

Predicting University Students' Performance of a Complex Task: Does Task
Understanding Moderate the Influence of Self-Efficacy?

by

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B.A., University of Victoria, 2003

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ABSTRACT

This study used a correlational design to examine the contribution of university students' task understanding and self-efficacy to performance on a grade-bearing course assignment. Participants were 38 undergraduate students enrolled in a first-year elective course. Task understanding for explicit, implicit, and contextual task features was measured using a forced-choice task analyzer quiz and an adapted version of the Epistemological Beliefs Questionnaire (Schommer, 1990). Self-efficacy for explicit, implicit, and contextual task features was assessed on a self-efficacy for performance scale. Final grade on a major course assignment was used as a measure of task performance. Results of hierarchical regression analysis indicated that task understanding significantly predicted task performance and task understanding moderated the influence of self-efficacy on task performance. Findings may help to bridge these disparate lines of research and provide support for Winne & Hadwin's (1998) model of self-regulated learning. Practical implications for facilitating university students' success in their academic tasks are discussed.

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Chapter 1

Introduction

University students must often contend with academic tasks layered with nuances far more complex than those encountered in secondary school (Simpson & Nist, 2000). As such, investigation of the factors that contribute to students' successes or failures in these challenging tasks is essential. Two such factors are students' understanding of academic tasks and their confidence to complete these tasks successfully. Emergent research suggests that, in order to decipher and define tasks, students must engage in a wide range of cognitive processes. Without accurate and complete interpretations of task requirements, however, students risk being "doomed to spend vast amounts of wasted time" labouring under faulty or misguided perceptions of what is expected of them (Simpson & Nist, 2000, p. 530). Recent investigations framed by models such as Winne & Hadwin's (1998) model of self-regulated learning suggest that students often fail to develop complete internal representations of university assignments, and that incomplete or inaccurate task understanding negatively impacts achievement (Butler & Cartier, 2004; Hadwin, Oshige, Miller, Fior & Tupper, 2008).

Furthermore, research in the arena of motivation has established self-efficacy as a central influence on academic performance (Bandura, 1997; Pajares, 1996; Schunk, 1995). Multon, Brown, and Lent's (1991) meta-analysis indicated that self-efficacy beliefs related positively to academic performance across a wide range of subjects, experimental designs, and methods of assessment. Despite the wealth of empirical support for the role of self-efficacy in achievement (Pintrich, 2000; Pintrich, 2003; Schunk, 1995) and the emergent support for the importance of task understanding in

academic success (Winne & Hadwin, 1998; Jamieson-Noel, 2004), little research has investigated the relationship between these factors and how it contributes to task performance.

Examination of this issue is essential for bridging the gap between these disparate lines of research and has the potential to contribute to theoretical accounts of the role of task understanding and motivation in self-regulated learning. Finally, it could provide valuable insight into the ways in which instructors can support students' successes in the complex tasks frequently encountered in university.

Purpose of the study

The purpose of the current study is to use a correlational design to assess university students' task understanding and self-efficacy for performance and examine how these factors contribute to performance of a classroom learning task. Specifically, this study used Winne & Hadwin's (1998) model of self-regulated learning as theoretical framework to investigate three questions: (a) does task understanding predict task performance, (b) does self-efficacy for task performance predict task performance, and (c) does task understanding moderate the influence of self-efficacy on task performance.

Chapter 2

Literature Review

Overview

The following review presents a theoretical foundation for investigating the link between task understanding, self-efficacy for performance, and task performance. Key findings of research investigating task understanding and self-efficacy for academic performance are described. Finally, implications of this research for the relationships among task understanding, self-efficacy performance, and task performance are discussed.

Theoretical foundations

As task engagement in university is often self-planned, self-initiated and self-sustained, models of self-regulated learning (SRL) offer insight into the complex relationships among task understanding, motivation, and achievement (Zimmerman & Risemberg, 1997; Zimmerman, 1990). In general, models of SRL conceptualize successful learning as a complex recursive process enabled by self-regulation of cognitive, metacognitive and motivational factors (Zimmerman, 1990). Although investigations of cognition and motivation in SRL have frequently adopted the models of Pintrich (2000) and Zimmerman (1989), Winne & Hadwin's (1998) four-phase model of SRL is most salient to the focus of the current investigation for a number of reasons. Specifically, this model attributes a central role to task understanding by positing this process as the first phase of SRL. Furthermore, by delineating a common cognitive architecture underlying each phase, it affords a fine-grained investigation of the way in

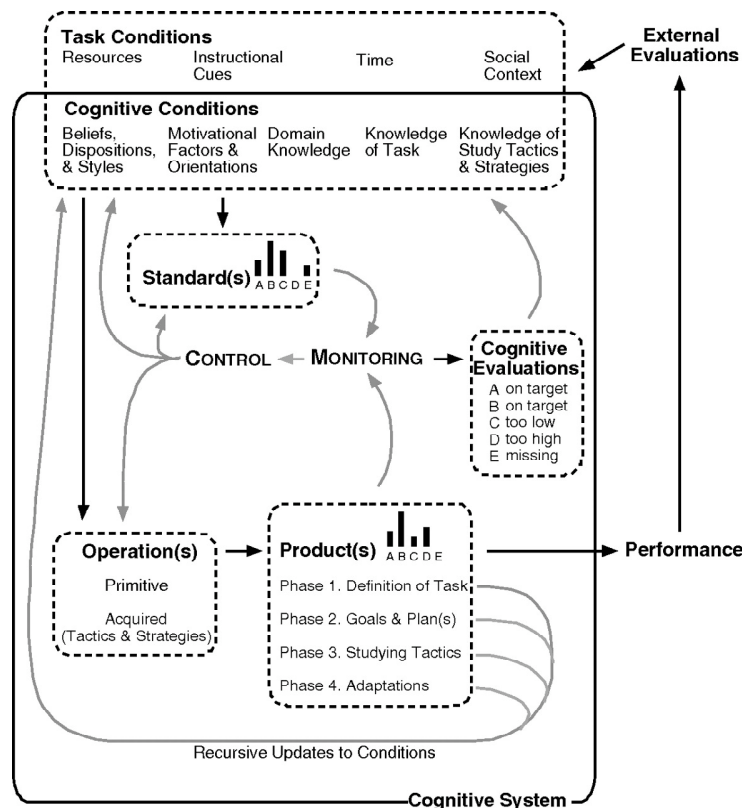
which motivational constructs, such as self-efficacy, interact with the cognitive processes essential for task understanding.

Winne & Hadwin's model of SRL. Winne and Hadwin's (1998) model of SRL (figure 1) is characterized by four distinguishable, weakly sequenced, and recursively linked phases: (a) task understanding, (b) goal setting and planning, (c) enacting tactics and strategies, and (d) metacognitively evaluating and adapting learning now and in the future. During the first phase, self-regulated learners engage in a number of cognitive processes to interpret and define the task's requirements. During the second phase, learners set goals and make plans for enacting the task. During the third phase, learners set their plans into action by utilizing strategies and tactics to achieve their goals. Finally, in fourth phase, under the drive of metacognitive monitoring and control, learners adapt and regulate their learning for both current and future tasks.

Winne & Hadwin (1998) posit that a common cognitive architecture, known as COPES (i.e., Conditions-Operations-Products-Evaluations-Standards), underlies each phase of SRL. Conditions include information about task conditions, such as time and task difficulty, and cognitive conditions, such as motivational beliefs about the task. Conditions are posited to influence the operations in which students choose to engage. Operations refer to the rudimentary cognitive processes, such as selecting, monitoring, assembling, rehearsing and translating, students utilize to engage in the phase. As students engage in operations, they create products for each phase. Under the drive of metacognitive monitoring, students can evaluate their learning and progress by comparing the products of their operations to standards. Standards refer to students' multifaceted criteria for the phase. Finally, if a discrepancy exists between products and

standards, students may utilize metacognitive control to either engage in further operations to modify products or update standards to reduce the discrepancy in outcome (Winne & Hadwin, 1998, Greene & Azevedo, 2007).

Figure 1. Winne and Hadwin's (1998) model of self-regulated learning.



Note: from Winne (2001)

Implications for the current study. Winne & Hadwin's (1998) model of SRL provides a solid theoretical framework for investigating the relationship between students' task understanding and self-efficacy and the influence of these factors on task performance. According to this model, the products of each phase of SRL influence student's engagement with future phases as these products update the conditions for future phases. As such, it posits that task understanding is instrumental for task success,

as the products of this phase direct students' goals and plans for the task as well as the strategies they choose to enact.

Furthermore, according to the COPES architecture, cognitive conditions, such as self-efficacy beliefs, influence the products of the current phase of learning as well as future phases. Thus, during the task enactment phase, students' self-efficacy beliefs are postulated to influence the cognitive operations, strategies, and tactics students use to enact and, ultimately, succeed on their tasks.

Finally, the COPES architecture provides a theoretical account of the way task understanding and self-efficacy intertwine. As the products of each phase update the conditions for future phases, the degree to which task understanding is accurate and complete may influence students' self-efficacy for future phases such as planning and setting goals, and enacting the task.

Task understanding

Task understanding is a key theoretical component in students' self-regulation and performance of academic tasks as it provides the foundation for effective and appropriate task engagement (Butler & Cartier, 2004; Butler & Winne, 1995; Jamieson-Noel, 2004; Winne & Hadwin, 1998). While task understanding is often conceptualized as playing a key role in task engagement, this assumption has only recently become the focus of direct empirical investigation (Hadwin, 2006). The emergent research in this area, however, supports the importance of this preliminary aspect of task engagement for achievement in academic tasks.

Definition of academic tasks. According to Doyle (1983), academic tasks are distinct units of academic work that consist of the products students are required to

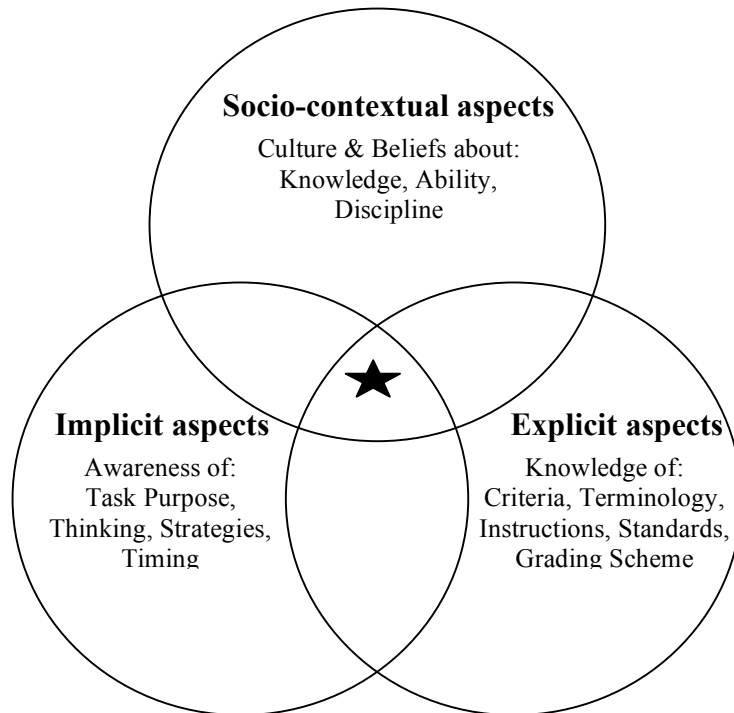
formulate, the processes necessary to produce these products and the resources available to students while they create the product. As teachers commonly employ tasks in order to foster academic work habits and learning outcomes (Ames, 1992), students must attend to the key characteristics of these tasks in order to be successful (Winne & Marx, 1989).

Among the characteristics identified in various areas of research are (a) content, such as the domain specific content covered in the task, (b) setting, such as the resources that should be examined, and (c) presentation, such as the format of the final product (Winne & Marx, 1989).

Definition of task understanding. Research in the field of Educational Psychology has begun to examine the ways in which students understand academic tasks and how task understanding affects task engagement and learning (Butler & Cartier, 2004; Butler & Hadwin, 1995; Hadwin, 2006; Jamieson-Noel, 2004; Winne & Hadwin, 2008). In this research, task understanding is conceptualized as the construction of an internal representation of the externally assigned task and is posited to involve a range of cognitive, metacognitive, and motivational processes (Winne & Butler, 1995; Hadwin, 2006; Winne & Hadwin, 1998; Winne & Hadwin, 2008). While task understanding has been operationalized in various ways in the literature, much of the extant research shares the underlying assumptions that (a) task understanding provides a foundation for successful learning and (b) students must interpret the important procedures and parameters of the task while incorporating prior knowledge of the task and task domain, as well as knowledge about the context and self into their understanding of the task (Butler & Cartier, 2004; Hadwin, 2006; Jamieson-Noel, 2004).

Hadwin's (2006) model of task understanding (figure 2) further defines this process by suggesting that academic tasks are comprised of three layers or spheres of information and that construction of accurate and complete task understanding demands that students interpret and synthesize information across these three spheres of information (Hadwin, 2006; Hadwin et al, 2008; Oshige, Hadwin, Fior, Tupper, Miller, 2007). This model posits that tasks are layered with explicit, implicit, and socio-contextual features. The explicit sphere of a task includes features overtly described by the task description, such as key task criteria, steps or instructions to be followed, and standards for grading. The implicit sphere of a task includes task features students must extrapolate beyond the assignment description, and may include things such as the purpose for the task, connections to learning concepts, potential resources for completing the task, and key types of thinking and knowledge targeted by the task. Finally, the socio-contextual sphere includes task features related to what is valued in the classroom and discipline in which the task is embedded, such as the instructors' beliefs about knowledge, and discipline-specific expectations for presentation.

Figure 2. Hadwin's (2006) model of task understanding.



Note: from Hadwin, Oshige, Miller, Fior, & Tupper (2008)

Task understanding and achievement. When students enter university, they encounter tasks that are often novel and ill-defined. In addition, these tasks often use simple language to confer complex expectations and are heavily embedded within the dynamic expectations of individual instructors (Hadwin, 2006; Simpson & Nist, 2000). As such, the construction of accurate and complete task understanding is a process inherently laced with difficulty (Oshige et al, 2007), and emergent research suggests that, even when provided with detailed task descriptions, students often struggle to decipher the requirements of tasks (Butler, 1995; 1998-a; 1998-b; Jamieson-Noel, 2004).

For instance, in an examination of how students construct and refine task understanding over the course of a semester, Jamieson-Noel (2004) investigated 58 undergraduate students' perceptions of two main writing assignments in an instructional psychology course. Task perceptions were measured by assessing students' qualitative responses in a studying portfolio in which they reported their initial perceptions of the task and described the strategic processes they used as they engaged with the tasks.

Qualitative analysis of the data revealed that students' interpretations of the task varied on two dimensions: a) breadth of understanding in terms of the task elements identified as important and b) depth of understanding in terms of the richness of descriptions concerning the underlying purpose and scope of the assignment. Specifically, while students often recognized a variety of task elements as important, they generally failed to make connections between task components or infer deeper implicit task conditions. Finally, students' responses over the course of the term indicated they monitored and refined their task progress. While this study did not quantitatively evaluate the quality of students' task understanding, Jamieson-Noel (2004) interpreted these results as indicating that selective attention to the surface and deep instructional cues initially precluded students from possessing a fully integrated understanding of the task. Furthermore, Jamieson-Noel (2004) recommended that, since task understanding is posited to influence achievement (Winne & Hadwin, 1998), students would benefit from attending to task features more directly.

Despite the inherent difficulty of this process, models of SRL posit that task understanding is essential for effective task engagement and performance in university (Butler & Winne, 1995; Winne & Hadwin, 1998). Specifically, to effectively monitor and

coordinate task engagement in complex university tasks, students must often interpret their own definitions of tasks and provide their own structure, organization, and goals for engaging in the task (Pintrich, Marx, & Boyle, 1993; Mayer, 1998; Zimmerman & Paulsen, 1995). Thus, the construction of accurate and complete perceptions of task descriptions and instructional cues is posited to play a key role in academic success as it drives effective goal setting and planning, and selection of tactics appropriate for successfully completing tasks (Butler & Cartier, 2004; Hadwin, Wozney, & Pontin, 2005; Jamieson-Noel, 2004; Vögele & Wild, 2003). Although few studies have directly examined the effects of task understanding on academic performance, emergent research suggests that students with accurate and complete task understanding evidence greater academic performance those less well attuned to their instructors' expectations (Butler, 1998-b; Hadwin et al, 2008; Oshige et al, 2007; Simpson & Nist, 2000).

For example, in two investigations of task understanding in 55 third-year university students, Hadwin et al, (2008) and Oshige et al (2007) examined performance differences associated with students' level of attunement with their instructor's perceptions of a complex mechanical engineering course assignment. Students' perceptions of the explicit, implicit, and socio-cultural aspects of task were measured three times over the course of an assignment using an open format Task Analyzer (Hadwin & Jamieson-Noel, 2004). The instructor completed a parallel version of the Task Analyzer. Items targeting explicit task understanding included asking students to describe the task and highlight key points in the assignment description. Items targeting implicit task understanding included asking students about the task purpose and key

course concepts. Items targeting socio-cultural understanding included asking students to rate the most important kinds of thinking and knowledge for the task.

Explicit, implicit and socio-cultural task understanding were scored by comparing students' responses to the instructor's responses on the Task Analyzer. Socio-cultural understanding was further measured using two parallel versions of Schraw, Bendixen, and Dunkle's (2002) Epistemological Beliefs Inventory (EBI) assessing the instructor's epistemological beliefs (EBI-T) and students' perceptions about their professor's epistemological beliefs (EBI-T-S). Correlation across all items was used as a measure students' socio-contextual task understanding. Results indicated that students generally had incomplete understandings of the explicit, implicit, and socio-contextual aspects of the task. In addition, both students' and the instructor's perceptions of the task evolved over the course of task engagement, and c) students with incomplete understanding of the instructor's beliefs about knowledge achieved lower course grades than students who were better attuned with the instructor. Hadwin et al (2008) and Oshige et al (2007) interpreted these results as evidence for the importance of understanding aspects of tasks beyond those explicitly depicted in assignment descriptions.

Further support for the role of task understanding in task performance is provided by Butler's (1995; 1998-a; 1998-b) investigations of the effect of the Strategic Content Learning (SCL) instructional model. In the SCL approach, instructors work collaboratively with students in to foster engagement in the cognitive processes that define self-regulation (Butler, 1998-a; 1998-b). In particular, SCL instruction targets task understanding by using discussion to help students analyze the task demands and define the criteria required for successful task performance.

In an article investigating the efficacy of SCL on the learning and performance of students with learning disabilities (LD), Butler (1998-b) reported findings from three studies in which 34 post-secondary students were provided with 2 to 3 hours of SCL tutoring each week over the course of at least one semester. Before and after the SCL intervention, students' metacognitive knowledge about tasks and strategies, self-efficacy, attributional patterns and strategy approaches were assessed using questionnaires and interview. Measures included the Metacognitive Questionnaire and the Strategy Interview (Butler, 1998-a; 1998-b). Work samples collected before, during and after intervention provided a measure of task performance. Results of qualitative and quantitative analysis indicated that SCL tutoring was associated with improvements in task performance as well as metacognitive knowledge about tasks and strategies, task-specific self-efficacy, attributional patterns, and strategic approaches to tasks. These findings provide support for the role of task understanding in task success by indicating that an intervention improving task definition, among other variables, resulted in improved learning and performance outcomes. Since SCL instruction targets a wide range of cognitive processes, however, the individual contribution of improvement in task understanding to task performance is unclear.

While research directly examining task understanding is emergent, empirical studies in a number of different areas, such as such as literacy, instructional design and epistemological beliefs, support the contention that task understanding plays a key role in task success. Specifically, this suggests that effective task engagement and performance is linked to accurate interpretation of explicit features of the task, such criteria, implicit features, such as task focus and purpose, and socio-contextual features such as

professors' beliefs about learning (Mayer, 1998; Brown, Collins, & Deguid, 1989; Lave & Wenger, 1991; Muis, 2007; Muis & Foy, 2008; Wong, Wong, & LeMare, 1982).

For example, in an investigation of the influence of task instructions in students with learning disabilities, Wong, Wong, and LeMare (1982) examined the effect of providing explicit task instructions on task achievement in upper elementary school children. All participants were asked to perform two criterion tasks: a reading comprehension task and a free recall task on passages of text varying in difficulty. Participants in the explicit instruction condition were provided with explicit written instructions for the task before reading the passage. For the comprehension task, students were instructed to attend to the paragraph questions included in the text. For the free recall task, students were instructed to study the passage and informed that a free recall test of the passage's content would follow. Results indicated that participants who received explicit instruction scored higher on both tasks. Wong, Wong, and LeMare (1982) interpreted these results as indicating that students' knowledge of the explicit instructions for tasks has a direct effect on student achievement. Since understanding the key explicit features for a task is considered to be one aspect of accurate and complete task understanding (Hadwin, 2006), Wong, Wong, and LeMare's (1982) study provides partial support for the role of task understanding in learning and performance. Specifically, it is likely that being provided with information about the task influenced the ways in which the participants engaged in the task. It is important to note, however, that Wong, Wong, and LeMare's (1982) investigation does not account for the ways in which participants interpreted the instructions. Even when students are provided with explicit instructions, it is possible that they may still conceptualize the task differently

than was intended by the researcher or instructor (Jamieson-Noel, 2004; Hadwin et al, 2008; Simpson & Nist, 2000).

Furthermore, a number of empirical investigations have suggested understanding the explicit instructions is not sufficient in order to develop a full representation the task (Mayer, 1998; Brown, Collins, & Deguid, 1989; Lave, 1991; Lave & Wenger, 1991). Instead, these studies suggest that understanding the implicit aspects of the task, such as task purpose, is an important element in the task engagement. For example, as part of a 4-year study, Prain and Hand's (1999) examination of the implementation of writing-for-learning strategies in a science classroom investigated students' perceptions of using diversified science writing tasks as a component of learning in the science classroom. Participants were 62 university students in science classrooms. In each classroom, writing tasks were implemented with the purpose of encouraging higher order thinking and deeper learning. Students were interviewed regarding their perceptions of the task. One type of perception examined was students' interpretation of task purpose.

Results of qualitative analysis indicated students' perceptions of the instructor's purpose for assigning writing tasks varied. Some students were able to articulate the rationale for using writing activities as a means of enhancing learning. Many students, however, were unable to describe a task purpose or incorrectly indicated that the main purpose of the task was (a) assessment or (b) other trivial purposes such as demonstration of creative writing skills. As a result, Prain and Hand (1999) suggested students did not often consider why the tasks would be beneficial and sometimes took an automated approach to completing the task. While this study did not examine the relationship between students' misconceptions of task purpose and achievement, results can be

interpreted as evidence that inaccurate or incomplete perceptions of task purpose may affect task engagement.

Finally, research in the area of epistemological beliefs also support Hadwin's (2006) model of task understanding. In the educational psychology literature, epistemological beliefs have been broadly defined as learners' beliefs about the nature of knowledge and the nature of knowing (Hofer & Pintrich, 1997). Research in this area is based on the assumption that learners have identifiable conceptions about knowledge and learning and that these conceptions affect learners' interpretations of and engagement in learning tasks (Schommer, 1990).

Furthermore, these beliefs have been posited to play a key role in students' self-regulated learning (Muis, 2007; Winne, 1995; Winne & Hadwin, 1998). For example, in an integrated theoretical model between self-regulated learning and epistemological beliefs, Muis (2007) posited that epistemological beliefs make up a key component of task definition and subsequently affect task achievement through exerting influence on learners' goals and plans as well as tactics and strategies executed during the task. While little research has directly investigated this claim, the contention is supported by a number of studies examining (a) the link between epistemological beliefs and learners goals and standards for the task and tactics and strategies utilized in tasks and (b) the consistency between professor and students beliefs.

For instance, in an examination of relationship between epistemic profiles and learning, Muis (2008) measured students' beliefs about learning and knowledge on two dimensions in accordance with Royce's (1978) theoretical framework in mathematics problem solving. Participants completed inventories targeting epistemic beliefs and were

profiled as holding either (a) a rational belief system focusing on conceptual information and logical verification, (b) an empirical belief system focusing on reliable and valid observation, or (c) both. Students participated in two problem solving sessions and the consistency between epistemic profile and approach to problem solving was observed.

Results indicated that students' problem solving approaches were consistent with epistemic profiles. In follow-up interviews, students profiled as rational indicated that they believed rational information was required to solve the problems. Students profiled as empirical indicated that observable information was required. In addition, students who used rational approaches solved more problems. Muis (2008) interpreted these results as evidence of the role of task understanding in self-regulated learning and the role of epistemological beliefs in task understanding.

Further support for the role of epistemological beliefs in learning is provided by research examining the relationship between student and teacher beliefs. This research suggests that when students hold similar beliefs to the instructor, they tend to demonstrate better task engagement and performance (Muis & Foy, 2008; Tsai, 2006). For example, Muis and Foy's (2008) investigation the epistemic and learning beliefs of teachers and students in mathematics in 55 Grade 4 and 5 teachers and 131 elementary school children examined whether (a) teachers' epistemic and learning beliefs influenced those of students and (b) whether students' beliefs were associated with their achievement goals. Teachers' beliefs were assessed on the Domain-Specific Belief Questionnaire (Buehl, Alexander, & Murphey, 2002). Students' beliefs were assessed on 15 items adapted from Schoenfeld's (1988) and Kloosterman's (1991) questionnaires. An adapted version of Elliot and McGregor's (2001) Achievement Goals Questionnaire was used to assess

students' goal orientations. After completing the questionnaires, students were given a set of mathematics problems to solve. Results of path analysis indicated that teachers' beliefs significantly predicted students' beliefs and achievement. Further, students' beliefs then influenced their levels of achievement goals. Muis and Foy (2008) interpreted these results as evidence for the role of both teachers' and students' epistemological beliefs in task understanding and achievement.

Measurement of task understanding. Initial investigations of task understanding framed by models of SRL have examined this construct using a variety of methods including structured interviews, open-ended questionnaires, and combinations of open-ended and closed format questionnaires (Butler, 1995; 1998-a; 1998-b; Jamieson-Noel, 2004; Hadwin et al, 2008; Oshige et al, 2007).

For example, as part of instruction using the SCL approach, Butler (1995; 1998-a; 1998-b) utilized interviews as a measure of task understanding in students with learning disabilities. Interviews required students to articulate their perceptions of the key elements of the task with the aim of improving task definition. This type of interview provides a wealth of qualitative data regarding how students understand the task. In addition, data represent actual traces of students' task understanding as they work on tasks. One limitation in this type of measurement, however, is that the general questions utilized in SCL interventions do not provide systematic assessment of students' perceptions of the explicit, implicit, and socio-contextual aspects of the task defined as important by Hadwin's (2006) model of task understanding.

Furthermore, Jamieson-Noel's (2004) measure of task understanding consisted of a series of general open-ended questions asking students to reflect on their initial task

understanding of a learning task and refinement of task understanding over time.

Questions targeting initial task understanding included items such as “how do you perceive this task,” and “try to describe this task as analytically as possible.” Changes in task understanding over time were measured by asking students how their perceptions of the task “have developed and changed over the last few weeks” (Jamieson-Noel, 2004). Strengths of this measure included the rich qualitative data it provided regarding the types of task components students perceived as important and the depth in which students analyzed the task.

This measure, however, also has a number of limitations. For instance, since questions elicited a wide range of responses, the measure did not provide a standardized way of assessing quality of task understanding across students. In addition, questions included on Jamieson-Noel’s (2004) measure were more general than specific. Thus, while they prompted students to reflect on their task understanding, they did not specifically assess students’ understanding of the key task features described as important in the literature. Finally, since students do not often encounter tasks requiring them to write about their task understanding, the open-ended format of the questionnaire may place increased cognitive demand on students and, thus, reduce the cognitive resources available to effectively process the demands of the task (Sweller, Chandler, Tierney, & Cooper, 1990).

Recently, investigations framed by Hadwin’s (2006) model of task understanding have expanded on this type of measurement by utilizing a combination of open-format questionnaires and closed-format scales to measure students’ task understanding (Hadwin

et al, 2008; Oshige et al, 2007). For instance, Hadwin et al (2008) and Oshige et al (2007) utilized an open-format Task Analyzer (Hadwin & Jamieson-Noel, 2004) including both open ended and closed format questions and targeted students' task understanding of the explicit, implicit and socio-contextual features of a complex engineering task. Items targeting explicit task understanding included asking students to describe the task and highlight key points in the assignment description. Items targeting implicit task understanding included asking students to describe the task purpose and list key course concepts. Items targeting socio-cultural understanding included asking students to rate the most important kinds of thinking and knowledge for the task.

In addition, Hadwin et al (2008) and Oshige et al (2007) employed an adapted version of the closed-format EBI (Schraw et al, 2002) to examine students' perceptions of socio-contextual task features (Hadwin et al, 2008). The EBI (Schraw et al, 2002) was administered to instructors. In addition, a parallel version was created in which items were re-worded to assess students' understandings about their instructors' beliefs about knowledge and learning. Thus, the adapted EBI (Schraw et al, 2002) provided an explicit measure of instructors' beliefs as well as valuable information regarding the attunement of students' socio-contextual beliefs with those of their instructors.

Measuring task understanding using the combination of an open format Task Analyzer (Jamieson-Noel, 2004) and the adapted EBI (Schraw et al, 2002) expanded on previous measures by directly assessing students' understanding of the types of key explicit, implicit and socio-contextual task information indicated as important for task understanding by previous research (Jamieson-Noel, 2004) as well as models of task understanding (Hadwin, 2006). In addition, the open format Task Analyzer (Jamieson-

Noel, 2004) supplied a mix of quantitative and qualitative data that provided a window into (a) the different types of task elements that students describe as important, and (b) differences in the quality of students' responses to the items. Finally, while research has indicated that students often hold different epistemological beliefs from their instructors (Foy & Muis, 2008) and that epistemological beliefs predict both task engagement and academic performance (Schommer, 1990), incorporating an adapted version of the EBI (Schraw et al, 2002) enabled examination of whether students' understandings of their professors' beliefs about learning influenced outcomes such as academic performance.

This type of measurement of task understanding, however, has a number of limitations. For instance, interpretation of data provided by the open format Task Analyzer (Jamieson-Noel, 2004) rests on the assumption that students' inaccurate or vague responses to open-ended items equate to faulty or poor task understanding. It is possible, however, that these measures underestimate students' task understanding. For instance, as free-recall of specific task features places high demand on working memory, the subsequent cognitive load of completing these measures may interfere with students' ability to demonstrate their true comprehension of task features (Sweller, 1988). In addition, the time intensive nature of completing this type of questionnaire limits its use in classroom environments.

Implications for research. Overall, the extant literature suggests that, while students often fail to achieve accurate and complete understandings of their tasks, this complex and demanding process is a key component in students' learning and academic success (Butler, 1995; 1998-a; 1998-b; Butler & Winne, 1995; Hadwin et al, 2008; Jamieson-Noel, 2004; Oshige et al, 2007; Winne & Hadwin, 1998).

While direct empirical investigation of task understanding is emergent, these findings are supported by a wide range of research in areas such as literacy, instructional design and epistemological beliefs (Mayer, 1998; Muis, 2007; Muis & Foy, 2008; Wong, Wong, & LeMare, 1982). Specifically, these studies buttress Hadwin's (2006) assertion that accurate and complete task understanding involves, not only deciphering the explicit aspects of the task overtly described in the assignment description, but also interpreting the underlying implicit and socio-contextual aspects of the task such as task purpose and beliefs about learning and knowledge of value in the particular instructional context.

Despite initial support, further research is required to empirically examine a) the relationship between task understanding and performance posited by Winne & Hadwin's model of SRL, and b) the roles of explicit, implicit, and socio-contextual task understanding in learning and performance suggested by Hadwin's (2006) model of task understanding. Finally, further research is required to examine task understanding using (a) closed-format instruments less dependent on free recall of task features, (b) instruments targeting the explicit, implicit and socio-contextual layers of complex university tasks, and (c) instruments such as the adapted EBI (Schraw, et al, 2002) that directly target students' understandings of their professors' beliefs about learning and knowledge.

Self-efficacy

Motivated students eagerly approach challenging tasks, utilize active tactics and strategies, focus on mastery and development of knowledge and skills, exhibit intense persistence and effort, and take pleasure and pride in both their engagement and achievement in academic tasks (Stipek, 1996). A number of motivational constructs are

posited to play a role in learning; however, self-efficacy, in particular, has been the focus of a great deal of research (Bandura, 1997, Pajares, 1996, Pintrich, 2003, Schunk, 1995).

Definition of self-efficacy. Self-efficacy refers to individuals' judgments of their capabilities to succeed in a particular task (Bandura, 1997). Grounded in Bandura's social cognitive theory, this construct includes aspects of both competence and ability and centers on the tenet that beliefs students hold about their ability to succeed on a specific task are vital forces in their success or failure (Bandura, 1989; 1997, Pajares, 1996). Furthermore, self-efficacy is conceptualized to be a mediating mechanism of motivation (Bandura, 1997). It influences learning and outcomes by mediating the influences of these sources on achievement. While other motivational beliefs may also influence learning and performance, Bandura (1997) holds that they do so primarily through their influence on self-efficacy.

Bandura (1989, 1997) suggests that students derive self-efficacy beliefs from four sources: interpretations of previous attainments or failures, observation of models, verbal persuasion and derision, and interpretation of physiological cues as anxiety or stress. Although all sources are important, students' previous experience is particularly influential (Pajares, 2008).

Furthermore, self-efficacy can be distinguished from similar constructs, such as outcome expectancy and self-concept, by its more micro-analytic focus on task- and situation-specific judgments of one's own personal capabilities to achieve a particular goal (Pajares, 1996, Pintrich, 2003). For example, it is possible for a student to feel confident in his ability to perform well on an exam (self-efficacy), but expect to do poorly because the instructor the instructor does not like him (outcome expectancy)

(Schunk, 1995). Although these constructs share the general principle that individuals who believe they can and will succeed are more motivated than those who perceive otherwise, there are distinct theoretical differences between these constructs, and these differences are reflected in the variation that exists in these constructs' definitions, measurement, and use in research (Pintrich, 2003).

Self-Efficacy and task achievement. Empirical research of self-efficacy supports Bandura's tenet that self-efficacy plays a central role in a myriad of learning and achievement outcomes (Pajares, 1996; Pintrich, 2003, Schunk, 1995). This research indicates that self-efficacy beliefs influence academic attainment in a number of ways.

For instance, a number of studies have indicated that self-efficacy influences academic performance by influencing factors such as task persistence, perseverance, choice of activities, effort expenditure, and resilience (Bandura & Schunk, 1981; Schunk, 1982). For instance, in an examination of the links between self-efficacy, persistence and performance, (Schunk, 1981) investigated modeling treatments in children's mathematical skill learning. In this study, children's development of long division skills was supported by either exposure to adult modeling or written instructions on long division. In the modeling condition, the adult model verbalized the steps in division solutions while working through a number of problems. All children received guided and self-directed practice. Results indicated that both modeling and written instructions improved self-efficacy, task persistence, and academic achievement. However, students in the modeling condition evidenced higher levels of academic achievement and better calibration of self-efficacy beliefs with performance. Finally, results of path analysis indicated that a)

modeling increased self-efficacy and achievement, b) self-efficacy influenced persistence directly, and c) persistence directly influenced academic achievement.

Much research also indicates that self-efficacy is associated with predictors of achievement, such as self-regulated learning and cognitive strategy use (Bouffard-Bouchard, Parent, & Larivee, 1991; Pintrich & DeGroot, 1990). Specifically, this research indicates that students with good self-efficacy for performance of academic tasks use more cognitive and metacognitive strategies which subsequently support task success (Pajares, 1996).

For instance, in an investigation of motivation, self-regulated learning, and classroom achievement, Pintrich and De Groot (1990) utilized a correlational design to investigate the relationship between self-efficacy, task value, cognitive strategy use, and classroom performance in 173 seventh grade science and English students. Self-efficacy and self-regulated strategy use were assessed by self-report on the Motivated Strategies for Learning Questionnaire (Pintrich, Smith, Garcia, and McKeachie, 1991). Performance data were obtained from grades on classroom assignments, homework, essays, reports, semester grades, and final class grades.

Regression results indicated that both self-efficacy and cognitive strategy use significantly accounted for variability in classroom performance. Pintrich and De Groot (1990) interpreted these results as evidence that self-efficacy influences classroom performance through facilitating cognitive engagement, and that students need both “will” and “skill” to be successful in academic tasks.

Finally, research indicates that self-efficacy beliefs often predict academic performance better than general ability or prior attainment and experience (Pajares, 1996;

Pajares & Kanzler, 1995; Pajares & Miller, 1994). For example in a study of the link between academic attainment and self-efficacy, Collins' (1982) examined the relationship between math ability, self-efficacy, problem solving behaviour and performance in grade 5 students. Students were given a series of solvable and unsolvable problems, and engagement in these problems was compared for high, average and low ability groups. Results indicated that, regardless of ability, high efficacy students correctly solved more problems and persisted in re-working a greater number of missed problems compared to students with low self-efficacy.

Furthermore, in an investigation of the influence of writing self-efficacy on writing performance, Pajares and Johnson (1996) examined grade 9 students' writing self-efficacy, writing self-concept, and writing apprehension on quality of essay writing. Data were analyzed using path analysis. Results indicated that students' self-efficacy for writing mediated the influence of other beliefs and directly influenced writing performance.

Measurement of self-efficacy. Self-efficacy scales for a wide range of tasks in a variety of disciplines have been utilized in the empirical literature (Multon et al, 1991). Self-efficacy for academic achievement outcomes is assessed most often by asking individuals to report their confidence for accomplishing or succeeding in a particular task or situation, and typically utilizes self-report questionnaires on a continuous 100-point scale (Pajares, 1996). Examinations of self-efficacy have become increasingly prevalent in the literature; however, mis-measurement of this construct is also common and problematic (Pajares, 1996).

According to Bandura (1997), proper measurement of self-efficacy is dependent upon a number of factors. For instance, in order to ensure optimal predictive power, self-efficacy should be measured prior to and within reasonable proximity to the outcome of interest. Finally, Bandura recommends that self-efficacy be assessed at the optimal level of specificity for the corresponding criterion task (Pajares, 1996, Bandura, 2001).

In other words, comprehensive assessment of self-efficacy must measure the contributing factors over which people have some control (Bandura, 2001). This recommendation is particularly salient for the investigation of the relationship among self-efficacy, task understanding, and performance. While measures of self-efficacy for performance have traditionally focused on explicit aspects of tasks such as use of good grammar in an assigned essay (Multon et al, 1991), Hadwin's (2006) model of task understanding posits that university tasks are layered with multiple levels of task features all of which play key roles in task performance through directing students' effective task engagement. Thus, research examining task understanding framed by this theoretical approach may benefit from developing and validating self-efficacy scales that target, not only explicit requirements of the task, but also implicit and contextual task requirements in order to optimally account for the variation in task performance.

Implications for future research. The extent to which individuals believe they are competent to produce behaviour as well as the outcomes they expect to occur are key sources of achievement motivation (Bandura, 1997; Pintrich, 2003). A great deal of empirical research indicates that self-efficacy is strongly related to cognition, behaviour, and performance (Pajares, 1996). As previous measurement of self-efficacy has often focused on the concrete and explicit aspects of students' tasks, however, future research

is required to investigate students' judgments of their capabilities to perform the multiple layers that exist in complex university tasks, and how these judgments predict performance.

The relationship between task understanding and self-efficacy for performance

Although numerous investigations have separately examined the effects of task understanding and self-efficacy for performance on academic success, the ways in which students' task understanding and self-efficacy combine to influence task performance has received little attention in the current literature. A number of studies, however, hold important implications for the relationship between self-efficacy for performance and task understanding. These studies include examinations of self-efficacy and goal setting, the calibration of self-efficacy beliefs, and investigations of the effects of task structure on self-efficacy.

Goal setting and self-efficacy. Over the past three decades, numerous studies have established a solid relationship between goal setting and self-efficacy (Schunk, 2003). This research suggests that proximal and precise goals serve as integral motivational forces in students' persistence in academic tasks and that certain types of goal setting are consistently associated with improved self-efficacy and performance (Schunk, 2003).

For instance, in an investigation of the effects of goal setting on self-efficacy and performance, Schunk and Rice (1989) examined the influence of learning and performance goals on self-efficacy and reading comprehension performance of 17 grade 4 and 5 students. All students participated in a comprehension strategy program aimed at improving students' ability to identify main ideas in text. There were two treatment conditions in which students were provided with either a learning goal or performance

goal at the beginning of the class. In the control condition, students were instructed simply to work productively. Results indicated that, compared with students in the control group, students who engaged in learning or performance goal setting had higher levels of self-efficacy for answering comprehension questions and better reading comprehension. Schunk and Rice (1989) interpreted these results as evidence for the positive influence of goal setting on self-efficacy and performance.

While the relationship between task understanding and self-efficacy has remained relatively unexamined in relation to the extensive literature examining goal setting and self-efficacy, this research holds important implications for the potential relationship between self-efficacy, task understanding, and performance. For instance, models of SRL posit task understanding to be a key theoretical precursor to goal setting (Winne & Hadwin, 1998). In other words, these models suggest that students who have better task understanding may set goals that are more effective and, thus have better self-efficacy for task performance.

Calibration of self-efficacy. A second area of research pertaining to the relationships among task understanding, self-efficacy, and performance focuses on the investigation of the calibration of self-efficacy beliefs. This research defines calibration as the accuracy of self-beliefs about potential functioning and recommends calibration be assessed by comparing mean efficacy beliefs with task performance (Klassen, 2002). Emergent research examining the deleterious effects of miscalibration of efficacy beliefs indicates that inappropriately high self-efficacy may be detrimental to students' task performance (Greene & Azevedo, 2007; Pintrich, 2003). While previous research suggests that optimistic or moderate self-efficacy beliefs foster effort and persistence in

difficult tasks and promote achievement (Bandura, 1997), emergent research examining calibration indicates that "naive optimism or gross miscalculation" can be detrimental to students' task success (Bandura, 1989).

For instance, in a review of the calibration of self-efficacy on students' learning disabilities, Klassen (2002) summarized and analyzed 22 studies investigating self-efficacy in this population. Results indicated that students appeared to miscalibrate their self-efficacy and that miscalibration had potentially negative consequences. Specifically, Klassen (2002) concluded that optimistic efficacy beliefs were not universally beneficial to students and that gross-misjudgments about one's ability can be misleading and potentially academically harmful.

Although few studies have examined the mechanisms underlying the calibration of efficacy beliefs, Bandura and Schunk (1981) suggest that miscalibrated self-efficacy is partly derived from faulty task perceptions. Thus, it is possible that students who fail to derive accurate and complete understandings of their tasks may be more likely to hold self-efficacy beliefs incongruent with ability and, thus, potentially detrimental for task performance. Future research, however, is required to empirically examine this claim.

Task structure. Further support for the possible relationship between self-efficacy and task understanding is provided by research examining the relationship between task structure and self-efficacy. For instance, in an investigation of task structure and self-efficacy, Lodewyk (2000) examined differences in reported levels of self-efficacy in differently structured tasks. Participants were 89 grade ten students in a sectarian school, and students were assigned to two task conditions. In the first condition, students were assigned an ill-structured task without identifiable steps or sub-goals, resources or criteria

for grading. In the second conditions, students were assigned a well-structured task with well-identified sub-tasks, resources, and criteria for grading. Self-efficacy was measured on the Self and Task Perception Scale (Lodewyk, 2000). Results indicated that students in the well-structured task condition reported significantly higher self-efficacy than students in the ill-structured task condition. Lodewyk (2000) interpreted these results as evidence of the strong relationship between self-efficacy and task structure. These results can be further interpreted as indicating that students in the difficult task condition may have had incomplete understandings regarding the requirements of the task, and these perceptions may have been detrimental to their efficacy as suggested by Winne & Hadwin's (1998) model of SRL.

Implications for future research. Although direct examinations of the effects of task understanding on students' self-efficacy and how this relationship may contribute to performance are largely absent in the current literature, research investigating goal setting, calibration of self-efficacy, and task structure suggest a possible relationship may exist. These studies suggest that students with faulty or incomplete perceptions of the requirements of their task may hold less calibrated or lower efficacy beliefs, and that these beliefs may negatively impact achievement (Klassen, 2002, Lodewyk, 2000). As such, future research is required to investigate the relationship between self-efficacy and task understanding and to investigate how this relationship contributes to the prediction of task achievement.

Summary of the literature

The extant literature suggests both task understanding and self-efficacy are important factors in university students' academic successes; however, a number of

questions require further investigation. For instance, further research is needed to investigate the impact of task understanding on performance and to utilize measures less dependent on students' free recall of task features which may underestimate students' task understanding. Research is also required to investigate students' self-efficacy for a wider range of task requirements and expectations using a range of measures that target the explicit, implicit, and socio-contextual features of tasks. Finally, research is required to bridge these disparate lines of research by examining the relationship between task understanding and self-efficacy and investigating how this relationship influences task performance.

The purpose of the current study is to use a correlational design to examine the relationship between university students' task understanding, self-efficacy for performance, and performance of a grade-bearing university learning task. This study used Winne & Hadwin's (1998) model of self-regulated learning as theoretical framework to investigate three questions: (a) does task understanding predict task performance, (b) does self-efficacy for task performance predict task performance, and (c) does task understanding moderate the influence of self-efficacy for performance on task performance.

Chapter 3

Methods

Participants

Participants were a non-probability sample of 38 undergraduate students (17 females and 21 males) enrolled in a first-year, second-semester learning strategies course (ED-D 101: Strategies for University Success) at the University of Victoria, Victoria, British Columbia, Canada. The mean age of the students was 18.66 years ($SD = 1.53$), and students represented a range of disciplines.

Criteria for inclusion. Criteria for inclusion in the present study included enrollment in ED-D 101, completion of the task analysis, self-efficacy, and EBI measures online, submission of the strategy library course assignment, and informed consent. Although non-probabilistic sampling has limited generalizability to the population of interest, this sampling strategy was the most appropriate since measurement of task understanding in this study was inextricably linked to the context and characteristics of the task in this course and sample size requirements did not permit for random sampling within the class.

Research Context

ED-D101 was offered by the Department of Educational Psychology and Leadership Studies and targeted undergraduate students across all faculties and disciplines at the University of Victoria. There was one co-requisite for the course: students had to be concurrently enrolled in at least one other university course. The primary goal of ED-D 101 was to facilitate the development of study skills and learning strategies for university success. The course provided students with three hours of

instruction each week for one term and had a value of 1.5 credits. ED-D 101 was comprised of one 90-minute lecture in which students received instruction on course concepts by the primary course instructor and one 90-minute computer lab in which students were supported in applying course concepts to their learning tasks by graduate student lab instructors. Course requirements in the Fall 2008 offering of the course included three major assignments, five quizzes and a series of weekly lab activities. A complete description of the course objectives and requirements is provided in the ED-D 101 course syllabus in Appendix A.

Data for this study were collected within the context of the regular course requirements of ED-D 101, and measures were integrated into instruction as assignments and quizzes. Instruments measuring students' task understanding and self-efficacy were administered as a quiz worth approximately 5% of the final grade. The Strategy Library Assignment was a major assignment worth 20% of the final grade.

Instructional value of study. Assignments and instruction in ED-D101 emphasized application of theory and experimentation with strategies in students' learning in their undergraduate courses. Each of the measures for the current study contributed to these learning objectives. Instruments measuring students' task understanding and self-efficacy provided students with an opportunity to monitor their understanding of and motivation for a major course assignment. An adapted version of Schommer's (1990) EBQ provided students with information regarding their attunement to their instructor's beliefs. The Strategy Library Assignment provided students with the opportunity to design strategies targeting their individual strengths and weaknesses as learners and to examine and

monitor the effectiveness of these strategies. The instructional value of the instruments for the current study is summarized in Table 1.

Table 1

Study Instruments and Related Course Learning Objectives

Instrument	Relevant Course Learning Objectives
Task Analyzer for Course Assignment	Receive feedback about learning and understanding of tasks; Monitor and evaluate understanding of academic tasks; Critically analyze academic tasks that pose problems.
Adapted EBQ (Schommer, 1990)	Receive feedback about learning and understanding of tasks
Self-Efficacy for Performance Scale	Identify and reflect upon changes in beliefs and motivation; Develop the attitudes and behaviours necessary to become lifelong learners.
Strategy Library Assignment	Explain knowledge of learning strategies and why they work. Identify and justify customized study strategies; Generate and evaluate strategies for addressing studying problems; Apply and monitor the effectiveness of various learning strategies.

Note. Course learning objectives described in ED-D101 course syllabus (Appendix A).

Instruments

This study utilized five instruments. Two instruments measured task understanding: (a) the Task Analyzer for Course Assignment (Miller & Hadwin, 2008-a) and (b) an adapted version of Schommer's (1990) Epistemic Belief Questionnaire (EBQ). Other measures included the Self-Efficacy for Performance Scale (Miller & Hadwin, 2008-b), the Strategy Library Assignment, and an online course management system called Moodle (Dougiamas, 2001).

Task Analyzer for Course Assignment. Students' mean explicit and mean implicit task understanding were measured using the Task Analyzer for Course Assignment (Miller & Hadwin, 2008-a). The instrument consisted of 43 forced choice items. 10 items targeted explicit task understanding and 33 items targeted implicit task understanding. The Task Analyzer for Course Assignment is included in Appendix D.

Task analyzer items were created by adapting Hadwin and Jamieson-Noel's (2004) open-format questionnaire into forced-choice questions that closely targeted key explicit and implicit features of the course assignment defined as important by the assignment grading rubric, course syllabus, and assignment description included in Appendix B and C respectively. All items were scored as 0 (incorrect) or 1 (correct) in accordance with instructional materials. Examples of item correspondence to Hadwin and Jamieson-Noel's (2004) questionnaire and instructional materials are provided in Table 2.

Table 2

Item correspondence of task analyzer quiz to open-ended task analysis questionnaire and the instructional materials.

Task	Open-Format	Task Analyzer for Course	Assignment
Sphere	Task Analyzer	Assignment	Description & Rubric
Explicit	List the main things that need to be included in this assignment at completion	For each strategy, I should provide: a) Step by step account for implementing the strategy; b) Thoughtful commentary about using the strategy in real learning; c) A list of courses or tasks for which I have used the strategy; d) all of the above; e) none of the above	Each Strategy Entry Should Include: Explanation about how to apply the strategy step by step; A list of courses or tasks for which you have used this strategy; General comments about your experiences with this strategy
Implicit	Describe what your instructor will be looking for in a top quality design project	It would be <u>best</u> to justify my strategies with: a) Information from study skills books; b) my own experiences and thoughts; c) facts and procedures from lecture; d) processes, concepts and theories	Superior descriptions or explanations anchored in deeper course content and theories (processes, theories, not just facts).

^bItems in column 2 are from Jamieson-Noel, D. (2004). *Exploring task definition as a facet of self-regulated learning*. Unpublished Doctoral Dissertation, Simon Fraser University.

Epistemic Beliefs Questionnaire. Understanding of the socio-contextual features of the task was measured using an adapted version of Schommer's (1990) Epistemological Beliefs Questionnaire. In accordance with Hadwin's (2008) procedures for adapting Schraw, Bendixen and Dunkle's (2002) measure, two parallel versions were created to assess students' attunement with their professors' beliefs: (a) the EBQ for teachers (EBQ-T) measuring the instructors beliefs about learning and knowledge and (b) the EBQ for students' perception of teacher's beliefs (EBQ-T-S) in which students estimated their instructor's beliefs about learning and knowledge (Hadwin, 2008). The EBQ-T included items such as "I believe that the only thing that is certain is uncertainty itself" and "I believe that genius is 10% ability and 90% hard work." The EBQ-T-S included items such as "My professor believes that the only thing that is certain is uncertainty itself." and "My professor believes that genius is 10% ability and 90% hard work." Items in the EBQ (Schommer, 1990) were not otherwise altered.

Both versions were comprised of 63 items on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Schommer's (1990) measure includes 4 subscales assessing beliefs about innate ability, simple knowledge, quick learning, and certain knowledge. These subscales were not utilized in the current study since a) the aim was to measure students' attunement to their professor's beliefs about knowledge rather than to examine the content of students beliefs and b) the number of items in each subscale was not sufficiently large enough to reliably calculate attunement for each. The EBQ-T and the EBQ-T-S are included in Appendix E and F respectively.

Attunement to the epistemological beliefs of the instructor was calculated by a) correlating each student's responses on all items of EBQ-T-S with the professor's

responses on all items of the EBQ-T and b) assigning the resulting correlation coefficient a score on a 100-point scale. For example, if a student obtained a .6 correlation with the professor's responses, the student was given a score of 60. Thus, scores for socio-contextual task understanding ranged from 0 to 100 with low attunement denoting poor socio-contextual task understanding and high attunement denoting good socio-contextual task understanding.

In regards to use of a correlation coefficient as a measure of attunement, it is important to note that the goal was to assess how well students recognized the beliefs about knowledge and learning valued in the ED-D 101 classroom. In other words, how well students understood which beliefs were of high value to the professor and which beliefs were of lesser importance. Thus, use of the correlation coefficient enabled assessment of how well students recognized the overall pattern of relative importance of different beliefs in this context. Since the importance placed upon beliefs about knowledge shifts across tasks, disciplines, and instructors, this type of recognition is fundamental to accurate and complete understanding of the contextual aspects of a task.

This measure is akin to measures of relative accuracy utilized in research examining calibration in metacognition (Schraw, 2009). According to Schraw's (2009) review, measures of relative accuracy provide information about the relationship between responses across items and most often use a correlation coefficient as the outcome measure (Schraw, 2009).

It is important to recognize that this measure of calibration is not sensitive to magnitude of difference in student-teacher ratings. For example, it is possible for students to be high in terms of relative accuracy, but low in terms of precision or absolute

accuracy. Measures of absolute accuracy provide information about the absolute precision of responses and most often use difference scores or a calibration index as the outcome measure (Schraw, 2009).

Since, students were not expected to know exactly what Likert scale value the professor chose for each item, but were expected to be well calibrated in terms of identifying items that would be rated more or less important in terms of the others, using a correlation coefficient as a measure of relative accuracy was deemed more appropriate for this study. In order to address this limitation, however, differences scores between students' and the professor's responses were also examined and compared to the measure of relative accuracy used in this study. There was a statistically significant negative correlation between difference scores and relative accuracy ($r = -.382, p < .05$). Thus, as relative accuracy increased, the precision of students' judgments also increased.

Composite task understanding. For the current study, task understanding was measured using a composite score of explicit and implicit task understanding measured on the Task Analyzer for Course Assignment (Miller & Hadwin, 2008-a) and socio-contextual task understanding measured on the adapted EBQ (Schommer, 1990). The composite score was utilized since the sample size did not allow for consideration of each component of task understanding independently. Composite score was derived by (a) scaling both scores on measures of explicit task understanding and implicit task understanding to scores out of 100, then (b) calculating the average of the mean explicit task understanding score, mean implicit task understanding score, socio-contextual task understanding attunement score. Composite task understanding scores ranged from 0 to

100 with high scores denoting high task understanding and low score denoting low task understanding.

It is acknowledged that this composite combines scores across different units of measurement, which may affect the meaningfulness of the measure. For instance, a student with the assigned score of 20 on the socio-contextual measure (derived from a correlation coefficient of .20) is not twice as attuned as a student with a score of 10. To address this limitation, scores on measures of explicit task understanding, implicit task understanding, and socio-contextual task understanding were converted to a common scale using *Z* scores. The composite scores was calculated again by finding the average *Z* score on each measure. The correlation between this score and the composite score for task understanding used in this study was high (.982, $p < .001$).

Self-Efficacy for Performance. The Self-Efficacy for Performance Scale (Miller & Hadwin, 2008-b) measured students' self-efficacy for performance of the explicit, implicit, and socio-contextual features of the task (Appendix G). The scale was constructed in accordance with Bandura's (2001) recommendations for proper measurement of this construct. Each item of the Self-Efficacy for Task Performance Scale was designed to closely correspond with key explicit, implicit and socio-contextual features of the task defined as important in the course syllabus, assignment description, and assignment grading rubric included in Appendix A, B, C, respectively. Examples of item correspondence to measures of task understanding and instructional materials are provided in Table 3.

The scale consisted of 37-items. For each item, students rated their confidence in their ability to successfully perform requirements of the EDD-101 strategy library

assignment from 0 (definitely cannot do it) to 100 (definitely can do it). Thus, self-efficacy for performance on the course assignment was measured as students' mean rating of confidence from 0-100 across all items on the scale with low scores denoting poor self-efficacy for performance and high scores denoting high self-efficacy for performance.

Table 3

Item correspondence of self-efficacy scale to the task analysis quiz and instructional materials

Task Sphere	Definition of Sphere	Measure of Task Understanding	Self-Efficacy for Task Performance	Assignment description & Grading Rubric
Explicit	Criteria, Terminology, Instructions, Standards, Grading Scheme	<p>Task Analyzer for Course Assignment:</p> <p>For each strategy, I should provide:</p> <ol style="list-style-type: none"> step by step account for implementing the strategy thoughtful commentary about using the strategy in real learning a list of courses or tasks for which I have used the strategy all of the above none of the above 	I am confident I can successfully provide step by step instructions on how to use my strategies; list the learning tasks in which I have used my strategies; create criteria for evaluating my strategies	Each strategy entry should include explanation about how to apply the strategy step by step; a list of courses or tasks for which you have used this strategy; criteria for evaluating this strategy General comments about your experiences with this strategy
Implicit	Awareness of Task Purpose, Thinking, Strategies, Timing	<p>Task Analyzer for Course Assignment:</p> <p>It would be best to justify my strategies with:</p> <ol style="list-style-type: none"> Information from study skills books My own experiences and thoughts Facts and procedures from the lecture slides Processes, concepts, and theories none of the above 	I am confident I can successfully provide deep course theories and processes to justify my strategies	Outstanding assignments include superior descriptions /explanations anchored in deeper course content and theories (processes, theories, not just facts).
Socio-Contextual	Culture & Beliefs about Knowledge, Ability, Discipline	Adapted EBQ (Schommer, 1990): Rate your agreement with the following statements from 1 (strongly disagree) to 5 (strongly agree). The instructor believes that the only thing that is certain is uncertainty itself.	I am confident I can successfully complete this assignment in accordance with what my professor believes and values about knowledge	Additional sources using empirical evidence are more desirable than common knowledge or information found in study skills books

The Strategy Library Assignment. Grade on the ED-D101 Strategy Library Assignment served as a measure of task performance. Scores ranged from 0 (failure to complete any of the required components of the assignment) to 100 (outstanding and original completion of the assignment). The Strategy Library assignment was worth 20% of students' final grade and was comprised of two parts worth 10 marks each. Part A required students to utilize and apply ED-D 101 course concepts to generate, apply, and evaluate five strategies. Part B required students to generate illustrations or examples of their use of the strategy in their learning activities in their current undergraduate courses. Assignments were graded by lab instructors using a precise grading rubric closely corresponding to items on the Task Analyzer Quiz (Miller & Hadwin, 2008-a) and Self-Efficacy for Performance Scale (Miller & Hadwin, 2008-b). The grading rubric is included in Appendix C. To ensure consistency in grading, a random sample of the assignments was graded by a second lab instructor. Interrater reliability was acceptable (86%). While lab instructors were not naïve to the purpose of the study, assignments were graded before scoring of the Task Analyzer Quiz (Miller & Hadwin, 2008-a) and instructors did not have knowledge of which students were participants in the study.

Moodle. Moodle is an open-source course management system utilized at the University of Victoria. The online system allows educators to create online learning sites including online activities, resources, and links to outside content (Dougiamas, 2001). The online quiz function in Moodle was used to administer the Task Analyzer Quiz (Miller & Hadwin, 2008-a) and the Self-Efficacy for Performance Scale (Miller & Hadwin, 2008-b). The assignment submission function in Moodle was used to allow students to submit their strategy library assignments electronically. To use this tool,

students logged in to Moodle on a web page and selected the activity to be completed.

After selecting the activity, students are provided with instructions for completing and submitting the activity.

Chapter 4

Design and Procedures

Research design

A correlational design was used to investigate a) students' task understandings, b) self-efficacy beliefs, and c) the contribution of these factors to task performance.

Hierarchical multiple regression was used to investigate the research questions with task performance as the criterion variable and task understanding, self-efficacy for performance, and the interaction between task understanding and self-efficacy for performance as the predictor variables. Predictor and criterion variables are summarized in Table 4.

Since the aim of this study was to investigate the degree of association between continuous variables in a classroom learning environment, a correlational design was most appropriate (Gall, Borg, & Gall, 1996). Furthermore, moderator analysis using hierarchical regression enabled the examination of the direction and magnitude of the associations between individual predictors and the criterion as well as the interaction between predictors and criterion without sacrificing information by converting scores into categorical variables as required by ANOVA (Miles & Shelvin, 2001)

Table 4

Variables for Moderator Analysis using Hierarchical Regression

Regression Variable	Description
Predictor	Task Understanding
Predictor	Self-Efficacy for Performance
Predictor	Task Understanding X Self-Efficacy for Performance
Criterion	Task Performance

Procedure

Pilot testing. To assess procedures, as well as the reliability and validity of the measures for the current study, pilot tests were performed on the target population of university students enrolled in the spring, 2008 offering of ED-D 101. The Task Analyzer for Course Assignment (Miller & Hadwin, 2008-a) measuring explicit and implicit task understanding was administered in lecture two weeks prior to the deadline of the strategy library assignment. An adapted version of the EBQ (Schommer, 1990) measuring socio-contextual task understanding was administered as a lab activity earlier in the term. Total task understanding was measured using a weighted composite score of explicit, implicit and contextual task understanding. Each factor was given equal weight. The Self-Efficacy for Assignment Performance Scale (Miller & Hadwin, 2008-b) was administered in the lab following administration of the Task Analyzer for Course Assignment (Miller & Hadwin, 2008-a). The Strategy Library Assignment was submitted at the end of term.

Although sample size for pilot testing was small, data were examined for suitability

for regression analysis. Data for each variable failed to reveal any significant problems in terms of outliers, normality, multicollinearity, homoscedasticity, and non-linearity.

Internal consistency for the Self-Efficacy for Assignment Performance Scale demonstrated high internal consistency (Cronbach's alpha = .963.). Internal consistency for the Task Analyzer for Course Assignment was moderate ($r = .209$). Since each item on the questionnaire targeted a different aspect of task understanding as outlined by the open format task analyzer (Hadwin & Jamieson-Noel, 2004), it is not surprising that there was little consistency between items. Including multiple items targeting each aspect of task understanding may have increased internal consistency of the scale, however, administration of this type of questionnaire was not possible within the constraints of the instructional context. Validity of the task analyzer and self-efficacy measures were assessed by consulting experts to determine whether items for each instrument were representative of the areas of interest.

Subsequent to pilot testing, a few items were re-worded to reflect changes in course management. To improve participation, the Task Analyzer for Course Assignment (Miller & Hadwin, 2008-a) and the Self-Efficacy for Assignment Performance Scale (Miller & Hadwin, 2008-b) were administered together as an online quiz. Data for pilot testing were not included in analysis for the current study.

Ethical approval. Ethical approval for the study was obtained as part of a larger SSHRC funded project for the study entitled "Evaluating Student Learning and the ED-D 101 Course" at the University of Victoria. Students' participation in this larger study entailed permitting investigators access to ED-D 101 coursework and university records for research purposes. The study was not expected to pose any significant risks to

participants. Anonymity could not be granted due to the nature of the data; however, students' names were removed prior to analysis to ensure confidentiality. Students in ED-D101 were invited to participate in the research study in lecture at the beginning of the term. The letter of consent for this study is included in Appendix H.

Data collection procedures. Data for this study were collected during the Fall 2008 section of ED-D101. As the COPES architecture of Winne & Hadwin's (1998) model of SRL suggests that task understanding impacts cognitive conditions, such as self-efficacy, influential for task performance, measures of task understanding were administered first followed by the measure of self-efficacy for performance. In accordance with recommendations for measurement of self-efficacy (Bandura, 2001; Pajares, 1996), both the task understanding measure and the self-efficacy measure preceded measurement of task performance on the strategy library assignment. Prior to all data collection, a description of the study objectives and procedures were provided to the instructor of ED-D101 and the lab instructors. Procedures for data collection are summarized in Table 5.

During the first week of class, students received all necessary instruction for completing the strategy library assignment in the syllabus, the assignment description, and the grading rubric. Instructional materials for the Strategy Library Assignment are included in Appendix A, B, and C. During the third week of the semester, the adapted EBQ (Schommer, 1990) was administered to students in lab. The students completed the questionnaire in an excel spreadsheet and submitted electronically in Moodle.

Two weeks prior to the deadline for the Strategy Library Assignment, The Task Analyzer for Course Assignment (Miller & Hadwin, 2008-a) and the Self-Efficacy for Performance scale (Miller & Hadwin, 2008-b) were administered as an online quiz in

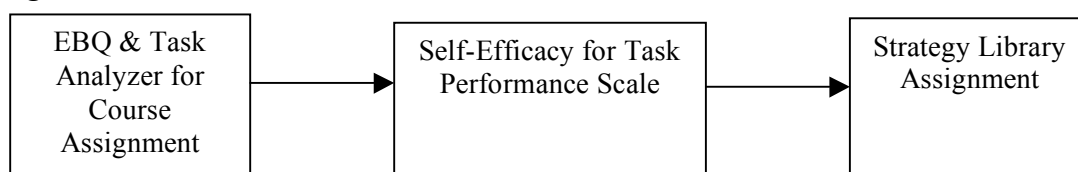
Moodle. First, students were asked to complete the Task Analyzer for Course Assignment. Students were provided with notification of the quiz and one week prior to its administration and were permitted to view instructional materials while completing the quiz. Standard notification was delivered in lecture and by email. After accessing the quiz, students were provided with standard instructions for the quiz. At the end of the quiz, students were asked to complete the Self-Efficacy for Performance Scale. Completion of both measures took an average of 26 minutes. Completed measures were submitted electronically in Moodle.

Students were required to submit the strategy library assignment electronically in Moodle during the final week of class. At the end of the term, data for non-consenting participants were destroyed. Once data for all variables were entered, students were assigned a case number and names were removed to ensure confidentiality.

Table 5

Procedures for Data Collection

Procedure	Description
General Information	All measures were completed individually by students
Order of Administration	Instructional materials including course syllabus, Strategy Library Assignment description and grading rubric were provided in week 1 of the course. Adapted EBQ (Schommer, 1990) was administered in EDD101 lab in week 3 of the course. Task Analyzer for Course Assignment and Self-Efficacy for Performance Scale were administered via Moodle in week 9 of the course. Strategy Library Assignment was submitted in week 11 of the course.
Time to complete measures	Average time to complete the adapted EBQ (Schommer, 1990) was 15 minutes. Average time to complete Task Analyzer for Course Assignment (Miller & Hadwin, 2008-a) and Self-Efficacy for Assignment Performance Scale (Miller & Hadwin, 2008-b) was 26 minutes

Figure 3. Order of instrument administration

Chapter 5

Results

Overview of analysis

This section reviews the statistical analyses conducted to examine the research questions in this study. First, results of preliminary analyses to examine the composition of the sample and assess the suitability of the data for hierarchical regression are addressed. Second, results of hierarchical regression analyses are described in relation to three research questions: (a) does task understanding predict task performance, (b) does self-efficacy for task performance predict task performance, and (c) does task understanding moderate the influence of self-efficacy on task performance.

Preliminary Analyses

Data screening and testing assumptions. Prior to analysis, data were screened, and general trends in the data were examined to assess the suitability of the data for regression analysis. Data from all measures were quantitative and continuous in accordance with the assumptions of regression analysis (Miles & Shelvin, 2001). There were 4 missing cases for task understanding, 4 missing cases for task performance variable, and 2 missing cases for the self-efficacy for performance variable. Missing cases were excluded pairwise from the final analysis. Sample size ($N = 38$) was smaller than the recommended sample for regression analysis with three predictor variables in the social sciences ($N = 45$) according to the heuristic provided by Stevens (1996). As the sample size was small, the adjusted R^2 was reported in order to provide a better estimate of the population. However, results of regression analysis should be interpreted with caution.

Graphical representations and descriptive statistics were used to evaluate whether data met the assumptions of normality, linearity, homoscedasticity, and multicollinearity for regression analysis. Pearson product correlations were examined to test for collinearity among the predictor variables. Task understanding did not significantly correlate with self-efficacy for task performance ($r = .039$, n.s., $n = 32$), thus assumption of multicollinearity did not appear to be violated. In addition, tolerances for all predictors were greater than .10 further indicating that little variability in each variable was explained by the other variables in the model.

Normality was assessed by examining skewness and kurtosis for task performance (skew = $-.339$, kurtosis = $.890$), self-efficacy for task performance (skew = $-.376$, kurtosis = $-.136$), and task understanding (skew = $-.457$, kurtosis = $-.309$). Although data were slightly negatively skewed, values were close to 0 indicating that data were reasonably normally distributed in accordance with expectations for constructs in the social sciences (Tabachnick & Fidell, 2001). In addition, histograms for all variables (Appendix I) showed no major deviations from normality and points on the normal probability plot of the standardized residuals (Appendix J) were distributed in a reasonably straight line from bottom left to top right. Thus, assumptions of normality did not appear to be violated.

Boxplots of the predictor and outcome variables indicated the presence of a single univariate outlier in the task performance variable (Appendix K). As the sample size was small, the presence of outliers was not unexpected. Thus, although outliers may influence the degree to which variables covary, outliers were not numerous or extreme and data

points were not removed or transformed. Scatterplots of the predictor variables indicated the relationships between predictors and outcome were reasonably linear (Appendix L).

The scatterplot of regression residuals showed that residuals were roughly rectangular in distribution, concentrated along the 0 point, and did not evidence any curvilinear relations (Appendix M). Thus, residuals did not suggest any major violations of homoscedasticity, normality or linearity. Finally, as all cases had a standardized residual of more than 3.3 or less than -3.3, the scatterplot did not indicate the presence of any outlying residuals (Tabachnick & Fidell, 2001).

Descriptive statistics. Means and standard deviations of all measures were calculated to examine the general level and spread of data, and the composition of the sample. Results indicated that mean score on task performance was 75.88 (SD = 8.21, n = 34). This score is equitable to a letter grade of B in accordance with the grading standards set by the Faculty of Education at the University of Victoria. Mean task understanding score was 58.52 (SD = 9.69, n = 34) indicating that students did not evidence high levels of task understanding. Specifically, students demonstrated highest levels of understanding of the contextual features of the task and lowest levels of understanding of the implicit features of the task. Mean score for self-efficacy for task performance was 82.05 (SD = 9.06, n = 36) indicating students had high levels of confidence for task performance. Means and standard deviations are reported in Table 6.

Table 6

Descriptive statistics for all variables

Variable	Mean	Std. Deviation	N
Task Performance	75.88	8.21	34
Self-Efficacy	82.05	9.06	36
Task Understanding			
Explicit	61.05	17.37	38
Implicit	51.67	7.04	38
Contextual	64.62	11.98	34
Total	58.53	9.69	34

Correlation analyses. Pearson product-moment correlations produced positive correlations between task performance and composite task understanding ($r = .611, p < .01, n = 31$). Specifically, task performance evidenced significant positive correlations with explicit task understanding ($r = .414, p < .01$), implicit task understanding ($r = .381, p < .01$), and contextual task understanding ($r = .318, p < .01$). Intercorrelations between explicit, implicit, and socio-contextual aspects of task understanding were also significant. There were no significant correlations between self-efficacy for task performance, task performance and task understanding. Correlations between all variables are reported in Table 7.

Table 7

Intercorrelations between variables

Variable	1	2	3	4	5	6
1. Task Performance	-	.519**	.412**	.381**	.611**	.123
2. Explicit Task Understanding		-	.414**	.418**	.887**	.027
3. Implicit Task Understanding			-	.303*	.629**	.266
4. Contextual Task Understanding				-	.743**	-.185
5. Task Understanding					-	-.039
6. Self-efficacy for Performance						-

** $p < .01$ level (2-tailed).

Regression analyses.

The relationships between the predictor variables and task performance were analyzed using moderator analysis with hierarchical multiple regression. Predictor variables were entered in two steps in order to investigate (a) whether task understanding and self-efficacy for task performance predicted task performance and (b) whether the task understanding moderated the relationship between self-efficacy for task performance and task performance. In accordance with recommendations for moderator analysis with hierarchical linear regression, all predictor variables were transformed onto a common scale using Z scores to improve interpretability and reduce collinearity (Miles & Shelvin, 2001). Sample sizes were small so findings should be interpreted with caution.

Step 1. In the first step, the degree to which task understanding and self-efficacy accounted for variability in task performance was examined. Task performance was entered as the outcome variable and task understanding and self-efficacy for task

performance were entered as the predictor variables. ANOVA indicated that the regression coefficient ($R = .628$) was significant ($p < .01$), and task understanding and self-efficacy for task performance accounted for 34.8% of the variability in task performance ($R^2_{adj} = .348$). Task understanding ($\beta = .616, p < .001$) was a statistically significant predictor of task performance, while self-efficacy for task performance ($\beta = .147, n.s.$) was not statistically significant.

Step 2. In the second step, the interaction between self-efficacy for task performance and task understanding was entered as a predictor variable in order to investigate whether the interaction between task understanding and self-efficacy for task performance improved the variability accounted for in task performance. ANOVA indicated that the regression coefficient ($R = .705$) was significant ($p < .01$). Task understanding, self-efficacy for task performance, and the interaction between task understanding and self-efficacy for task performance accounted for 43.7% of the variability in task performance ($R^2_{adj} = .437$). Both task understanding ($\beta = .482, p < .01$) and the interaction between task understanding and self-efficacy for task performance ($\beta = -.350, p < .05$) were significant predictors of task performance. Self-efficacy for task performance ($\beta = .178, n.s.$) was not significant.

The change in variability between the first and second models indicated that the interaction between task understanding and self-efficacy for task performance significantly improved prediction of task performance over and above the variability accounted for by task understanding and self-efficacy alone ($R^2 \text{ Change} = .103, p < .05$). Results of regression analysis are summarized in Table 8.

Table 8

Summary of regression analyses

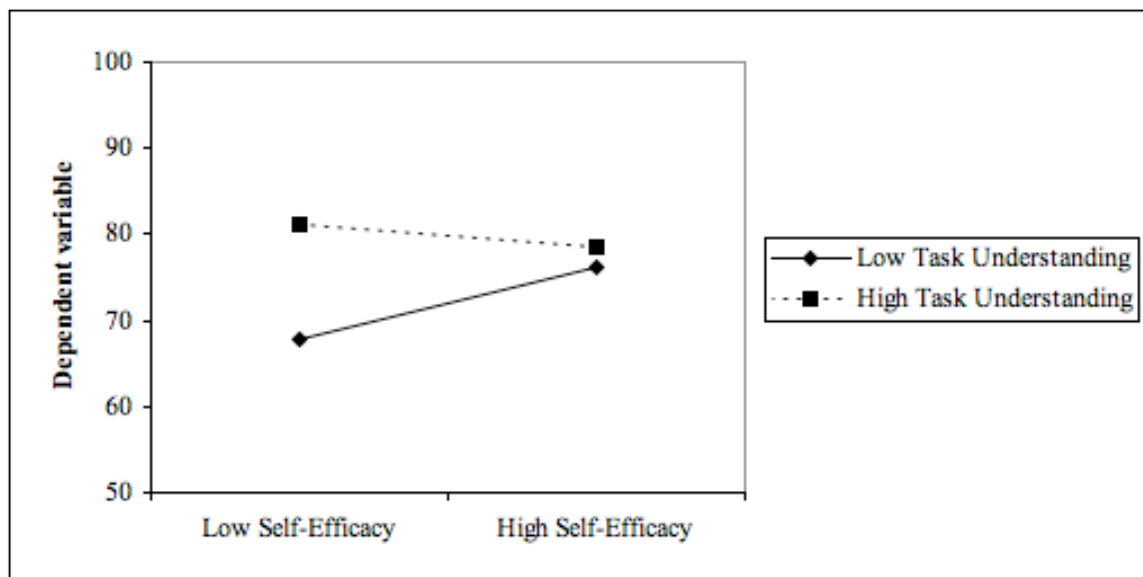
Criterion	Step	Predictor	R ² _{adj}	R ² Change	F ^a
Performance	1	Task Understanding & Self-Efficacy	.348	.395	8.47
	2	Interaction between Task Understanding & Self-Efficacy	.437	.103	8.25

^a All *F* ratios are statistically significant at $p < .01$.

In order to interpret the interaction, regression lines for task understanding and self-efficacy for task performance were plotted using procedures recommended by Aiken & West (1991) and Dawson & Richter (2006). The plot of the interaction effect is provided in Figure 4. The plot indicated that the relationship between self-efficacy for task performance and task performance differed depending on level of task understanding. Specifically, higher levels of task understanding were associated better performance compared to lower levels of task understanding. For students with higher task understanding, results indicated that performance remained relatively constant regardless of level of self-efficacy. For students with lower task understanding, however, higher self-efficacy for task performance was associated with better task performance.

Figure 4.

Plot of the interaction between predictor variables.



Summary of major findings

Overall, results indicated that students had mediocre levels of task understanding. Mean scores for implicit task understanding were the lowest, while scores for socio-contextual task understanding were the highest. Conversely, students exhibited high levels of self-efficacy for task performance. Pearson product-moment correlations produced statistically significant, positive correlations between task performance and composite task understanding as well as amongst explicit, implicit, and socio-contextual task understanding. Self-efficacy for task performance was not significantly correlated with task understanding or task performance.

Regression analysis indicated that task understanding significantly predicted task performance while self-efficacy for task performance did not. In addition, task understanding moderated the influence of self-efficacy on performance. Specifically, for students with high levels of task understanding, task performance remained relatively

constant regardless of level of self-efficacy for task performance. When students had lower levels of task understanding, however, higher self-efficacy was associated with higher performance. Overall, however, higher task understanding was associated with higher task performance than lower levels of task understanding.

Chapter 6

Discussion

Upon enrollment in post-secondary education, students must often contend with academic tasks far more complex than those they encountered in secondary school (Simpson & Nist, 2000). Investigations of the factors that contribute to students' successes and failures in these challenging tasks indicate that the accuracy and completeness of students' explicit, implicit and socio-contextual task understandings as well as students' self-efficacy for task performance are key components of task success (Bandura, 1994; Butler, 1998b; Hadwin et al, 2008; Jamieson-Noel, 2004; Pintrich, 2003; Schunk, 1995). Despite the wealth of empirical support for the role of self-efficacy in achievement (Bandura, 1994; Pintrich, 2000; Pintrich, 2003; Schunk, 1995) and the emergent support for the importance of task understanding in academic success (Butler, 1998b; Oshige et al, 2007; Jamieson-Noel, 2004; Winne & Hadwin, 1998), little research has examined the ways in which these factors intertwine to influence task performance.

As such, the current study used a correlational design to explore whether task understanding and self-efficacy for task performance predicted task performance, and whether the degree to which students' understood a task influenced the relationship between self-efficacy for task performance and performance. Specifically, this study used Winne & Hadwin's (1998) model of self-regulated learning as theoretical framework to investigate three research questions: (a) does task understanding predict task performance, (b) does self-efficacy for task performance predict task performance, and (c) does task understanding moderate the influence of self-efficacy on task performance.

Does task understanding predict task performance?

Findings of the current study indicate that students had generally mediocre levels of task understanding for the strategy library assignment. In addition, task understanding was a strong predictor of task performance with low levels of task understanding associated with low levels of performance. These results buttress the findings of previous research suggesting that students often have difficulty deciphering academic tasks and misinterpret or misperceive task requirements (Butler & Cartier, 2004; Jamieson-Noel, 2004; Hadwin et al, 2008; Oshige et al, 2008). Furthermore, results are consistent with the literature indicating that accurate and complete understandings of tasks is a key component of task success (Butler, 1998b; Butler & Cartier, 2004; Jamieson-Noel, 2004; Hadwin, 2000; Hadwin et al, 2008; Simpson & Nist, 2000).

In addition, these findings provide support for the relationship postulated to exist between task understanding and performance by Winne and Hadwin's (1998) model of SRL. According to Winne & Hadwin (1998), accurate and complete task understanding in phase 1 of SRL is key to academic success since it provides the foundation for setting effective goals and creating standards against which to monitor engagement in phase 2 as well as selecting appropriate strategies for enacting the task in phase 3.

The results of the current study appear to be consistent with this theoretical relationship. Specifically, the association between low task understanding and low task performance could be interpreted as evidence that students' inaccurate or incomplete understandings of the task deleteriously affected learning by leading students to set goals, create standards and choose strategies that were not effective or appropriate for success on the strategy library assignment. In order to further explore this possible effect,

however, future research is required to examine these relationships using more advanced statistical techniques such as hierarchical linear modeling.

Finally, since students' overall understandings of the explicit, implicit and socio-contextual task features was associated with academic attainment, findings are also consistent with Hadwin's (2006) model of task understanding. Specifically, this model suggests that in order to build accurate and complete task understanding, students must interpret and decipher three types of task information: explicit task information, implicit task information and socio-contextual task information. Since this study used a composite measure of task understanding, however, future research is required to directly investigate the relationship between implicit, explicit, and socio-contextual task understanding and task performance individually.

Does self-efficacy for task performance predict task performance?

Results indicated that students had generally high levels of self-efficacy for performance on the strategy library assignment. Contrary to expectation, however, self-efficacy for task performance did not significantly predict task performance. These results are not consistent with much previous research indicating that students' confidence in their ability to succeed on a task plays a key role in task performance with optimistic self-efficacy often associated with high levels of performance (Bandura, 1997; Collins, 1982; Pajares, 1996; Pajares & Johnson, 1996; Pintrich, 2003, Pintrich & De Groot, 1990, Schunk, 1995).

Results also appear to be inconsistent with the role self-efficacy is posited to play in task engagement by Winne and Hadwin (1998) model of SRL. Specifically, this model suggests that cognitive conditions of a phase, such as self-efficacy, influence the

operations in which students engage during the phase as well as the products of the phase. As such, it was expected that students with good self-efficacy would effectively engage in the task and attain high grades on the strategy library assignment. Since the findings of the current study indicated that self-efficacy did not evidence an association with task understanding or task performance, it did not appear that self-efficacy influenced students' operations and products with each phase of learning as expected.

While findings are contrary to results of the majority of literature investigating self-efficacy in academic performance, they are consistent with previous research examining self-efficacy beliefs in students with learning disabilities (Butler, 1998-a; 1998-c). Specifically, research in this area indicates that students with learning disabilities often exhibit optimistic efficacy beliefs miscalibrated with task performance (Butler, 1998-a; 1998-b; 1998-c; Klassen, 2007). In a review of the literature examining miscalibration of self-efficacy, Klassen (2007) suggests that this miscalibration of efficacy beliefs in students with LD could be the result of : (a) enactment of a compensatory strategy to improve task engagement or (b) deficiencies in metacognitive monitoring.

As such, the lack of relationship between self-efficacy and task performance may indicate that students inflated efficacy beliefs as a coping strategy to deal with the difficult task through improving task persistence, perseverance, effort expenditure and resilience (Bandura & Schunk, 1981; Schunk, 1981). Alternatively, the lack of association between self-efficacy and task performance in this study could indicate that students may have had difficulty metacognitively monitoring task requirements in the complex and novel task. For instance, Winne and Hadwin's (1998) model of SRL

suggests while the products of past phases, such as task understanding, influence the cognitive conditions of future phases, such as efficacy beliefs, they do so under the drive of metacognitive monitoring. Thus, it is possible that students had difficulty monitoring their knowledge of the complex and novel task, and as a result, set efficacy beliefs poorly attuned to their actual abilities.

It is important to note that findings from this study do not imply that these undergraduate students had learning disabilities. Rather findings may suggest that when undergraduate students encounter novel and complex tasks and lack domain knowledge or expertise, they may experience difficulties with metacognitive monitoring task engagement. Further research is required, however, to investigate these possibilities.

Finally, the lack of association between self-efficacy for task performance and task performance could have also resulted from the measure of self-efficacy used in this study as well as from the time at which this measure was administered. For instance, while previous investigations of efficacy for task performance have often focused on students' confidence for the explicit features of tasks (Multon et al, 1991), the questionnaire developed for this study targeted not only explicit task features, but also implicit and contextual task features defined as important for task performance. As such, it is possible that these different aspects of self-efficacy for task performance were differentially predictive of task performance. Further, students may have been differentially confident for these aspects of task performance and, thus, may have had difficulty forming confidence judgments well-calibrated to their ability and knowledge of the task when items targeted more abstract layers of task performance. In addition, self-efficacy for task performance was measured two weeks prior to the submission of the

final assignment. As such, it is possible that as students engaged in the task, self-efficacy would have become more predictive of task performance. To test these hypotheses, this further investigation is needed to (a) replicate this study with a larger sample size that would enable investigation of self-efficacy for the explicit, implicit, and socio-contextual aspects of the assignment individually, and (b) examine self-efficacy for task performance at multiple points during task engagement.

Does task understanding moderate the influence of self-efficacy on task performance?

Results of the current study further indicate that the relationship between self-efficacy and task performance differed depending on students' levels of task understanding. Specifically, high task understanding was associated with better task performance compared to low task understanding. When students had low task understanding, however, higher self-efficacy was associated with levels of task performance comparable to those of students with high task understanding. In addition, when students had higher levels of task understanding, task performance appeared to remain relatively constant regardless of the level of self-efficacy.

As students' self-efficacy beliefs were relatively optimistic in comparison to level task understanding and performance, these results do not support the suggestions of previous research that miscalibrated efficacy beliefs held by students with faulty or incomplete perceptions negatively impact performance (Bandura, 1989; Klassen, 2002; Lodewyk, 2000; Schunk & Rice, 1989). Instead, results were consistent with Bandura's (1997) suggestion that optimistic self-efficacy beliefs are key to succeeding in challenging tasks, and that having good self-efficacy can support good task engagement

and performance even when students possess less expertise or prior knowledge of the task material (Bandura & Schunk, 1981; Collins, 1982; Schunk, 1981).

In addition, results indicated that task understanding was a much stronger predictor of task performance than self-efficacy, and that when students had high task understanding, they performed well regardless of their confidence for the task. As such, these findings appear to suggest that, while self-efficacy may help students to persist when they encounter difficulties in tasks, developing accurate and complete task understanding is beneficial for task success even when students do not feel efficacious about their abilities to perform well.

Limitations

It is important to note there were a number of limitations in the current study. For instance, the small sample size of the current study may have influenced the relationships between the variables as well as the degree to which they co-varied. As such, regression results should be interpreted with caution. In addition, scores on the task performance variable all fell within a small range. Since participation was contingent on the completion of the strategy library assignment and results indicated that all scores fell within close proximity of each other, it is possible that restriction of range may have reduced the degree to which the independent variables, such as self-efficacy, correlated with performance.

Second, a number of other limitations of this study result from the potential influence of factors external to this study as well as possible changes within the participants. For instance, research suggests that task understanding and self-efficacy are dynamic states that change and evolve over the course of engagement with a task

(Hadwin et al, 2008; Jamieson-Noel, 2004). The current study measured both self-efficacy and task understanding at one point of task engagement and contextual task understanding was measured earlier in the term than explicit and implicit task understanding. As such, it is possible that students' task understanding and self-efficacy may have evolved and changed prior to the measure of performance. This limitation is especially salient since socio-contextual task understanding was measured earlier in the term. In addition, as the final assignment was due at the end of term, it is possible that time constraints common during these months of the term may have limited students' ability to perform well on the complex assignment and influenced their confidence in their ability to perform well on the assignment despite their understandings of its requirements.

Third, the use of a correlation design did not allow explicit causal conclusions regarding the relationship between self-efficacy and task understanding and task performance. For instance, while it is possible that task understanding may influence students' self-efficacy, it is also possible that students' self-efficacy for the task may influence task understanding.

Finally, the use of a non-probability sample of university students in a single instructional context delimits the extent to which results can be generalized all university students. Specifically, students enrolled in a learning strategies course may be qualitatively different than the general undergraduate university population. Furthermore, as participation was dependent upon voluntary completion of an online quiz, it is possible that participants in this study were qualitatively different from the population of students enrolled in the course. Finally, the characteristics of Strategy Library Assignment

differed from tasks commonly assigned in other undergraduate courses, such as essay assignments and exams. However, since this study embedded measurement of task understanding and self-efficacy within the context of an actual grade-bearing classroom learning activity, the context in which these constructs were measured is similar to situations experienced in other courses.

Implications for theory, research, and practice

Despite these limitations, the current study holds a number of possible implications for theory, research, and practice.

Implications for theory. Results of the current study lend support for the key role of task understanding in task engagement and performance described by Winne & Hadwin's (1998) model of self-regulated learning. In addition, as measurement of task understanding targeted students' understanding of the explicit, implicit, and socio-contextual features of the task, findings were also consistent with Hadwin's (2006) model of task understanding.

Implications for research. While task understanding is often assumed to play a foundational role in academic attainment, few studies have empirically investigated this assumption. As such, this study contributed to research by directly investigating the relationship between task understanding and task performance within a framework of SRL. In addition, it added to the emergent literature empirically investigating students' understanding of explicit task features, implicit task features and socio-contextual task features.

Second, this study investigated new methodology for measuring task understanding in the classroom. Specifically, measures of task understanding used in this study extended

previous research using open-format task analyzers by creating a closed format measure targeting a specific task. Since the measure of task understanding in this study used multiple-choice items, it was less dependent on free recall of task features, less demanding to complete, and more easily administered in a variety of research contexts in which time is limited.

Third, while investigations of the relationship between task performance and self-efficacy have often focused on students' confidence in their capabilities to perform explicit aspects of the task, this study aimed to extend investigations of self-efficacy in a number of ways. For instance, this study examined how students' self-efficacy for a wider range of explicit, implicit and socio-contextual task features contributed to variability in task performance. In addition, this study utilized a measure of self-efficacy for task performance that included explicit, implicit and socio-contextual features of the task.

Finally, while research indicates that both task understanding and self-efficacy are key aspects of academic performance, little research has investigated the relationship between these factors. As such, this study attempted to begin to bridge the gap between these disparate lines of research by examining the relationship between task understanding and self-efficacy and how this relationship contributes to task performance.

Implications for practice. Finally, this study has a number of implications for practice. For instance, findings suggest that supporting students in constructing accurate and complete task understanding is key for facilitating students' successes in university tasks. Further, findings indicate that, while encouraging students to be efficacious

regarding their ability to perform well on a task can be useful, especially when they have difficulty deciphering the task, accurate and complete task understanding had a significant effect on performance regardless of students' confidence in their ability to perform. As such, these findings support the suggestions of previous research indicating that in order to support students' success on classroom tasks, instructors should both closely attend to the ways in which students interpret the tasks as well provide instruction and opportunities that facilitate students' construction of accurate and complete task representations (Butler & Cartier, 2004; Jamieson-Noel, 2004).

Suggestions for future research

Although the current study attempted to extend and add to the literature regarding the relationship amongst task understanding, self-efficacy and task performance, further research is required to more thoroughly investigate these factors.

First, while the current study explored how students' understanding of and confidence for the explicit, implicit, and contextual task features influences performance, further investigation is required to examine the influence of these types of task understanding and efficacy beliefs individually in order to better understand the role played by each in task success. In addition, the current study utilized relative accuracy as a measure of students' attunement to the professor's beliefs about learning and knowledge. Since this measure did not take into account the precisions of students' judgments, future research is required to explore how different measures of attunement, such as absolute accuracy, influence the relationship between socio-contextual task understanding and task performance.

Second, as the possibility of reverse causality between the relationship between self-efficacy and task understanding cannot be controlled for in this design, research using more sophisticated analyses, such path analysis or structural equation modeling would be required to provide better insight into the directionality of this relationship. In addition, research using more sophisticated analysis would allow for investigation of how understanding of the explicit, implicit and socio-contextual features of a task contribute individually to the relationships between task understanding, self-efficacy, and task performance

Third, one possible contributor to the lack of association between self-efficacy and task performance in this study may have been students' difficulties in metacognitively monitoring the task. As such, investigation of the calibration of students' efficacy beliefs to both their task understanding and performance is required to further explore whether students experience difficulties in metacognitively monitoring their engagement in the complex task and how this type of attunement might contribute to performance.

Fourth, in order to increase the confidence with which results can be generalized to all university students, further investigation is required to replicate results with a larger sample size of participants engaging in different types of tasks in different university classroom contexts other than a learning strategies course.

Finally, future research is required to examine the relationships amongst task understanding, self-efficacy, and performance at multiple points throughout task engagement in order to explore how the relationships between these dynamic constructs

evolve as well as to control for possible confounding factors associated with the final weeks of term.

Conclusions

This study aimed to extend previous research by bridging the gap between the disparate lines of research examining the roles of task understanding and self-efficacy in students' task performance. In addition, it investigated new methods of measuring task understanding and self-efficacy targeting the explicit, implicit and socio-contextual layers of complex university tasks. Results of the current study indicated that students had difficulty constructing accurate and complete understandings of a complex university task. In contrast, however, students had high self-efficacy beliefs for performance. Furthermore, while self-efficacy alone was not associated task performance, task understanding was highly predictive of students' success in the task. Finally, when students had low levels of task understanding, higher levels of self-efficacy were predictive of higher performance.

These results suggest that task understanding is a powerful predictor of task performance. In addition, while it appeared that students might have had difficulty calibrating efficacy beliefs with performance and understanding of the task, optimistic self-efficacy beliefs may still be a positive influence on performance even when students do not understand the task. While there were a number of limitations in the study, results buttress the findings of previous research in the area of task understanding and provide support to Winne & Hadwin's (1998) model indicating that task understanding plays a key role in students' success in tasks.

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Appendix A

ED-D 101 Course Syllabus



University of Victoria

Faculty of Education

Department of Educational Psychology & Leadership Studies

*Learning Strategies for University Success***ED-D101 / S01 (1.5 Units)**

Tuesday 1:30-3:00

ECS 125 (Lectures) and MACD282 (Lab Sessions)

Instructor:	Dr. Allyson Hadwin
Office:	A461
Office Hours:	Thursday 10am-12pm
Phone:	(250) 721-6347
Fax:	(250) 721-6190
E-mail:	Hadwin@uvic.ca
Web Site for course:	http://www.moodle.uvic.ca

Lab Instructors and contact information:

Dr. Allyson Hadwin	hadwin@uvic.ca	(MACA461)	Lab LS01 Monday 8:30-10am
Mariel Miller		(MACA210)	Lab LS02 Monday 2:30-4pm
Amy Gendron		(MACA210)	Lab LS03 Tuesday 3:30-5pm
Elizabeth Webster		(MACA210)	Lab LS04 Wednesday 6-8:30

CALENDAR DESCRIPTION

This course supports undergraduate students to develop study skills and strategies for success in university courses. The course emphasizes applied assignments that help students to master reading; note taking, studying, time management, and assignment work in their current undergraduate courses. Students will apply theory to examine their own learning and experiment with new strategies for learning. Students will be required to use computers for course work and group projects.

TEXT/READING LIST

- Nist, S. L., & Holschuh, J. P. (2006). *College success strategies* (2nd Edition). New York, NY: Penguin Academics, Longmann Publishers.
- Learning kit materials provided as part of the course and shared electronically

COURSE GOAL: BECOMING A SELF-REGULATED LEARNER

One of the goals of learning and study strategies courses is to provide opportunities for students to develop the skills, strategies, attitudes and behaviours necessary to become independent lifelong learners. Successful self-regulating students learn to direct, monitor, evaluate, mediate and adapt their own learning. Research findings suggest that self-regulation is a strong predictor of performance and is related to beliefs about success, motivation, and effort. Learning how to monitor and control the processes and behaviors associated with learning involves much more than learning sets of prescribed strategies, skills or methods for studying. Therefore this course focuses on providing opportunities for you to experiment with and improve upon your own learning. This is not a skills based course. Rather, our goal is to introduce you to the theory and practice of self-regulated learning and provide opportunities for you to apply what you are learning in the course to a range of study skills problems you encounter in your undergraduate courses. Activities in this course will provide opportunities for you to:

- (a) receive feedback about your own learning;
- (b) examine your strengths and weaknesses as learners;
- (c) experience success through your own efforts and persistence;
- (d) share and model for each other a range of learning strategies; and
- (e) practice and receive feedback on your understanding of tasks, goal setting, planning, and reflective evaluation about learning processes across your undergraduate courses.

LEARNING OBJECTIVES

Learning Strategies

- Explain knowledge and understandings of learning strategies and why they work.
- Identify and justify study strategies that are useful for you.
- Generate and evaluate strategies for addressing studying problems you encounter.
- Apply and monitor the effectiveness of various learning strategies.
- Evaluate the effectiveness of strategies you have experimented with in your learning and adapt them for future use.
- Develop a customized repertoire of strategy information (descriptions, tools, and examples) you can draw from.
- Develop awareness of the course and discipline contexts that bring meaning to academic tasks.

Self Regulated Learning and self-knowledge

- Explain what self-regulated learning is and how it contributes to your undergraduate learning.
- Use a model of self-regulated learning to critically analyze academic tasks that pose problems.
- Monitor and evaluate your understanding of academic tasks in your other courses.
- Utilize strategies for improving your task understanding.
- Identify and reflect upon changes in your learning strategies, learning knowledge, beliefs and motivations.

Learning processes and mechanisms

- Explain how people process and remember information.
- Self-assess your own studying processes including notetaking, reading, time management, and writing.
- Learn to interact with instructors or peers.
- Learn to give feedback to peers

COURSE EXPECTATIONS

- You are expected to read the syllabus thoroughly.
- You must be enrolled in both the lecture section (1.5 hours) and a lab section (1.5 hours).
- You are expected to come to all class and lab sessions prepared (having completed readings & exercises).
- You must purchase the text for the course and bring it and any preparatory exercises to each class & lab.
- Use of the computer is required in this course. The computer and computer software applications are integral for readings and assignments.
- Participation in google docs and google groups is required in this class.
- ALL documents must be backed up on your home computers to protect you against technological glitches.
- All course assignments must be submitted electronically.

ASSIGNMENT OVERVIEW

Assignment	Marks allotted	Due Date:
Problem Analysis	20 marks	February 4
Task Analysis	20 marks	March 3
Strategy Library	20 marks	March 24
Learning Portfolio	20 marks	Weekly after lab
Concept Review Quizzes	20 marks	4 administered during lecture time

Notes:

- (1) All assignments must be submitted electronically on Monday morning before 8:30 am. Therefore it would be wise to submit Sunday night. In many cases you will also be asked to print and bring a copy to your lab session. Electronic submission ensures that your paper does not get lost and protects against plagiarism.
- (2) Please read carefully the instructions for submission in each assignment description. Some assignments are submitted and shared with your lab group.
- (3) You must abide by academic regulations as set out in the university calendar. You must observe standards of ‘scholarly integrity,’ especially with regards to plagiarism and cheating.
- (4) Late assignments will be docked **one letter grade per day (e.g. A- down to B+)**. Because we all have “bad” days, we are providing you one opportunity to hand in an assignment “late” and still receive full credit if we receive it within 1 week. Please send an email message in lieu of the assignment. The subject should read: [assignment name] LATE PASS. THE LATE PASS CANNOT BE USED FOR ACTIVITIES COMPLETED IN CLASS OR FOR CONCEPT REVIEW QUIZZES.

COMMUNICATION AND CAMPUS RESOURCES

If you have special needs or require special learning assistance, I encourage you to speak to me in person so we can create a positive learning environment for you.

Resource Centre for Students with a Disability

Phone: 472-4947, Web: <www.rcsd.uvic.ca>, E-mail: inforesd@uvic.ca

Counselling Services (personal, career, peer, and study skills counseling and courses)

Phone: 721-8341, Web: <www.coun.uvic.ca>

Student Transition Centre (when you don't know, who to ask or where to find information or assistance) <http://web.uvic.ca/transition/>, Phone: 472-4512

Academic Advising <http://web.uvic.ca/calendar2007/CAL/index.html#WCIGAAMS>

PRELIMINARY COURSE SCHEDULE

Week of	Class Topic	Lab Topic	Readings	Assignments Due	Learning Portfolio Activity Submitted
Jan 7	Introduction to course Motivation and Beliefs Active learning Monitoring progress	Introductions google docs ED-D101 website 1 st reflection	Nist Chp 1, 2		1 st Reflection
Jan 14	Research - study skills? Self-regulated learning Self-monitoring	MSLQ and EBQ Strengths/ weaknesses You as a SR learner	SRL module Hadwin 1996		MSLQ-1 EBI-1
Jan 21	Task Understanding Goal Setting & SRL	Task Analysis Practice	Nist Chp 5, 8		Task Analysis Practice Monitoring TU
Jan 28	Figuring out what is going wrong?	Writing SMART goals for the week E.g. PA assignments	Chp 7, 8		SMART goal list
Feb 4	Learning and Memory Processes	SMART operations	Nist Chp 3	Problem Analysis	Evaluating a strategy
Feb 11	Memory Strategies	Intro to strategies Mnemonics -tracking time use			New Mnemonic strategy + e.g.
Feb 18	Reading Break				Submit time tracking activity
Feb 25	Getting organized - regulating time		Nist Chp 4		Planning & monitoring time
Mar 3	Reading for learning	Recognizing text & information structures	Reading Kit Chp 11	Task Analysis	Identification of information structure
Mar 10	Notetaking and learning from lectures	Reading strategies	Notetaking kit Chp 14		Reading strategy activity
Mar 17	Exam Preparation & Writing	Notetaking strategies PASS	Chp 12, 13		PASS
Mar 24	Topic chosen by class: Guest Lecture	Exam Preparation strategies MSLQ	Chp 17, 18	Strategy Library	Reviewing & rehearsing activity MSLQ-2
Mar 31	Writing Exams finished up	Exam strategies	Writing kit		Final Reflection + Letter to student

IMPORTANT UNIVERSITY DATES

Jan 16	Last day for 100% reduction of tuition fees for first-term and full-year courses
Jan 19	Last day for adding courses that begin in the first term
Jan 31	Last day for paying second-term fees without penalty
Feb 6	Last day for 50% reduction of tuition fees. 100% of tuition fees will be assessed for courses dropped after this date.
Feb 18-22	Reading Break (no classes)
Feb 29	Last day for withdrawing from first-term courses without penalty of failure
March 21	Good Friday (no classes)
March 24	Easter Monday (no classes)

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**Department Of Educational Psychology and Leadership Studies
Faculty of Education
Grading Policy**

NOTE: Any departure from this grading system must be submitted in writing to the Chair of the Department. Approval of the Chair must be obtained prior to the distribution of the course outline.

1. When numerical marking is used at the UNDERGRADUATE or GRADUATE level, normally the following conversion from percentage to letter grades will be used:

A+	> 95	A-	85-89	B	75-79	C+	65-69	D	51-59
A	90-94	B+	80-84	B-	70-74	C	60-64	E or F	<50

2. In assigning grades at the UNDERGRADUATE level, the following guidelines should be followed.

Passing Grades

A+	Outstanding scholarship and originality. Complete mastery of subject matter.
A	Exceptional scholarship displaying strong knowledge, synthesis and application of concepts
A-	Excellent scholarship showing depth of knowledge and analytical ability
B+	Very good scholarship, high knowledge level and good application of information
B	Steady performance, not outstanding in knowledge or application
B-	Good knowledge but some lack of understanding, ability, or background
C+	Satisfactory knowledge, limited application and demonstration of understanding
C	Satisfactory knowledge, definite lack of some information, no application
D	Marginally satisfactory (but not failure), noticeable gaps in knowledge and understanding

Failing Grades

E	Failing grade: Conditional supplemental. (note—undergraduate only)
F	Failing grade: No supplemental
N	Failing grade: Did not write examination or otherwise complete course requirements by the end of the term or session; no supplemental

- Students must abide by academic regulations as set out in the university calendar. They must observe standards of 'scholarly integrity' especially with regards to plagiarism and cheating (see p. 31-32 of

the 2004-2005 Calendar

Appendix B

Strategy Library Assignment Description

Strategy Library (20 marks)

The purpose of this assignment is to encourage you to customize your strategy library so that it becomes a useful resource for you in your future studying. The strategy library should be a place where you can keep track of things that work for you and build your own library of study strategies. This assignment asks you to adapt and revise your knowledge of learning strategies and how effective they are for you in your classes. This assignment is essentially your final exam for the course. It is worth 20% of your final grade. It should demonstrate your understanding and application of course concepts to your own learning.

Related Learning Objectives:

- Explain knowledge and understandings of learning strategies and why they work
- Identify and justify study strategies that are useful for you
- Generate and evaluate strategies for addressing studying problems you encounter
- Apply and Monitor the effectiveness of various learning strategies
- Evaluate the effectiveness of strategies you have experimented with in your learning and adapt them for future use.
- Develop a customized repertoire of strategy information (descriptions, tools, and examples) you can draw from

Description:

In this course, you have been provided with a preliminary strategy library in Moodle. The strategy library contains information about a variety of study strategies. For each strategy it provides a description about the strategy, information about when and why to use it, tips for evaluating its effectiveness, and fields for describing when and how you have used the strategy. All strategies can be modified by you. You can revise them, add to them, delete them and add new strategies to your library.

For your strategy library assignment, you can: (1) Use the strategy template in Moodle to create your own documents using the same format, (2) create your own strategy templates (making sure you still cover the key areas, and or (3) use your own medium for creating and illustrating your personalized strategy library. For example last year some students constructed their strategy library in a website or blog or included video based examples of the strategies in action. If you create your own strategy explanation formats, they must include the same key categories of information.

CREATE 5 NEW STRATEGIES: Each Strategy Entry Should Include:

PART A: Description fields and explanations (10 marks):

1. Strategy name and topic or category
2. Your name
3. A general description/overview of the strategy
4. Description of the kinds of goals for which this strategy is suited (When you would choose it)?
5. Explanation about how to apply the strategy step by step.
6. Explanation about why this strategy works? Explain the theory and concepts underlying this strategy (justification).
7. A list of courses or tasks for which you have used this strategy
8. Questions you can ask yourself to monitor and evaluate how effective this strategy is, or criteria for evaluating this strategy
9. General comments about your experiences with this strategy
10. References and empirical support for this strategy:

PART B: Creative Illustration of your use of the strategy (10 marks)

1. Create an example, illustration, or demonstration of the strategy and how you are using/applying it in one of your courses. This should provide enough illustration and explanation that another student can use the example to understand the strategy. You might create a podcast that you upload to your kit, annotate and html text that you upload, create a digital video-based demonstration, etc.

Appendix C

Strategy Library Assignment Grading Rubric

PART 1: STRATEGY DESCRIPTION

Your grade	Grade Categories	Overall Descriptions
	0/5 Marginal	Incomplete descriptions/explanations about why it works Not linked to course content Could have just copied this out of a study skills book Answers are missing or very sketchy.
	1/5 Minimally Satisfactory	More of a tactic or technique than a strategy Described a technique or approach. Weak descriptions/explanations about why it works, not linked to course Used a stock evaluation scale
	2/5 Satisfactory Limited application & demonstration of understanding	Lacking reasoning about purpose or explanation Basic descriptions/explanations stick to facts, lack depth, not linked to course Strategy sticks very closely to one you were provided with
	3/5 Very Good high knowledge level & good application of information	Presents strategies rather than skills or techniques. Thorough descriptions/explanations anchored in course content, but lack depth Chosen evaluation scale makes sense. Evidence of understanding and applying course concepts
	4/5 Exceptional strong knowledge, synthesis & application of concepts	Presents strategies rather than techniques. Superior descriptions/explanations anchored in deeper course content and theories (processes, theories, not just facts). Innovative self-generated strategies OR customized evaluation scales
	5/5 Outstanding scholarship & originality. Complete mastery of subject matter	Superior descriptions/explanations anchored in deeper course content and theories (processes, theories, not just facts). Innovative self-generated strategies AND customized evaluation scales Evidence of researching strategy effectiveness in additional sources, articles, chapters.

PART 2: ILLUSTRATION EXAMPLES

Your grade	Grade Categories	Overall Descriptions
	0/5	Little effort to apply or demonstrate strategies
	1/5 Minimally Satisfactory	Examples not always provided. Examples may be difficult to understand or follow
	2/5 Satisfactory Limited applications & demonstration of understanding	Inconsistency in the quality of examples. (very good to difficult to follow) Tendency to use stock examples, rather than to actually apply the strategy to learning.
	3/5 Very Good high knowledge level & good application of information	Consistently very good examples for each strategy Examples provide clarity about the strategy Evidence application of the strategy to real learning. Not always anchored in your authentic studying activities.
	4/5 Exceptional displaying strong knowledge, synthesis & application of concepts	Creative examples for each strategy, some of which go the extra mile Examples provide clarity about the strategy Evidence application of the strategy in meaningful ways to real learning.
	5/5 Outstanding scholarship & originality- complete mastery of subject matter	Consistently creative examples that go the extra mile Examples provide clarity about the strategy Evidence application of the strategy in meaningful ways to real learning.

Appendix D

Task Analyzer Quiz for Course Assignment

Quiz #7: The Strategy Library Assignment

For each question, select the best answer, or enter the number that represents your rating

1. This assignment asks me to:
 - a) revise 5 strategies
 - b) monitor 5 strategies
 - c) generate 5 strategies
 - d) a and c
 - e) all of the above
2. A strategy is:
 - a) a recipe that you can apply to your studying
 - b) something that applies well to all kinds of tasks
 - c) customized for your own strengths and weaknesses
 - d) all of the above
 - e) none of the above
3. Which of the following is a/are good resource(s) for this assignment?
 - a) the strategy library in moodle
 - b) lecture notes
 - c) outside sources
 - d) all of the above
 - e) e and b
4. This assignment asks me to:
 - a) show examples of how I could use my strategies in my learning
 - b) show examples of how I have used my strategies in my learning
 - c) show examples of how a peer has used my strategies in his/her learning
 - d) all of the above
 - e) none of the above
5. Regarding the grading scheme for this assignment, which of the following statements is false? (Part 1 = strategy description, Part 2 = example or illustration):
 - a) Part 1 is worth more than Part 2
 - b) Part 1 is worth 10 marks
 - c) Part 2 is worth 10 marks
 - d) The entire assignment is 20% of final grade
 - e) The assignment is worth 20 marks
6. The main purpose of this assignment is to:
 - a) customize strategies so they become useful for future studying
 - b) adapt and revise your knowledge of learning strategies
7. Each strategy description must include:
 - a) what it is, when to use it, how to use it.
 - b) why it works, how well it worked for you.
 - c) links to course content
 - d) the kinds of goals it is suited for
 - e) all of the above
8. A strategy illustration is:
 - a) a picture that shows how somebody might use the strategy
 - b) a real example of the strategy in use
 - c) a illustration in any medium that clarifies how somebody could use the strategy.
 - d) b and c
 - e) all of the above
9. It would be best to justify my strategies with:
 - a) Information from study skills books
 - b) My own experiences and thoughts
 - c) Facts and procedures from the lecture slides
 - d) Processes, concepts, and theories
 - e) none of the above
10. For each strategy, I should provide:
 - a) step by step account for implementing the strategy
 - b) thoughtful commentary about using the strategy in real learning
 - c) a list of courses or tasks for which I have used the strategy
 - d) all of the above
 - e) none of the above
11. Good questions for evaluating my strategy would:
 - a) connect directly to my explanation about why the strategy works
 - b) emphasize language and concepts from the course
 - c) be found in study skills texts and websites
 - d) be appropriate for any student using the strategies
 - e) a and b
 - f) c and d
12. How do you think this assignment relates to the rest of the course?
 - a) this assignment is like a final exam for the course
 - b) I need to demonstrate my understanding of course

- and how effective they are for you
- c) build knowledge of how to apply strategies step by step
 - d) a and b
 - e) b and c

13. Which of the following is a/are learning objective(s) for this assignment?

- a) develop a customized repertoire of strategy information
- b) rehearse factual information important for executing a strategy
- c) apply and monitor effectiveness of strategies
- d) a and c
- e) all of the above

14. In this class, an 87% would be:

- a) A+
- b) A
- c) A-
- d) B+
- e) B

15. Rate the importance of each type of thinking for succeeding in this assignment

(0= not important, 1= possibly important, 2= very important)

- ___ Understand
- ___ Apply
- ___ Remember
- ___ Evaluate
- ___ Create
- ___ Analyze

16. Rate the importance of each type of knowledge for succeeding in this assignment

(0= not important, 1= possibly important, 2= very important)

- ___ Procedural
- ___ Conceptual
- ___ Factual
- ___ Metacognitive

17. Rate the importance of including the following course concepts in your strategy descriptions

(0= not important, 1= possibly important, 2= very important)

- ___ SRL cycle
- ___ SMART operations
- ___ SMART goals
- ___ Task Understanding
- ___ Topic/Process concepts relevant to your strategies

concepts I have learned.

- c) I need to focus on the last half of the semester
- d) a and b
- e) all of the above

18. Which of the following statements is true:

- a) describing step by step study techniques is the main focus of this assignment.
- b) using course terminology in my strategy explanations is more important than explaining course concepts.
- c) a student who uses multi-media techniques in this assignment will do better than someone who uses a word document
- d) strategies I find on the web can be adapted and augmented for this assignment.
- e) I need to evaluate my understanding of my strategies by comparing it to my professors'

19. Rate the importance of the following types of strategy justification.

(0= not important, 1= possibly important, 2= very important)

- ___ Facts from lecture
- ___ Theories and processes
- ___ Facts from outside sources
- ___ My own knowledge
- ___ Study skills books

20. How likely would it be to find the following things in an A or A+ assignment?

(0 = not very likely, 1 = likely, 2= very likely)

- ___ Strategies from strategy library in moodle
- ___ Descriptions anchored in processes and theories
- ___ A stock evaluation scale
- ___ Brief, to-the-point descriptions
- ___ Researching strategy effectiveness in outside articles and chapters
- ___ Strategies that are just as good as the ones in the moodle strategy library
- ___ Examples that are creative
- ___ Complex hypothetical strategy examples

Appendix E

Epistemological Beliefs Questionnaire – Instructor Version

(EBQ-T)

Complete this questionnaire by rating your agreement with each item from 1 (strongly disagree) to 5 (strongly agree)

	1 (Strongly Agree)	2 (Agree)	3 (Neutral)	4 (Disagree)	5 (Strongly Disagree)
1	If a student is ever going to be able to understand something, it will make sense to them the first time he/she hears it.				
2	the only thing that is certain is uncertainty itself.				
3	For success in university, it's best that students not to ask too many questions.				
4	A course in study skills would probably be valuable for my students				
5	How much students get out of university mostly depends on the quality of the teacher				
6	Students often wonder how much their teachers really know				
7	Ability to learn is innate				
8	It is annoying for students to listen to a lecturer who cannot seem to make up his/her mind as to what he/she really believes				
9	Successful students understand things quickly				
10	A good teacher's job is to keep his/her students from wandering from the right track				
11	If scientists try hard enough, they can find the truth to almost anything				
12	People who challenge authority are over-confident				
13	Students should try his/her best to combine information across chapters or even across classes				
14	The most successful students have discovered how to improve their ability to learn.				
15	Things are simpler than most professors would have students believe				
16	The most important aspect of scientific work is precise measurement and careful work				
17	To me studying means getting the big ideas from the text, rather than details				
18	Educators should know by now which is the best method: lectures or small group discussions				
19	Going over and over a difficult textbook chapter usually won't help you understand it				
20	Scientists can ultimately get to the truth				
21	You never know what a book means unless you know the intent of the author.				
22	The most important part of scientific work is original thinking				

23	If students find the time to re-read a textbook chapter, they get a lot more out of it the second time.	
24	Students have a lot of control over how much they can get out of a textbook	
25	Genius is 10% ability and 90% hard work	
26	I find it refreshing to think about issues that authorities can't agree on	
27	Everyone needs to learn how to learn	
28	When students first encounter a difficult concept in a textbook, it's best for students to work it out on their own.	
29	A sentence has little meaning unless you know the situation in which it is spoken	
30	Being a good student generally involves memorizing facts	
31	Wisdom is not knowing the answers, but knowing how to find the answers	
32	Most words have one clear meaning	
33	Truth is unchanging	
34	If a person forgot details, and yet was able to come up with new ideas from a text, I would think they were bright.	
35	Whenever students encounter a difficult problem in life, it is good for them to consult with their parents.	
36	It's often necessary for students to learn definitions word-for-word to do well on tests.	
37	When students study, they should look for the specific facts	
38	If a student can't understand something within a short amount of time, they should keep on trying.	
39	Sometimes students just have to accept answers from a teacher even though they don't understand them	
40	If professors would stick more to the facts and do less theorizing, students could get more out of university	
41	I don't like movies that don't have an ending	
42	It takes a lot of work for students to get ahead	
43	It's a waste of time to work on problems which have no possibility of coming out with a clear-cut and unambiguous answer.	
44	students should evaluate the accuracy of information in a textbook, if they are familiar with the topic.	
45	Often, even advice from experts should be questioned	
46	Some people are born good learners, others are just stuck with limited ability	
47	Nothing is certain, but death and taxes	
48	The really smart students don't have to work hard to do well in school	
49	Working hard on a difficult problem for an extended period of time only pays off for really smart students	
50	If a person tries too hard to understand a problem, they will most likely just end up being confused	
51	Almost all the information students can learn from a textbook they will get during the first reading.	
52	Usually students can figure out difficult concepts if they eliminate all outside distractions and really concentrate.	
53	A really good way for students to understand a textbook is to re-organize the information according to their own personal scheme	
54	Students who are "average" in school will remain "average" for the rest of their lives.	

55	A tidy mind is an empty mind	
56	An expert is someone who has a special gift in some area	
57	Students appreciate instructors who organize their lectures meticulously and then stick to their plan	
58	The best thing about science courses is that most problems have only one right answer.	
59	Learning is a slow process of building up knowledge	
60	Today's facts may be tomorrow's fiction	
61	Self-help books are not much help	
62	Students will just get confused if they try to integrate new ideas in a textbook with knowledge they already have about a topic	
63	You can believe almost everything you read	

Appendix F

Epistemological Beliefs Questionnaire – Student Version

(EBQ-T-S)

Complete this questionnaire by rating your agreement with each item from 1 (strongly disagree) to 5 (strongly agree)

	1 (Strongly Agree)	2 (Agree)	3 (Neutral)	4 (Disagree)	5 (Strongly Disagree)
1	My professors believes that if a student is ever going to be able to understand something, it will make sense to them the first time he/she hears it.				
2	My professor believes that the only thing that is certain is uncertainty itself.				
3	My professor believes that, for success in university, it's best for students not to ask too many questions				
4	My professor believes that a course in study skills would probably be valuable for students				
5	My professor believes that how much students get out of university mostly depends on the quality of the teacher				
6	My professor believes that students often wonder how much their teachers really know				
7	My professor believes that ability to learn is innate				
8	My professor believes that it is annoying for students to listen to a lecturer who cannot seem to make up his/her mind as to what he/she really believes				
9	My professor believes that successful students understand things quickly				
10	My professor believes that a good teacher's job is to keep her/his students from wandering from the right track				
11	My professor believes that if scientists try hard enough, they can find the truth to almost anything				
12	My professor believes that students who challenge authority are over-confident				
13	My professor believes that students should try their best to combine information across chapters or even across classes				
14	My professor believes that the most successful students have discovered how to improve their ability to learn.				
15	My professor believes that things are simpler than most professors would have students believe				
16	My professor believes that the most important aspect of scientific work is precise measurement and careful work				
17	My professor believes that studying means getting the big ideas from the text, rather than details				
18	My professor believes that educators should know by now which is the best method: lectures or small group discussions				
19	My professor believes that going over and over a difficult textbook chapter usually won't help you understand it				
20	My professor believes that scientists can ultimately get to the truth				

21	My professor believes that you never know what a book means unless you know the intent of the author.	
22	My professor believes that the most important part of scientific work is original thinking	
23	My professor believes that if students find the time to re-read a textbook chapter, they get a lot more out of it the second time	
24	My professor believes that students have a lot of control over how much they can get out of a textbook	
25	My professor believes that genius is 10% ability and 90% hard work	
26	My professor finds it refreshing to think about issues that authorities can't agree on	
27	My professor believes everyone needs to learn how to learn	
28	My professor believes that when students first encounter a difficult concept in a textbook, it's best for students to work it out on their own	
29	My professor believes that a sentence has little meaning unless you know the situation in which it is spoken	
30	My professor believes that being a good student generally involves memorizing facts	
31	My professor believes that wisdom is not knowing the answers, but knowing how to find the answers	
32	My professor believes that most words have one clear meaning	
33	My professor believes that truth is unchanging	
34	If a person forgot details, and yet was able to come up with new ideas from a text, my professor would think they were bright.	
35	My professor believes that whenever students encounter a difficult problem in life, it is good for them to consult with their parents.	
36	My professor believes it's often necessary for students to learn definitions word-for-word to do well on tests.	
37	My professor believes that when students study, they should look for the specific facts	
38	My professor believes that if a student can't understand something within a short amount of time, they should keep on trying.	
39	My professor believes that sometimes students just have to accept answers from a teacher even though they don't understand them	
40	My professor believes that, if professors would stick more to the facts and do less theorizing, students could get more out of university	
41	My professor does not like movies that don't have an ending	
42	My professor believes that it takes a lot of work for students to get ahead	
43	My professor believes that it's a waste of time to work on problems which have no possibility of coming out with a clear-cut and unambiguous answer.	
44	My professor believes that students should evaluate the accuracy of information in a textbook, if they are familiar with the topic	
45	My professor believes that, often, even advice from experts should be questioned	
46	My professor believes that some people are born good learners, others are just stuck with limited ability	
47	My professor believes that nothing is certain, but death and taxes	
48	My professor believes that really smart students don't have to work hard to do well in school	

49	My professor believes that working hard on a difficult problem for an extended period of time only pays off for really smart students	
50	My professor believes that if a person tries too hard to understand a problem, they will most likely just end up being confused	
51	My professor believes that almost all the information students can learn from a textbook they will get during the first reading.	
52	My professor believes that usually students can figure out difficult concepts if they eliminate all outside distractions and really concentrate	
53	My professor believes that a really good way for students to understand a textbook is to re-organize the information according to their own personal scheme	
54	My professor believes that students who are "average" in school will remain "average" for the rest of their lives.	
55	My professor believes that a tidy mind is an empty mind	
56	My professor believes that an expert is someone who has a special gift in some area	
57	My professor believes that students appreciate instructors who organize their lectures meticulously and then stick to their plan	
58	My professor believes that the best thing about science courses is that most problems have only one right answer.	
59	My professor believes that learning is a slow process of building up knowledge	
60	My professor believes that today's facts may be tomorrow's fiction	
61	My professor believes that self-help books are not much help	
62	My professor believes that students will just get confused if they try to integrate new ideas in a textbook with knowledge they already have about a topic	
63	My professor thinks you can believe almost everything you read	

Appendix G

Self-Efficacy for Performance Scale

DIRECTIONS: Rate how confident you are in your ability to successfully perform each of the following items for EDD-101 Strategy Library Assignment.

Note: You are not being evaluated on your confidence level. Please answer honestly.

Rate your confidence by recording a number from 0 to 100 using the scale

0	10	20	30	40	50	60	70	80	90	100
Definitely Cannot Do it It		Probably Cannot		Maybe			Probably Can			Definitely Can Do

I am confident I can successfully:

	1. Provide consistently good strategy examples
	2. Provide deep course theories and processes to justify my strategies
	3. Anchor my strategy examples in my real learning activities
	4. Choose appropriate evaluation scales for my strategies
	5. Provide a basic overview of my strategy
	6. Generate strategies customized to my strengths and weaknesses as a learner
	7. Justify my strategies using course concepts
	8. Use good sources of information to justify my strategies
	9. Create customized strategy evaluation scales for my strategies
	10. Complete this assignment in accordance with what Dr. Hadwin believes about learning about knowledge
	11. Demonstrate knowledge of course concepts in my strategy library
	12. Divide my time across the two main parts of the task.
	13. Generate innovative strategies
	14. Present thorough descriptions/explanations of my strategies
	15. Create examples that would help another student use the strategy
	16. Anchor my descriptions in course content
	17. Generate 5 strategies
	18. Use the term "strategy" in this assignment
	19. Complete this assignment in accordance with the expectations of this discipline.
	20. Provide step by step instructions on how to use my strategies
	21. Demonstrate my knowledge of how learning strategies work
	22. Show ways to monitor the effectiveness of my learning strategies
	23. Demonstrate the most important type of thinking in this task
	24. Demonstrate the most important type of knowledge targeted by this task
	25. Demonstrate understanding of the course concepts covered over the term
	26. Use appropriate resources for completing this assignment
	27. Apply the Self-Regulated Learning Cycle in this assignment
	29. Demonstrate my understanding of topics/processes relevant to my

	strategies
	30. Create 5 strategy illustrations/examples
	31. Present strategies rather than tactics or techniques
	32. Create customized evaluation scales for my strategies
	33. Provide superior descriptions of my strategies
	34. Justify the effectiveness of my strategies using outside sources
	35. Provide creative examples of strategies
	36. List the learning tasks in which I have used my strategies
	37. Use the term “strategy illustration” in this assignment

Appendix H

Participant Consent Form



UVic

Department of Educational
Psychology & Leadership Studies

Participant Consent Form

Technology Integration and
Evaluation Research Lab

Evaluating Student Learning and the ED-D101 Course

You are invited to participate in a study entitled *Evaluating Student Learning and the ED-D 101* course that is being conducted by Dr. Allyson Hadwin (Principal Investigator). Dr. Hadwin is a Faculty member in the department of Educational Psychology and Leadership Studies at the University of Victoria. This research is being funded by the Social Sciences and Humanities Research Council of Canada (SSHRC-INE grant), the University of Victoria (LTCDG), and the Canadian Foundation for Innovation (CFI-LOF).

Purpose, Objectives, and Importance of Research

This research project will examine: (a) how students who have taken ED-D101 compare with students who have not according to standard performance indicators collected by Institutional Planning and Analysis, (b) how students self-regulate their learning and use of strategies during the course. Research of this type is important because it will inform: (a) evidence based decision making regarding future offerings, expansion of the course, course content and course activities, and (b) advance theory and research in educational psychology by informing understandings about how students learn to strategically regulate their learning over time.

What does participation in this study involve

You are being asked to participate in this study because you are enrolled in the course ED-D 101: Learning strategies for University success. All data examined in this research are part of your regular course activities. We are requesting permission only to analyze and review this data for research purposes after the course is completed and your final grades have been submitted. If you agree to voluntarily participate in this research, your participation will include allowing us to analyze for research purposes: information you produce as part of your regular course activities (e.g., self-assessment questionnaires, written assignments, computer based discussions) course based studying activities when using the gStudy software to complete course readings and assignments, provided you have agreed to have that information recorded when you first login to use the software institutionally collected performance indicators such as entering GPA, yearly GPA, exit surveys, will be examined for the entirety of your undergraduate degree. Data will be anonymized.

Risks and Benefits

There are no known or anticipated risks to participating in this research. By participating in this research, you will provide invaluable information that will be used to improve the course and its value for future undergraduate students. The potential benefit is that this course evaluation will lead to: (a) improving the course design, (b) making evidence-based decisions about the future of the course, and (c) improving our understandings about how students learn to self-regulate their learning over the course of a semester.

Voluntary Participation

Your participation in this research must be completely voluntary. If you do decide to participate, you may withdraw at the end of the course without any consequences. Consent forms will be made available in paper copy at the beginning of the course, and electronically at the end of the course. At the end of the course you can login in to either add consent that you did not provide at the beginning of the course, or withdraw consent. When you use the software for this course for the first time, you will be asked to indicate if it is ok to record your studying actions. This type of data is used in usability testing and for researching how students use the software to learn. If you do not consent to participate in the research study by signing this form, we will not access or use any logged data for research purposes. It may only be examined to make improvements to the software.

Anonymity and Confidentiality

Since data consists of course assignments and activities, they will be saved/recorded with identifying information (your name and student number). Therefore data will not be anonymous. However, we will protect confidentiality in the following ways: (1) Data will be summarized and stored in a spreadsheet that will identify participants by a random case number rather than name or student ID. (2) Data reported in publications and presentations will be: (a) summarized across students, or (b) presented using pseudonyms in cases where specific examples are used.

Researcher's Relationship with Participants

Dr. Hadwin is your course instructor so she will leave the room when you complete the consent forms. Consent forms will be placed in a sealed envelope and delivered directly to the Dean of Education's office where they will be kept until Dr. Hadwin has submitted your final course grades. Therefore, Dr. Hadwin will not know if you have or have not consented to participate in the research until she is no longer your course instructor.

Analysis of Data and Dissemination of Results

Data will be analyzed by Dr. Hadwin and collaborators on her research project. Findings from this study will be shared in academic publications and presentations, a web bulletin on the TIE website, graduate student thesis work, and reports to senior administrators and undergraduate instructors. Examples from student work will be used in future ED-D101 course offerings but all identifying information will be removed from those examples.

Disposal of Data

Data from this study will be kept for approximately 10 years as it is part of a longitudinal evaluation of the ED-D101 course and its influence on student performance at University. Paper based data will be stored in a locked filing cabinet in the TIE research lab (A210D MacLaurin) after which it will be shredded. Electronic data will be archived and stored anonymously on a password protected server accessible to the researchers. After approximately 10 years the electronic files will be erased.

Contacts

You may contact the following people if you have further questions, comments, concerns or wish to verify information about the study:

During the course: Mika Oshige (mikao@uvic.ca), or Dr. Ted Riecken (deaneduc@uvic.ca)

After the course: Dr. Allyson Hadwin (hadwin@uvic.ca)

Human Research Ethics Office at the University of Victoria (250-472-4545 or ethics@uvic.ca).

Your signature below indicates that you understand the above conditions of participation in this study and that you have had the opportunity to have your questions answered by the researchers.

Name of Participant

Signature

Date

I am willing to be contacted for a follow up interview after the completion of the course and can be contacted as follows:

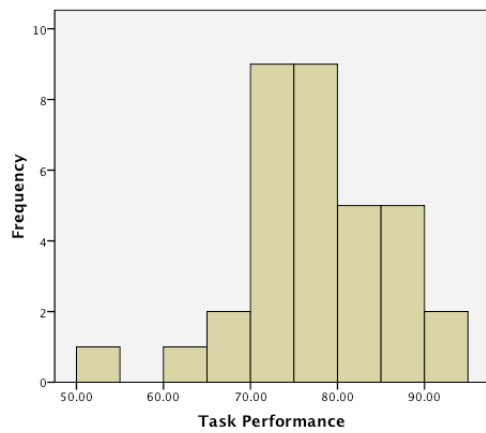
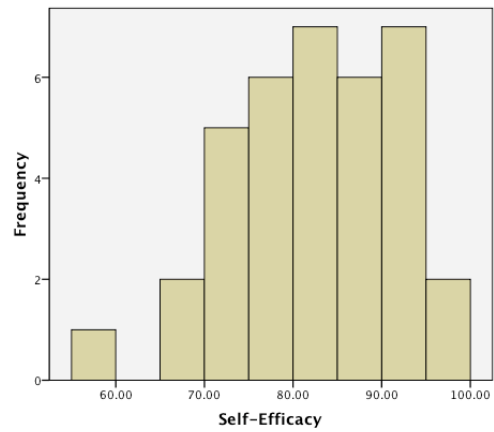
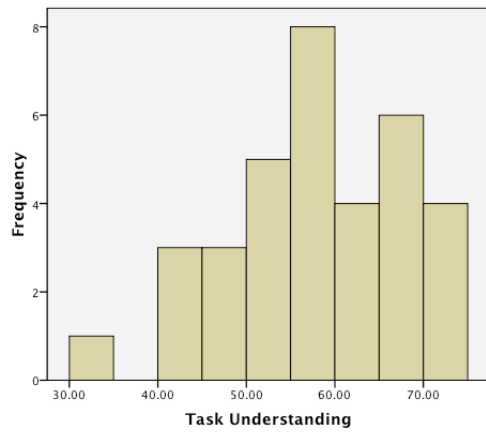
Email: _____

Phone: _____

A copy of this consent will be emailed to you and a paper copy will be taken by the researcher.

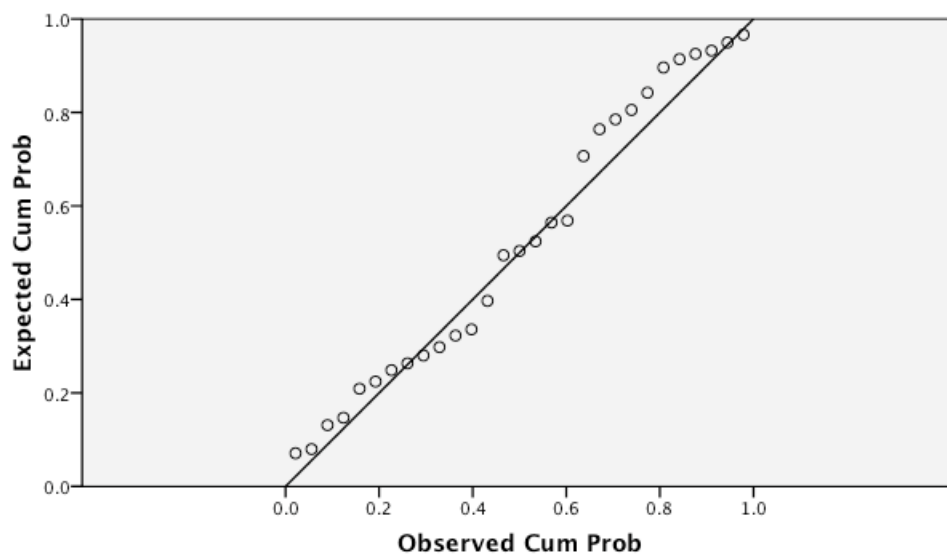
Appendix I

Histograms of task understanding (left), self-efficacy (right), and task performance (bottom) variables.



Appendix J

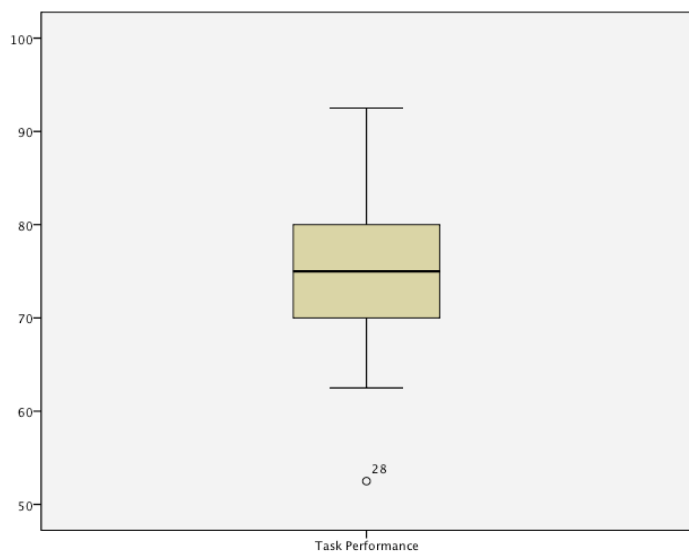
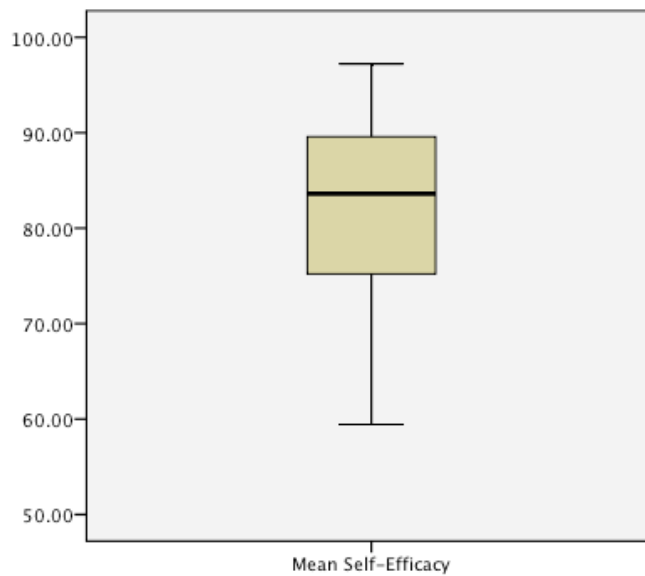
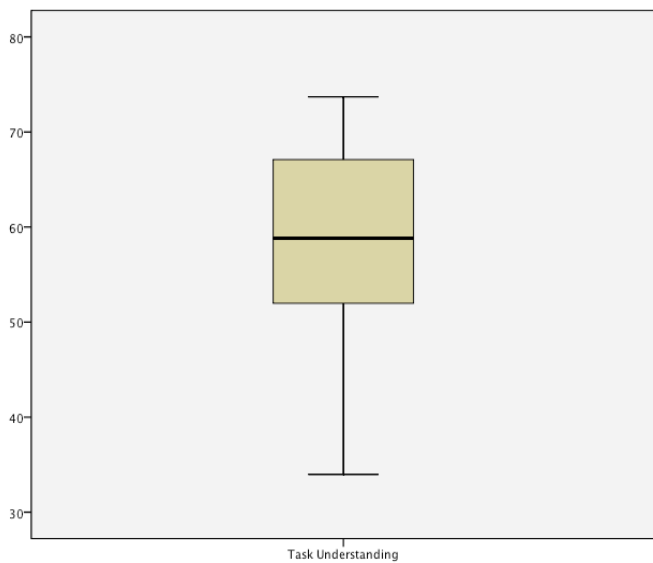
Normal probability plot of regression for outcome variable of task performance



Appendix K

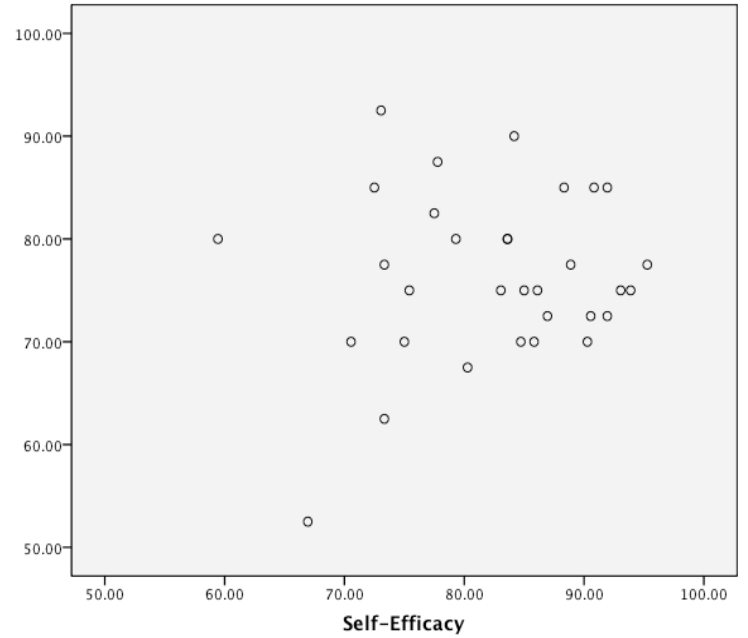
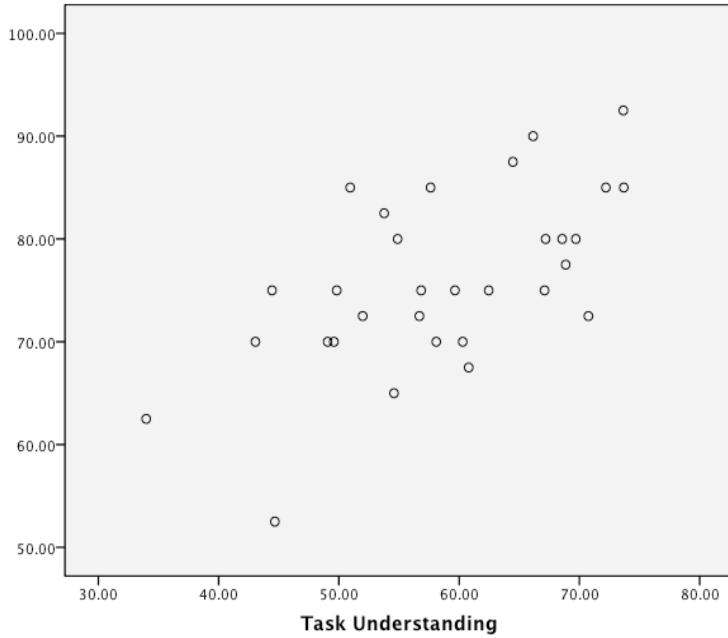
Boxplots of task understanding (left), self-efficacy (right), and task performance (bottom)

variables.



Appendix L

Scatterplots of task understanding (left) and self-efficacy (right)



Appendix M

Scatterplot of regression residuals

