference to the project outline and how that would help them organize and frame their thoughts. Six students indicated the outline made direct reference to examples of topic choices they may want to pursue. Two students made reference to how the outline confirmed topic choices for them. Only one student indicated that the design project outline did not help them determine a topic directly, but did give some general guidance in terms of finding a topic.

Overall, finding a topic provides a foundation for pursuing other task activities. As with the previous category, finding a topic may also direct forms of cognitive engagement, which may provide some guidance to help students regulate their learning during the task (Winne & Hadwin, 1998).

***Motivation***

Six students (12%) made comments related to motivation. For example, one participant mentioned a time management goal "tells me I'd better get going because the due date is sneaking up" (Participant 36). Another student mentioned that it was

"easy to study a theory, applying it is a challenge" (Participant 9). This student recognized one key element of the assignment—the translation of theory into practice, which was a difficult component of the assignment to achieve. A third student mentioned that doing research on a topic of interest would help her clarify the assignment. Finally, three students mentioned the instructions for the assignment contained too much detail, making it overwhelming to examine. Two of the 3 students identified alternative strategies to work through the instructions.

Overall, this motivation category reveals that students had primarily adaptive motivational orientations towards the task despite the task complexity. These motivational orientations may be a catalyst to help students begin the task. Theory suggests if students have a positive motivational orientation toward the project, there may be greater chance of maintaining task pursuits in face of challenging circumstances (Zimmerman, 2002, 2004).

***Clarity and expectations***

Twelve students (23%) commented on how the design project clarified the expectations for the projects. Five students wrote comments pertaining to how the design project expectations were clear. One student commented specifically on the grading rubric "break down grading rubrics clear what should be looked at –lots of details that is simple enough to elaborate on, and relate to other topics" (Participant 27). Other students elaborated on how the expectations for the design project would help them determine what they could do for the think paper. "The design project outline gives us ideas as to what the instructor is looking for, what questions the think paper should answer, and what kinds of knowledge we should have regarding writing

the think paper" (Participant 62). Other comments reflect the overall structure of the design project.

> Participant 16: The outline is very useful because it is informative, and specific. It tells us, or guides us into what we should be thinking about when selecting our think paper topic—there are many courses that I've taken which are very ambiguous in what they want in terms of papers and projects.

One student indicated that although the design project instructions did clarify some questions about the project, the process of completing these questions raised additional questions. This participant was going to talk to the teaching assistant about these questions. This student understood that her understanding of the task was incomplete, and devised an approach to address the issue. Therefore, students expressed how they could use the expectations for the design project as a means to frame what they wanted to do for the think paper.

The verbal and written expectations for the task were two key resources students relied on to help them define and refine their understanding of the task. Students often searched for additional information by asking questions of other students or of the teaching assistant or myself to gather as much information as possible. Students recognized the value of obtaining information from other resources to fill in or clarify gaps in their understanding. This reflects more of a sociocultural model of self-regulated learning (Zimmerman, 2004). Expressions of the need to clarify the expectations also represents a pivot for metacognitive control because recognizing a potential gap in understanding, in some cases, led students to seek out information

from other sources (Winne & Hadwin, 1998).

***Connection to think paper***

Fourteen students (27%) made direct connections between the design project and think paper assignment. Students observed the think paper was the theoretical basis for its application in the design project. "The think paper is like the theory of the design project and the actual design project is the application of the theories and principles of the think paper" (Participant 45). Another student had a different way of describing the connection between the two projects.

> Participant 82: The design project seems to be more narrow in scope—that is, it is very focused (a single lesson/assignment) whereas the think paper is more broad. It is more about theory and the design project is more about putting theory to practice. By giving us the design project outline first, it allows us to pick a specific area and to move to a broader realm. In other words, it allows us to think bottleneck approach—that is frame a narrow topic to a more general understanding of that topic.

This student then draws a visual depiction (flask) outlining her understanding of the two projects. Overall, students were accurate in building a connection between the design project and think paper. This understanding provided a framework for thinking about how they could conduct research and link the two projects together. More importantly, these students recognized important implicit details of both writing tasks in their descriptions of the link between the think paper and the design project.

From an instructional design standpoint I set out different instructional purposes

for the two assignments. These comments suggest students recognized the need to allocate different types of cognitive resources to find information that was suitable for the projects. This suggests that students recognized that tasks represent different purposes. Therefore, there prior knowledge of either task or knowledge factors influence students conceptions of the task states (Winne & Hadwin, 1998).

***Miscellaneous***

There were four students who answered this question in a manner that couldn't be classified in any of the categories. One of the students refers to her experience in designing intervention work and believed this design project would be easier because the outline for the design project has a similar theme. This reflects a cognitive condition—prior knowledge that could influence her approach to completing the task. Participant 33 indicated she would be "able to tie in theoretical principles learned in lecture and in the text to gain a better understanding of each concept." Two students refer to elements of the design project task, but did not provide reasons for how these would help them frame a think paper topic. Overall, students in this category may not have fully interpreted the nature of the original question and how it could be used to augment their understanding of the task.

Overall this fourth question about the link between the think paper and the design project description appeared to be a good starting point for students to think about what they might want to pursue for the think paper and design project. Students were able to extract elements from the larger task description to identify key elements to begin work on the think paper. Students also started to build connections between the think paper and the design project, allowing them to think about the parameters and

purpose behind the two projects.

**Summary for all Four Initial Task Understanding Questions**

Overall, the four questions that assessed initial task understanding helped students focus on different aspects of the task space. The questions appeared to direct ways students attended to specific elements of the task space as well as how they interpreted the meaning of those features. Specifically, students exhibited awareness of many features of the task space—task, cognitive, and motivational conditions that may function to direct future cognitive engagement (Winne & Hadwin, 1998). However, these features were often mentioned in isolation, with no clear indication students knew how to assemble those elements into a fully integrated understanding of the task. Therefore, students were missing operations key for developing a full integrated understanding of the task, where these operations may also function to produce internal standards to help students make cognitive evaluations of task progress (Winne & Hadwin, 1998).

I did not expect that students would develop a fully integrated understanding of the assignments based on these questions, but I did expect task understanding would change as a function of working through the task space. The next question was designed to assess whether task understanding changed, as well as what accounted for the change.

# Revising Task Understanding

**Table 2— Question 5: How has your perception of the think paper changed over the last few weeks?**

This question was asked to determine if and how students refined their understanding of the task. The question was posed in class and students were asked to submit responses with their first studying portfolio. Forty-eight students were included in the analysis, as 5 failed to provide responses to the question. Students' responses were categorized based on key words or emphasis.

### *No Change in Perceptions*

Only two students (4%) reported their perception of the think paper had not changed over the last few weeks. The first student indicated her understanding had not changed because she was aware of her topic, the issues, and solutions to alleviate the problem. I would argue her comment does suggest her understanding changed as a result of engaging in specific activities because she made progress in achieving goals. This represents some degree of inaccuracy in her response to this question. The second student wrote her understanding of the project had not changed because she was focused on working on two other courses with huge assignments so she had not started to work on the think paper assignment.

### *Change in Perceptions*

Forty-six students (96%) indicated their perceptions of the think paper had changed over the last few weeks. Reasons for the change were grouped into 11 categories. It should be noted that of these 46 students, 14 students cited two reasons,

7 students cited 3 reasons, and 2 students cited 4 reasons for changes in their perceptions of the task. Appendix H provides sample comments in the main categories.

**Role of discussion.**

One of the main reasons for changes in students' perceptions of the task was the role of discussion in tutorials with the teaching assistant or myself. One tutorial period was spent asking students what topics they were considering and we provided feedback to students about their topic choices. These conversations appeared to be beneficial as 17 students (40%) made comments pertaining to the role of discussion in helping refine their understanding of the task.

Five students simply stated changes occurred because they discussed the think paper in tutorial. They did not explain why discussion changed their understanding of the task. The 12 remaining students explained how or why discussions changed their understanding. Three students indicated discussion helped them monitor whether their topic choice was of an appropriate scope. Sharing ideas in tutorial appeared to help students refine their topic choice so they felt more confident in completing the think paper assignment. Two students indicated comparing perspectives on topic choice helped them refine their thinking about expectations for completing the think paper. By comparing ideas for choices of topic students were able to attain a better sense of the task expectations. Two students commented on how discussing their topics in class had a positive impact on their motivation to complete the assignment. Therefore, discussion answered questions, clarified expectations, and boosted their confidence so they could complete the task. Five students made comments about how discussing

topic choices with the instructor or teaching assistant helped them clarify expectations for completing the project. Discussion provided a better sense of direction and purpose for completing the assignment.

Thus, for these students, talking to the teaching assistant, peers, or myself provided an avenue for them to express their thoughts on the project and receive feedback to guide their understanding. Discussion helped them move forward with the think paper by providing enough additional task information for students to identify a direction and purpose for beginning the think paper. Therefore, the opportunity for feedback provided a key tool for bootstrapping approaches for self-regulated learning as students were able to use discussion to clarify and integrate better understandings of the goal state for the task (Butler & Winne, 1995; Winne, 1997). Consistent with previous research the construction of knowledge developed through discussion helped students formulate more concrete understanding of the task by directing their attention to specific elements of the task space (Butler, 1998b).

**Defining a focus.**

Three students (7%) indicated they developed a clearer think paper focus. Focus came from breaking the task into manageable steps (1 student), and clarifying the expectations for the assignment (1 student). However, this participant's understanding was modestly inaccurate because she thought the think paper task was about summarizing each article's findings in the think paper. The assignment actually called for more than a mere description, but required an analysis of the articles. A third student commented on how her prior knowledge and beliefs influenced her understanding and approach to completing the think paper.

> Participant 27: Over the last few weeks I've had to force myself to pull away from my personal views of the subject chosen for my paper, and had to focus more on the theoretical side. What theories are teachers putting into play as they choose what direction to take in teaching their students?

This student made particular reference to how a cognitive condition—prior knowledge about the subject area influenced her research and writing process. In this case, monitoring prior knowledge was important for this student because she recognized how her personal views affected her ability to develop an adequate representation of the task to form products conducive to meeting the task's goals. This is consistent with research that suggests prior knowledge influences the way information is processed (Dochy et al., 1996). As well, for all students in this category monitoring knowledge is theorized to be an important facet contributing to creating cognitive evaluations of progress as well as providing a pivot for controlling how engagement in the task should proceed (Winne & Hadwin, 1998).

**Defining scope of topic.**

Ten students (22%) commented on how defining a topic for the think paper changed their understanding of the think paper assignment. Five students stated choosing a topic gave them a direction to approach the think paper. Three students indicated their understanding changed because they had struggled with defining the parameters of their topic choice. By narrowing the topic focus, these students developed a stronger understanding of the task's purpose. The final two students were not completely satisfied with their chosen topics and considered how to revise them.

Choosing a topic can be a major stepping stone or stumbling block in determining how students could approach the task. If the scope of the think paper topic was too large, this would have implications for both the type of research they would perform and also may impact how they put the think paper together. Students needed to set standards for monitoring the appropriateness of their chosen topic as these standards could be used to evaluate if there were discrepancies between original task states and the desired goal state (Winne & Hadwin, 1998). Although students often did not mention standards to monitor or evaluate their topic choice, they were aware this was an important factor influencing task progress.

**Academic purpose.**

Six students (13%) provided various descriptions of an academic purpose for completing the think paper. Two students indicated the purpose of the think paper was to develop a deeper understanding of an issue. The four remaining students indicated the think paper was about applying their understanding of their chosen topic into a written framework that emphasized principles of teaching or learning. These students were developing more complex and integrated understandings of the think paper assignment. They started to assemble and translate components of the task description into more concrete ideas about how they could frame a product for the paper. This is consistent with Winne and Hadwin's (1998) model of self-regulated learning that suggests students' focus on conditions embedded in the task space and engage in SMART operations to direct forms of cognitive engagement. This type of emergent understanding provides an indication of how task understanding evolves as work on the task ensued.

**Formatting.**

Six students (13%) commented that their understanding of the assignment changed because additional information was provided about the task such as the grading criteria for the think paper. Students' comments in this category indicated how the grading criteria would help them frame the paper or understand the expectations for the think paper. However, this additional information did not always help.

> Participant 59: The actual writing of the think paper I am still confused on. I don't know if you want us to write a paragraph on each article or if we pick a topic (say prior knowledge) and write a paragraph on how each of the articles help us understand this concept. I personally think the second way would be easier.

The comments in this category reveal students recognized the importance of framing a product that would meet elements of the task, however, they did not know how to transform this understanding of the base elements of the task into a suitable product. Students recognized the need to evaluate whether their approach to structuring the product was going to meet the criteria for the assignment. This is consistent with Winne and Hadwin's (1998) model of self-regulated studying. However, it also illustrates that students lacked standards for determining if their writing approach would successfully meet criteria.

**Research process.**

Sixteen students (35%) commented the research process helped them develop a better understanding of the think paper assignment. I illustrate only key ideas that

emerged within this category. Six students made statements that reading the articles enhanced their understanding of the think paper with no explanation for how this changed their understanding of the task. The remaining 10 students cited different reasons, outlining how research changed their understanding of the think paper. Three students indicated they were able to refine their topic choice as a result of reading. Seven students indicated reading and researching increased understanding of their topics and provided insight into ideas and issues they could pursue in their think papers. All 10 students indicated reading increased their knowledge base.

The research process was an important facet of the assignment that led to students refining their task understanding. Students were able to add to their knowledge base, thus updating the cognitive conditions associated with the task. Students were able to evaluate their progress at this preliminary stage to determine whether they were on the right track (Winne & Hadwin, 1998).

**Motivational orientation.**

Six students (13%) provided comments about how their motivational orientation towards completing the task influenced their task progress. Two students expressed a positive motivation towards the task. One student indicated she was confident that she could do the project. The other student indicated she had put a lot of effort into studying and clarifying her confusions with these efforts paying off. Four students expressed concern about their ability to complete the assignment. For example, Participant 51's and Participant 62's comments in Appendix H reveal how negative motivational orientations influenced approaches to completing the think paper. Feeling anxious, flustered, and stressed negatively affected their ability to

productively engage in processes to reach task goals. These negative perceptions about the think paper left students spinning their wheels cognitively and motivationally. Negative evaluations of and reactions to their task progress prevented students from finding more effective and productive methods to work through the task space and also diminished their confidence. This is consistent with previous research suggesting the evaluations derived during the self-reflection phase can enhance or inhibit approaches to learning and performance (Winne & Hadwin, 1998; Zimmerman 2002, 2004).

**Task difficulty.**

One student indicated the task was not difficult because the teaching assistant had confirmed her topic choice. Four students (11%) made specific comments about difficulties they experienced that changed their understanding of the task. Two students made direct comments concerning finding articles in the library and, if articles were found, problems addressing the complexity of the articles. Both problems made the task more challenging. Two students talked about difficulties getting started on the think paper.

Without a clear task purpose students may not able to use search terms or find articles that were well matched to the parameters of the task. These comments indicate that students were monitoring two key task conditions: searching for and selecting articles. Articles provide key resources required for meeting task criteria. If students could not satisfy this parameter of the task space they would have to modify their approach to ensure they could complete the task. If students were self-regulating they adapted approaches to address these difficulties either by refining their topic

choice, choosing different articles, or finding alternative approaches to reading articles to deal with these complexities.

#### Link to design project.

Six students (13%) commented on what they believed to be the connection between the think paper and design project. Four students elaborated on how the theory for the think paper could be used as the basis for the design project. They recognized the think paper topic was a deep, theoretical examination of the issue they chose whereas the design project was the application of the theory in practice. Two students discussed the connection in terms of their topic choice, recognizing their topic for the think paper did not have to be specifically tied to a curriculum area. Therefore, for these students monitoring potential connections between the think paper and the design project helped them further recognize the potential savings in time, energy, and effort that could come about if they thought about building a connection between the think paper and design project task.

### Summary about Changes to Think Paper Perceptions

Overall, students recognized they needed to actively monitor and evaluate several components of the think paper task to ensure they were on task. Some of the descriptions reveal students struggled to develop an accurate understanding of the task, especially when it was related to finding a topic, finding articles, or researching information. Moreover, the descriptions that students provided reveal quite different information about the factors students considered concerning task conditions, cognitive conditions, and motivational/affective conditions. That students often considered multiple conditions at the same time reflects the dynamic qualities of SRL

(Winne & Hadwin, 1998).

What this category reveals more directly is how updates to task, cognitive, and motivational conditions change students' representations of the task space. Specifically, the categories in this question illustrate how operations involved in finding or gathering information pertaining to the task changed knowledge structures of not only domain knowledge, but also knowledge of the task space. Winne and Hadwin (1998) termed this toggling where information is accreted, tuned, or restructured to change future learning endeavors. Similarly, in research associated with transfer, existing knowledge is tweaked or adapted to meet the new conditions for the task space so the task goal can be fulfilled (Salomon & Perkins, 1989). Therefore, students' responses in this category indicate they were evaluating their task progress in a variety of ways. As well, these refinements to task understanding also illustrate the interplay between task, cognitive, and motivational conditions and how evaluation of any of these features of the overall learning environment can affect positively or negatively what students choose to do in the task space.

**Table 2— Question 6: What are the easy and difficult aspects of the assignment (Think Paper)?**

***Easy Aspects***

There were 6 themes and 21 statements about the easy aspects of completing the think paper. Thirteen participants (22%) made comments with 3 participants making 2 statements, 1 student making 3 statements, 1 student making 4 statements, and the remaining 8 students making 1 statement.

**Finding a topic.**

Two students (15%) thought finding a topic was easy. One student made a commented "deciding on a topic was not too difficult" (Participant 88). A second student indicated that "connecting the think paper issue to the design project was not too difficult, but right now my focus is mainly on the think paper and completing it successfully" (Participant 77). Finding a topic was a key task condition that students needed to address to make the task easier to manage.

**Finding articles.**

Eight students (62%) made comments pertaining to finding articles for the think paper. "We are lucky because we can find many articles in our library but it will be hard to pick the most suitable ones. So it's easy to look for info on topics" (Participant 76). A second student commented "the easy part of this assignment is simply getting all the information together. I now have all the material I need to start the paper (Participant 16).

**Reading and research process.**

Three students (23%) indicated that reading articles and going through the research process were easy aspects of the assignment. "Carrying out the research for information following the establishment of an issue, reading through the articles to find relevant info, relating the info into the paper" (Participant 84).

**Attending to specific elements within the task.**

There were two different comments (15%) about specific elements of the think paper. One participant indicated the third question of the think paper assignment relating the research to learning was easy "because of other classes that I have taken

and because I could use my prior knowledge" (Participant 64). The second participant commented "the easy aspect of the assignment is that the assignment marking criteria is broken down into very small components, and so I only need to follow the guidelines" (Participant 91).

**Writing Process.**

Four students (31%) made comments on the writing process. Participant 79 indicated "supporting ideas and writing the body" of the paper was easy because all of the resources and the outline for the think paper were at her fingertips. This was important to her because she needed to keep her attention focused on the task at hand.

Students also commented that devising an outline for the paper, using the articles and the text to ask questions, and having a good introduction along with an outline were necessary to speed up the writing process. These task conditions were conducive to creating the think paper. The products students created would help keep students on task, but also help them organize and manage their work.

**Motivational factors.**

Two students (15%) commented on their motivational orientation towards the task and how this helped them move forward with completing the assignment. One student commented intrinsic motivation allowed her to keep focus for long periods of time. The second student indicated prior research projects resulted in good grades and increased her confidence that she would be successful in completing the think paper assignment. These comments reflect two different types of motivational conditions that positively influenced students' beliefs about their ability to complete the project.

**Summary for Easy Aspects of the Think Paper**

Only 22% of the participants identified easy elements of the task. This suggests easy aspects of the assignment were few and far between and may indicate this task may have been high on ambiguity and risk. These descriptions were typically short statements that did not elaborate on why they found these aspects of the assignment easy, which makes it difficult to interpret how these features of the task space helped them refine their understanding of the task. However, for aspects of the task that were identified, they highlight that isolated aspects of the entire task process fosters confidence in students' ability to perform other aspects of the task. However, the next section reveals students often had difficulties coordinating and managing elements of the task space to produce a final think paper product.

### *Difficult Aspects*

A total of 116 statements pertained to difficulties students experienced completing the think paper. Thirty-four students (64%) made these comments with many students experiencing multiple issues completing the task (see Table 3). There were a total of 7 main categories where students experienced problems. Appendix I provides specific examples of quotes to illustrate each of the categories.

#### Finding a topic.

There were 18 statements made by participants about the role of finding a topic. Fourteen students (41%) made these statements. Two participants commented on finding a topic twice and one student commented on finding a topic three times. The main problems with finding a topic were associated with: (a) failing to define a narrow enough focus to pursue as a topic for the think paper (10 students), (b)

identifying a label for a topic (5 students), (c) using prior knowledge from a different discipline to inform topic choice (1 student), (d) needing a topic which would maintain interest (1 student), and (e) finding a topic with no explanation provided for why it was difficult (1 student).

**Table 3. Number of participants and problems experienced with the think paper.**

| Number of Participants | Number of Problems | Total |
|---|---|---|
| 7 | 1 | 7 |
| 7 | 2 | 14 |
| 7 | 3 | 21 |
| 4 | 4 | 16 |
| 2 | 5 | 10 |
| 4 | 6 | 24 |
| 1 | 7 | 7 |
| 1 | 8 | 8 |
| 1 | 9 | 9 |
| 34 | | 116 |

Difficulties finding a topic represent either inaccurate or incomplete task understanding. Without a clearly defined, narrow topic it is more difficult to decide if search terms will lead to successful article search outcomes. It also is difficult to determine if articles that are available to choose from are relevant and address the task at hand. This lack of a clear, narrow topic often led to frustration in locating articles to help students move forward in completing the think paper. This often led to multiple searches or choosing articles and then discovering they were not what students wanted to include in the think paper. Therefore, students appeared to have either no developed standards or inadequate standards for determining whether this component of the task had been satisfied. This is a key element required to make

cognitive evaluations for assessing task progress (Winne & Hadwin, 1998; Zimmerman, 2002, 2004). Failing to define a topic focus affected future activities, as continually performing article searches hindered task progress.

**Finding articles.**

There were 15 statements about finding articles made by 10 participants (29%). Two participants made three comments about finding articles, and one student commented twice on finding articles. This category was divided into two main categories: (a) problems with database searches (6 participants—1 participant 2 comments), and (b) problems dealing with the quantity of information (7 participants—1 participant 2 comments). Three participants had comments in both categories.

Using the database to find articles proved difficult for a number of reasons. Two students found articles, but could not locate them easily in the library. Two students experienced problems using search terms to find articles that matched or were relevant to the issue they wanted to pursue. Three students made direct reference to finding and narrowing search terms to minimize the number of articles the database found. Other difficulties related to the quantity of information search terms produced, and determining from the search results what articles were most relevant for the think paper. Five students made direct reference to the large number of articles they found in their database search. One student pinpointed frustration in having to sort through a large number of articles and the need to refine search terms to narrow search results. One student indicated how her motivation was stunted because of unsuccessful search processes. The final student makes an interesting comment about finding articles. "I

had considerable trouble getting my articles for the paper. This was because I started the project with no goal in mind. I should have thought of a clear research topic before I started reading random articles" (Participant 24).

These problems reveal a key issue with task understanding—mainly it points to an inaccurate or poor conceptualization of the task and a failure to set goals for components of the task. Students may have found a topic, but did not appear to know how to define search terms that were well aligned to the topic that they wanted to pursue. Therefore, students may not have established clear criteria for search terms or article choices. Or, students' ideas for a topic were too broad to pinpoint articles relevant to the topics they wanted to pursue. The apparent misalignment resulting from these problems negatively affected reaching task goals.

Experiencing no success at this stage of the task process appeared to frustrate students. Although students appeared to monitor their lack of success at this stage, they also appeared to lack the cognitive resources to adapt approaches to resolve difficulties they experienced. Also, students who did find articles did not know whether the articles, based on the abstracts, would be good articles to include as part of the think paper. For example, I asked one student how she determined whether articles were relevant to which she responded "Honestly, I didn't know. The list was made up of every article I could find relating either to writing, advanced organizers or attributional pattern" (Participant 57). This lack of criteria to evaluate whether articles were relevant or not may lead to a significant amount of effort being spent on reading articles not pertinent to the actual task goal.

These results are consistent with similar research suggesting students' search for

information in texts is often inaccurate with students often failing to find efficient and effective methods for finding information (Dreher & Guthrie, 1990; Symons & Spetcht, 1994). As well, Schellings et al. (1996) found that even if students attended to task details they often had difficulty extracting relevant text information. These findings appear to extend to database search processes, as definitions of the task did not help students find a narrow enough topic to help them determine whether their search terms, or examination of the abstracts, would help them reach task goals.

**Researching information.**

There were 11 comments about researching information. Eight students (24%) made these comments, with 3 students making 2 comments in this category. One student simply indicated doing research was difficult, providing no explanation for why it was difficult. Three students commented that the use of technical terms and jargon made the articles difficult to understand, which necessitated a more careful reading of the articles. Three students found choosing relevant information difficult. Or, students reported needing to shift focus when reading to find information relevant to address other aspects of the paper. Two students reported difficulties finding relationships between articles, and between the articles and the text. One student commented on the need to find new articles as a result of refining her topic choice. The final student commented on her use of strategies and how this helped keep her focused during the research process.

The results revealed several areas of potentially inaccurate understandings of the task. Overall, students found it difficult to transform and assemble information into the 5 considerations for the think paper. Therefore, there appeared to be some

misalignment between the research process and understanding the purpose of the think paper. It appears students either did not establish a clear purpose for reading, or they did not fully consider the 5 think paper considerations when reading. Either way, students may have exerted a lot of time and energy finding information that was either not well matched or did not address aspects of the task. In fact, only 1 student commented she actively used the think paper considerations during the research process. Thus, she evaluated whether the information collected during the research process would meet task goals. When she discovered that she had more information for one consideration over others, she shifted the focus of her reading to search for information to address other considerations. This suggests that she was actively monitoring and adapted her approach to studying to meet task goals. These comments reflected a very self-regulated approach for researching information.

These findings are also consistent with search process findings indicating students often do not know how to examine information to effectively and efficiently select information required to meet the demands of the task (Dreher & Guthrie, 1990; Schellings et al., 1996; Symons & Specht, 1994).

**Writing Process.**

Sixteen students (47%) made 40 comments about how the writing process was connected to their understanding of the task. This in itself suggests students experienced difficulties with the writing process, and also indicates some degree of task misunderstanding. This category had 3 sub-categories: framing the paper (18 comments), translating information to address task elements (13 comments), and keeping page limits and other task constraints in mind (9 comments). These main

categories reflect key elements of the writing process that suggests students need to create a plan, translate information, and revise to reach task goals (Mayer, 2003).

Eight participants (50%) made 18 comments about difficulties deriving a framework or organizational structure for the think paper. In these 18 comments, 3 participants provided 3 comments, and 4 participants provided 2 comments on their writing process. Students with more than one comment in this category may have had a more inaccurate understanding about the nature of the task. Four students mentioned difficulties getting started on the paper. Participant 82 commented, "there is nothing more scary than looking at a blank page." Four students made direct reference to the 5 think paper considerations and how they should integrate these considerations into the framework for the paper. This was an important difference from other students in the category because it indicates these students were actively monitoring whether they were meeting think paper criteria. Two students commented on problems experienced presenting information in the paper. Two students made reference to creating an outline as a framework for the paper. One student commented on chunking ideas for the paper, which made the paper easier to write. One student commented she felt there were no set guidelines for the paper, and because of its open format it was difficult to determine a structure. One student was concerned about whether she was including the correct information in her paper, and another student really wanted to include her personal views on the paper, but indicated she couldn't because the paper was to be more formal in structure. The last student commented on her confusions regarding the paper.

> Participant 66: This paper seemed more like a research paper, but that was never specifically stated. Nowhere did it say I needed to argue a thesis, but I feel that I did. None of the questions I, and others asked helped me and I had some personal thought and ideas but since I didn't find textual evidence, I felt I couldn't use them.

Comments reflected a very diverse set of problems in terms of establishing an appropriate framework for the think paper. These reflections may suggest students started the paper with an incomplete or inaccurate representation of the overall task. If students experienced difficulties structuring and organizing the paper, these difficulties may result in inefficient and perhaps ineffective use of their time. For example, one student commented that she spent four hours trying various things to start her paper with no success. However, the comments also illustrated some strategic approaches to the task, as students also indicated how they could adapt different approaches to rectify issues with framing the paper. Finding an appropriate framework for the task is an important task condition because the person evaluating the paper would make a judgment about whether their framework met task criteria.

Overall, the problem with finding an appropriate framework provides some indication that although they attempted to plan some approach for writing, students' plans were often inadequate because they continued to rely on literal interpretations of key task structures such as the think paper outline and criteria. This is consistent with previous research that suggests students understand the importance of the criteria, but they don't transform this surface level knowledge of explicit task

conditions into a framework that would allow them to strategically adapt to the parameters of the task space (Hadwin, 2000; Hadwin et al., 2003).

Translating information into a product also emerged as a category that is another key element of the writing process (Mayer, 2003). To create a product, in this case an essay, students had to take ideas presented in the articles and reconstruct them to address the 5 think paper considerations. The comments also referred to how students evaluated the presentation of ideas in their papers. Seven students (44%) made a total of 13 comments. (One student had four comments, 1 student had 3 comments, and 1 student had two comments). Again, students' comments reflected a diverse number of concerns about constructing the paper. Four students highlighted problems incorporating specific considerations from the think paper outline into the paper. Two students highlighted problems making links across articles and incorporating information into the paper. One student's main concern was about wording. "This is very difficult. I know what I want to say, but it won't come out in logical, accurate phrases" (Participant 67). One student commented on difficulties trying to think abstractly to connect pieces of information together. One student made three related comments. The first was about churning information over and over, trying to determine how to map it into her paper. The second concern was about how to present ideas in the paper, which she addressed by finding strategies to reduce writing frustrations. The third concern related to what she found to be regurgitation of information within her paper. The final student commented on her thesis for the paper. "What's my thesis—it changes with every article...I find a good point then I go to the next article and I start to rework my thesis so that it's relevant to the article

ahhhh!" (Participant 85).

Thus, students were actively monitoring if their presentation of ideas addressed the considerations outlined in the think paper handout. Although students appeared to be actively thinking about content they had researched and the ways that content contributed to their think paper, they experienced difficulties searching for information, assembling pieces of information together, and translating that information into their papers. For example, sometimes students found it difficult to recall where they could find a reference to a particular idea they wanted to include in the project. However, the comments also show that students often did not have standards with which they could adequately monitor whether their choice of information for what to include, or how they phrased particular ideas would meet the criteria for the task. Although students metacognitively monitored processes to judge task difficulties, they provided little evidence of metacognitive control to assess, evaluate, and enact potential solutions to these problems. These are key elements of productive self-regulation (Winne & Hadwin, 1998).

The page limit also posed significant problems for some students. One of the key task conditions within the assignment was a page length of only 5 pages. I believed a shortened page length was required so students would carefully consider the content and present this information in a synthesized framework. The think paper outline included 5 considerations or questions that provided a framework for things to include in the paper. A total of 7 students (44%) made 9 statements about how the page limit had an impact on not only what, but also how they presented information. Four students recognized the sheer amount of content they thought was important to

address each consideration was too much to include. A related commented was about creating a flow in the paper.

> Participant 7: One difficulty was making the though paper flow nicely. I found that we were to include so many things in five pages that it was difficult for ideas to flow nicely. While reviewing my work, I found that the paper sounded choppy and needed a lot of smoothing around the rough edges.

One student commented on topic choice. She wanted to ensure that the topic was not too broad so information could fit within the five pages. Another student commented that the considerations were hindering her ability to write the paper.

> Participant 79: I'm forced to express each consideration equally as equal marking is allocated to each one. This is a challenge for me because I like to just go with my thoughts and expand in areas that provide interest or importance as I am writing.

This student also made note of whether the person marking the paper would be able to recognize if her structure of the paper indirectly addressed some of the considerations.

Overall, students appeared to have difficulties determining how they could include all of the research on their selected issue and their own ideas as these pertained to the think paper. Five pages for a paper was a small space—the goal was to evaluate and synthesize the information, not summarize the contents of the articles. The marking criteria also played a key role in helping or hindering students from

developing a coherent paper. Therefore, students actively considered the key task conditions—both implicit and explicit—while writing. Students were actively monitoring and evaluating task conditions, but struggled to determine how they could balance the content, the considerations, and the marking scheme to meet assignment criteria. These types of activities reflect how task conditions can be used to help students enact and adapt activities while self-regulating. Across all three sub-categories, although students engaged in SMART operations throughout the writing process, they often failed to choose standards that would help them work efficiently through the task space (Winne, 2001; Winne & Hadwin, 1998).

**Monitoring motivation.**

There were 9 comments made by 7 participants (18%) related to their motivation towards the think paper task. Four comments were directly related to their motivation as it pertained to doing research (3 participants). Six students made comments concerning motivation for writing (5 participants). The final comment was a statement of general confusion about what she was supposed to do, and indicated that through talking to others, she gained some confidence that she was on the right track.

Students were generally frustrated with the research process. They pinpointed how the articles were not meeting their expectations about what they thought the articles would discuss, or how the language was too complex. "It's been frustrating more than anything ... thinking these articles will help at first glance, then to discover some are crap and some are way beyond my vocab" (Participant 20). One student appeared to be looking to find the perfect article that covered all aspects of the think paper considerations. Since articles usually represented a much broader outline of the

content, it was difficult for her to determine how she could find a focus when researching, as not all information in the articles could be included in the think paper.

Students were also frustrated about writing, as they experienced difficulties putting a product together. Three students expressed difficulties in finding a focus for writing the paper and gained confidence once they wrote something significant. "Need to feel more sure, I bet I will once I get going ... got down a good opening I think I will continue" (Participant 38). One student commented she was so fixated on the idea she couldn't write the paper and hence experienced motivational difficulties while completing the task. The two remaining students commented about the amount of effort and energy they put into the product and their perceived satisfaction with the outcome.

> Participant 26: I guess this is about as good as I will be able to produce given that the paper is due tomorrow. I'm not satisfied with the product because I've struggled with my topic and feel it may not meet my expectations of a good mark.

Students recognized specific things about either the product or the process of their learning that had an impact not only on their ability to write, but also on their satisfaction with the process and outcome of researching and writing. If students were not satisfied with the end product, then the likelihood of getting a good grade on the paper may be diminished. What this reveals is how feedback affects the research and writing process. Butler and Winne (1995) suggest that internally generated feedback cycles backwards and forwards to influence future task activities. Negative reactions to feedback led to feelings of dissatisfaction and, depending on the student, resulted

in either adaptive or defensive reactions to the task (Zimmerman, 2002, 2004).

**Time management/planning.**

Time management was also a problem for some students. There were 16 comments. Two students made 3 comments, and 2 students made 2 comments in this category. Six students (18%) commented on how other courses or other commitments interfered or prevented them from developing a think paper focus. However, these students also indicated they had some plan for working through the project. One student commented on her general inability to apply herself in school and the final student commented on how work and family responsibilities did not leave a lot of time and energy for her schoolwork.

Four students (15%) made 11 comments on other time management issues. Getting started (2 participants) and staying focused while writing (4 students) were the main problem areas. "Why is getting started (on anything) always the hardest? At the beginning the idea is always vague, unclear, cloudy. Search for strategies that will make this assignment easier" (Participant 20). One student mentioned she had to find time to complete the paper. One student mentioned the role of procrastination in 3 different entries. For this student, despite the increased stress of putting the paper together at the last minute because she procrastinated, she was confident she would be able to pull the paper together in less than two days. Students in this category often mentioned strategies to deal with their procrastination. Whether students carried these strategies through to fruition is another matter. Research suggests students may have the skills for more strategically approaching the task, but they may not have the will for carrying out those same activities, preventing students from bootstrapping more

productive forms of self-regulation (Corno, 1993; Winne, 1997).

Procrastination typically leads to negative affective consequences such as feeling overwhelmed or anxious, which leads to putting off responsibility making decisions about what needs to be done (Kachgal, Hansen & Nuttter, 2001). These motivational comments attest to the complex interplay between behavioral, cognitive, and affective components with some students working well by strategically adapting to these circumstances while the majority become helpless under the same circumstances (Kachgal et al., 2001).

#### Environmental factors.

There were 3 students (9%) who mentioned factors that were out of their control, and impeded their task progress. The first student spilled coffee over her keyboard, which created a stressful situation as she lost the file containing her "unsaved" paper. As a result, the student had to restart her paper from scratch by hand. This same student also mentioned she was unable to concentrate because she needed to get groceries. A second student developed an eye infection, which impeded her progress in reading material for the think paper and the assignment due date was quickly approaching. The final student resolved an issue on her own by determining how to use the microfilm machine without asking for help, a feat that she was quite proud of. These environmental factors can also have a direct impact on their ability to complete the assignment and can have an impact on the type of product produced.

### Summary about Difficult Aspects of the Think Paper

I thought the think paper was a fairly straightforward task, however, students did not agree. They appeared to have many difficulties in producing a think paper. These

students were very active in identifying features within the task space—task, cognitive, and motivational conditions that presented problems or roadblocks to task progress, however, I interpret that they were not fully aware of the source of the problems. I consider the source of the problems to be a mismatch between their perceptions of the initial state and the goal state. Students experienced problems selecting, assembling, and translating information into products. Although students successfully used operations to gain additional domain knowledge, they often became overwhelmed by how they could use this information in an effective manner to produce a task product. The problem(s) students identified often left them spinning their wheels in terms of finding solutions to the problems they identified. Since problems were identified, students could use this information as a pivot to adapt approaches to more productively engage in self-regulation, however, this often was not the case (Winne, 1997).

**Table 2- Question 7: What are the easiest and difficult aspects of the assignment: Design Project.**

### *Easy Aspects of the Design Project*

Twenty-five participants (43%) made 47 comments about easy aspects of the design project, which were grouped into 5 main categories. Again with this question students did not provide elaborate explanations for why or how these easy aspects helped them move forward with the project, which makes it difficult to interpret the influence of these categories on refining their understanding of the task.

#### Finding a topic.

Two students (8%) commented finding a topic was the easiest part of completing

the design project. Participant 36 indicated "deciding on a topic wasn't too hard." Participant 73 indicated "choosing a topic of interest" wasn't hard.

**Finding articles.**

Five students (20%) indicated the easiest aspect of the design project was finding articles. "In a way I could say that finding articles because all it took was to look at the database to decide which article fit the profile of what I wanted to talk about" (Participant 69). The remaining participants had similar responses.

**Research process.**

Five participants (20%) indicated the research process was the easiest aspect of the design project. "Reading articles—I find reading the articles easy because I know what information I am looking for so I can discriminate the useless information from the important information" (Participant 37). One student had a method for reading the articles, which allowed her to put an outline together for the project.

> Participant 57: The reason I wrote the words what, function, types and when next to all the quotes while doing the summary is so that the outline is easy to put together. I can find common themes amongst the information in all of the different articles and therefore my 3 or 4 main topics of discussion are compiled.

Research proved to be a positive activity for these students. Students recognized elements of the research process that needed to be actively monitored to help them maintain a direction and purpose for reading that was well connected to the nature of the task.

**Writing process.**

Eighteen students (72%) made 29 comments on aspects of the writing process. Eleven of these students made a single comment about the role of the writing process. Four students made 2 comments, 2 students made 3 comments, and 1 student made 4 comments.

Seven students (28%) made 10 general comments about the ease of the writing process as it pertained to creating the bibliography and title page, examining the design project criteria, and reshaping what they wrote during the writing process. The final student made reference on 3 separate occasions to the ease with which she was able to generate ideas for the design project. This student was able to draw on material from other classes into her project. "It's interesting actually because some of my clearest straight-forward ideas come to me when I have no intention of working on my design project" (Participant 84).

Four students (22%) commented directly on the ease of building prior knowledge through research or participation in other course contexts, which helped generate ideas for a design project activity. "The writing was a lot easier than the think paper, because I had worked with the information so often that I knew most of what I would include" (Participant 66). Two participants mentioned knowledge developed in previous courses helped them design the activity or learning objectives. The final student remembered her own grade four experiences as a basis for thinking of an activity. The reference to prior knowledge distinguished this group from the next group of participants.

Seven students (39%) indicated creating the activity for the design project was the easiest aspect of the project. "The easiest part of the assignment was coming up with

a learning activity" (Participant 4). Three participants mentioned that creating the activity was easy because it allowed them to use creative thinking. One student referred to a current course context where she could draw on an activity. One student indicated she wanted to create an amusing activity. The last student commented the activity was easy because "there was quite of bit of verbal/explicit instruction on both the outline and Dianne/T.A. behalf to emphasize writing" (Participant 17).

Four participants indicated specific components of the design project were easy to complete whether the element was the justification, goals, task condition, learning objectives, or theoretical principles part of the project. Students cited a number of reasons for why these sections were easy to complete. They had a clear idea of what they wanted to do in particular sections of the design project, the instructional context was easy to define, or, they could draw on the project outline or information from the think paper to complete sections of the paper.

**Linking theory to practice.**

Five students (20%) indicated it was easy to link the theory they had read to practice. Three participants commented the groundwork for the design project had already been done in the think paper, which made the design project easier. For 1 student the easy part was "relating my research articles to classroom theory. I found it easy to see how it could apply to classroom instruction" (Participant 24). Participant 85 provided a more elaborate explanation of the connection between the two projects.

> The interrelationships/interconnectedness of TP and DP made it twice as relevant, twice as significant, twice as meaningful –able to explore info found in articles in more depth from two

perspectives: making lesson plan versus applying principles found in lesson plan to real life situations.

Thus, considering the broader nature of the project design, these students made specific reference to how they could make connections between theory and practice.

**Summary for Easy Aspects of the Design Project**

For the 25 students (43%) who identified easy aspects of the design project, these easy aspects covered the range of the task space from finding a topic to writing the paper. Identifying easy aspects of the activity may provide opportunities to not only evaluate task progress but also generate positive internalized feedback leading to additional learning activities to reach task goals (Butler & Winne, 1995; Zimmerman 2001). Again there were a greater number of difficulties with the design project task.

***Difficult Aspects***

There were 38 students (66%) who made 103 statements about difficult aspects of the design project. The number of comments made by individual students ranged from 1 to 12. Table 4 provides the number of participants and associated number of difficulties. More comments about the difficulties of the design project task may reflect more incomplete forms or inaccurate understanding of the task parameters. These statements were grouped into 8 different themes. Appendix J highlights example statements from each of the themes.

**Generating a topic.**

Four students (11%) indicated difficulty in generating ideas for a topic. Comments were generally concerned with the scope of the topic. The topic was an

important feature of the design project. Choosing a topic too broad in scope would make the project harder to manage because the number of principles, objectives, and goals would also multiply. Thus, students were aware of, and monitored their topic choice to make sure it would fit the parameters of the task.

**Table 4. Number of participants and problems experienced with the design project.**

| Number of Participants | Number of Problems | Total |
|---|---|---|
| 13 | 1 | 13 |
| 9 | 2 | 18 |
| 8 | 3 | 24 |
| 1 | 4 | 4 |
| 4 | 5 | 20 |
| 2 | 6 | 12 |
| 1 | 12 | 12 |
| 38 | | 103 |

**Generating ideas for practice.**

Six students (18%) made 7 comments about what type of activity they should use for the practical portion of the design project. Two students mentioned difficulties generating ideas for teaching in specific content areas with one of these students relying on scouring her Mom's books for ideas. Three students were concerned about how to make a link between the theory they had chosen and how they could create an activity based on theory. One student realized she needed to think backwards and start with the activity first before examining theory. The final student struggled with framing the activity and determining how much information to include in her write-up of the activity.

The activity was a key task condition of the design project—more important was the bridge students were expected to make between theory and practice. Students

recognized they needed to establish a link between theory and practice, but were not sure how to do it. Since students had started to think about both theory and practice, they also started to build connections to determine how they could translate information from both areas to form an integrated product. This merging and melding of practice and theory ideas was essential to illustrating the required bridge, suggesting students were maybe allocating more cognitive operations and resources to help them identify how to work through the task space (Winne & Hadwin, 1998).

**Research process.**

Nine students (24%) made comments about the research process, with a total of 14 comments about the research process (5 students made 2 comments each). Comments differed in terms of what they reported about the research process. For example, Participant 85, on two separate occasions in her portfolio wrote about difficulties associated with selecting articles, finding relevant main points, and determining how much information to include in the paper. Two participants reflected on their use of strategies when reading complex articles or just managing the amount of content in the articles. One participant commented on the need for better time management because she did not have time to "to really comprehend and critically think about the articles ... what I never did was develop the big picture of each article" (Participant 15). Only one student indicated that her knowledge base increased as a result of researching, which made the design project easier. One student indicated that she spent too much time researching information and not enough time writing.

There was a very diverse set of comments about completing research for the

design project. The key areas that posed difficulties were in choosing appropriate articles and using strategies to select relevant information. For example, students often mentioned needing to sort through large amounts of information, or problems digesting article information in a single read. Through evaluating the outcomes of the research process, they were able to assess the accuracy of their task understanding, which influenced their ability to reach or modify task goals. For example, one student mentioned doing additional database searches to find articles that more closely fit her topic. Students experienced problems in terms of searching, monitoring, and assembling information to frame a product for the design project—key operations that allowed them to produce products (Winne & Hadwin, 1998). As well, these results reiterate how students fail to effectively and efficiently search text to find information that is pertinent to reaching task goals (Dreher & Guthrie, 1990; Schellings et al., 1996).

**Framing the paper.**

Seventeen students (45%) made 22 comments about problems framing the paper. These comments were based around different issues: planning a framework (14 comments), depth of detail (5 comments), and organizing knowledge (3 comments). Five students made 2 comments and 1 student made 3 comments about framing the paper.

Students mentioned a diverse set of issues framing the paper. Generally, students expressed difficulties determining how they should start the paper and created a plan to manage this difficulty. Students tried different techniques to determine how they could tackle framing the think paper. Students often needed to think backward from

practice to theory instead of the other way around (4 students). Two students commented on how they brainstormed ideas to structure a framework for the paper. Two students divided the task into chunks to manage the writing process. Two students commented on the need to take different perspectives so they could understand both sides of the project—the student and teacher components. Three students questioned whether they used a good organizational framework, but only 1 mentioned getting feedback about whether she was on the right track. One student mentioned the most difficult part was planning how to execute a description of the bridge between theory and practice. These comments are consistent with previous research that suggests planning, translating, and reviewing tax cognitive resources; and failing to attend to any of these elements affects a writer's ability to produce good quality text (Kellog, 1988; Zimmerman & Kitsantas, 1999). Some students found strategic ways to deal with these difficulties so they could manage the multiple task elements.

Often, through experimenting with different writing strategies, students devised methods for refining their understanding of the task by reframing what structure would be suitable to meet the demands of the task. Students' emphasis on planning was important as it indicates they were aware this was a key process to writing (Mayer, 2003; Zimmerman & Kitsantas, 1999). However, evaluating the formation of the frame for the design project either resulted in productive outcomes that moved the student forward to the next stage, or was unproductive and failed to resolve planning issues. In the latter case, the evaluations led students to unproductive methods of task engagement and were most likely a reflection of an inaccurate understanding of the

task. I interpret these were inaccurate because they did not recognize the underlying purpose of the task conditions, which included making connections about relationships between specific task conditions (Winne & Hadwin, 1998; Zimmerman 2002).

Monitoring the amount of content information required as well as how much depth they needed to include for specific elements of the project also posed problems. Five students were in this category. Four students made direct reference to selectively choosing information to include in each section of the paper. One student recognized she needed to take a break to reorganize her thoughts because she was cognitively overloaded when trying to frame the paper. The major stumbling blocks came from managing information acquired during the research process. Specifically, students experienced problems connecting and integrating information to the structure of the design project outline to ensure that all of the requirements were met.

Students needed to distinguish between depth of information versus breadth of information, especially in sections that had low mark allocation. Thus, an increased awareness of the criteria was required to determine how much information was necessary in each section. Students did not recognize how they could use the task criteria to judge how much detail was required to create a good product. For example, the theoretical principle section was worth 5 marks only, yet in the product students often provided a lot more detail than was required to get full marks. This is consistent with previous research that suggests students do not fully interpret the meaning of the standards or criteria to frame a better understanding of what they could do within the project (Hadwin, 2000; Hadwin et al., 2003).

A final issue with framing the paper concerned using the design project outline to organize their knowledge and determining if this organization fulfilled task criteria. Three students made comments about creating a stronger organizational framework by considering task criteria. Three students only mentioned organization as a problem, however, it does represent a key task condition to which students may not always direct their attention.

Overall, some of the same issues with writing the think paper emerged with the design project task. Students failed to identify or integrate elements of the task space to form a coherent picture to create a framework for completing the project (Winne & Hadwin, 1998). Zimmerman and Kitsantas (1999) suggest setting hierarchical goals function not only to break down the task, but also are self-motivating because it is easier to recognize progress in researching overall goals, thus improving self-efficacy and performance. In the context of this study, students did not articulate particular goals for writing at each stage of the writing process. However, by recognizing key problem states they adapted different processes to reach goals. The problems and solutions paths did not always result in positive motivational orientations to reach task goals, however, they did help refine their understanding of the task to find solutions to the roadblocks they experienced.

**Time management.**

Six participants (16%) indicated they had specific difficulties with time management. Three students made specific reference to other courses and demands within those courses that impeded their progress in terms of being able to work on the design project. The remaining three students set aside time to work on the project in

small chunks to manage the demands of the task. Given that students knew when the assignment was due, and despite the emphasis on self-regulated learning in the course, some students still failed to actively regulate their use of time to manage the demands of their coursework. However, many of the students' comments reflect confidence about completing the task, or indicated that they had developed specific strategies to deal with their time constraints in meeting the design project deadline. As Zimmerman (1995) indicates, it is one thing to be aware of ineffective learning approaches, but it is another to use this knowledge under competing circumstances.

**Motivational factors.**

Nine students (24%) mentioned specific motivational factors that had a direct impact on how they framed the design project. Key phrases indicated motivational issues of feeling overwhelmed (1 student), lacking stamina (1 student), procrastinating (4 students), experiencing general confusion (1 student), or low self-efficacy (2 students). These negative affective feelings hindered their efforts to put the design project together. One student who had been struggling all semester with self-efficacy issues outlined a future plan for dealing with such issues.

Motivational orientations had a direct impact on a student's ability to actually maintain task motivation and persevere despite challenging circumstances. The pervasiveness of these motivational/affective thoughts affected students' abilities to refine their understanding of the task. Specifically, dysfunctional motivational orientations prevented students from identifying strategies that would help them overcome problems with understanding content or completing tasks. Zimmerman's (2002, 2004) research supports this contention.

**Confusion among elements of the project.**

Eighteen students (47%) made 30 statements concerning problems with addressing specific components of the design project. Twelve students experienced problems deciphering the difference between instructional goals and learning objectives, which stemmed from defining what the terms meant, or in operationalizing the terms into concrete practical examples of content. One student commented on difficulties selecting goals most appropriate for the scope of the chosen activity. Two students experienced difficulties framing learning objectives. One student commented twice on the difficulty of making a connection between the learning objectives and framing a learning activity. Five students struggled with how many theoretical principles to include and how much depth they should include in their description of the principles and within their justification. Four students made reference to the difficulty in determining how to apply, incorporate, or transform either theory into practice or practice into theory. Three students identified difficulties determining what information should be described in the instructional context/conditions element of the design project. Finally, one student was generally confused with all elements within the design project.

For each of the main concepts included in the think paper, students recognized the explicit task conditions, but they often did not define or interpret the meaning of those elements outside of the context of the design project instructions. In other words they adopted the language used in the describe project and then tried to build these elements into their product. For example, students recognized that instructional goals were from the teacher's perspective and learning objectives related to the student's perspective, but they were unable to translate this knowledge into their own framing

of goals and objectives for the context of their activity. Besides these issues, the amount of content to include in each section of the paper also was a key question. For example, students often went into a lot of detail for the theoretical principles section, but provided minimal data for the justification section, which was worth twice the marks.

**Revision process.**

Eleven students made comments regarding evaluation of their products and whether they would meet the criteria set out in the design project instructions. One student mentioned twice that the assignment was not clearly explained and, as a result, was unsure of whether her product would meet my expectations. Four students mentioned the need to ask questions to ensure things were explained clearly in their papers and that the papers made sense so the marker could identify all of the components of the project. One student mentioned how all of the components were implicitly connected, with a second student indicating some concern about the overlap of ideas across sections in the paper. Another student mentioned difficulties pulling information together into a product. The final student made a 7-point list of the problem areas that she identified in a draft of her design project and used this list as a means of revising her paper.

What this mix of reactions to completing the design project suggests is that students struggled to identify standards through which they could monitor whether the product they created would meet the criteria. Through recognizing these issues students became more aware and attuned to elements of the task structure that could be modified to more accurately meet the demands of the task.

### Summary for Difficult Aspects of the Design Project

Overall, students were very active in monitoring elements of the design project task that were difficult for them. They identified problems in all of the key areas of completing the task from finding a topic, to researching, to writing. They were able to identify implicit and explicit task conditions that posed problems, and in some cases were able to articulate solutions to those problems. What this analysis also reveals is that students had an inaccurate or incomplete understanding of the design project as well because of the number of problems they were able to identify.

## Summary of Results

### Initial Task Understanding

In Chapter 1 I outlined a potential model of task understanding based on previous research in memory and self-regulated learning. It suggested students selectively attend to task elements, interpret the meaning of those elements, create goals based on this interpretation, and then plan an approach to complete the task. Do students engage in these processes? Students appear to engage in some of these processes, but not all, and not to the same degree when initially exposed to a task. I characterized student understandings of the task across two dimensions, breadth and depth. In terms of depth, students selected information of different grain sizes. Students with less depth selectively attended to fewer characteristics of the task that outlined an overall framework for the task. Students with more depth chose more characteristics of the task to outline in their descriptions. Therefore, these latter students were able to identify key task conditions that allowed them to determine what processes might

work to complete the task.

In terms of breadth, students with deeper understandings used most of the SMART operations to develop an understanding of the task (Winne & Marx, 1989). Students with greater depth not only searched and selected information from the task, but they actively worked with information to assemble elements of the task and monitored how those components fit with one another. By engaging in these processes they translated task information into their own framework so they could either develop a new schema for the task or integrate this task information with prior task knowledge to build a representation of the task (Mayer, 2003; Winne & Marx, 1989). However, there is a danger in students relying on prior knowledge to frame an understanding of the task because this knowledge may be inaccurate and lead them astray by choosing process strategies that may be effective for some task contexts, but not others (Butler & Cartier, in press; Winne & Hadwin, 1998). This was true in cases where students listed components of the task at the expense of framing an integrated picture that combined task elements.

Students did set goals and create plans; however, not all goals or plans were framed in light of theoretical criteria for goals or plans that would foster self-regulated learning. Goals typically were general in scope and did not have set standards embedded within them that would help students monitor task progress (Hadwin 2000; Hadwin et al., 2003). Plans varied in the degree of sophistication with more elaborate plans outlining not only elements of the task process, but also strategies or tactics they thought were aligned to task goals. I interpreted the goals and plans provided a good stepping stone to engage in self-regulation, however,

several students experienced roadblocks in task progress the prevented them from carrying out plans and reaching goals.

**Revising Task Understanding**

Questions 5-7 assessed factors that created opportunities for refining their understanding of the task. Given the number of problems students identified, they were successful in metacognitively monitoring task progress. Self-monitoring is believed to lead to "better organization of one's knowledge, more accurate self-judgments, and more effective planning and goal setting for future efforts to learn" (Zimmerman & Paulsen, 1995, p. 15). Therefore, metacognitive monitoring provided pivots for choosing what direction to pursue to address issues in achieving task progress (Winne, 1997). In some cases students did adapt approaches to completing the task. Some of these adaptations improved learning by reducing the distance between the initial and goal state. In other instances, the distance was not reduced, but stayed stationary or even added to the distance. Therefore, there appeared to be a difference between monitoring task progress and exercising self-regulation by using metacognitive control processes.

Engaging in task processes such as finding articles or performing research updated task, cognitive, and motivational conditions. Strategic processes and problems experienced with those processes contributed to either accreting, tuning, or restructuring knowledge of both the tasks, but also domain knowledge (Winne & Hadwin, 1998). This additional information helped students reassess the discrepancy between the initial state and the goal state to determine next steps to reach task goals. Therefore, internal feedback generated by students about changes to task progress

created reactions that either promoted or inhibited additional learning activities (Butler & Winne, 1995; Winne, 1997). Effectively engaging in metacognitive control to adapt approaches to learning requires not only the skill for enacting these processes, but also the motivational and volitional catalysts to sustain these efforts when competing factors are present (Garcia et al., 1998; Zimmerman, 1995).

# Chapter 5: Discussion

In the last two decades, there has been increased emphasis on research investigating properties and outcomes of SRL. If students are proactive in learning, they seek out opportunities to define the task, set goals, choose tactics and strategies to reach goals, monitor and evaluate methods for learning, as well as explain the outcomes of all these activities (Pintrich 2000; Winne & Hadwin, 1998; Zimmerman, 2002, 2004). These activities occur within a physical and social context where features of the instructional environment and the approach to instruction may either support or hinder various SRL processes (Hadwin, 2000; Meyer & Muller, 1990; Perry 1998). The level of learning students achieve may depend on an interaction between characteristics of the instructional environment and knowledge of how to effectively self-regulate in these environments.

Most studies investigating SRL are controlled experimental studies that manipulate features of SRL to determine their impact on other variables of interest such as achievement (i.e., Jamieson-Noel & Winne, 2003; Thiede, Anderson, & Therriault, 2003). These research studies have developed, refined, and advanced theory, but studies continue to show that students are passive learners who are not strategically adopting approaches to learning (Simpson & Nist, 2000). As well, research also suggests "few teachers currently prepare students to learn on their own" (Zimmerman, 2002, p. 64).

Research is beginning to examine SRL in school contexts to investigate how features of the instructional environment, such as the tasks assigned, and teachers'

instructional actions can foster SRL in the classroom (i.e. Hadwin, 2000; Perry, 1998; Perry et al., 2002). This research addressed the call to adopt new methodological approaches to investigate SRL (Winne et al., 2002; Zeidner et al., 2000).

In this dissertation, I collected data within the context of an upper level undergraduate Instructional Psychology class. My purpose was to understand more fully properties of tasks that students use to develop and refine their understanding(s) of tasks over time, as well as how task structures moderate choices to self-regulate learning. I pursued 4 main research questions: (a) What are students' initial understandings of tasks? (b) What do students believe are the appropriate steps to take to begin the task? (c) How do task understandings change over time? and, (d) What factors influence how task understanding changes over time? The studying portfolio provided a lens through which I could trace both the products and outcomes of learning. This allowed for a more fine-grained analysis of features of the task space students use to moderate and adjust learning activities to support reaching task goals. My analysis reveals several theoretical and practical implications for understanding SRL and instructional practice.

## Theoretical and Practical Implications

I selected key features from the larger studying portfolio assignment that I believed would best illustrate: (a) how students perceive, attend, and interpret features of the task space; and (b) how students monitor and control features of the task environment to regulate learning processes. The main purpose of this study was to draw connections among differences in students' interpretations of task demands, their skills for carrying out activities involving SRL, and what they perceive about

tasks. In the portfolio, I asked students not only to describe their learning processes, but also reflect on the effectiveness of their learning processes. Task definition is a key aspect of SRL, yet very few researchers have investigated the role of task understanding in SRL or factors that influence how students define and refine their understandings of the task. This investigation was fruitful in a number of respects as outlined below.

**Initial Task Understanding**

Students have very different interpretations of the task space when directly prompted to think about the task that varied in what I characterized as sophistication in both breadth and depth of understanding. Moreover, different questions prompted students to think differently about elements of the task space. If achievement is a function of differences in how students interpret task demands, then students need to attend more directly to the features of the task as one method to enhance their approach to completing a task. I was unable to address this question directly because the results suggest students have unique, complex, and multidimensional profiles of activities. This made it difficult to meaningfully and validly create groups to investigate other theoretically important questions such as relationship between task understanding and achievement. Future research with revised methodological approaches could be used to address this question.

From a practical viewpoint, this finding suggests instructors should focus on task understanding in the classroom so students derive adequate conceptual knowledge of different task structures. Specifically, instructors should think about what types of questions would facilitate task understanding because previous research suggests

students often create inadequate, absent, faulty, or inaccurate understandings of task structures (Butler & Cartier, in press). The goal of an exercise that prompts students to think about the task would be to direct students' attention to an "appropriate" number of features of the task without cognitively overloading them. This may be a fine balance to strike.

I hypothesize there may be a factor that moderates the sophistication of students' initial task understanding. This factor is whether students are able to address questions an instructor designed to promote task understanding. In this study, I gave students a short time to read a handout and then answer questions about the project. In retrospect, had I allowed them more time a different profile of results may have emerged from the data.

Given the studies cited in the literature review indicating a misalignment between what teachers believe they assign and what students produce, I explored features of the task context that may affect students' understanding of the task. The types of questions I asked is one such feature. With each additional question, students attended to different elements of the task structure, yielding different pictures of its overall structure. This highlights that my questions were effective in stimulating attention to various task and cognitive conditions in the assignment (Winne, 2001; Winne & Hadwin, 1998).

Students selectively attended to and interpreted different implicit and explicit instructional cues embedded in the task space. This suggests that students varied the operations they used to search and assemble task conditions to create an understanding of the task (Winne & Hadwin, 1998). However, the results also suggest

that some students' understanding of the task space was constrained. They adopted the task's language to illustrate their understanding of the task. This may reflect a passive approach to developing an understanding of the task, which may impact future decisions these students made about self-regulating learning. Alternatively, it may be simply be the case that some students needed to be immersed in the task before they could develop a more fully integrated picture of the task.

Therefore, it is difficult to discern whether students were able to develop a fully integrated understanding of the task based on the task components they identified. Components of the task were often talked about in isolation from other components. Students also did not infer many implicit task conditions I held to be central to developing a full understanding of the task. Based on the first task understanding question I interpret that, at best, students in the low level groups and to some extent the high level groups had incomplete or inaccurate descriptions of the task. Students' understandings may have been incomplete or inaccurate because they selectively attended to some elements of the task space more than others. Or, they may have recognized certain instructional cues as relevant but decided to make use of them at a later point in time, when they may have appeared more timely and appropriate to consider. Students often recognized task elements but did not take the next step to translate their interpretations of those elements into a plan about specific learning activities to complete the task. These possibilities are consistent with problems identified by Butler and Cartier (in press).

Features of the task students attended to and interpreted are the basis for setting goals. This study provided students with an opportunity to articulate their goals in

relation to a specific task context, in contrast to assessing goals in general. My results suggest students may hold multiple and diverse goals.

Interestingly, one student made a specific comment about framing goals. "At this point I don't really have any goals for the project, or at least I don't know how to verbalize them yet. I'm not completely certain what goals for this project would involve/include" (Participant 62). This illustrates one potential problem with task understanding. Students may not know whether goals should be specific and tied to elements of the task or general, and thus provide a broad framework for completing the task.

Goals may start out general and then become increasingly focused as work on the task proceeds. General goals may be the motivational catalyst to energize students to begin work on the task. As work on the task ensues, specific goals may be created to direct cognitive engagement while completing specific task activities. In the portfolios students did not articulate goals beyond the actual question that asked them to frame a goal for the task. However, in future research this could be explored by asking students to frame goals at multiple points in the studying portfolio to track how goals change across stages of completing a task. Examining students' goals at different stages in the process may reveal unique characteristics about how they view different task elements and use goals as a basis for directing and altering approaches to completing a task.

Very little is known about the planning element of self-regulation. Studies typically survey students about whether they planned an approach, but they do not directly ask students about how they break the task into components. In my study,

plans spanned the entire task process from an initial goal state to a product state. Students differed in the number of steps and how they prioritized these steps in their plan. Again, students limited their descriptions of plans to the initial task understanding session. Future research should strive to examine how students articulate initial plans, and then how they add to, delete, or edit steps of the plan as the task unfolds. Revisions to the planning process may reveal unique information about how students decide what steps are important, and how specific tasks completed in the plan may motivate and direct next steps in the task process.

Overall, students are agents who make choices about what they want to examine, when they want to examine it, and how they will examine it (Bandura, 1996, 1999). Based on students' initial task understanding they made a choice about what level of cognitive engagement they might want to apply to the task. These decisions also affected whether students refined their understanding of the task.

**Revising Task Understanding**

Revisions of task understanding occurred at several points as the task unfolded. With each new task component students pursued, they had an opportunity to acquire additional information about both task and cognitive conditions that refined understanding(s) of the purpose and parameters of the task. In most cases, this resulted in a more sophisticated understanding of the task because updates created by adding information to the task space concerning task, strategic, or domain knowledge altered the discrepancy between the initial and goal state. Therefore, I interpret that task understanding is cumulative over time. However, this may not always translate into effective methods to self-regulate.

Students metacognitively monitored several problem areas that directly or indirectly influenced their understanding of the task and helped them adapt different approaches to completing the task: (a) searching for a topic, (b) performing a library search, (c) choosing articles to examine, (d) choosing strategies for reading, (e) planning to write, (f) enacting writing processes, and (h) revising written products. Within each of these relatively large task components students also monitored a diverse set of issues. Students successfully identified they were experiencing problems in these areas. Although students may have identified problems, they did not always find strategies to successfully deal with these issues. This is consistent with previous research (Hadwin et al., 2003).

In the literature review it was suggested that everyone self-regulates, but to different degrees. I identified in the data a diverse set of circumstances that led students to what I characterize as productive and nonproductive forms of SRL. Although this sounds like a dichotomy, it is not. What constitutes the degree of productivity depends on the number of problems students experienced with the task and their ability to effectively find solutions to these problems. Productivity also ties back to the perceived ambiguity and risk associated with the task. If students perceived the task as high on ambiguity and risk, then their ability to engage in productive forms of self-regulated learning may be diminished. Students may find it more difficult to discern what to do for a task high on ambiguity and risk than a task that is not (Doyle, 1983).

Productive self-regulation helps students move forward through the task space. Each product created is assembled and analyzed, ideally, in relation to the purpose of

the task. Achieving success in each component of the task space contributes to a positive motivational orientation towards the task, which adds momentum to continue enacting learning activities that ultimately allow students to complete the task (Zimmerman, 2004). Nonproductive SRL prevents students from moving forward through the task space. When students experience problems they may "spin their wheels" as they strive to create products designed to reach task goals. For students "spinning their wheels" they often failed to find solutions to address problems in an effective manner. Therefore "spinning wheels" may lead to decreased momentum when striving to work through the task space.

Within the data set, I observed that students often experienced productive and nonproductive forms of self-regulation as they worked through various components of the tasks. Different elements of the task space posed different challenges for different students as illustrated by the diversity of issues within and across categories in the think paper and design project. For example, when it came to doing database searches for articles, familiarity with the library database engines may have enhanced or hindered students' ability to find research articles. Some students reported multiple instances of having to perform a search because they could not find articles that they thought were suitable for the papers. Even after selecting articles, some students reported the articles were not providing information they monitored as well-matched to the parameters of the task space. They went back to find other articles.

Therefore, self-regulation varies considerably across students depending on their perceived ability to successfully complete the task. This is reflected in my data through the number of problems students identified and also through the number of

solutions they generated, even if solutions were not well-aligned to a problem state. Circumstances within the task environment like those described above can drive or impinge student engagement. Most of the problems appeared to be associated with enactment, but I interpret they actually stemmed from underlying problems with task understanding. As Simpson and Nist (2002) suggest "task identification must precede strategy selection or students are doomed to spend vast amounts of wasted time using inappropriate strategies, and, in the end, not performing well in their courses (p. 530). Other research suggests similar findings. For example, Hadwin (2000) found that students often labeled problem with self-regulation differently from how, as the instructor, she labeled the problem. As well, Hadwin found students often were aware of standards for evaluating final products, but they failed to internalize these standards for evaluating their own task progress. These types of inaccuracies may have negative effects on future task activities.

**Feedback—An Essential Ingredient to Refining Task Understanding**

The analysis of the data also reveals that students, with respect to their task progress, generate a very dynamic and iterative cycle of feedback. Feedback is an essential process in learning as it guides and directs current and future processing of task, domain, and strategic information (Butler & Winne, 1995). As students define the task and enact task operations, they generate feedback that updates information about task conditions, goals, and operations so an "appropriate" product can be constructed. To do this, students must set standards they can use to evaluate products of their work. Students in this study generated lots of ideas and concerns about how to complete the task plus factors that impeded task progress. However, they did not

always appear to know how to use this information to modify methods of examining task or content information. Alternatively, they may have recognized a method for addressing the issue, but failed to implement the solution they invented. For example, in terms of time management one student indicated she was not going to procrastinate, and she would achieve this by creating a schedule to reach task goals. This schedule would be a good mechanism to help distribute the workload over a longer work period. However, future portfolio entries indicate she did not do this, instead leaving the task until a few days before it was due because of competing factors such as other course requirements. This would represent a production deficiency (Winne 1997, Zimmerman, 2001).

Butler & Cartier (in press) suggest that students establish work habits or "consistent approach[es] to completing academic work" (p. 7). In instances of a production deficiency, students' predominant work habits may override the desire or need to change an approach to learning, instead relying on past approaches that are more comfortable and reliable even if they create more stress in the long run. This failure to adopt alternative approaches represents failures to bootstrap more effective forms of self-regulation (Winne, 1997).

The studying portfolio provided an opportunity for students to generate process feedback as they constructed the studying portfolio (Butler & Winne, 1995). The feedback students generated concerned both processes and products of learning in the following main areas: (a) instructional cues that they may have missed or misinterpreted, (b) goal states that either matched or did not match the task demands, (c) operations (tactics or strategies) to adopt or adapt to reach task goals, and (d)

standards for creating cognitive evaluations about goal progress. The comments about these processes helped them refine their understanding of the task. Students chose to maintain their current or revise their plan by adapting alternative approaches—strategies or tactics to gain new information about the task or content. This type of self-generated process feedback provided more explicit ideas to students about how they could be processing task demands.

**Role of Monitoring**

Although students recognized they needed to monitor many components of the task space, there was little evidence students adopted standards that would help them accurately assess the underlying sources of problems they experienced or what they could do to resolve them. For example, I recall one student's entries where she commented at multiple points on how her search for articles was leading her nowhere. She could not figure out how to alter her search parameters to find articles more suitable for the topic. It is one thing to be dissatisfied with task progress; it is another to recognize why one is not satisfied with task progress. Moreover, it is another issue altogether to plan strategically how to resolve the problem and create a situation that results in more desired task outcomes. Metacognitive monitoring is important to recognize learning difficulties; however, metacognitive control is equally if not more important because it alters the learning process so students can address the problems they have identified (Schraw, 1998).

What was most noticeable about the difficulties students described is what I will call a cognitive disconnect between task understanding and researching new information. For example, despite examining the task, students often went to the

library to do a database search with no clearly defined topic in mind. Or, given the search results obtained, they had difficulties determining which articles suited the project outline. Finally, they also experienced problems searching for information in the articles that they had selected. Students often found they had selected information related to one of the questions in the think paper but really did not have enough information for other aspects of the task. All of these problems illustrate an inadequate alignment between understanding the parameters of the task space and conducting library research.

There was also a cognitive disconnect between task understanding and the writing process. When it came to writing think papers and design projects, students often struggled to determine how they should frame their papers to meet the criteria for the assignment. For example, in the think paper there was 5 key considerations or questions to address in the paper. Often students did not know how to incorporate these into an organized and coherent framework. Upon reexamining their draft papers students realized they did not have enough information to complete certain elements of the task. As well, students often commented that they did not know whether their constructed product would meet the criteria outlined for the papers.

The third type of cognitive disconnect relates task understanding, researching, and writing. These three processes often appeared to be isolated from one another instead of connected processes. Students did not direct cognitive resources to the full complement of task elements. For example, students often found they had too much information to include in the paper and had to refine their approach by reselecting information. Alternatively, they lacked cognitive resources needed to select,

assemble, and translate information from the task environment to newly acquired domain knowledge or to writing a product (Winne, 2001; Winne & Hadwin, 1998). Future research should more directly examine how students interpret standards or the marking criteria embedded with a task and how they use this information to judge whether they have met standards for completing tasks.

**Social Construction of Knowledge**

The tutorial discussion, peer discussions, and peer feedback session all appeared to have a positive impact on students' representations of the task space. Each of these activities changed their understanding of the task. They were able to use feedback from these activities to refine their understanding and adopt strategies or tactics to enhance their work. The opportunity to share views and ideas about the task helped to confirm, and added to students' interpretations of the think paper and design project tasks.

**Instructor's Role**

I interpret based on these findings that instructors need to take an active role in helping students find the sources of difficulties they experience. My role could be considered active because the studying portfolio provided a mechanism for me to find out what students were doing to complete the assignments and provided an opportunity for me to provide feedback to students about their studying process. After teaching the course, I reflected on my role in the course and how effective I was as an instructor in guiding students' understanding of the tasks. I was constantly trying to determine how much and what type of support students needed to develop productive

constructions of the tasks. From a practical standpoint, instructors need to provide support to help students define the nature of the task, but not provide too much information to limit students' opportunity to construct their own understanding of the task. This left me with an important instructional question. What can an instructor do to support students' exploration of the task space?

I wrestled throughout the course in my multiple roles as task designer, instructor, and researcher. My knowledge of the self-regulated learning field guided my design of the instructional environment intended to support student learning. Although this was my first time teaching the course, I had previously been a teaching assistant for this course on 3 separate occasions. I was aware of the types of learning difficulties students experienced in past course offerings and expected the same would hold true for this course offering. I expected students to engage in higher levels of thinking that allowed them to transform and apply their knowledge in task contexts with an emphasis on building connections between theory and practice.

It seemed throughout the entire course that I was constantly answering questions being asked about the assignments. At some points, it seemed that no matter how I described or provided additional information or clarification about the assignment, more questions kept coming up. This was frustrating as throughout the course some of the students' comments in the portfolio indicated they felt the assignment had not been clarified. So the question remains, How should instructors strike the balance between answering questions so students are clear as to what they are supposed to do, but not take the responsibility for learning away from students so they construct their own understanding of the assignment?

I aimed to use instructional design principles to support self-regulation as outlined by Perry, Philips, and Dowler (in press). Tasks in the course reflected multiple goals, involved large chunks of meaning, extended over a relatively long period of time, afforded opportunities for students to engage in a variety of cognitive and metacognitive processes, and allowed for the production of a wide range of products (see also Perry et al., 2002).

Given the number and types of questions students asked during the course, I started to ask myself, Were my standards too high? or Were the tasks too foreign? Given that this was an upper level course in Instructional Psychology, I believed students should be able to handle complex task structures. However, their previous course experiences and assignments may not have been informing about the types of tasks that I assigned in the course or the types of thinking I was expecting. Although I tried my best to model ways to think about completing the assignments, for some students this type of thinking was a struggle at best, whereas others appeared to thrive in doing this kind of thinking. There is often a double-edged sword to providing support that guides self-regulatory processes.

I attempted to create assignments that tapped into the higher levels of the revised Bloom taxonomy. For the knowledge dimension, the assignments focused on conceptual knowledge by requiring students to examine relationships among multiple concepts. The assignments also focused on the metacognitive dimension by asking students to indicate knowledge of their processes and how to regulate and reflect on them (Krathwohl, 2002). For the cognitive process dimension, the tasks assigned asked students to apply, analyze, evaluate, and create new knowledge (Anderson &

Krathwohl, 2001). The assignments were complex and multi-faceted and, as a result, the degree of ambiguity and risk associated with the think paper and the design project may have been too high. In future instructional designs, it may be better to design multiple tasks of smaller proportions rather than a few large and very complex tasks. As well, more activities could be embedded within the course to familiarize students with ways to process information for higher level thinking.

## Methodological Implications and Limitations

In my view, one of the advantages of this study is that it investigated SRL in a course context over a 13-week period that allowed collecting data at a very fine-grained level. This approach supported an analysis of factors that both helped and impeded SRL in practice. Most studies examine self-regulated learning in limited contexts—for example, researchers give students questionnaires to fill out and correlate responses to achievement. As noted in recent reviews of methodological issues related to these and other types of measures (see Winne et al., 2002 or Winne & Perry, 2000), questionnaire studies can ascertain how often students report self-regulating behaviors; however, they cannot characterize what students actually do to study. The studying portfolio provided a mechanism to assess more fully all facets of SRL over an extended period of time to ascertain underlying factors that influence SRL. The methodological approach was unique in these respects. This approach answers the call for new methods to investigate SRL (Zeidner et al., 2002).

In this research I had to wear multiple hats as an instructional designer, instructor, teaching assistant, and researcher. This can be seen as a possible confound and strength of the research. My multiple hats represents a methodological confound

because the reasoning behind including specific assignments and activities in the course were designed to augment the data collection process to collect information on theoretically important variables. This would influence what types of things students reported in the studying portfolio and to some extent may have biased what students included in the portfolio because this was a marked assignment. However, my direct involvement in the teaching and research process is also a strength because I was able to design activities and assignments in the course that directly tested students on two levels. First, in terms of students' understanding or knowledge of the course content, and second in terms applying and evaluating new knowledge gained in the course. Therefore, the emphasis on building a bridge between theory and practice, which was the main instructional goal throughout the course, provided multiple methods and opportunities for testing this understanding. As well, the assignments in the course represent authentic classroom events for capturing the dynamic and recursive properties of task understanding which is in contrast to other methodologies which measure elements of self-regulated learning in a single session or in contexts which may not necessarily represent events that map well into what students do on a daily basis.

The sample included in this study consisted of undergraduate university students. These students would have a long history of experience in completing academic tasks. One might assume that undergraduate students would be effective at self-regulating their learning. However, previous research suggests that students develop poor work habits (Butler & Cartier, in press) and have poor knowledge about how to use tactics and strategies effectively or efficiently (Hofer et al., 1998). The question

about the difficult aspects of the assignment revealed that students often experienced many problems completing academic tasks across all elements of the task from finding articles, to performing research, to writing. I believe the problems expressed by students are common problems that exist in all settings from elementary school onwards. Future research should examine students' perceptions of task in other contexts and grade levels. This would clarify whether students would report the same type of difficulties as this particular sample.

The course was an Instructional Psychology class that covered topics such as memory, self-regulated learning, and metacognition to name a few. In the studying portfolio it was evident that students were appropriating the language from the lectures and text to describe how they were processing task elements as well as reflecting on these processes. Since students were utilizing the language from the course to describe their thought processes this may limit the generalizability of the findings because this course provided a unique context where students were learning about the concepts at the same time as using the concepts when completing course assignments. However, I argue it is one thing to be aware of theory; it is another to transfer this knowledge into practice by completing the assignments. In the portfolios students had to use their conceptual knowledge of these theoretical terms accurately to demonstrate they had a clear understanding of course concepts in terms of their own processing of course assignments.

I expect that a slightly different profile of results may emerge in a different research context because the predominance of the theoretical language would not be available to students. However, Winne and Marx (1982) demonstrated that students

were able to articulate their understandings of the academic purposes of tasks and processes associated with completing tasks. The processes often didn't match what teachers expected or intended, but nonetheless did illustrate the processes used to complete tasks. I would expect that students would report similar types of behaviors and reflections on those behaviors in different settings provided the task structures used in those contexts had task elements that were similar to this study. Future research needs to more fully examine how profiles would differ across domains.

One of the limitations of the study was the data collection process. As I indicated in the Methods chapter, some students wrote almost daily entries and provided great detail in their responses, whereas others provided a minimal account of their thought process. As well, not all students followed the framework for the studying portfolio as I outlined in the assignment. Thus, the open-ended format means that only a small portion of the data set has been reported in the Results chapter. Besides the answers to the main portfolio questions, students responded in other entries about their processes and outcomes of studying. Therefore, the analysis only includes a subset of the data and represents a partial picture of the entire studying process.

Within the data analysis there were some themes and categories within themes attributed to only a small number of students. This makes it difficult to generalize the results. To make this study more powerful it would have been advantageous to use multiple methods to investigate task understanding. Besides self-reports collected within the studying portfolio, follow-up interviews and other self-report measures such as questionnaires might be used to verify and qualify the results. Future research should strive to find ways to use multiple methods to triangulate research results that

do not overwhelm students in a credit-bearing course.

The studying portfolio appeared to be an appropriate method to assess what students' did to self-regulate learning. It was an open-ended format with some provisions about what they needed to include in the assignment. However, in retrospect this open format created confusion, as students were not familiar with having to write about or reflect on their learning processes. The question is: Did the studying portfolio enable or hinder students' ability to complete the think paper and design project tasks? I highlight two examples of comments among others made about the studying portfolio.

> Participant 4: I think this task is really useful for me. By recording/tracking my movements I'm finding that it's helping me organize my material and my thoughts. It's also making me get/stay 'on task' because I'm being held accountable for the work I'm suppose to be doing. I think that's basically what this task is about, keeping us on track and helping us organize our ideas and research.
>
> Participant 39: I disliked this study portfolio. I found it cumbersome and time consuming and I don't think it helped me self-regulate any better although it certainly drilled home the fact of how we self-regulate. Although it was so time-consuming I'm not sure if I addressed enough quality or rationale throughout...there I go monitoring just part of SRL. Because so many of the processes are automaticized and so

> many occur simultaneously it can be difficult to recognize them in our conscious working memory and hence, jot them down as they are occurring.

Participants' comments about the studying portfolio suggests that at least for these students they had not previously been asked to think about what or how they processed information or why reflecting on these processes were important learning opportunities. Students were either grateful to gain some insight into their studying methods or were put off by having to do it despite my emphasis on how this would useful for thinking about features of learning and teaching methods they might want to pursue as teachers. Where some students saw the utility of the studying portfolio, other students did not and did not want to. Previous research suggests that students are not being exposed to instructional designs that foster higher level or metacognitive thinking (Airasian, 1994). Future research should survey courses at all levels to determine the extent to which courses are designed to assess higher level and metacognitive thinking.

Do students think and engage in self-regulated processes the way theorists assume? The results suggest that they do as students reported on their approaches in all phases of studying. Reflections on the portfolio outlined in the previous paragraph indicate there were diverse responses to the studying portfolio task, some positively oriented, others not. My goal was to bootstrap self-regulation by creating the studying portfolio process so students could examine and potentially improve their approaches, but also think more directly about learning processes they should be accessing if they wanted to become teachers (Winne, 1997). However, is prompting students to be

metacognitively aware a good thing to do?

Paris (2003) suggests that metacognition can be helpful, debilitating, or benign. He argues that metacognition is helpful at three stages: (1) during initial acquisition when students are becoming familiar with a task's requirements, goals, and tactics or strategies to fulfill the task; (2) during instruction when teachers stimulate students' cognition via direct or indirect methods to challenge each other's conception of the content; and (3) if students are troubleshooting to clarify understanding of the task, the content or to "enhance self-presentation" (p. 117). Under these circumstances of deliberate thinking students are able to frame better ideas and improve decision making, actions, and performance.

Metacognition is debilitating under 3 circumstances: (a) if negative self-evaluation occurs, (b) if it leads to obsessive thinking or, (c) if it leads to delusional thinking (Paris, 2003). Negative self-evaluations may prevent students from engaging in task activities and moving forward with a task. This may lead to a recursive cycle of self-doubt leading to actions that are not conducive to success. In the second instance, obsessive thinking occurs where students ruminate over possible courses of action and, in doing so, may prevent action from taking place at all. Since the tasks in the course were high on ambiguity and risk, students who were worried about their approaches and whether they were on the right path may have become passive in their approaches and may have felt doomed even before they started the task. In the third case, the delusional response occurs when the first two circumstances are combined, leading to a desire to self-protect.

Metacognition is benign if what is being monitored is unrelated to the overall

purpose for learning or there is "no commitment to the methods or conviction in your response" (Paris, 2003, p. 117). Paris critiques current methodologies such as questionnaires and think-aloud protocols as these methods lack consequences for the student. They are not necessarily held accountable for their actions and behaviors, and thus may not benefit from completing these measures. The strength of my approach was that the studying portfolio was not detached from consequences as it was a marked assignment in the course. However, metacognition can also be benign if "people try to appear clever or more intelligent than they are" (p. 117). It may be the case that some students included descriptions in the studying portfolio that may not have reflected their true processes. They may have reported specific processes because they knew this was a marked assignment and reporting particular information may lead to a better mark on the assignment. In other words, students may have been trying to present a positive image of themselves as opposed to accurately representing their behaviors.

So, is prompting students to be metacognitively aware a good thing to do? It may depend on the student. Across all of the portfolios I read there were instances of metacognition falling into each of these helpful, debilitating, and benign categories. Anecdotally, I know some students left the first studying portfolio until the last minute and most likely did not fully think about their learning processes and outcomes. Others very quickly became invested in the studying portfolio process regardless of whether this process was helpful or debilitating. In the tutorials, I tried to build support systems to address these issues, and ensure students were on track, but not always with success. As I continue to think about instruction, it is important to

consider ways to support students so they do not fall into Paris' (2003) debilitating or benign categories and so they can find ways to bootstrap their learning processes (Winne, 1997).

I used my own interpretive lens—theory associated with self-regulated learning—to interpret what students reported about their processes and outcomes of learning. Heidegger stated "an entity can show itself *from* itself in many ways, depending in each case on the kind of access we have to it" (cited in Packer & Addison, 1989, p. 278). Packer and Addison further add "What is uncovered in the course of a true interpretation is a *solution* to the problem, the confusion, the question, the concern, and the breakdown in understanding that motivated our inquiry in the first place" (Packer & Addison, 1989, p. 279). I don't believe this research fully uncovers the solution to the problem. However, it does provide insight into issues that have not been addressed in the field and yields several potential areas for future research.

## Future Research

This study makes several important contributions to the field. Although from a theoretical standpoint task understanding has had a predominant emphasis in models of self-regulated learning, very little research has directly measured task understanding and its role in terms of understanding self-regulated learning. Second, the longitudinal nature of the data collection process also represents a strength as very little research has examined self-regulated learning over time. In this study, task understanding was tracked throughout a 13-week course. Therefore, I was able to collect data that reveals the dynamic and recursive properties of how task

understanding changes over time. Furthermore, it also captures more directly the relationships between cognitive, motivational and affective variables that influence task understanding, and approaches to self-regulation. What the data reveal is the dynamic interplay between how the course was structured in terms of assignments and activities and what students reported in their studying portfolios. Finally, since this study occurred with an actual course context this also represents a strength of the research as this approach to conducting the research provided a unique lens for determining how instructional design variables, instructional processes and learning processes interacted to influence how students engaged in the learning process to create task products.

In future research, new methodological approaches need to be devised to examine more fully the role of task understanding as a facet of self-regulated learning. Measures need to be developed that can capture not only how students represent their understandings of tasks, but also reflect how task understandings change as a result of engaging in specific activities over time. Furthermore, additional efforts need to be spent to determine how to present results of studies that capture individual difference variables in ways that illustrate the dynamic and recursive properties of self-regulation. This study represents an initial attempt to capture how students define and refine their understandings of tasks. However, much more research needs to be done to characterize and qualify how task definition influences learning and performance.

I recommend future research continue to investigate how students interpret tasks that vary in structure. Although I attempted to provide both a well-structured and ill-structured task for students to complete, my framework for the think paper appeared

to be just as challenging if not more challenging than the design project. Future research should investigate task structures that vary on the dimensions of cognitive process and knowledge as described in Bloom's taxonomy (Anderson & Krathwohl, 2001). The goals of such research would be to examine how students react to and interact with these different task structures to self-regulate learning, and more specifically how task, cognitive, and motivational conditions interact to influence how students self-regulate.

The questions I used in the portfolio were moderately useful in generating data for assessing task understanding. In future research, I would like to use the studying portfolio tool but refine the questions and revise aspects of the procedure. One way to refine the tool is to re-examine themes that emerged to investigate more fully properties of tasks that students used to generate and refine their understanding of the task. For example, asking students to underline key terms that indicate what they think the key task conditions are might be one way to assess what students attend to about the task structure. In terms of procedure, one refinement would be the following. First, give students the task and provide some time for them to read it over and think about it. After this, give students the initial task understanding questions and, after they respond to the questions, collect the information. Then, after various periods of time, hand back to students this information and ask them to respond to the questions again. This could be done 3 or 4 times between the initial task understanding assessment until students hand in a final product. This would create data that could be analyzed to examine differences in task understanding over time. This approach may highlight different task features that students attend to at different

points in the studying process.

Beyond these foregoing suggestions, I forecast three potentially useful areas of future research. First, the processes students use to search has not been fully examined. My results suggest that searching for articles did pose stumbling blocks and challenges for students. How do students choose search terms for querying a database search? How does familiarity with the search tool(s) influence search? Finally, how do students select articles based on search results? Answers to these questions may provide some more important additional information about initial planning stages in the SRL model.

The second area of research is also based on search processes, but this time in terms of selecting information from resources. For example, if you gave students particular questions that varied in complexity, what and how much information would they select from the main text to answer those questions? How would students perceive the relevance of particular sections of text in relation to the questions being asked? Therefore, this research would examine specific connections between the selection of information from resources and then how students take these ideas to transform them into products. As Broekkamp et al. (2002) illustrated, students and teachers perceive the instructional importance of various elements of text differently. Furthermore, previous research asked students how often they would use particular instructional cues (i.e., bold terms, figures) in relation to objectives that varied in complexity. Findings suggest that students reported using more tactics for less complex objectives and fewer tactics for more complex objectives (Winne & Jamieson-Noel, 2003). This seems opposite to what theory would suggest should

happen—more complex tasks should result in greater depth and breadth in terms of processing information than less complex tasks. This is an avenue for continued research. Information from such research would provide greater insight into the enactment process in the SRL model.

Finally, more exploration is needed regarding the writing process. Based on search and selection processes during the research stage, how do students assemble and translate information to form their own responses to questions? If computers traced students' approaches to writing, researchers could examine how students construct written products, as well as how they revise those products. Determining how to frame a product was a large concern for a number of students in this study. How do students create a framework for constructing a product—do they make an outline or do they just jump in head first, so to speak, and start writing with no formal plan in place? What types of decisions do students make about organizing information in relation to reaching task goals? What standards do students use to decide whether text needs to be moved around within the text to make the paper, as one student commented in a studying portfolio entry, "flow?" After students spend some time writing and revising, researchers could follow-up with students about why they decided to move information within sections of their paper around. Or, researchers could ask students questions such as whether they think, for example, the introduction to a paper is strong. This would provide more insight into the decisions students make regarding the writing process. Answers to these types of questions may capture a very diverse set of methods for engaging in these activities. Defining these variables may provide opportunities for thinking about instructional design and

methods teachers could use to support students in their learning processes.

All of these future areas of research would add to and complement current research in SRL. As researchers, we do not know enough about the interplay between instructional design characteristics and how students react to those elements. Moreover, we do not know enough about specific theorized elements of self-regulation, task definition, and in particular, how students adapt approaches when they realize task goals are not being met. Future research in these areas would lend credence to current models of self-regulated learning or perhaps enhance them to more fully understand properties that impact both learning and achievement.

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# Appendix A

Simon Fraser University

This research project investigates your understanding of the assignments included within this course (EDUC 320, Instructional Psychology), and how you engage in self-regulated learning for those assignments. The goal is to assess a) what you understand about the nature and purpose of course assignments, b) how your understanding of the course assignments changes over time c) what you perceive to be the best methods to complete the assignment, and d) how the strategies and tactics used to complete the assignments contributed to your completed assignment and your course grade.

Initially I asked you to build a representation of your understanding of the annotated bibliography and the design project with the questions about the instructions for both projects. We revisited your understanding of the design project and what contributed to changes in that understanding with both the revised questions for the design project and your first class discussions. I asked you to create a portfolio of activities, which included the various processes you used to derive the final product for the annotated bibliography and the design project. These were the specific questions within the portfolio. Each course activity has allowed you to engage in self-regulated learning. In particular, the studying portfolio provided an opportunity for you to think about how you approach and engage in task activities, and evaluate your progress in these activities. I'm seeking your consent to use the assignment questions, all sections of the studying portfolio, first class discussions, other questions you generated about the assignments and your grades in this research project.

The University and those conducting this project subscribe to the ethical conduct of research and to the protections at all times of the interests, comfort and safety of subjects. This research has been examined and approved by the SFU Ethics Review Committee. Your signature on this form signifies that you have read the above paragraphs that describe this research project, and that you have received an adequate opportunity to consider the information provided. Your participation is completely voluntary. Any information provided by you will remain strictly confidential by randomly coding files so that you are entirely anonymous. If you decide at any time that you do not want to continue participating, all information about you will be destroyed.

If you want to participate in this research, sign below to indicate that you understand the voluntary nature of participating. If you want a report on this project after it is completed, provide an address (below) to which I can mail it. If at any time

you have questions about this project, please contact me (telephone, office number and e-mail are at the bottom of this letter). If you have questions or concerns that you prefer to discuss with someone else, contact Dr. Philip Winne, Professor and supervisor of this research, telephone 291-4858 or Dr. Ian Andrews, Acting Dean for the Faculty of Education, 291-3148.

Name (print) _____

Signature _____

Address/ e-mail _____

As part of the research, I need to know a bit about your background. If you have signed the consent form please fill out this information. All information will remain completely confidential.

_____ Age (in years)

_____ Sex (F or M)

_____ Grade Point Average in all your post-secondary studies (0-4.33, or %)

_____ Number of courses enrolled in this semester

_____ Number of courses taken at SFU, including this semester

_____ Average hours worked per week

_____ Average hours studying per week

Previous Education courses—please list all that you have taken (course number is fine).

_____

_____

_____

Academic major

_____

_____

_____

# Appendix B

Assignment 2: Studying Activity-Portfolio of Activities

In this assignment you will complete a portfolio where you create an evolving picture of the activities that you use to complete the course assignments. The portfolio consists of 2 parts; each part is outlined below. You will hand in the portfolio at 2 points: once on October 19, 2001. At this point we will examine your portfolio and provide feedback regarding your progress and point out issues that need to be addressed to complete the assignments. This will be worth 10% of your mark. The complete portfolio is due last class, November 30, 2001. This aspect of the assignment will also be worth 10% of your mark.

**Part I**

- How do you perceive this task? What do you think this task is all about? Try to describe it as analytically as possible.
- What would you add to the design project to make it more clear and concrete?
- Describe concretely the activities you plan to accomplish the task. What steps are you going to use to complete the task? What are your goals for the project at this point?
- How does the outline for the design project help you outline or develop ideas about what issue you might frame for the think paper?

**Part II**

In the portfolio you will track your activities while doing the assignment. In this part of the portfolio you are asked to consider the following things:

- what goals do you set for the task and for reading the articles
- what processes are you using to find information for the task (library searches)
- what method(s) are you using to tackle the assignment
- what strategies are you using to develop an understanding of the articles
- how do the readings contribute to your understanding of the teaching/learning process
- how does the purpose or scope of the article relate to the think paper/design project

- what are the 'easy' aspects of the assignment and
- what are the stumbling blocks to completing the assignment, and how do you overcome these stumbling blocks.

When you hand in your design project in the last class, I will ask you to submit not only your records of these elements of the project, but I will also ask you to hand in any reference materials (articles) and notes you have created to complete the assignments.

Another way to think about the assignment is to consider the discussion on metacognition covered in Chapter 4. In your portfolio consider the aspects of knowledge of cognition and regulation of cognition. In your portfolio you should outline how you are engaging in these types of activities.

**Grading**

- 4 marks for illustrating the *details* of studying
- 4 marks allocated for *rationale and/or reflections and/or evaluations* of the study process
- 2 marks for *quality* of evidence provided

Note: when you hand the portfolio in at the end of the course I will be looking to see if and how you have incorporated the feedback that I provided. This will tie into the 4 marks for rationale.

10 marks at 2 points in the course. Total of 20 marks.

# Appendix C

- What does the term theoretical principle mean to you?
- How do the examples of theoretical principles help you characterize what a theoretical principle is?
- What is an instructional goal?
- What is the role of an instructional goal from a task designer perspective?
- How do the examples of instructional goals help you characterize what an instructional goal is?
- What does it mean to set objectives for learning?
- What is the role of instructional objectives from a task designer perspective?
- What do instructional objectives provide for students?
- How would you describe the scope of the instructional activity?
- What does it mean to justify features of the instructional activity?
- What is the relationship between the instructional principles and the instructional activity?
- As an instructional designer, what issues will you have to think about when you design your instructional activity?
- What does it mean to be a task designer?
- What theoretical issues have come up so far in the course that could tie into the design project and be an issue for the think paper?
- Given you understanding of the design project, how will you think about creating an issue for your think paper?

# Appendix D

Table 2— Question 1: Task Conditions

| **Surface Description-Low Level Details** | **Surface Description-Moderate Level Details** | **Deep Description-Low Level Details** | **Deep Description-High Level Details** |
|---|---|---|---|
| Participant 9: Extended abstract question: application of theories to concrete situations. Lesson plan for one of five topics must be based in theories from text/readings from think paper. | Participant 38: The task of this design project is to design a classroom plan/lecture/activity/ lesson for a class to do and be part of (create a lesson plan for a class of a certain grade level). What should be included is what the lesson will be, how it will carried be out, what is necessary and needed to complete the task, what principles and techniques are needed to carry out the lesson/activity. What will be effective/what will make and keep students interested, motivated and productive (on task). | Participant 82: I think that the main thing this assignment is about is putting into practice all of the theories and strategies that we have been reading in our text. This is very important thing to do because we will be extending our knowledge to the real-life situation. It's where they are meant to be applied. It's one thing to read theories in textbooks, but it becomes more meaningful to understand how, when, where, and why they can be used in the real world—that is, used effectively in practice. Theories are interesting on their own, but it is not until they are put into practice that they become valuable. To understand the reasons underlying successful theory | Participant 15: I feel the project can be broken down into 3 steps: A) development –brainstorm ideas on what type of lesson you would give, think about ways learner learn, try and match your ideas with resources from textbook, extra readings, Prof/T.A. develop a theoretical classroom situation—decide and plan what lesson you will teach and.... B) describe— recount what resources you have used. What theories, models, etc you are going to use to justify your lesson, clarify your goals as a teacher, what your goals are for your students. Ask yourself what you want them to walk away with? Helpful hint from Prof—objectives stated in the last bullet. C) Justify |

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| based instruction one needs only to look to the theory for the answers. | –bring it all together—classroom situation, lesson and references—explain why all these go together and how they reinforce each other to make a successful lesson. |

Participant 29:
To me the design project is about putting together a task or activity for a classroom. The activity has to be based on a theoretical foundation. Furthermore, I have to justify why the task I describe is helpful for the purpose put forth.

Participant 11:
Apply principles learnt in class to develop—principles, goals, outcomes. What you are trying to achieve—don't be too general. Objectives—each objective is justified with how they've achieved/criteria to evaluate. To use a specific instructional episode based on research from think paper described in detail and incorporates principles/theories we've learnt/teaches how to write objectives/goals and measure the success of the goals activities.

Participant 1:
I think that this design project will be an excellent way for each of us to focus not only on how we can devise an effective teaching tool, but also to increase our awareness of the ways that children learn. I believe that by developing this project, I will be furthering my understanding of how to focus on a specific age group and planning activities with the goal of not only teaching them, but teaching them in the most effective and enjoyable manner possible. The project forces us to think about how students understand and learn, creating questions for the teacher: will this project be fun for the learner? Will it make sense and be appropriate for the age group? Will it challenge the learner? The design project will also challenge us to think past the development stage of the design project and force us to consider how effective specific projects or assignment can be

Participant 51:
We looked at the orange sheet as our guide and decided that we had to begin with a theoretical understanding of our subject. However, we thought that the task conditions should have been placed at number 2 on the orange sheet instead of printed last because we felt it was important to ask ourselves about context and the student subject prior to making our goals and objectives. The task is about creating a through analysis and diagnosis of a situation so that I can familiarize with the protocol of creating a project worth promoting in the classroom. The theoretical underpinning are important so that I can apply, for example, strategy planning, to all areas of cognitive and metacognitive development. The goals and objectives are important for the eventual presentation of a lesson and the monitoring of each individual's process.

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| | for teaching: What am I hoping to accomplish with this project? How can I alter it to make it more effective? |

# Appendix E

Table 2— Question 1: Cognitive Conditions

| Strategic Knowledge | Prior Domain Knowledge | Motivational/Affective Conditions |
|---|---|---|
| | | Task difficulty/ complexity. |
| Participant 4: This causes us to both think about what we are learning and apply it in a meaningful context, which will further enhance our understanding of the material. | Participant 5: expand current schemata, correct false assumptions or substantiate the relevance of some strategies to learning. | Participant 69: This task I feel is a challenge in a sense that you have to look deeper in understanding an issue. At first I found the task very difficult because I could not understand the assignment.<br><br>Participant 64: I perceive this task as being difficult yet a lot of fun<br><br>Participant 82: It sounds like it will be challenging yet do-able. |
| | | Effort |
| Participant 26: Also, by actually doing this project, I will be actively learning and making the concepts my own thus it will be more meaningful, rather than learning passively. This will allow me to see how everything fits together as well as make me aware of the forces at work in a classroom situation. | Participant 24: The task is thorough and requires us to really examine the foundational beliefs as to why we would teach something the way we do. If we know what we want to get out of a lesson, then we can focus our attention towards our learning goals. Everything done in the classroom has a purpose. By dissecting our motives we can change the activity based on the needs of the students. | Participant 36: this task will require work such as a trip to the library's 6th floor for journal articles and the drawn out process of photocopying—that's the only part I don't look forward to.<br><br>Participant 51: We all agree that it would involve a lot of thinking and a lot of work on our part. |

Participant 82:
Lots of thinking will be necessary.

Participant 7:
I feel it is going to take much time and organization on my part to successfully complete all of the required components.

Incentives/Interest

Participant 61:
I believe this task is to help us understand fully the concepts that we learn in this class. Understanding the concepts can also help us to effectively implement and apply them to any given context, namely an instructional one, ie. A classroom setting.

Participant 61:
There are many issues that arise in a classroom setting and having the background knowledge about these particular issues, one can utilize what one knows to improve and prevent these issues from happening.

Participant 82:
I'm excited about this task, as it sounds interesting.

Utility

Participant 36:
I believe this project is suppose to enable us as students to attempt to "apply" our newly acquired knowledge in a pseudo hands on "experiment" rather than just memorizing information to later regurgitate on an exam.

Participant 62:
The design project is a task that will get us to see from the learner/our future students' eyes. It is a task that will get us to use our prior knowledge and experiences to develop a type of criteria that we wish we could have had when we were younger (I only say younger because my age group/grades that I hope to teach in the future are elementary, grade seven or younger -preferably, younger) and learner to read and write etc. The design project also gets us to look within ourselves, to see how we perceive learning, and then to see if we can build on our assumptions and

Participant 38:
I perceived and understand that this is an important and useful assignment/project for us to do—because as teachers it will be something that we will need to know and be able to create for managing a productive, effective class, and effectively teaching and completing lessons—it is an important and crucial skill to know how to do.

Participant 21:
This seems to be a very practical activity, especially for those who wish to become a teacher in the future, in the sense that they are given an opportunity to apply the knowledge learned

improve our way(s) of thinking, so it can incorporate all learning styles and peoples' personalities.

from the text and apply it, thus create, to a real situation.

Outcome Expectancy

Participant 39:
Completion of this task should allow us to demonstrate our understanding of theories of instructional psychology and how individuals learn and show our ability to apply this knowledge.

Participant 7:
This a novel activity, since I have never designed curriculum before. I believe it will take much creativity to do so.

Participant 70:
It needs to be highly organized and detailed.

Participant 29:
On the other hand, with the design project by applying the knowledge I will encode the information at a much deeper level of process, thus increasing my chances of long term retention. With this project, we are being asked to not only know the concepts, but also see how they work and how they influence the learner.

# Appendix F

Table 2— Question 2: What would you add to the design project to make it more clear and concrete?

| Category | Example 1 | Example 2 | Example 3 | Example 4 |
|---|---|---|---|---|
| Examples of Format | Participant 63: I would add an outline of a sample design project. For example, showing specific headings which could be used in the design project would be good (i.e., 'introduction,' 'methods,' 'conclusion'). | Participant 37: One thing that I might add or change to this project are some suggestion on how to format this project. For example, should we list in point form our instructional goal, student goal and teacher goals? | Participant 36: I would add to the design project to make it more clear and concrete, an example of a previously conducted design project so students can get a visual idea of what it should look like, layout, content, method used, that sort of thing. | Participant 77: In my design project I'd probably include headings such as 'instructional goals' or 'learning objectives' etc to make each aspect of the project more clear. |
| Examples of Finished Product | Participant 73: An example of finished project or components to clarify goals and ways of connecting info | Participant 45: I think it might help if some examples were given. I know this project is supposed to be creative and original, but I just think that it might help. | Participant 49: Regarding the assignment of the design project we felt the guidelines handed out were pretty clear but all felt that an example of a prior design project or thought paper would be a definite asset because we were not completely sure of what we | Participant 42: An example project. Because we are attempting to construct our own collective view of what is expected from this project, we lack a concrete example of what is expected. I realize this follows with the study of socially constructed |

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| | | | were supposed to do. | understanding, but the reality is that we are expected to adhere to a standard, and in order to do that, we must be presented with a strict guideline so as not to glaze over important parts. |
| Examples of Topics | Participant 11: To make the design project more clear, I would provide more examples of topics. In addition, I wondered if the principles discussed are to be linked to each objective. | Participant 14: Concrete ideas for activity. | Participant 59: Explain the topics more clearly, give some examples of topics that we could choose from | Participant 29: In addition, it would be nice if the field would be narrowed down. For instance, instead of having the whole book to choose from for principles and goals, maybe narrow it down to the first few chapters. As it is, the range of knowledge that is required to integrate is vast so shortening the options would make the project seem more approachable. |
| Examples of Concepts | Participant 29: A list of theoretical principles would be a great help. | Participant 91: I would probably add some more examples about the theoretical principles, instructional goals and | Participant 24: The project seems pretty clear already. I like the way you defined and gave examples of all the terminology, | |

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| | | learning objectives as I feel that they are going to be the more difficult part<br><br>Otherwise the outline itself is quite descriptive in a sense that it gives us a lot of information on what we need to do to complete the project | theories and points we are expected to cover. Good use of cues | |
| Amount of Information | Participant 15: The assignment sheet is already very dense and I wouldn't add more to it because it might make it overwhelming. | Participant 26: I would reduce the amount of writing and use sub titles such as theoretical principles then describe what it is in point from and then given examples in point form. I think the amount of writing could be reduced without diminishing the expected requirements | Participant 8: Initially, the double-sided long list of instruction was intimidating. I though perhaps it would be better if it was a shorter format with less 'big words'. Upon re-reading the instruction for the design project, however, I realized that it was like a recipe for our project; a step-by-step instructional guide to completing it, in fact helpful by being so detailed. If the instructions were a little simplified or condensed it would be a little | Participant 1: However, the instructions contained a lot of words, and I would suggest that they be simplified, to encourage students to pay closer attention to them. I find myself more likely to pay attention to every detail when there are fewer words. |

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| | | | more encouraging upon initial glance | |
| Questions about Project | Participant 9: Emphasize whether or not this is to be a lesson that could realistically performed. Are there time constraints, budgeting issues? Clean-up? Is this (in part 1) the suggested organization? Tasks out of order. Is possible to pick a topic non-classroom related, one-on-one or remedial | Participant 73: Are we to bring in outside research besides that used for think paper? | Participant 14: How do we select the actual activity—what resources can we use, areas to get materials? | |
| Need for Scaffolds | Participant 42: A summary which doesn't use the word 'instructional episode.' | Participant 27: list basic steps and purpose then describe in detail—explain how it is related to the think paper | Participant 67: Add to design project: step by step for completing the project—where to start—library or chapter summaries, explain or define what a learning objective, products—wher e do we go for more information about products. | Participant 15: To help clarify the assignment—it might be nice to provide a checklist to summarize the main points. But then again, it would be more beneficial for the student to do this on their own and then discuss with the Prof. |
| Expectations Clear/Not | Participant 26: I like that the goal of the | Participant 1: In terms of the instructions for | Participant 10: To make the outline more | Participant 59: Explain a little more clearly, |

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| | project has been put in a box. This offsets it from the rest of the requirement and draws attention to it. Also, it's easy to locate so I can refer to it from time to time to see if I'm meeting the objectives | the design project, I found them to be carefully detailed and believed that everything was explained well. | clear and concrete I would be slightly more specific as to the expectations as far as a format for the project. Questions such as: should we make up an outline? Should we describe it and use pictures as aids? Should we just write a paper? Arise when considering how to approach this task. Though at the bottom of the sheet there is an obvious possibility for all of these things, it is not clear as to whether or not they are required. | more straight forward, not as vague. |
| Charts and Graphs | Participant 21: In order to make this design project more clear and concrete, I may include some statistical data, graphs, concept maps, worksheets etc. | Participant 49: I thought that using more visual models and examples in our own design project would make our objectives more clear to the student as well as to others who would hope to utilize this educational tool. | Participant 69: I would add findings that have graphs and charts and reference because it gives a clearer picture of the statistics as well as a visual aid in understanding the design project. | Participant 65: I would add that it not only be a description of the activity, but to actually provide a portion of the activity to support your written component |

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| Motivation | Participant 49: This type of assignment is new to me and is quite a challenge because I am not able to rely on past experiences of assignment to help guide me through. | Participant 84: Starting to think about the design project the juices are starting to flow and ideas are coming to me. | |
| Structure Initial Task Understanding Question | Participant 64: Furthermore, I feel that we should have gone over the outline as a whole group step by step. This way we could have asked questions and given more examples of what is expected at each step. | Participant 49: There was a lot of confusion regarding this actual question because we weren't sure whether the question was what could be done to make this assignment more clear or whether it was asking how we could make out own specific design projects more clear for the students. | Participant 76: I wish we had been informed about it earlier. If the prof had explained it first because we haven't been given any details about it before right now. |

# Appendix G

Table 2—Question 3: Elements of plans created for the design project.

| Element of Plan | Definition | Priority in plan | Number of Students |
|---|---|---|---|
| Clarify the Assignment | Statements that indicated students needed to develop a better understanding of the task. | Step 1. | 4 students |
| | | Step 3. | 1 student |
| | | Step 4. | 1 student |
| | | | Total 6 students |
| Pick a topic/activity | Statements that indicated the first priority was to find a topic. Four students referred to this category twice at stages 2, 3 and 5 indicating some degree of topic refinement as a result of thinking about their activity. | Step 1. | 33 students |
| | | Step 2. | 7 students |
| | | Step 3. | 5 students |
| | | Step 4. | 1 student |
| | | Step 5. | 1 student |
| | | | Total 43 students |
| Brainstorming | Statements made regarding the generation of ideas pertaining to different elements of the task space (i.e., topic, activity) | Step 1. | 1 students |
| | | Step 2. | 6 students |
| | | Step 3. | 2 students |
| | | Step 4. | 1 student. |
| | | | Total 10 students |
| Examine the Textbook | Statements related to picking a topic, but with specific reference to the using the textbook as a means to find a topic. | Step 1. | 5 students |
| | | Step 2. | 4 students |
| | | Step 3. | 3 students |
| | | Step 4. | 3 students |
| | | | Total 15 students |

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| Find Articles | Statements related to going to the library and selecting articles for the project. Two students referenced finding articles twice, suggesting the need to refine article search or article selection. | Step 1. | 3 students |
| | | Step 2. | 12 students |
| | | Step 3. | 4 students |
| | | Step 4. | 3 students |
| | | Step 5. | 3 students |
| | | | Total 23 students |
| Research Information | Statements that referred to examining the articles to research information. Six students made direct reference to specific strategies such as highlighting or making questions. Three students referenced researching twice—one student at stage 4 after step 2 and 2 students at step 6 following step 3 and step 4. | Step 1. | 2 students |
| | | Step 2. | 1 student |
| | | Step 3. | 6 students |
| | | Step 4. | 2 students |
| | | Step 5. | 2 students |
| | | Step 6. | 3 students |
| | | | Total 13 students |
| Writing the Paper | Statements that referred to different aspects of the writing process: Outline (O), Draft (D), Revised Draft (R) and Final Copy (F). After each letter the number of students within the category is next to it. For example 2 students referred to a final copy in step 8. Five students referred to multiple stages of the writing process. | Step 2. | O-1, D-1 |
| | | Step 3. | O-1 |
| | | Step 4. | O-1, D-2, |
| | | Step 5. | O-1, D-1, R-1 |
| | | Step 6. | O-1, D-3 |
| | | Step 7. | O-1, D-2, R-1 |
| | | Step 8. | F-2 |
| | | | Total 12 students |

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| Feedback from other sources | Statements that referred to checking with the Teaching Assistant to ensure topic was on the right track (TA) or to peers (P). One student mentioned talking to the TA twice (Steps 3 & 8). | Step 1. | P-1 |
| | | Step 2. | TA-2 |
| | | Step 3. | TA-3, P-1 |
| | | Step 4. | TA-1 |
| | | Step 5. | TA-3 |
| | | Step 7. | TA-2 |
| | | Step 8. | P-1 |
| | | | Total 3 peers and 8 teaching assistant |
| Create Activity | Statements that referred to generating ideas about an activity that could be used in the project | Step 1. | 3 students |
| | | Step 2. | 6 students |
| | | Step 3. | 3 students |
| | | Step 4. | 5 students |
| | | Step 5. | 2 students |
| | | Step 8. | 1 student |
| | | | Total 20 students |
| Generating ideas other aspects of Design project | Statements that referred to completing specific components of the design project. Instructional goals (IG), Operations (O), Principles (P), Justification (J), Supplementary materials (SM), All elements* (AE)<br><br>*All elements refer to breaking the task down into components and writing on each. | Step 1. | AE-2 |
| | | Step 2. | LG-1, P-3, AE-1 |
| | | Step 3. | LG-3, O-3, P-1, AE-1 |
| | | Step 5. | LG-2, J-1, AE-1 |
| | | Step 6. | LG-2, J-1, AE-1 |
| | | Step 7. | J-2, SM-1, AE-1, |
| | | Step 8. | J-1 |
| | | | Total 18 students |

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| Create schedule | Statements that referred to setting up a schedule to complete the project | Step. 1 | 1 student |
| | | Step 2. | 1 student |
| | | | Total 2 students |

# Appendix H

Table 2— Question 5: How has your perception of the think paper changed over the last few weeks? Examples are for changes in Perceptions.

| Category | Example 1 | Example 2 | Example 3 | Example 4 |
|---|---|---|---|---|
| Role of Discussion | Participant 36: Class discussion has helped— others' generated ideas to assist me in redefining my topic of 'reading to learn' so it was not so broad. Hearing about others approaches to the assignment and their topic choices gave me ideas to further develop/re-evaluate my thoughts around the think paper. | Participant 91: After talking in tutorial about the think paper and after the handout, I feel that I know (pretty much) what to do for the paper. I understand what is expected and how to write it. I think that it has changed because we got more information about it, and also because we got a chance to talk about it. It helped because then I got to hear what other people think about the paper, and to compare my own understanding. By comparing what we know, I felt confident because what I thought was similar to others, which | Participant 26: It has developed gradually however as my understanding did. This happened because I kept asking other students questions, and if they were at the same point. Also, if they were experiencing confusion. It was reassuring to know they were also confused and their answers to my questions made my understanding improve. | Participant 70: I think in some ways the task has become somewhat clearer as to what's expected for the think paper. It helped that I emailed Dianne and spoke to T.A.. I think this helped because I'm the kind of person that gets an idea in their head and it generally sticks. But, my idea wasn't quite what was expected so it helps to talk about your perceptions. I think overall my understanding has developed, and I feel more confident than a few weeks ago |

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| | | could mean that I'm on the right track. I also talked about the think paper and the design project to some friends, and it helped for the same reasons. | | |
| Defining Scope of Topic | Participant 2: As well, choosing my topic gave me a firmer understanding of how to approach the paper. Because the assignment is rather vague, having a topic gave me a focus to think about" | Participant 67: I have had to really narrow down from wanting to write on motivation to self-efficacy—didn't realize it would be so time consuming to narrow topic and search for articles –know that I will read the articles and try to link them together and then draw implications for teaching. | Participant 40: The topic for think paper has cleared a bit as I figured it should be a topic discussed in lecture, but the choices has increased these few weeks as more materials are covered. I also found out the topic should answer a question that is high level and therefore would require real life application and issues. These issues should also be more complex than what I first thought. Now I want to reevaluate what I want as a topic because they have to be more complex than what I first had in mind. | Participant 40: The topic for think paper has cleared a bit as I figured it should be a topic discussed in lecture, but the choices has increased these few weeks as more materials are covered. I also found out the topic should answer a question that is high level and therefore would require real life application and issues. These issues should also be more complex than what I first thought. Now I want to reevaluate what I want as a topic because they have to be more complex than what I first had in mind. |
| Academic Purpose | Participant 67: Well, at this point, I now understand | Participant 21: Now that I've been working on this | Participant 42: As I find more info on my topic, my | Participant 82: The think paper is to be broad—that is, |

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| | what the think paper is about. I believe it is intended to get us to more deeply understand the issue we are working with in class. | 'studying portfolio' I am more conscious of my own thinking. So, as I read the articles, I try to think how I can relate this theory to understanding how students learn. In other words, before I thought of it as our understanding of a theory, but now I think that it's about extending this to understanding how it affects student's learning. | understanding of what is expected from the project becomes clearer. I must relate the topic to how it is useful. I must apply the theory to the real world as opposed to merely defining and explaining. | dealing with strategy-training (my issue) and the theories which underlie it. I will discuss why strategy training is important to contemporary education (specifically, in relation to mainstreamed classroom which include students of various abilities) I will mention my sources and their relevance to my topic. Finally I will propose my ideas which I plan to use in my design project. In this way, the think paper seems to be a research proposal. It will also be helpful because it can serve as an outline for the design project. |
| Formatting | Participant 39: With the additional hand-out on the think paper giving us guidelines and marking scheme it has allowed me to have a structural image | Participant 59: The actual writing of the think paper I am still confused on. I don't know if you want us to write a paragraph on each article or if | | |

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| | of how to design think paper i.e.) address the 5 listed concerns and so how I can construct each section to achieve grades | we pick a topic (say prior knowledge) and write a paragraph on how each of the articles help us understand this concept. I personally think the second way would be easier. | | |
| Research Process | Participant 66: I have had a chance to look at articles and formed a better understanding. | Participant 36: My understanding has developed/changed in the way that I better comprehend what the assignment is about and I have refined my topic for my paper greatly. Reasons for this change include my library research which has enabled me to get a good idea of what type of studies are available for me to use and help support and develop my think paper. | Participant 64: I found that my process for studying the articles self-questioning, summarizing info and looking up vocabulary words has really helped me get a good understanding of this part of the assignment, and will help me develop my think paper. | Participant 75: My understanding of the issue for my think paper is gradually developing. I believe the readings helped a lot, and by focusing on the consideration questions I was trying very hard to elaborate on the readings and push it to an extent that it not only looks at the surface of the issue. By monitoring myself and questioning myself through reading, I was able to have a deeper understanding of the issue on think paper. However of course there's still a long way to go before any final production is made. |

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| Motivation | Participant 15: But I know what to do, or at least feel confident that I know how to complete the assignment. | Participant 64: My understanding of the think paper has developed and changed over the past weeks. This is because I have put a lot of work into my studying process, which has caused myself to get a better understanding of the cognitive load theory (my think paper topic). I understand how to go about doing the think paper because I had my original concerns and confusions answered. | Participant 51: My understanding of the think paper has gone from medium anxiety to high anxiety. I feel like I'm not familiar enough with psychology and most of all I don't want to fall behind in time. I wish I had someone that could sit by me while I read and explain or report what's going on, or more specifically, how to make the important connections I know that I should set aside more time but there's constant self-efficacy problems and mixed attributional emotions. I wish I could be more positive throughout this process, but the truth is I only recently started to understand some of these concepts—metacognition and self monitoring so I feel really lost and panicked | Participant 62: Normally I am already done an essay by this time. (I hate not having more than 2 weeks to write a good essay, because normally with essays, even with a lot of time, they're not very good.) The more time that passes the more stressed and flustered I'm getting. I will need to figure out what I need to do in order to finish the paper as soon as possible. To help me do this, I am still looking for articles and I'm trying to get a better understanding and focus of the task. But basically, I'm still unclear of what is expected for this assignment. |

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| | | | about the process. | |
| Task Difficulty | Participant 59: I am still having some trouble finding articles because a lot of the ones I want are not in our library. Also, a lot of the ones I find are very mathematical and scientific and it is hard to understand them. | Participant 20: When the think paper was assigned, I thought OK I'm writing a paper that won't be very difficult. It was difficult getting started because I didn't have a clear idea of a topic or issue. Then I found an issue, thought it was interesting and felt confident about finding research. I'm still having trouble trying to minimize my topic in 5 pages (attribution theory). There are a number of ideas/issues I could look into and develop eg. Ethnicity, parent and teacher stereotypes, motivation, self-efficacy. | Participant 62: My understanding of the think paper has changed quite a bit—I thought I knew what I was doing but now realize that I don't. It's turning out to be a lot more difficult than I had originally thought and I don't know how to start it. | Participant 57: Not finding articles on my specific topic has made the think paper more difficult than I original thought it was going to be. |

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| Link to Design Project | Participant 65: Essentially it seems to me that my think paper is essentially the theory for my design project, it will help me pick an area that is well-designed and easily integrated into a think paper | Participant 82: Hey, now I can see why you gave us the design project hand out first yet made the think paper due first. The design project handout narrowed our focus, which we could easily broaden to find theory for support to write the think paper. In turn the think paper serves as our outline for the design project because it is where we do all of our initial planning and goal setting. When writing the design project we simply have to monitor that we're meeting our goals set out in our think papers. You are in fact forcing us to be self-regulated learning and teaching us how in the process. | Participant 84: Yes, I initially was confused as to the difference between the 2 assignments. I then realized/was informed that the think paper focuses in depth on one issue which you'll address w/ the design project not briefly touching all. Also, I discovered that the think paper issue does not need to be embedded in a particular curriculum area. | Participant 43: My understanding of the think paper has changed in that I now understand how the research I collect for it will inform the development of my design project. I now understand the think paper is separate and does not have to specifically deal with the subject and grade I've chosen. Results can, to some degree, be generalized. This change has come about by trial and error. I had some frustrating hours in the library before emailing my TA and taking a second look at thinks. I made it more complex that it was. |

# Appendix I

Table 2- Question 7: What are the difficult aspects of the assignment: Think Paper.

| **Difficult Aspects** | **Example 1** | **Example 2** | **Example 3** | **Example 4** |
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| Finding a topic | Participant 57: Originally, I thought theory should be linked to the subject area I chose for the design project, but Dianne corrected me on this assumption and said that the topic of advanced organizer and how they activate prior knowledge would suffice. | Participant 9: I had trouble picking my topic. I was associating it with a think paper from a psychology course, where you link two topics and discuss correlation and causation. At the start I found it too vague to work with, but after a bit of time in the library, I found it easy to make a mental map of the think paper. I didn't really consider the design project until after I was done the think paper | Participant 11: The difficulty I had in narrowing my topic is the huge amount of information on reading comprehension in the library. I knew I wanted to discuss reading comprehension but there are so many factors that contribute to if a learner is able to understand the material presented to them. I finally decided to focus on the background and prior knowledge of the learner because it interested me more than other things I saw being discussed such as phonics. | Participant 1: I wanted to comment on my research process during the paper writing process. It was very difficult for me research for the think paper. I did not really know what my topic was, but I went to research anyway, thinking that I would figure out the topic as my research went along. This led to a great deal of |

frustration, and two almost fruitless searches. It wasn't until I asked for your help Dianne, and finally figured out what I was looking for as a topic, that I could go back and find the research articles. What it made me realize is that research cannot necessaril y be done without a clear focus: unless I have a picture in my head of what I am looking for, I am not doing the research in a very effective way. I think that it was a good lesson: I should

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| | | | | have some specific picture of what my topic is and what I am hoping to find, before I do my research. |
| Finding Articles | Participant 66: So far, as you can see my strategies have consisted of trial and error at finding articles (usually too many articles) and trying to narrow search down. This is probably the most difficult thing so far. | Participant 57: Research! I found it frustrating finding articles that matched the words I put into the search, but that really focused on adults, students with LD, high school students etc. All of these areas I think are out of the scope of my paper and design project. When I added elementary to the search there were no search results AHHH. | Participant 67: Also, using ERIC isn't easy—its been a couple years since I used it and it has such a broad range of article for each topic. Then, if I find and article I'm interested in, it's usually not available at SFU or the whole text isn't available. I wouldn't want to order the article through inter-library loan without getting it to scan it over. | Participant 67: I have many ideas, look ERIC up on the net punching in some of my terms only to receive huge quantity of articles... After realizing that I was having difficulty narrowing down my search, I went back to the text. I searched it and found some useful sections. I looked up the articles that the book used seeing as they've already done the hard searching part. |
| Research Process | Participant 57: It took a lot of time to summarize, find quotes and comprehend each article but it helped me to focus my paper and keep it cohesive | Participant 77: Reading the articles may be another challenge since some tend to be full of too much jargon that I may not understand. To overcome this | Participant 7: Began reading the five articles and became frustrated that each of the five articles talked about very different aspects of self-efficacy. I | Participant 84: Deciding which information from reading will be most useful because not all info can be included, there's too much. [States second entry] |

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| | cohesive | challenge I just may have to read those articles more carefully or just choose ones that would fit my understanding better. | realized that I had to narrow down my topic and just look at a particular part of self-efficacy in order to develop a meaningful thought paper of five pages. Reading the articles wasn't a complete waste of time since I discovered I was interested most in goal setting by those with self-efficacy. | When I was going over my notes I realized that I have a lot of info related to the 1st body paragraph but not as much for during and after reading. The 1st time I read through my articles I focused more on that section, so this time I'll allocate my attention elsewhere and see if I can come up with a more well-rounded collection of facts. Solution went through the articles again and made detailed notes related to during and after reading. |
| Writing Process-Framing | Participant 39: I had started out making comprehensive notes on all of the bulleted points for each article but that is too time consuming and probably won't be all that useful so I'm no longer doing it. | Participant 38: I keep analysing and questioning if I am correctly doing what is asked—keep reading outline. \|Separate entry.\| Wrote out 2 different kinds/ways of presenting my think paper issue = main point—already nervous and | Participant 75: Brainstorming/constructing ideas on where to begin and what to begin was not an easy task although we have been constantly asking ourselves questions. Thus, if I went to the 5 criteria and basically set out a framework | Participant 66: My past experiences with think paper involved writing a personal discussion about a topic, and I didn't have to look any farther then the text and my head. This paper seemed more like a research paper, |

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| | | jumping back and fourth from different ways of starting and wording. Need to decide and start writing can always go back and touch up/alter things. Need to pick and move on. | more like a heading/draft for what to write in and/the emphasis for each heading. | but that was never specifically stated. No where did it say I needed to argue a thesis, but I feel that I did. None of the questions I and others asked helped me and I had some personal thought and ideas but since I didn't find textual evidence, I felt I couldn't use them. |
| Framing (Con't) | Participant 82:<br>I take back what I said on Oct 10th (now Oct 13th). The hardest part of any assignment is actually getting started. There is nothing more scary than looking at a blank page. I had said on Oct 10th that reading the research was the most difficult part because it's so voluminous, but really that is relatively easy in comparison to developing your own ideas in relation to what you've read (and highlighted) I usually dwell in the research to avoid getting started because it is so difficult to do. I know that planning is a good first step to getting started, but in my own experience, I find that elaborate planning (e.g. making an outline) is really just another way of putting off getting started. For me, I like to just DO IT! | | Participant 62:<br>I think the difficulty of the assignment is due in part to the openness of it. There are no set guidelines that we must follow and so it's difficult to know how to structure the paper. I'm having problems starting the paper knowing how to structure the paper and know what kind of information to include in the paper. However, I assume for some reason that the openness of the think paper is a good thing because it leaves the writing of the paper open for personal and more preferred writing styles (and because of this, I'm sure the papers will vary in structure. | |
| Writing—addressing task elements | Participant 5:<br>I sometimes felt information was constantly regurgitated | Participant 85:<br>What's my thesis—it changes with every article…I find a good point then I go to the | | Participant 66:<br>In all my past research papers I have had to hand in a minor project +/or an outline. So in the past I |

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| | was I being clear and concise or acting in repetition. Decided I was clarifying information and aspects of self regulation and writing to meet criteria set in five questions—this was achieved by rereading several times and criticizing work. | next article and I start to rework my thesis so that it's relevant to the article ahhhh! Got to start picking one thing what is important especially in terms of student's learning...attribution theory can be viewed from both students perspective and teachers perspective such as the attributions students make towards their academic outcomes but attributions made by teachers towards student's academic performance outcomes are also important which perspective can I take. | have read the articles, then thought of a thesis and sort of had it all mulling around in my head while doing the outline and/or minor projects. This meant that by the time it came to the paper, I knew the articles very well (from working with and rereading) and had very clear ideas about what and how I wanted to say stuff.... In this project since there were no pre-projects I hadn't worked with the material as much therefore I had less of a sense of where things were in articles and which articles were in. I had very less clear ideas of what I was going to say and how to say it and how to put it together. Solution: created a 3 step plan to identify information to include, put into categories and re-skim articles labeling information into sections. | |
| Writing-Task constraints | Participant 77: Also there is the problem of being able to fit all of this information in 5 pages. One possible way to tackle that is to set out about one page for each consideration in the marking scheme totaling 5 pages for five considerations. However, that | Participant 43: Perception of assignment. At first, I thought it was too wide open with too many aspects to connect. I've had to mentally simplify it. Take things one step at a time. I also think it will be difficult to summarize 5 articles in 5 pages! I will try to be concise | Participant 79: I have started to write my rough copy. The hardest part is making sure that I'm answering the questions correctly and that how I answer them will relate to my overall paper. I find that the considerations given for the | Participant 79: Indirectly I may cover all of the considerations but will this provide a challenge for the outcome of my final grade? Will the marker evaluate it as unclear or unstructured because they were not explicitly stated? I have decided to |

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| seems like much too simple a solution since when writing a paper there are usually more things to say about one thing than another and so dividing it up like this may not be the best solution. It will all be dependent on the amount of information I have for each consideration. | and spend more time linking ideas. | paper hinder my ability to write. It makes me analyze the order of the considerations and somehow makes me use the considerations as an outline. Because the marking scheme was developed on the basis of the considerations I'm forced to express each consideration equally as equal marking is allocated to each one. This is a challenge for me because I like to just go with my thoughts and expand in areas that provide interest or importance as I am writing | follow the considerations but this process to be somewhat challenging with respect to my organization of thoughts and interests. The stumbling block had to do with my evaluation of my own thoughts setting up my own criteria by interpreting the guidelines for the assignment and incorporating with my criteria and the criteria of the teacher /marker. |

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| Monitoring Motivation | Participant 51: Feeling perplexed about not able to read the text. Keep reading words over and over again but the information is either too dry or too complex to grapple. I resorted to drawing in my sketchbook but I know this is just wasting time. Will try another day but for now will try to search for a strategy and make sure my attributions are positive next time around. | Participant 75: I did not see any easy aspect of the assignment because I found that each process or each task requires a lot of thinking, analysis etc. It is important that I know how to push myself to elaborate and extend from the information I have so far. The difficult part is to be flexible and elaborative | Participant 26: Paper is not going well. Can't seem to focus on importance of issue, too many demands on my time. I know I should have started much earlier writing paper. Will chock this up as a learning experience. [second entry]. I guess this is about as good as I will be able to produce given that the paper is due tomorrow. I'm not satisfied with the product because I've struggled with topic and feel it may not meet my expectations of a good mark. Usually when I'm meeting my expectations, my writing process usually proceeds smoothly. This experience has been anything but smooth thus feel unsure about the quality. Time will tell. |
| Time Management | Participant 9: For me personally, the stumbling blocks of this assignment will most likely be regulating my time and maintaining task motivation. To overcome them, it will be important to keep the goal of completing the task on time, and also the consequences of receiving a poor grade following evaluation | Participant 82: As I handed out candies to the trick or treaters I wondered if I should not use some articles because they didn't contain as many main points as others. I decided against this because I really felt like all of the articles had valuable tidbits that I wanted to use. How would I incorporate the many tidbits into a cohesive paper? I always plan things to do, even research a little but actually writing paper never happens for me until the due date is fast approaching. I'm really a good planner, but I have problems doing what I've planned. ...but usually I don't carry thru what I've planned to do when I planned to do it. Everything tends to get pushed back until I can't push it back any farther. | |

# Appendix J

Table 2- Question 7: What are the difficult aspects of the assignment: Design Project.

| Difficult Aspects | Example 1 | Example 2 | Example 3 | Example 4 |
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| Generating a Topic | Participant 37: Deciding what age/grade level I want to deal with—I don't know what age children are expected to be able to comprehend texts so I need to find this out. Deciding whether I want to work on comprehension of a story or comprehension of instructions-- To overcome: read again and highlight main info, relate it to my topic and not the one that's being discussed. | Participant 75: The hard part of the project for me was to first understand what theoretical principle was and find a topic or issue that I can state as a theoretical principle. | Participant 67: motivation seems like too broad a topic to write on. Besides I should be writing on a theoretical principle that is suggested in the Design Project outline. | Participant 75: The hard part of the project for me was the first understand what theoretical principle was and find a topic or issue that I can state it as a theoretical principle. |
| Generating an Activity | Participant 26: The most difficult thing I'm finding to develop for my design project is a clear picture of what and how I am going to successfully teach writing. So according to my plans it's not going smoothly. I'm still very confused and overwhelmed about how I will accomplish this. | | Participant 64: Began to brainstorm ideas for the design project, I had a hard time trying to come up with an activity that I could use cognitive load. Therefore I spoke to Dianne and she said that my activity did not only have to use the theoretical principle of cognitive load, I could also use prior knowledge and metacognition. This made it so | |

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| | | | much easier for me. I guess it was a little unclear to me as I thought that the assignment was only suppose to be about the theoretical principle we used for the think paper. |
| Research Process | Participant 17: However coming up with detailed notes/outline was one of the harder and more challenging aspects of the assignment. This is because of the sheer massive amounts of information I had to sort through to get what I wanted to get. It was also hard to connect these ideas together because there was just so much information. To get over this, I just had to limit myself to the number of articles and texts to use and just methodically go through each to pick out the points of relevance to my paper. I chose mainly the points that supported my claim, as well | Participant 15: If I had to do this project again? I would start sooner, so that I had time to really comprehend and critical think about the articles I was reading. What I never did was develop the big picture of each article; I never took the time to determine what they were saying and how they contributed to my understanding of attribution theory. After finishing my project, and reading over it, I realized that I had never really stated what I had learned by reading the articles. Upon reflection I felt that I had met all the other criteria for the project, but that I had not fulfilled this one area. My goal for my future courses | Participant 1: However, as I thought about the design project and narrowing the topic I thought taking it to a general perspective might be difficult to for me to design my instructional goals. Lastly, after asking for assistance and reading the design project requirement to get some hint, I created a web just like theories in tutorial on metacognition. I read the discussion at the beginning and end of each article to find highlights and try to think about the themes each has to convey. I had problems within using this method because I wasn't familiar with the brainstorming ideas in class. It seemed to me my knowledge of misconceptions are so tacit that it is difficult to articulate. I kept thinking about the underlying beliefs held by the authors and the possible common points shared. I only hoped their insight would contradict each other. Or perhaps, I was thinking about the cognitive process that they tried to describe in misconceptions. I am still uncertain whether I chose good strategies to solve the problems and begin to have doubt about my evaluation ability. But reading from the text on understanding theory taught me that the key is to coordinate data or make theory adjustment if the data is unambiguous. I decided to go for challenging students to coordinate and letting them realize they aren't discriminative of each other. |

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| | as some that challenged it just to make the paper more interesting | is to regulate my progress, and make sure I do not spend too much time on one section and neglect another. I will also go for help sooner, because I realized doing this project that getting feedback was really helpful at determining which sections need more attention. | |
| Framing—Planning a Framework | Participant 54: Many early attempts to type out my design project failed quickly as I had no direction, trying to do too much at once. By breaking down the material, in a matter which I could see a fuller picture made it a lot easier to produce what I wanted to say in concise terms. | Participant 15: I found that by doing this (free write) I was able to determine what sections were going to take me the longest to do, and which sections I was having difficulty with. As it turned out, the section on theoretical principles was the one section I struggled with. So instead of starting off with it, I decided to rearrange the order that the section were on the orange assignment sheet. | Participant 85: One of my biggest challenge with the assignments especially the design project was how I had to work backwards in the process. I tried to start with the theoretical perspectives but found it difficult to develop them because there were nothing to develop them from or for. I then tried to come up with instructional goals that didn't work either since I was still unsure what my activity was going to be. My last resort was to skip to the learning objectives and again the same problem arose I had nothing to base/develop it from. |

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| Framing—<br><br>Depth of Detail | Participant 84:<br>Okay now I obviously have too much info to include it all in my assignment. It did let me know where I stand with each section and things are looking good. Now I just need to take a deeper look at each piece of info and decide whether it will benefit my project. Obviously a lot of my gathered info came from multiple sources is bound to overlap. I think its better to have high quality not high quantity so I'll need to edit throughout. | Participant 54:<br>There were a couple of stumbling blocks that hindered my progress in completing both this assignment and my think paper. Too much information always seemed to muddle the ideas that I was trying to present in a clear format. I tried several outlines to for my presentation, but only achieved real success when I broke down all the points that I was going to present, so I could see all the various information separated from each other. | Participant 66:<br>My design thing itself was harder. I sorted through all my Mom's books found some related activities and worked from there. I mixed them together and altered them to fit my needs. The learning objectives and stuff came out. I just wasn't sure how much to say for anything is what I said right? I tried to get it clarified but these attempts left me more confused. Even when we asked for clarification it didn't happen, so I felt very alone on this assignment. Eventually I talked with other students and just wrote. It was proofed in class when it was 3/4 finished. I finished it later and had more people proofread it and worked with their suggestions. Now it's done and I have 1 part I don't really like. |
| Framing—<br>Organizing Knowledge | Participant 29:<br>A big help was reading your criteria provided in the task assignment sheets. I felt that I often had to do so. Whenever, I was unsure of what I was writing I would go back to the task assignment sheet. I believe having this sheet helped me organize my knowledge and decrease the pressure on my cognitive load | | Participant 26:<br>Working on paper has been murder because there seems to be some hesitance on my part still. By that I mean I'm not sure yet about my project meets the criteria. I have been dwelling on it for some days now and interestingly today Nov 29 it was like a light bulb went on and in my head I saw how the issues in my paper interrelated or linked between theory and practice. I feel |

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| | | | | satisfied that I can now meet the criteria. |
| Time Management | Participant 88: Establish what you wanted to achieve for each day. If you did that, you would be OK—but busy schedules get the best of you sometimes too! Breaking everything down into sections really helped—I could organize my time resources better and really focus on how I wanted to relate that theory to the instructional activity. | Participant 17: Another challenging aspect of this assignment turned out to be time. I found that I had very little time to spend on this paper (due to other assignments and exams) from other classes as it is close to the end of the semester. Perhaps it would have been better to assign this design project earlier in the class and push the due date earlier in the semester because I'm sure a lot of people found that I had to really push to write this paper and I didn't have enough time to look for more sources or articles which could have helped to strengthen /deepen my discussion. Next time, I would definitely, start research and writing this design project earlier so to allow myself enough time to edit and revise. This time I just had to use my time as best I could (ex. Concentrating harder, writing for longer hours in the day, and depending on myself to proofread). I usually get one other person to help proofread the paper (in its final form) because he/she may pick up on something that I may have missed, but since we had the feedback session in class this helped a little bit. | | |
| Motivational Factors | Participant 26: On this, I felt I couldn't get it for some time. The orange sheet intimidated me, but when I broke it down into smaller pieces it helped because the task seemed less complex and daunting. Trying to work thru my ideas for the design project but am still confused how this is to look. Asked other students | Participant 82: I spent most of the today reading, but then I started to realize that I was procrastinating —that is, I should have been trying to get started because there comes a point when you can't read anymore. At this point, I have read these articles backwards and forwards such that I am very familiar with | Participant 51: The major stumbling block that I had this semester was organization and second to that was self-efficacy. I have been unsure about directions and goals although I started to make them near the end of the project. For example, I told myself just to think about the activity and to concentrate on developing that. | Participant 67: What hindered my efforts in this project is grades—I worry that I will have made my best effort and then still get a [crappy] mark. That's the problem with the education system its grading policy. If success = grades and success/achievement = good self efficacy how will I ever feel really good about what I'm |

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| how they are feeling about the design project. They seem to be as confused as I am which is comforting to know especially to my self-confidence. Depending on the results of my think paper may have to change my strategies towards my design project. | their content. I just don't want to get started because it requires heavy-duty thinking, whereas reading doesn't require much thinking, you just read the words. Getting started is difficult because you have to put everything together. Figure out how to put it altogether it tough. You have to figure out what order to place them in, you have to omit certain points (even if you find them interesting which don't develop your topic), you need to determine if there are gaps that needs to filled in with additional resources—all in all this is not fun and this much thinking hurts my brain. | It really helped me to actually have fun and enjoy creating a plan that would work in the classroom. However time caught up to me and I realized that a lot of my actions were coming too late. In this last week I've tried to balance the focus on my design project with the assignment for my other courses and I realized that I could not focus on three things at the same time. For improvements I need to designate a day where I can focus on one topic, that way I set better goals and have a more direct plan developed and encoded into my mind. Writing things down worked to some extent but near the end, I couldn't keep track of what I had written. In the future I would like to rehearse and memorize things so that I | doing if I'm constantly taking on new unfamiliar tasks and subject matter (such as the research papers that I chose for the think paper). I will just have to ignore my grades and think about what I take away and what I know. |

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| | | | can recall what I need to do when I need to do it. |
| Confusing Elements of Project | Participant 77: The other stumbling block was trying to come up with the instructional goal and the learning objective. I had to make sure the instructional goal was broad, but not too broad, and that the learning objective was specific and could be measured in a concrete and observable way. This was a challenge but getting help from T.A. in tutorial helped me in thinking about and coming up with the goal and objective. | Participant 77: One stumbling block was figuring out the differences between theoretical principles and the justification part in part 2. To me they seemed like the same thing. However, in tutorial, after asking about this it became clear that theoretical principles had to do with actual theory such as schema theory in my case and how it related to my activity. The justification part on the other hand, had to do with justifying the actual features of my activity such as why the strategy would be effective in accomplishing my objective, or how modeling would help etc. | Participant 7: Struggling a bit with the instructional goals. There are so many goals to consider concerning self-efficacy and goal setting, I don't know which ones to focus on. I had to really critically think about what I thought was most important. I reviewed my thought paper, as well as my articles and notes from reading several portions of several texts. I chose three goals after evaluating which were most important. I as usual, took notes, did a written rough copy and then typed my thoughts out on a computer. It felt pretty good completing this section, it was the most difficult to this date, since it required thought of what to include. Before finishing for the night I outlined three important components I wanted to include in part two. |

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| Revision Process | Participant 11:<br>Clarifying my ideas so I am making clear statement that will fit into my design project. I realized from this process I need to not take granted that the reader know what I'm talking about. Through going through the process of writing the think paper and design project I learnt that I need to answer the why and how question when I'm writing and assignment. Although I struggled to complete the design project I found going through the steps—asking for assistance-and taking the help/clarification very useful in the overall learning process. It also taught me that creating a design plan need to be a long step-by step process where all terms/ideas and questions are answered so all aspects are clear to the reader. | Participant 75:<br>When I begin writing for the first draft, I started to realize the difficulty despite that I thought I understood the task. I noticed that I was able to describe things but was not able to justify them. So I begin to question myself where the problem was due to the lack of justification. My activities were just activities that people would not know whether they are effective, and what it is for. Also, due to the lack of explanation, the flow of the paper was not there. Problems 1. Excess information—loose focus, must be specific. 2. lack of introduction of what phonemic awareness and would help to children's learning of reading 3. lack of flow in theories addressed. And why questions were not specifically engaged—eg why is context important for instruction 4. some points were not clear because of the use of words that lack explanation –eg scaffolding—need to expand to the theories/zone of proximal development 5. Discard unnecessary statements in learning objectives. Originally I had too many of them and a few of them were awkward/structured, so either I elaborate on those or discard them. I decided to discard them due to page limit and also the others would be enough to address the main objectives I would like the children to achieve, which is basically to be able to recognize and distinguish the relationship between words of sounds. 6. excess and redundant information. Information was written originally. I had too much in mind to cover in 10 pages, so rethought. 7. lack of justification in the activities designed—need to reflect back to the theories, objectives goals etc. |