

**Evidence of Disequilibrium and Changes in
Metacognitive Awareness in Prompted Co-Operative
Students' Work Term Blogs**

by

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Abstract

This study examined how 26 co-operative education students responded to either explicit or implicit metacognitive prompts in their biweekly written reflections in one of two closed group blogging environments during their first work terms. Fourteen female and 12 male undergraduate students from six faculties volunteered to participate in lieu of completing conventional end of work term reporting. Each group received four metacognitive prompts, either explicit or implicit, based on Winne and Hadwin's four-phase model of self-regulation. Prompts guided participants to reflect every two weeks on how they defined, planned, conducted, and evaluated workplace tasks. Pre-treatment assessments included metacognitive awareness, as assessed by the Metacognitive Awareness Inventory, and autonomy, as assessed by the Self-Determination Scale. Post-treatment assessment was via a second administration of the Metacognitive Awareness Inventory. Exploratory analysis revealed qualitative evidence of disequilibrium, as theorized by John Dewey, in both prompting conditions. Explicit and implicit metacognitive prompting conditions lead to distinct frequencies and qualities of affect, increased references to prompt language, lengthier postings, and an inverse relationship between participant autonomy and changes in metacognitive awareness over a 13-week work term. Results confirmed the effectiveness of Winne and Hadwin's four-phase model of self-regulation as a basis for guiding prompts to increase undergraduate student metacognitive awareness, especially among students who scored lower on the autonomy measure when given explicit metacognitive prompts. This project revealed how social media and metacognitive prompting were successfully used in a field setting to foster reflection and metacognitive awareness in co-operative education students as they completed their first work terms.

Keywords: blogs; reflection; workplace learning; metacognitive prompting; disequilibrium; autonomy

*To my parents for showing me the way.
To Landon, Jon and David for helping me get there.*

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Table of Contents

Approval.....	ii
Partial Copyright Licence	iii
Ethics Statement.....	iv
Abstract.....	v
Dedication	vi
Acknowledgements	vii
Table of Contents.....	viii
List of Tables.....	x
List of Figures.....	x

Chapter 1. Description of the Problem	1
1.1. Purpose of the Study	4

Chapter 2. Review of Related Literature	6
2.1. Reflection	6
2.1.1. Affect and Learning.....	11
2.1.2. Prompting Reflection.....	12
2.2. The Adult Learner.....	15
2.3. Nature of Co-operative Education Work Terms	16
2.4. Use of Technological Tools for Students on Work Terms	18

Chapter 3. Method.....	21
3.1. Research Objectives	21
3.2. Research Questions	22
3.2.1. Exploratory questions.....	22
3.3. Participants	22
3.4. Measures	25
3.5. Procedure.....	26
3.6. Qualitative Analysis	32
3.7. Quantitative Analysis	37

Chapter 4. Results.....	38
4.1. Computer Familiarity	38
4.2. Metacognitive Awareness.....	40
4.3. Audience Awareness.....	41
4.4. Research Questions	43
4.4.1. All Affect.....	44
Posting 687: Group 1 (Explicit); Δ MAI +13; SDS 39	45
Posting 860: Group 1 (Explicit); Δ MAI +8; SDS 44	47
Posting 684: Group 1 (Explicit); Δ MAI +15; SDS 42	49
Posting 258: Group 2 (Implicit); Δ MAI -8; SDS 41	50

Posting 885: Group 2 (Implicit); Δ MAI -23; SDS 47	51
4.4.2. Uncertainty.....	53
4.4.3. Prompt Reference.....	54
Coded Qualitative Examples of Prompt Frequency	55
Posting 36: Group 1 (Explicit); Δ MAI +37; SDS 36	56
Posting 164: Group 2 (Implicit); Δ MAI +19; SDS 35	57
4.4.4. Proximity	57
4.4.5. Blog Length.....	58
Blog Posting 197: Group 2 (Implicit); Δ MAI -2; SDS 47.....	62
Chapter 5. Discussion and Implications for Future Research	64
5.1. Disequilibrium.....	66
5.2. Methodological Implications and Limitations.....	71
5.3. Conclusions and Future Implications	75
References	78
Appendix A. Consent Form	82
Appendix B. Demographic Form.....	84
Appendix C. Metacognitive Awareness Inventory	86
Appendix D. Self-Determination Scale.....	89
Appendix E. Explicit Metacognitive Prompts.....	90
Appendix F. Implicit Metacognitive Prompts	91
Appendix G. Blogging Community Entry Page View	92
Appendix H. Sticky Welcome Message	93
Appendix I. Student Blog View	94
Appendix J. Prompt Reminder	95
Appendix K. Final Communication.....	96

List of Tables

Table 3.1.	Demographics.....	23
Table 3.2.	Group Demographics	24
Table 3.3.	Group Pre-Assessment Scores	27
Table 3.4.	Explicit and Implicit Metacognitive Prompts.....	28
Table 3.5.	Key Metacognitive Elements of Prompting Language	29
Table 3.6	Coding Rules.....	34
Table 3.7.	Types of Numbered and Unnumbered Prompt References	36
Table 4.1.	Group 1 (Explicit) and Group 2 (Implicit) Computer Familiarity	39
Table 4.2.	Group Pre- and Post MAI Scores	41
Table 4.3.	Group Net Change in MAI Scores	41
Table 4.4.	Summary of Group 1 (Explicit) and Group 2 (Implicit) Dependent Measures	44
Table 4.5.	Level of Prompt Engagement and Change in Metacognitive Awareness	60

List of Figures

Figure 2.1.	Winne-Hadwin COPES Model of Self-Regulated Learning (1998).....	9
Figure 2.2.	Affective Phases of Learning.....	12
Figure 2.3.	Adult Blogging Participation Rate 2007 and 2009.....	19
Figure 2.4.	Adult Blog Posting Participation Rate 2007 and 2009.	19
Figure 4.1.	Group Affect Frequency	52
Figure 4.2.	Prompt Reference Frequency by Group and Sub-Group.....	55

Chapter 1.

Description of the Problem

This research explored reflection in co-operative education students' work term blogs as hypothesized by one of history's most acclaimed educational theorists: John Dewey. A firm footing on how Dewey visualized reflection, an important construct in current educational theory and pedagogy, made it possible to observe traces of reflection in student writing. Dewey's description of the origins, nature, and consequences of reflection served as part of the theoretical framework for this study and ultimately shaped the analysis and conclusions in a delightfully surprising, but unexpected, and metaphorical manner characteristic of Dewey's own words:

Thinking begins in what may fairly enough be called a *forked-road* situation, a situation which is ambiguous, which presents a dilemma, which proposes alternatives. As long as our activity glides smoothly along from one thing to another, or as long as we permit our imagination to entertain fancies at pleasure, there is no call for reflection. Difficulty or obstruction in the way of reaching a belief brings us, however, to a pause. In the suspense of uncertainty, we metaphorically climb a tree; we try to find some standpoint from which we may survey additional facts and, getting a more commanding view of the situation, may decide how the facts stand related to one another...*Demand for the solution of a perplexity is the steadying and guiding factor in the entire process of reflection* (1910, p. 11).

University learners in co-operative education work terms are in transition. They have not yet fulfilled their program requirements for graduation; yet, they have begun to establish themselves as part of the workforce in their chosen fields. This leap from classroom to workplace learning may challenge learners in novel ways. For example, learning is usually not the sole focus of a typical work day, nor is it anchored to particular hours of the day as it is in conventional schooling. Further, there may be no external assessment or direct reward accompanying learning at work. And, unlike academic

classrooms, there is not likely to be a group of similarly-aged peers moving simultaneously through a lengthy, structured learning experience.

These differences may challenge a learner's established self-regulation surrounding the integration of new knowledge into their existing schema. Examples of metacognitive activities that may precede or accompany workplace learning could be adults' recognition they lack understanding, their decision to increase their efforts to focus on their work, or their deliberate recall of prior knowledge that they believe may help them in the present situation. The first activity represents metacognitive monitoring and the next two activities are examples of metacognitive control. Undergraduate students may not be adept at thinking and acting metacognitively. We do know, however, that they are practiced learners who have years of experience coping, for better or worse, with new learning.

Research is needed to examine what metacognitive activities underpin adult learning in the workplace, how aware individuals are of their thought processes as they learn on the job, and what aspects of learning individuals recollect, reflect on, and choose to share with peers undertaking a similar experience. Further, we don't know what, if any, influence can be exerted by University or employer sources to change how students in a first work term placement describe their workplace learning or, ideally, transfer prior learning from academic courses or workplace tasks to future challenges. This research addressed both theoretical and pedagogical aspects of reflective writing during co-operative education student work terms. Using a mixed methods design, I carried out a discourse analysis of the effects of two conditions of metacognitive prompting on student reflective writing in co-operative education work term blogs. In addition, I monitored changes to student metacognitive awareness over the course of 13 weeks relative to student autonomy and qualitative aspects of student reflective writing.

Analysis of reflective writing is an inexact science – a measured balance between calculated assumptions and theoretical models. Extending this framework to deduce anything about actual reflection adds a layer of complexity to these calculations. This research used the concept of reflection proposed by John Dewey as beginning with a state of uncertainty and imbalance (1910). Winne and Hadwin's model of self-regulated learning (1998), which proposed four phases of learner reflective activities

performed during a learning task, shows many parallel qualities with Dewey's descriptions of reflection when used to think and learn. This study employed Dewey's definition and Winne and Hadwin's four-phase model to build both an explicit and an implicit metacognitive prompting framework upon which student reflective writing could be prompted and analyzed. Specific metacognitive traces found in students' reflective writing during discourse analysis were construed as indicators of uncertainty and affect. In combination with an effort measure (blog length), these traces were identified as representative of disequilibrium. Hence, this supported the extent to which students in co-operative education work terms were influenced to reflect by two forms of metacognitive prompting according to the Winne-Hadwin (1998) model of self-regulated learning. Qualitative discourse analysis of students' reflective writing was an unobtrusive means to record and analyze these traces and other reflective elements of self-regulated learning.

Blogs represent a largely untapped way for co-operative education students to maintain communication with a community of university peers and share and reflect on their workplace learning experiences. In addition, blogs offer an opportunity for researchers to explore this important, but temporary, shift from academic to workplace learning. Many questions remain unanswered with regard to students' first experiences in co-op work terms. This research explored how blogs can be used to capture reflective writing on learning in workplace environments for co-operative education students as they enter a work term for the first time. For co-op students engaged in work terms, learning through reflection traditionally meant completing end-of-semester reports with at least some retrospective reflective components. As time passes, retrospective reflection draws heavily on memory and reconstruction and may omit important details about workplace learning and self-regulated learning. Thus, blogs allow for reflective writing to be spaced throughout a work term and reduce memory effects found in conventional work term reporting.

A fresh perspective employing a novel use of online tools was employed in this study to address at least three shortfalls in our current understanding and use of student reflective writing activities in co-operative education. First, conventional work term reporting takes place after a work term concludes. Although this may capture overall impressions of the work term experience, it may be lacking in detail of everyday, but

noteworthy, elements of student learning experiences. Asking students to reflect in personal blogs while they are still working bridges what Schön described as *reflection-on-action* to *reflection-in-action* (1987) and may expand our understanding of how established learning strategies are applied in novel, and not necessarily well-structured, workplace learning environments. Second, this study applied a litmus test using Dewey's original conceptions of reflection (1910) and Winne and Hadwin's (1998) model of self-regulated learning to support the use of disequilibrium and affect as markers for reflection in reflective writing. Finally, this study prompted students according to the Winne-Hadwin (1998) model of self-regulated learning to monitor differential effects of prompting condition (explicit or implicit) in a qualitative discourse analysis and supported by exploratory quantitative analyses of affect, student autonomy and metacognitive awareness.

This research examined the nature of student reflections in an applied learning environment: the co-operative education work term. It used Dewey (1910) as the theoretical foundation for identifying traces of reflection using evidence of disequilibrium found in student reflective writing completed over the course of a 13 week semester. Additionally, its findings help to establish how two conditions of metacognitive prompting interventions (explicit or implicit) and a blogging environment may reveal patterns in student reflective writing and learner characteristics such as metacognitive awareness and autonomy. The full semester blogging environment allowed students to write reflectively every two weeks about a diversity of workplace experiences, including many involving learning new tasks. Each prompting condition was contained in a small group, confidential blogging space, thus creating an unsupervised platform for students to relate their stories about how they faced a common challenge: completing their first co-operative education work term.

1.1. Purpose of the Study

The purpose of this study was twofold: first, to compare the influence of two conditions of metacognitive prompting on reflection by examining learner disequilibrium located in student reflective blogs written over the course of a first co-operative education work term; and second, to examine how these two prompting conditions affect

metacognitive awareness, especially in relation to student autonomy. This study provided support for the influence of explicit and implicit metacognitive prompting on qualities of student reflective writing and metacognitive awareness in a co-operative education learning environment. Findings confirmed the utility of the Winne-Hadwin (1998) model of self-regulated learning in designing prompting interventions for adult learners in co-operative education work term blogs and described qualitative patterns in disequilibrium and affect in student reflective writing and relationships among prompting condition, learner autonomy, and changes in metacognitive awareness.

Chapter 2.

Review of Related Literature

Several key elements from reflection and learning inform this research. These include how reflection is *conceptualized*, how evidence of reflection is *observed* and *measured*, and how it can be *influenced* in adult learners in the workplace. Dewey's alignment of how people think, how and when reflection occurs, and how they learn is fundamental to this research problem (1910). His bridge between theory and pedagogy can illuminate aspects of more contemporary models of learning, self-regulation, and learning environments.

2.1. Reflection

In the Western tradition, reflection was first conceived as a mental operation by Locke in the 17th century (as cited in Georghiades, 2004). Almost 250 years later, Dewey linked mental deliberations constituting reflection to processes that included thinking, intelligence, and, most importantly, learning. He differentiated between reflection linked to casual or routine everyday occurrences and reflection that increases our knowledge and satisfaction with how we think (1910).

Dewey, in his examinations of how people think and learn, surmised that reflection begins with an awareness of conflict between what he described as "conditions at hand and a desired and intended result, between an end and the means for reaching it" (1910, p. 72). This gap between the present and future is a theme that reverberates through how reflection is defined and, as this research found, how it is measured and influenced. A central element to Dewey's premise was uncertainty brought about by an individual's awareness of a conflict. Without uncertainty, individuals are likely to embark on routine actions in response to observations. Uncertainty arises when events

challenge what an individual thinks they know or believe in some unexpected way. In the face of such incongruity, Dewey believed a "[d]emand for the solution of a perplexity is the steadying and guiding factor in the entire process of reflection" (1910, p. 11).

This impetus, but not the necessity, to reflect in the face of uncertainty is what Dewey called *disequilibrium*. An individual must persist and resolve ambiguities brought about by unexpected turns of experience in order to restore a "more extensive balance" (1934, p. 14). Without the unsettling experience of disequilibrium, there can be no reflection and no learning. Disequilibrium is an awareness that precedes and triggers subsequent reflection, if it is to occur. If a person elects to reflect in response to disequilibrium, he must actively remove or distance himself, even momentarily, from cognitive tasks to do so. Individuals first must recognize this dissonance and be sufficiently motivated and skilled for reflection to occur. According to Dewey, "One can think reflectively only when one is willing to endure suspense and to undergo the trouble of searching" (1933, p. 16). If reflection is triggered, the individual enters a period characterized by problem definition, explaining, strategizing, testing, and evaluating. With deliberate action as the conclusion of this process, the individual seeks a return to equilibrium.

Some individuals respond impulsively and intuitively when faced with uncertainty, which Dewey believed did not represent complex reflection found in more practiced learners, while others embarked on a journey of exploration (1910). Reflection that leads to learning is preceded by doubt involving making a judgment of some type. Reflection is effortful and sometimes painful because individuals must embark on a conscious search to overcome inertia, break away from impulsive or intuitive responses, and to tolerate a period where judgment is suspended while they seek a solution to their dilemma.

Dewey saw reflection as a sequence of distinct phases that could be over in an instant or sustained over time as individuals adapt to changing realities of their situation (1910). He envisioned each stage as "determin[ing] the next as its proper outcome, while each outcome in turn leans back on, or refers to, its predecessors. The successive portions of a reflective thought grow out of one another and support one another; they do not come and go in medley. Each phase is the step from something to

something..." (1933, p. 4). Although Dewey believed much thinking about every day observations and occurrences could also be termed *reflection*, reflection of educative value involved successive engagements in reflective thinking based on doubt and inquiry that, through gathering and contemplating evidence, cumulatively lead to conclusive thought (1910). Dewey saw that "equilibrium comes about not mechanically and inertly but out of, and because of, tension" (1934, p. 14). These iterations represent dynamic disequilibrium to equilibrium shifts in balance that are mediated by reflection and learning.

This historical view of reflection closely parallels a contemporary model of self-regulated learning put forward by Winne and Hadwin (1998) (see Figure 2.1). They proposed that learners may engage in self-regulated learning in any of four phases: 1) initial task perception; 2) goal setting; 3) activation and adaptation of the selected tactic; and, 4) evaluation and revision of their learning strategies. More specifically, learners perceive internal and external conditions related to the learning task, such as the nature of time, resources, knowledge, and motivation available to them. They set goals based on standards they will use to guide enactment and judge the success of their task. Students select and perhaps adapt tactics while carrying out the task. Each of these phases results in certain products. Students evaluate their products (the act of evaluating results in another product) and may revise their future strategies as a result.

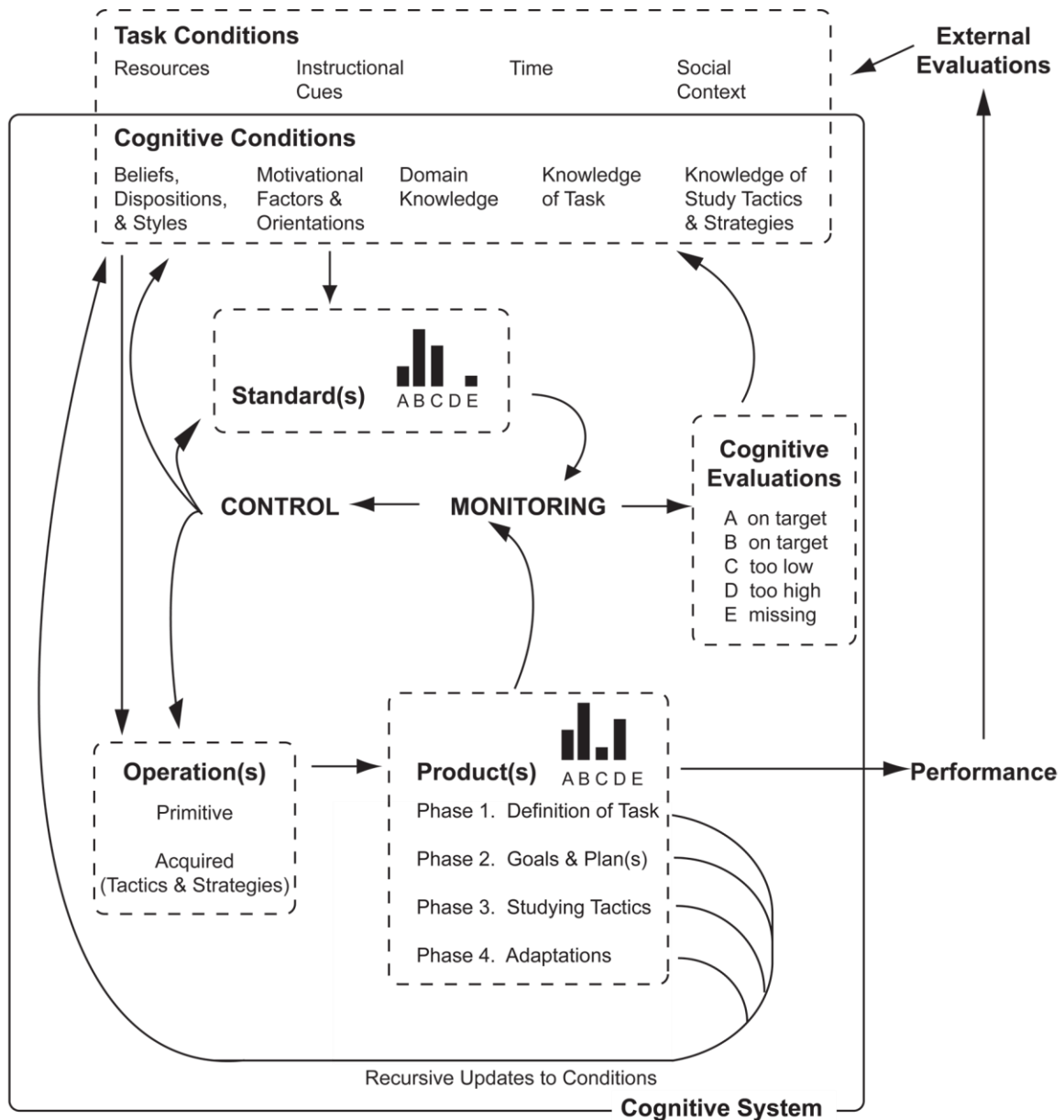


Figure 2.1. Winne-Hadwin COPES Model of Self-Regulated Learning (1998).
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Winne and Hadwin's (1998) model of self-regulated learning contains elements from Flavell's (1979) early descriptions of metacognition. Metacognition engages when a learner becomes aware that he is in a learning situation. Once aware, a learner may, through reflection, move on to the second component of metacognition, described by Flavell as monitoring and control (1979). In these metacognitive states, a learner

evaluates his learning with the potential to influence it by changing elements within himself or changing elements external to himself, such as the environment. Similarly, Winne and Hadwin (1998) describe a highly integrated model of self-regulation whereby learners become aware of conditions influencing their situation (both internal and external) through monitoring. These conditions, also known as metacognitive awareness, can be likened to a state of disequilibrium if they are evaluated by the learner to be deficient or discordant in some way. These are the basic awareness and comparisons described by Dewey (1910) that precede reflection, although the Winne and Hadwin model (1998) provides much more granular detail. Dewey's disequilibrium also represented a comparison between present conditions and expectations. When discrepancies arise, learners can choose to reflect as result of their judgements. In Winne and Hadwin's model, learners make comparisons against standards (i.e., expectations based on experience) as part of the metacognitive monitoring process.

Both Dewey's concept of reflection and the Winne-Hadwin model of self-regulated learning (1998) have no age or domain limitations to their application. Other models seem to overtly preclude the possibility of being used in non-academic adult learning. As an example, consider the maxims on constructivism put forward by Paris, Byrnes, and Paris based partly on their work from 1989 and from Piaget, Bruner, and others:

- "There is an intrinsic motivation to seek information. Understanding goes beyond the information given.
- Mental representations change with development.
- There are progressive refinements in levels of understanding.
- There are developmental constraints on learning.
- Reflection and reconstruction stimulate learning (2001, p. 254)."

The three middle principles clearly equate constructivist principles with developmental processes, which cannot be easily extrapolated into the 60-70 plus years we live as adults. These principles do not mention a turning point beyond which the adult would experience developmental regress, for example, when examining the statement "there are progressive refinements in levels of understanding" (p. 254). Similarly, if developmental constraints exist in very young children, but fade as we age, does that

mean there are no further developmental constraints during our adult years? When models fail to impose conditions that define their limitations for the full lifespan, researchers examining adult metacognition in the workplace are left wanting.

Evidence to confirm the Winne-Hadwin model of self-regulated learning (1998) may be found in learners' metacognitive monitoring, where they make comparisons and judgments regarding standards they hold and the products of their cognitive operations that lead to performance. When these judgments show discrepancies, task and cognitive conditions change. Winne and Hadwin describe these evaluations precisely in terms familiar to the historical view of Dewey's disequilibrium (1910). Importantly, these evaluations can influence learners' cognitive states, such as their beliefs, dispositions, styles, and motivation. When disequilibrium results in an affective or heightened response to current conditions, traces may be found in ancillary products of student performance, such as written reflections.

2.1.1. Affect and Learning

Although this study stops short of causal links between reflection and learning, it is noteworthy that educational psychology researchers identified uncertainty as an affective state related to learning performance. Kort, Reilly, and Picard proposed a model depicting phases of positive and negative affect according to whether they supported or thwarted learning (2001) (see Figure 2.2). They place uncertainty, shown in the model as *puzzlement* and *confusion* in quadrant II, as negative affect linked to increased learning.

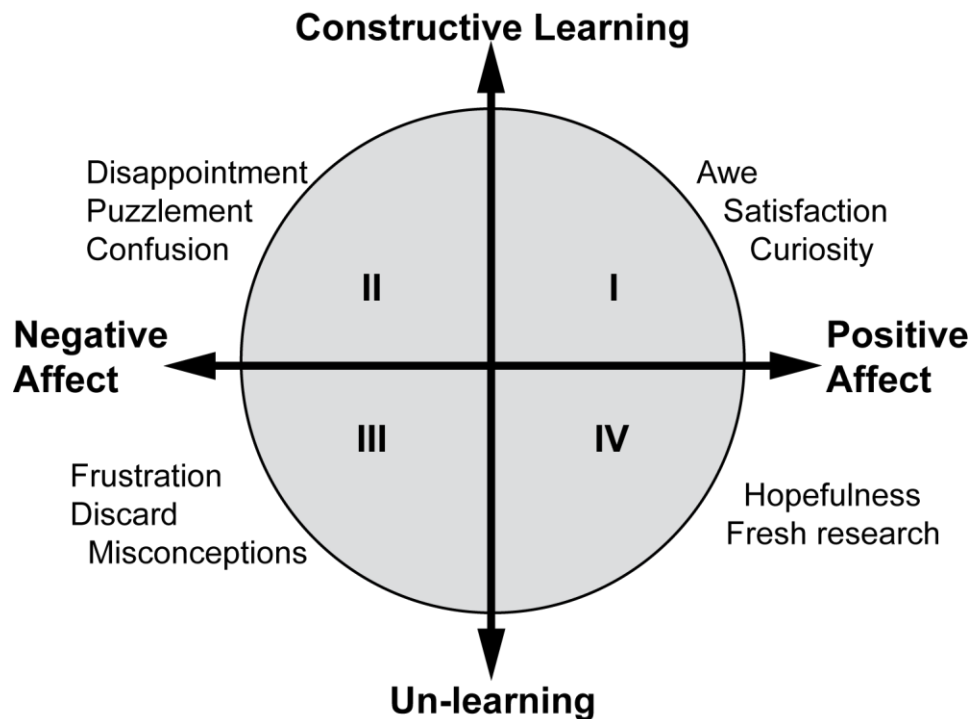


Figure 2.2. Affective Phases of Learning. (Kort, Reilly, & Picard, 2001). Used with permission © 2001 IEEE.

2.1.2. Prompting Reflection

Historically, research into prompting (sometimes referred to as metacognitive cues or scaffolds in the literature; collectively referred to as *prompts* hereafter) was split between measuring learning performance and products of self-regulated learning (Davis, 1998). Earlier work by Scardamalia, Berieter, and Steinbach (1984) showed learners were able to respond to metacognitive prompts independently to improve reflective writing. Schunk and Zimmerman (1998) demonstrated students increased performance on cognitive tasks with a gradual withdrawal of prompted instruction that provided students with explicit instruction in self-regulated learning. Teacher or tutor involvement gradually faded in order to allow students to apply self-regulated learning strategies on future tasks on their own. Metacognitive instruction was a means for teachers to accommodate individual student differences by selectively adapting metacognitive guidance throughout the learning process. To be effective, this instruction needed to be integrated into cognitive tasks, explain how students should apply selected strategies, and allow sufficient time for students to learn and implement self-regulation skills (Bannert, 2006). In a study done by Watson and Allen (2002), a learning activity for 5th

grade boys and girls was embedded in a familiar classroom context and use of metacognitive prompts was explained; however, the entire pre-posttest interval was only 20-30 minutes. Although students increased metacognitive awareness scores over this fairly short time interval, they showed mixed results in terms of posttest performance on a learning activity. Thus, conditions such as strategy training, domain knowledge and familiarity, and time may no longer be sufficient considerations to design effective metacognitive prompts. According to the Winne-Hadwin model of self-regulated learning (1998), task conditions are only a subset of the inputs to the cognitive processing that precede self-regulated learning and performance on learning tasks. Internal learner conditions, including how task conditions are evaluated by a learner considering his tactical and domain knowledge, his affective state, and his unique standards built from experience, are unknowns. Measuring research outcomes solely in relation to cognitive elements may not be sufficient to capture the effects of prompting interventions. Measuring metacognitive outcomes from metacognitive prompting seems to be a logical way to address this potentially complicated theoretical model and causal relationship.

Metacognitive prompt structure has been defined many times in the literature over the past 15 years. These prompts often contain elements similar to those found in the Winne-Hadwin (1998) model of self-regulated learning. For example, Corliss (2005) designed metacognitive prompts that guided students to examine how they understood problems, set goals, drew upon prior knowledge, accessed tools and resources, monitored their progress, compared strategies, and finally, evaluated their learning. Similarly, van den Boom, Paas, van Merriënboer, and van Gog (2004) designed metacognitive prompts in three broad categories: *forethought*, which were designed to capture students' perceptions of a task and their plan to address it; *intermediate*, which focused on ongoing student judgements of whether adaptations to strategies were needed; and *afterthought*, which was a broader evaluative category looking back on student selection and use of cognitive strategies. Thus, the Winne-Hadwin model supports a broadly-accepted individualized view of self-regulated learning that can be used to design prompting interventions to help learners.

Designing research that uses metacognitive prompting followed by monitoring metacognitive outputs is a straightforward way to examine both the utility of a self-regulated learning model and characteristics of prompted reflective writing. As with

other research mentioned here, intervening at the point students monitor each of Winne-Hadwin's (1998) four phases of a task may, according to the model, lead to changed conditions and learner self-regulation. Accurate learner monitoring at this point potentially considers all task and cognitive conditions, standards, and evaluations. It still allows adjustment to the system if learner evaluation deems it necessary; however, it also takes place most immediate to performance and the potential for external evaluation. Learner disequilibrium at any of these four phases of self-regulated learning has the potential to influence the task and cognitive conditions themselves, which could result in changes to any cognitive or task conditions, including learner affect.

Thus, prompting for reflection works, but not always. Prompting seems most successful when accompanied by appropriate support and sufficient incentive. According to Oliver and Hannafin (2000), providing prompts by themselves does not ensure learners will use them correctly, if at all. They further stated prompts can fail if learners perceive them as a distraction. They linked poor learner response to metacognitive prompting to a lack of metacognitive awareness in some learners. When knowledge of how and when to strategically use prompts is not given, learners with lower metacognitive awareness may struggle. Bannert (2006) concurred with this assumption, but found undergraduate learners have sufficient levels of metacognitive awareness to respond to even the most basic forms of metacognitive prompting. Davis (2003) found that student reflection is more productive when students were given generic rather than metacognitively directed prompts that nevertheless contained appropriate levels of scaffolded organization. Mid-to-highly autonomous learners, however, may be negatively affected by more direct metacognitive prompting. Davis concluded these middle school learners work best when left to their own autonomous styles when reflecting. Davis concluded by noting negative aspects of direct prompts may derail all learners, but especially those who scored higher in autonomy on a researcher-developed belief scale. She called for more research into the potential differential effects of prompt structure on learner metacognitive awareness relative to student autonomy. Inconsistent findings from prompting research confirm the importance of considering individual learner differences when interpreting empirical results, especially with regard to adult learner metacognitive awareness and autonomy.

2.2. The Adult Learner

Undergraduate students are not necessarily autonomous, self-directed learners. From their very first moments of consciousness, they have been learning through their responses and experiences, building a personal arsenal of both cognitive and metacognitive knowledge and skills. They are products of years of schooling that may have led to poorly structured learning habits, orientations, and strategies. Students entering postsecondary education bring with them this knowledge of at least 18 years of learning and perhaps a great deal more if informal learning experiences are considered. These metacognitive experiences represent decades of testing various strategies and weighing outcomes and are likely to be great influences on how students approach learning in a more autonomous University environment.

Learners who have poorly developed self-regulation skills and who do not have experience with effective learning strategies may be especially challenged when faced with applying learning practices honed during formal education to a new learning environment: the co-operative education workplace. Ennis (1990) traces these difficulties back to problems with adaptation of self-regulated learning skills by both less and more capable self-regulated learners in a novel learning environment. When faced with such difficulties, Evensen, Salisbury-Glennon, and Glenn (2001), in a longitudinal study looking at self-regulation in first year students, discovered students will employ tried-and-true strategies used in familiar, but not necessarily applicable, learning environments. According to Boekaerts (1997), placing previously successful learners in a novel learning environment immediately causes them to revert to novice learners because of a lack of contextual experience. This regression to a novice state may cause learners, already in an unfamiliar environment, to enter a state rife with additional stress and uncertainty (Evensen et al., 2001). Especially for novices, rising to the challenge of a new learning environment may require adaptation of existing and development of new skills in self regulation, a process Winne (1995) argued could be facilitated. This presents an opportunity for University co-operative education programs to provide support for students to make this transition to new workplace learning environments in a constructive, efficacious manner. Assisting co-operative education students to develop increased, skillful self regulation whereby they can identify the requirements of a task,

formulate learning goals, including resource selection, activate and adapt learning strategies, and evaluate task and strategy outcomes is a desirable undertaking for University co-operative education programs.

Thus, formal opportunities to learn may be less frequent, more sporadic, and less structured in adulthood than when these learners were in grade school. However, by placing learners familiar with formal learning into a novel learning environment, their first co-operative education work term, this research sought to capture evidence of adult disequilibrium as expressed in reflective writing during a rare period for adult learners of rapid change and new learning.

2.3. Nature of Co-operative Education Work Terms

Wendlandt and Rochlen described three stages – anticipation, adjustment, and achievement – typically found in a successful transition between being a university student to being a new employee (2008). Although the first two stages may begin upon entry into the new workplace, the third stage, achievement, requires socialization into organizational culture (Wendlandt & Rochlen, 2008). However, even after one year, new graduates placed in their first jobs lacked basic understanding of their new organization's culture (Kammerlyer-Mueller & Wanberg, 2003). Thus, combined with the known temporary and short term nature of a co-op job placement, successful transition seems unlikely to occur for work term students.

For students in their first career work term placements, learning shifts from being a formalized activity to a less formal one rooted in authentic tasks in a workplace. Unlike conventional schooling, which uses course outlines and familiar learning and assessment cycles, learning targets, structures, and periods of review may not be as well defined in a workplace. Learning, feedback, and assessment are no longer strongly structured with usually clear expectations. Ultimately, uniformity in age, career, and learning progression disappear, as do traditional hierarchies found in educational institutions. Co-operative education students on their first work term placements transition from being one of many learners to often being alone as the sole novice in a workplace. What experienced University learners know as studying to prepare for

assignments and tests has no workplace equivalent. Outcomes for authentic tasks may be very real, such as loss of money, productivity, or reputation for the business. Real consequences may introduce different stressors to co-operative education students who are used to personal and perhaps group evaluations in academic settings, but likely not the possibility of significant business losses. Selection and use of resources may similarly be less controlled. Students in co-operative education work terms must therefore adapt their metacognitive strategies, however effective in academic learning, to these ill-defined and unfamiliar learning environments.

This research investigated the possibility of multiple forms of uncertainty and learners' attempts to restore equilibrium through help-seeking and self-regulation. Learning, according to Dewey, necessarily involves disequilibrium (1910). Learners in co-operative education work term placements may experience disequilibrium both as a consequence of new learning and as a result of being in a new, unconventional learning environment. Holden and Hamblett (2007, p. 516) in their study of first permanent career placements described time in a first workplace as "an uneven journey" full of "conflicting dynamics." Help seeking would presumably be one way for co-operative education students to lessen the gaps in their understanding and reduce their sense of disequilibrium. Pintrich, Smith, Garcia, and McKeachie (1991) defined help-seeking as a student reaching out to peers, instructors, or colleagues; however, these behaviours may be difficult for adult learners to initiate (Karabenick, 2003), especially for learners currently on work terms in a new workplace environment and removed from their home campus locations. Students entering their first co-operative education work term may be particularly ill-equipped to deal with such a set of challenges.

Research on vocational environments tends to accumulate in parallel to education or educational psychology research, although the scope appears narrower and focused on a few key areas, such as transfer of cognitive skills (Lieberman & Hoffman, 2008), self-efficacy (including group efficacy) (Brown, 2003; Gibson, 2003), and goal orientation (Chiaburu & Marinova, 2005). Unfortunately, specific mention of metacognition in research on workplace learning may not occur or be obscured by domain-specific vocabulary. Zimmerman and Schunk (2008) noted variation in terminology even within a single discipline. A further complication with some research on workplace learning is a lack of credibility of published sources. Workplace research

that appears in trade publications and conference proceedings does not necessarily have the benefit of peer review. Thus, overlap in how constructs such as reflection are defined and researched in the fields of academic and non-academic learning is not necessarily available.

2.4. Use of Technological Tools for Students on Work Terms

Two technological factors affected the study. First, participants needed to be comfortable using technological tools such as the co-operative education discussion forum and email (for reminders), and be willing to try, if not familiar with, blogging. Second, this was the first time this University used blogging as a reporting mechanism for co-operative education students while they were on a work term. Thus, this research represented a shift in culture regarding expectations of both staff and students about the components of a co-operative education program. University staff felt blogging could address some of the challenges they had with maintaining student awareness about resources within their online system, which, although they were not related to this study, nevertheless were visible to students as they entered the online platform to complete their blog entries.

According to Lenhart, Purcell, Smith, and Zickuhr (2010), this current study was done when blogging among similarly aged young adults was near a peak (2008). In telephone interviews of over 2200 adults, Lenhart et al. found 28% of adults aged 18-29 maintained a blog in December 2007. As shown in Figure 2.3 (Lenhart et al., 2010, p. 46), this figure dropped by nine percentage points in the next two years.

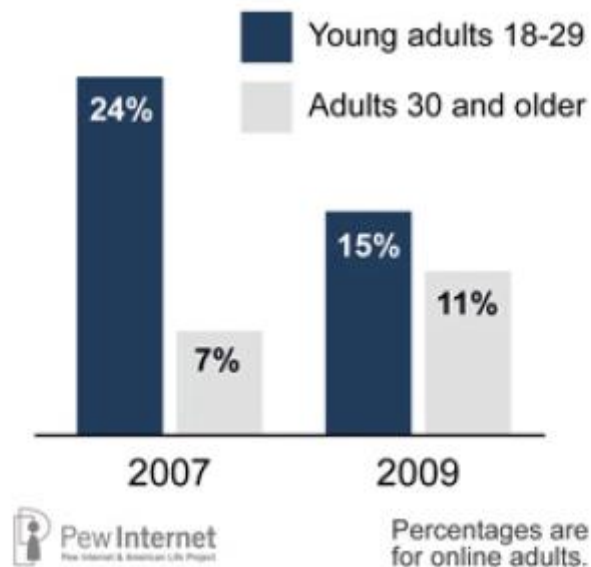


Figure 2.3. Adult Blogging Participation Rate 2007 and 2009. (Lenhart, Purcell, Smith, & Zickuhr, 2010, p. 46).

In terms of reading and commenting on other people’s blogs, the percentage of adults aged 18 to 29 who posted comments on public blogs in 2007 and 2009 was higher than those who created blogs and remained relatively stable over the two-year period (35% and 33%, respectively) (see Figure 2.4).

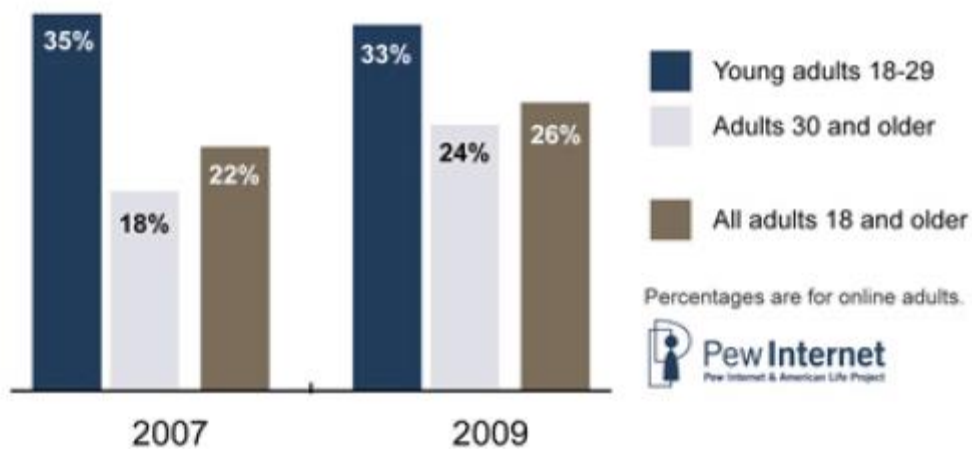


Figure 2.4. Adult Blog Posting Participation Rate 2007 and 2009. (Lenhart, Purcell, Smith, & Zickuhr, 2010, p. 48)

Online technology can bring off-campus learners back into familiar university support structures. Atkinson, Rizzetti, and Smith (2005) introduced students on work

term placements to a suite of online resources, including small group discussion forums. Virtual teams were assembled within individual programs and were moderated by program staff. The researchers reported a reduction in students' sense of isolation when students maintained contact throughout a work term by using online discussions. Blogs may, therefore, present a bridge to campus and to peer support structures when students face unfamiliar territory and new learning challenges in a workplace learning environment. Furthermore, Bailey, Hughes, and Moore (2004) also suggested that work term students need non-employment-related outlets to express thoughts and feelings not appropriate for the workplace. Thus, confidential blogging communities reserved for work term students may offer a safe outlet for expression without fear of repercussions from employers or university programs.

Conventional co-operative education initiatives may include a variety of campus-based and online resources for students registered in a work term. These resources typically consist of support for placement and career development, organizational awareness, transition between university and work environments, and development of personal and workplace skills through reflective practice. Universities typically encourage off-campus students to use these online resources during a work term. Blogs hosted on university IT platforms provide one additional way for universities to maintain connectedness with work term students and direct students towards university resources. Thus, the addition of web-based blogging communities for work term students is a natural complement to an inclusive co-operative education learning program.

Chapter 3.

Method

This study addressed research questions in two distinct areas designed to explore student learning in first career workplace learning environments: (a) patterns of disequilibrium in student reflective writing in explicit and implicit metacognitive prompting conditions; (b) relationship between explicit and implicit metacognitive prompting conditions and changes in metacognitive awareness, especially in relation to student autonomy.

This research examined qualitative elements of learners' written contributions to individual blogs over a 13-week university co-operative education work term. Data were collected from six biweekly blog entries (also referred to as postings), a pretest assessment of learner autonomy, and pre- and posttest measurements related to learner metacognitive awareness. Exploratory qualitative analysis of student discourse identified traces of disequilibrium, affect, and proximity and compared frequency counts between the two prompting conditions. An effort measure (blog length) and prompt reference counts were also compared. Finally, despite limitations in sample size, differential effects of baseline student autonomy on longitudinal changes to metacognitive awareness were evaluated using exploratory quantitative analysis.

3.1. Research Objectives

The following research objectives guided this research: (a) to create, implement, and evaluate two conditions (explicit/implicit) of metacognitive prompts for learner reflective writing based on the Winne-Hadwin four-phase model of self-regulated learning (1998); (b) to identify qualitative discourse patterns in student reflective writing related to theoretically-based definitions of reflective thinking in blogs created while

learners are engaged in first co-operative education work terms; and (c) to identify qualitative discourse patterns in student reflective writing related to explicit and implicit metacognitive prompting conditions.

3.2. Research Questions

3.2.1. Exploratory questions

Exploratory questions arising to guide this inquiry included: (a) what impact does implicit and explicit metacognitive prompting, based on the Winne-Hadwin four-phase model of self-regulated learning (1998), have on learner reflection, as evidenced by Dewey's concept of disequilibrium (Dewey 1910), in blogs produced during a co-operative education work term?, (b) what effects do implicit and explicit metacognitive prompting have on levels of learner metacognitive awareness over the course of a 13-week work term?, and (c) how is learner autonomy related to implicit and explicit metacognitive prompting and changes to learner metacognitive awareness over the course of a 13-week work term?

3.3. Participants

Students at Simon Fraser University entering their first co-operative education work term in September 2008 were given a choice of conventional end-of-work term reporting or blogging as part of this research project. A total of 30 (16 female and 14 male) undergraduate students from 6 co-operative education programs opted to participate in the blogging option. Three students (two males and one female) failed to initiate blogging after completing preliminary assessments, even after repeated prompting every two weeks for eight weeks. One of the male students indicated his employer disallowed participation due to privacy concerns. The other two students did not respond to requests to confirm participation. One female student withdrew after completing a single blog entry, but prior to completing all research requirements due to extenuating circumstances. All data from these four participant withdrawals were

removed from further analysis. The average age of all remaining participants was 22.54 years ($N = 26$), with a range of 20-27 years.

Table 3.1. Demographics

	All Participants				
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
Gender					
Female	14				
Male	12				
Faculty					
Arts & Social Sciences	3				
Business	16				
Communications	1				
Computing Science	2				
Health Science	1				
Science & Environment	3				
Language spoken at home					
Cantonese	7				
English	9				
English/Farsi	1				
Korean	2				
Mandarin	1				
Punjabi	1				
Serbian	1				
Age in years	24	22.54	1.83	20	27
GPA (4.33 point scale)	24	3.26	0.46	2.4	4.06

Computer familiarity and access were important considerations for participant completion of research requirements. According to Drennan, Kennedy, and Pisarski (2005), undergraduate students as a whole can be expected to exhibit similar levels of computer familiarity and usage. Thus, students were asked about their levels of computer familiarity in a demographics questionnaire completed before blogging began (see Appendix B). The 10 items were adapted from the Computer Aversion, Attitudes, and Familiarity Index developed by Schulenberg, Yutzenka, and Gohm (2006).

Students were also asked to indicate the primary language spoken in their home as a safeguard in case quality of language used in blogs was later determined to be insufficient for analysis. Students reported a total of seven primary languages spoken in their homes, with the largest group (10 students) indicating English ($n = 22$). No language contained within blogs in either group was eliminated because of readability.

Demographics for each prompting condition are reported in Table 3.2. Group 1 (Explicit) reported a higher frequency of English as primary language speakers (7 students vs. 2 students), higher GPA (3.50 vs. 3.01), and a younger mean age (22.25 years vs. 22.83 years). Notably, data was incomplete for four students from Group 2 (Implicit) for language and two students for Group 2 (Implicit) for GPA. Students were given the option to list their previous five course grades if they could not recall their GPA. Two students from Group 1 (Explicit) opted to report letter grades, which were subsequently converted to a numeric GPA by the researcher. No corresponding omissions in primary language, GPA, or letter grade reporting were found in Group 2 (Implicit).

Demographic information was not revealed until after all coding was completed. Therefore, no demographic information was used for group assignment. Masking demographic information also reduced any likelihood that students could be identified by language patterns or details about the nature of their co-operative education work placement during qualitative analysis before coding concluded.

Table 3.2. Group Demographics

	Group 1 (Explicit)					Group 2 (Implicit)				
	<i>n</i>	<i>M</i>	SD	Min	Max	<i>n</i>	<i>M</i>	SD	Min	Max
Gender										
Female	6					8				
Male	6					6				
Faculty										
Arts & Social Sciences	2					1				
Business	7					9				
Communications						1				
Computing Science						2				

	Group 1 (Explicit)					Group 2 (Implicit)				
	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max	<i>n</i>	<i>M</i>	<i>SD</i>	<i>Mi</i> <i>n</i>	Max
Health Science	1									
Science & Environment	2					1				
Language spoken at home										
Cantonese	2					5				
English	7					2				
English/Farsi	1					0				
Korean	1					1				
Mandarin	1					0				
Punjabi	0					1				
Serbian	0					1				
Age in years	12	22.25	2.14	20	27	12	22.83	1.59	21	26
GPA (4.33 point scale)	12	3.50	0.39	2.6	4.06	12	3.01	0.43	2.4	3.67

3.4. Measures

Levels of metacognitive awareness were measured in this study using the Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994). This self-report instrument is composed of 52 items (see Appendix C) that ask learners to rank their response to statements on a five-point Likert scale, anchored at 1 (Absolutely False) and 5 (Absolutely True). For example, one statement was “3. I try to use strategies that have worked in the past.” Learner scores on each item were totalled across the 52 items, with a minimum possible score of 52 and a maximum score of 260. Learners completed the MAI twice: once at the beginning of their work terms and once after completing the 6th blog entry. Coefficient α for the entire instrument was .93 on the pretest and .93 on the posttest. The stability coefficient across pretest and posttest was .61.

Learner autonomy was measured using a self-report instrument, the Self-Determination Scale (SDS) (Sheldon & Deci, 1996 as cited in Reis, Sheldon, Gable, Roscoe, & Ryan, 2000), and was administered at the beginning of the work term to all participants. This instrument is composed of 10 items rated on a five-point Likert scale, anchored at 1 (Only A feels true) and 5 (Only B feels true) (see Appendix D). It consists

of five pairs of statements that ask learners to rank the appropriateness of their responses. For example, one pair of alternatives was “A: I am free to do whatever I decide to do” and B: “What I do is often not what I’d choose to do.” Five pairs are reverse scored. Range of possible scores is 10 (minimum) to 50 (maximum). Coefficient α for the one time administration was .82.

3.5. Procedure

Due to the small sample size, a quasi-experimental design was employed in this study in order to minimize differences between the groups that could affect research outcomes independent of treatment condition. Individual scores on continuous variables for metacognitive awareness and autonomy were converted to categorical dichotomies (high or low). These dichotomies were used to randomly assign equal numbers of each subset of participants to one of two treatment conditions. The use of a “high” and “low” designation for these students was strictly arbitrary and did not reflect their relative metacognitive awareness or autonomy to any individuals outside this sample, such as other co-operative education students, other undergraduate students, or other similarly aged peers. All students were ranked according to scores on the pre-assessment MAI, with the higher scoring half labeled “high metacognitive awareness” and the lower scoring half labeled “low metacognitive awareness.” Similarly, students were ranked according to their scores on the SDS and labeled either “high autonomy” or “low autonomy” using a median split. The median value for autonomy was 39 on the SDS, with three students achieving that score. Accordingly, students with median tie scores were randomly ranked as either high or low autonomy, yielding two students assigned a high autonomy rank and one student given a low autonomy rank. Students in each of these four subsets (high/high; high/low; low/high; low/low) were randomly selected and placed alternately into either Group 1 (Explicit) or Group 2 (Implicit) in equal numbers¹ (see Table 3.3).

¹ As previously noted, four students were assigned to groups, but failed to complete all research requirements. Thus, final cell sizes were not equal.

Table 3.3. Group Pre-Assessment Scores²

	Group 1 (Explicit)					Group 2 (Implicit)				
	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max
SDS (Autonomy)										
“High”	7	41.14	1.77	39	44	8	44.22	2.74	41	47
“Low”	5	32.8	3.70	27	36	6	34.33	4.08	28	39
MAI										
“High”	5	205.40	3.78	199	209	7	218.57	16.98	196	245
“Low”	7	187.14	15.64	152	195	7	181.00	16.22	153	195

Students completed all pre-assessments, including the demographics questionnaire, the SDS, and the first MAI after informed consent was received according to standard University ethics protocols. Students in each group were then sent a welcome message giving them access to one of two prepared, restricted groups hosted on a university modified online will discussion platform. Students could see only their group when logging into the university platform; thus, students were unaware there were students in another group or another prompting condition. Students could read each other’s blog postings within each prompting condition. Group 1 (Explicit) initially contained 15 students and Group 2 (Implicit) contained 15 students. Three students withdrew from Group 1 (Explicit), leaving 12 students and one student withdrew from Group 2 (Implicit), leaving 14 students.

Within each group, each student’s blog contained one of two sets of pre-loaded prompts based on Winne and Hadwin’s four-phase model of self-regulated learning (1998). All students within a group received the same prompts. Group 1 (Explicit) received explicit metacognitive prompts that provided more detailed guidance relative to the four phases of the Winne-Hadwin model (1998) and Group 2 (Implicit) received implicit metacognitive prompts that provided less focussed guidance but still adhered to the four phase structure of the Winne-Hadwin model (see Table 3.4).

² Initial sorting into groups was based on data from four students who later withdrew. Consequently, numbers in cells are not equal.

Table 3.4. Explicit and Implicit Metacognitive Prompts

Explicit Metacognitive	Implicit Metacognitive
1. How did I know what I was supposed to do when I was given a particular problem or task at work? For example, did I base my understanding of the task on what I was told by others, did I take clues from the situation, or did I base it on my own understanding of how the task related to others I had done?	1. What things did I wonder about when I was given a particular problem or task at work? What kinds of information did I still need before I could begin the task?
2. How did I know how to approach a specific problem or task at work? What did I draw from my past experiences or learning that told me that my planning on how to accomplish the task was on the right track?	2. What ideas did I have about a particular problem or task at work I was just about to start? What was the source of my ideas?
3. After I began to work on a particular problem or task, how did I know if my chosen strategy was working? What, if any, changes did I need to make to my understanding of the task, my planning, or my strategies by the time I had finished?	3. What are some of the things I thought about while I worked on a particular problem or task at work? In what ways did my thinking help me, or not help me, with the task or problem?
4. In thinking about a past problem or task at work, what have I learned that will help me with future problems or tasks, either at work or elsewhere? What specific things do I still need to understand?	4. What, if anything, has changed as a result of my involvement with a problem or task at work? In what way will my thinking about future problems or tasks be different?

Prompt language was based on key metacognitive elements designed to guide students' reflective writing in an unobtrusive, nonprescriptive manner. Although there did not seem to be consensus in the literature on the use of two types of prompts versus a control condition with the absence of prompts, two versions of guided prompts were deemed necessary for this study's importance and timing to students' educational programs. According to Bannert (2006) initiation of self-regulation activities is not spontaneous in all learners. Even though students were not required to use prompts, the absence of any type of prompt may have placed additional pressure on students who were not skilled in self-regulation, did not know how to complete their blogs, or found the requirement to complete a blog burdensome. If they withdrew from the study as a consequence, they also would not have fulfilled their co-operative education program reporting. Failure to complete the requirements of the study meant students would have to submit a conventional work term report at the conclusion of the semester. This may have influenced their successful completion of their co-operative education work term by

exposing the student to additional stress. Thus, both sets of prompts contained metacognitive language, with Group 1 (Explicit) receiving *explicit metacognitive prompts* and Group 2 (Implicit) receiving *implicit metacognitive prompts*.

For the purposes of this research, explicit metacognitive prompts differ from implicit metacognitive prompts in several key areas (Bannert & Reimann, 2012). First, the explicit metacognitive prompts were designed to assist students with **sequencing**. Sequencing was important for learners to be able to plan and identify components of a task. Second, explicit metacognitive prompts provided students with more **contextual features**. Context helped learners draw from prior experience of other learning environments and other tasks, if applicable. Next, explicit metacognitive prompts gave students more guidance with regards to **planning**. Planning was related to sequencing, but also included other attributes, such as strategy choice. Explicit metacognitive prompts also aided students to establish **relevancy** related to task completion. Relevancy was important because it helped students filter essential information from nonessential information related to a task. Next, explicit metacognitive prompts helped students with **elaboration**. Elaboration was necessary for students to provide more than superficial responses to the prompts, which were written in the form of questions. Finally, explicit metacognitive prompts contained a higher degree of **specificity**. Specificity was an important element designed to help students focus on their understanding (see Table 3.5 for a side-by-side comparison of these metacognitive elements).

Table 3.5. Key Metacognitive Elements of Prompting Language

	Explicit Metacognitive Examples	Implicit Metacognitive Examples
Sequencing	Explicit breakdown of key task components according to sequence, such as "...my understanding of the task, my planning, or my strategies..." (Prompt #3).	Choice between two non-sequenced options, such as "In what ways did my thinking help me, or not help me..." (Prompt #3).
Contextual features	Guidance for learners to consider past experiences in learning environments and with similar tasks. For example, "...draw from my past experiences or learning..." (Prompt #2) and "how the task related to others I had done" (Prompt #1).	Absence of linkages to past learning and learning environments, for example "What was the source of my ideas?" (Prompt #2).
Planning	In addition to breaking down task	Prompts were generic in their depiction of

	Explicit Metacognitive Examples	Implicit Metacognitive Examples
	components (see Sequencing), prompts guided students to approach tasks strategically; for instance, “How did I know how to approach a specific problem or task at work?” (Prompt #2).	task components and approach, for instance “What ideas did I have about a particular problem or task at work?” (Prompt #2).
Relevancy	Prompts supported student consideration of relevancy of multiple information sources, for example “... did I base my understanding of the task on what I was told by others, did I take clues from the situation, or did I base it on my own understanding?” (Prompt #1).	Prompts lacked clues regarding resource options, for example “What things did I wonder about when I was given a particular problem or task at work?” (Prompt #1).
Elaboration	Prompts guided students to think beyond the immediate task to future applications of learning, such as “what have I learned that will help me with future problems or tasks, either at work or elsewhere?” (Prompt #4).	Prompts did not direct students to think beyond current or future work-related tasks, for instance “What, if anything, has changed as a result of my involvement with a problem or task at work? In what way will my thinking about future problems or tasks be different?” (Prompt #4).
Specificity	Prompts asked for details regarding student evaluation of their understanding, for example “What specific things do I still need to understand?” (Prompt #4).	Prompts contained vague language (e.g., “different”), for example “In what way will my thinking about future problems or tasks be different?” (Prompt #4).

In addition, *explicit metacognitive prompts* provided students with more detailed direction for self-regulated learning based specifically on the Winne-Hadwin model (1998). Prompt language pointed students into thinking about task and cognitive conditions they may need to evaluate and operations they may need to undertake as part of their reflective writing. Metacognitive language drawn from the Winne-Hadwin model included prompting students to think about words such as *strategies*, *plan*, and *understanding* related to their workplace tasks. In contrast, *implicit metacognitive prompts* did not provide the same level of explicit support for self-regulated learning. Implicit metacognitive prompts were less specific as to evaluations and operations students may wish to consider, although they still contained four sets of parallel questions aligned with the Winne-Hadwin model of self-regulated learning (1998). Language differences between the implicit and explicit metacognitive prompts included terms such as *wonder about* instead of *understanding*, and *ideas* instead of *plan*, and *thinking about* instead of *strategies*.

Links provided online to students took them to the online forum for their assigned groups (see Appendix G). The online discussion forum was set up to contain a separate thread for each student based on a student's University-assigned ID. Total anonymity was not possible given the structure of the technical platform available; however, IDs were not explicit enough to derive a person's name and, secondly, most students began their blog by introducing themselves by name to their group anyway. Thus, any effect on blogging arising due to lack of anonymity in the blogging platform was deemed insignificant.

The discussion forum for each group contained a standard, identical welcome posting (a "sticky"; see Appendix H) from the researcher. A sticky, as the name implies, was fixed to the top of the discussion forum so that it was always visible when group members entered the forum. This greeting also included general instructions to students about how to find their blog and suggestions on how much to write and how often. Students were asked to post a minimum of six 150-word reflections over the course of their 13-week work term.

The preamble gave students flexibility to decide on content of their blogs. The key words used to guide students on how to select topics for their blogs were "learning experiences," "problem," "task," and "challenge." Students were given three broad examples: 1) something that happened last week, 2) part of a complex project that is still underway, and 3) learning how to work with the people around you. Thus, the preamble set expectations that this research exercise was not a social blog, such as the types students in the same age group (~22 years) may have encountered elsewhere.

Within each student's personalized thread, (their "blog"), a preloaded message from the researcher contained prompts relevant to each group. Each student within a group received the same prompts. The structure of the online forum meant this first blog entry by the researcher remained visible to students every time they clicked on their blog to write another posting containing their reflective writing. Students replied to this initial researcher posting each time they blogged (see Appendix I). Each student posted a minimum of six times in their blog. Thus, each group contained 12 or 14 student blogs, with each blog containing, at the minimum, the researcher preloaded message containing the prompts followed by six student postings of reflective writing. Each

student's blog could be viewed by all students within a group. Students were told they could interact with other students in the forum, but it was not a requirement. Notwithstanding, numerous instances of evidence of audience awareness were identified, along with a lesser number of direct student interactions.

The primary researcher did not view any student blogs during the 13-week period. A research assistant checked for new blog entries twice a week and read any new entries to ensure no students included information regarding workplace harassment or other distress in their reflective writing. No such instances occurred in either group. The only researcher-student communications were biweekly email reminders from the researcher to post reflections in the blogs (see Appendix J). Students who still hadn't posted after another week were sent a second reminder. If a third reminder was needed, it included a request for the student to confirm continued participation. Students who didn't respond, or who declined to fully participate, were dropped from the study and their survey and blog data were removed. As mentioned previously, only one student stopped posting. All pretest and demographic data and reflective writing completed to date by this student were deleted from the study.

After students posted six reflections, they were sent a thank you message and asked to complete a second MAI (see Appendix K). In total, 26 students completed all study requirements.

3.6. Qualitative Analysis

A research assistant prepared blog entries for analysis by copying each posting of reflective writing from all students in both groups into a single Word document. Each posting of reflective writing was placed starting on a new page within the document so that it was given a unique page number. The research assistant generated 156 random numbers and paired a random number with the page that contained the beginning of each separate blog entry (many entries spanned several pages). This resulted in each posting of reflective writing receiving a unique random number. The research assistant then did a numeric sort based on these random numbers, which essentially shuffled all postings of reflective writing, thereby losing their original sequencing and ownership.

Finally, the research assistant reviewed every piece of reflective writing and removed any personal names. The primary researcher could then code each posting of reflective writing without bias from knowing which student wrote it, when it was written, or if the student who wrote it came from Group 1 (Explicit) or Group 2 (Implicit). After the data were prepared, the primary researcher conducted a qualitative analysis of the codified blog entries.

In keeping with the non-evaluative framework used throughout this study, scoring of latent content was primarily categorical, not numeric. After a familiarization phase, initial codes were generated and content was coded into segments that demonstrated affective discourse. Segments varied from single words to multi-sentence extracts as long as the coded excerpt did not overlap with other instances of affect. Similarly, extracts were identified where student reflective writing referenced the guiding prompts. Discourse analysis consisted primarily of frequency counts of identified elements and considered both linguistic and non-linguistic elements. See Table 3.6 for coding rules that guided scoring of the data.

Instances of affect were identified based on mutually exclusive descriptors of negative and positive affect. Coding proceeded in an open-ended and exploratory manner until all data were reviewed. A total of 212 labels for affect were initially identified in multiple scoring passes. Next, specific language markers were drawn from student reflective writing to create working definitions and descriptions and placed into a coding scheme. This was then used to detect additional instances of affect according to six broad, mutually exclusive, categories: boredom, engagement (excitement), frustration (anger), uncertainty (confusion), or happiness (delight) (see Table 3.6). The working definition for all forms of affect required that the affect in question be linked in student reflective writing to identifiable and relevant needs, concerns, goals, and events. In other words, affect related to “an incident that stimulates appraisal of and emotional reaction to a transitory or ongoing job related agent, object or occurrence” (Basch & Fisher, 1998, p. 2-3), was included in the scoring system (“when I got to enter numerous invoice data everyday, I sometimes felt overwhelmed”) and instances demonstrating extraneous affect were omitted from scoring (“I love my bed!”).

Table 3.6 Coding Rules

Linguistic and Nonlinguistic Markers	
Prompt references³	<p>An excerpt was scored as a single prompt reference if it:⁴</p> <ul style="list-style-type: none"> • contained verbatim language from one of the four guiding prompts (with or without the accompanying prompt number); • contained a number and adjacent content that matched the Winne-Hadwin phase described by the corresponding prompt number; • contained partial or re-worded prompt language, including "base my understanding" (Prompt 1; Group 1 (Explicit)); or "things that I wondered about" (Prompt 1; Group 2 (Implicit)); • contained partial or re-worded prompt language, including "I drew from my past experiences" or "task was on the right track" (Prompt 2; Group 1 (Explicit)); or "ideas I had about a particular problem/task" or "the source of my ideas" (Prompt 2; Group 2 (Implicit)); • contained partial or re-worded prompt language, including "I knew my chosen strategy was working" or "the changes I needed to make to my understanding/planning/strategies" (Prompt 3; Group 1 (Explicit)); or "some of the things I thought about"(Prompt 3; Group 2 (Implicit)); or • contained partial or re-worded prompt language, including "specific things I still need to understand" (Prompt 4; Group 1 (Explicit)); or "changed as a result of my involvement" or "my thinking will be different" (Prompt 4; Group 2 (Implicit)).
Uncertainty	<p>An excerpt was scored as indicating uncertainty if student reflective writing included variations of any of the following words or close synonyms or phrases plus adjacent content that confirmed the situation related to a work place challenge (selected terms initially identified from Baron-Cohen, 2003):</p> <ul style="list-style-type: none"> • uncertain, not certain, unsure, not sure, confused, puzzled, don't know, undecided, difficult to decide, baffled, bewildered, disorientated, hesitant, am lost, have no idea, doubt, inadequate/lack of (resources; skills), not believing, not aware, not comfortable, insecure, very vague, reluctant, mystified, or maybe.⁵

³ See Table 3.7 for more examples of prompt references.

⁴ Note: several instances where language was similar to prompts but where the context did not indicate prompt use were not counted as prompt references. These extracts were not marked for future retrieval; however, there were very few of them.

⁵ Note: *maybe* was identified once as a marker for uncertainty because context was clearly referring to doubt over a course of action.

Linguistic and Nonlinguistic Markers

Affect	<p>An excerpt was scored as a discrete category of affect if student reflective writing contained words or phrases representative of reactions to:</p> <ul style="list-style-type: none">• boredom, engagement (excitement), frustration (anger), uncertainty (confusion), or happiness (delight). <p>Nonlinguistic forms that were scored into discrete categories of affect included typographic conventions typically used in social media communication, such as:</p> <ul style="list-style-type: none">• multiple exclamation marks, capitalization of words for emphasis, or iconographic symbols. <p>Categories indicated by nonlinguistic forms included:</p> <ul style="list-style-type: none">• engagement (excitement), frustration (anger), or happiness (delight).
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Coding was a dynamic process involving an initial coding stage of rapid growth and adaptation of the coding scheme followed by slower refinements on subsequent scoring passes through the data until no further changes were deemed necessary. This framework was deemed sufficiently discrete to meet research objectives and allow exploratory analysis to proceed. Finally, all instances of affect were collapsed into two narrower subsets (positive and negative), except for uncertainty, which was placed into a subset of negative affect as an additional indicator of disequilibrium (Dewey, 1910).

Data were scored for references to the guiding prompts (termed *prompt references* hereafter). This process entailed an initial familiarization phase with the data, followed by subsequent passes where verbatim, partial, and re-worded prompt language were identified in student reflective writing. Student use of a numbered paragraph was coded in its entirety as a single prompt reference if language included in those paragraphs included a verbatim copy of the corresponding prompt. For example, a paragraph beginning with "1." and including language describing task definition (the Winne-Hadwin phase associated with the first prompt in both prompting conditions) was counted as one prompt reference. Similarly, student use of a numbered paragraph followed by non-verbatim or partial use of language corresponding to one of the numbered prompts was scored as a single prompt reference. Paragraphs that contained both a "1." and full, partial, or re-worded prompt language related to task definition were scored as a single prompt reference. Student reflective writing that contained a prompt number or full, partial, or re-worded prompt language and a second verbatim, non-verbatim, or partial use of prompt language, separated by non-prompt language, was scored and counted as two distinct prompt references (split prompt references). See

Table 3.7 for examples of student use of numbered paragraphs that were scored as prompt references (bold emphasis added to indicate language scored as prompt references).

Table 3.7. Types of Numbered and Unnumbered Prompt References

Examples of Prompt References ⁶	
Verbatim	<p>“1. How did I know what I was supposed to do when I was given a particular problem or task at work? For example, did I base my understanding of the task on what I was told by others, did I take clues from the situation, or did I base it on my own understanding of how the task related to others I had done?”</p> <p><i>My new task is to create a Cost Benefit Analysis document for a project that is in its inception phase. Although I am a business student , I am not that great with accounting practices , and therefore I was having a hard time starting this task . After about 30 minutes of looking on our company’s website I decided to go and ask the other Coop student who has been here longer. Luckily she had done similar documents before so she was able to send me a template and guide me through it”</i> (Prompt 1, Group 1 (Explicit)).</p> <ul style="list-style-type: none"> • The above example was scored as a single prompt reference.
Non-verbatim	<p>“1. Honestly I was not sure what I was supposed to do when my supervisor told me we would be doing the vessel function study” (Prompt 1, Group 2 (Implicit)).</p> <ul style="list-style-type: none"> • The above example was scored as a single prompt reference.
Split	<p>“2. How did I know how to approach a specific problem or task at work? What did I draw from my past experiences or learning that told me that my planning on how to accomplish the task was on the right track? I did not have any idea after I got back to my desk . In my mind I thought of many ideas and brain stormed each method’s pros and cons. I believe my planning on how to accomplish the task was on the right track because what I thought of are all doing the same thing and accomplishing the same results. Just the way of doing it are different, because the manager did not specify any specific way I have to follow” (Prompt 3, Group 1 (Explicit)).</p> <ul style="list-style-type: none"> • The above example was scored as two prompt references.

Because the sticky welcome message in each group contained common terms such as "specific problem or task" and "challenges," which were words also found in certain prompts, these words were not sufficient indicators that students were referencing specific prompt language. Indicators for implicit metacognitive prompt references and explicit metacognitive prompt language are given in Table 3.6. The

⁶ Language used for scoring purposes is shown in bold.

affect category uncertainty (negative) was most relevant to the research objectives of this study. Uncertainty was coded in student reflective writing in three stages. The first step in coding and analyzing affect was to investigate underlying models and theories of affect, with particular attention to learning environments and means of classification. Dewey's original works were instrumental in depicting the relationship of affect, in particular, uncertainty, to reflection, thinking, and learning (1910). His theoretical framework informed how affect was conceptualised in reflective writing. Affective states collapsed into the category of uncertainty are given in Table 3.6.

Following the completion of all qualitative coding, student reflective writing was restored to its original sequence and group assignments. Each student blog was then visible in its entirety. Qualitative codes previously generated for affect, uncertainty, and prompt references for all six individual postings could then be summed for each student. Finally, student IDs were revealed and student data were sorted into Group 1 (Explicit) and Group 2 (Implicit) prompting conditions for analysis.

3.7. Quantitative Analysis

Analysis was primarily qualitative based on frequency counts of scored elements, with support from quantitative descriptive analysis and limited exploratory quantitative testing.

Student pre-assessment scores for the SDS and pre- and post-assessment scores for the MAI were entered into SPSS 17.0 using student ID. Following completion of the semester, the research assistant sorted IDs into Group 1 (Explicit) and Group 2 (Implicit) assignments.

Data was assessed using standard descriptive data analysis. Where research objectives warranted, exploratory quantitative analysis was performed on results from students' pre- and post-assessment scores on the SDS and MAI. All quantitative testing was done at the $\alpha = .05$ level. Limitations identified during data exploration were duly noted.

Chapter 4.

Results

Student blogs contained 44,645 words written by 26 students in six biweekly postings spaced over the course of their first co-operative education work term, resulting in 156 separate postings. The timing of each entry was left entirely up to the students, although all students received prompts every two weeks regardless of completion status of a blog entry and individual students received one or two additional prompts if blog entries fell delinquent by more than two weeks. Additional prompting was only needed twice for two individual students during the semester; thus, the 154 out of 156 blogs entries were spaced no more than two weeks apart.

4.1. Computer Familiarity

Successful participation in this study relied on participants' familiarity with blogs, blogging, and computers. Participant familiarity with creating blog content coming into this research was greater than figures provided by Lenhart, Purcell, Smith and Zickuhr (2010) in research conducted on 2007 and 2009 blogging habits of similarly aged adults. Participants answered a series of questions designed to establish computer familiarity, enjoyment, and use prior to starting their blogs (see Table 4.1). Slightly more than half of Group 1 (Explicit) students had never created a blog in comparison to slightly less than half of Group 2 (Implicit) students, which nevertheless was still twice the 24% (2007) and 15% (2009) blogging rates for adults aged 18 to 29 found by Lenhart, Purcell, Smith and Zickuhr (2010).

Table 4.1. Group 1 (Explicit) and Group 2 (Implicit) Computer Familiarity⁷

	Group 1 (Explicit)					Group 2 (Implicit)				
	n	<i>M</i>	<i>SD</i>	Min	Max	n	<i>M</i>	<i>SD</i>	Min	Max
I often read other people's blogs on the Internet	12	3.08	1.24	1	5	14	3.14	1.35	1	5
I enjoy creating my own blogs	12	3.00	1.04	1	5	14	2.64	1.01	1	4
I have never created my own blog	12	3.17	1.64	1	5	14	2.36	1.39	1	5
My friends often ask me computer-related questions	12	3.75	1.14	1	5	14	2.79	1.12	1	5
I enjoy learning to use a computer to do new things	12	4.42	0.51	4	5	14	4.29	0.73	3	5
I enjoy using computers	12	4.33	0.65	3	5	14	4.14	0.86	3	5
I use computers every day	12	4.92	0.29	4	5	14	4.93	0.27	4	5
I worry about security on the Internet	12	3.83	0.72	3	5	14	3.79	1.19	2	5
Generally speaking, I enjoy participating in online discussions	12	3.83	0.94	2	5	13	3.38	1.04	2	5
I have a lot of experience participating in online discussions	12	3.83	1.03	2	5	14	3.43	1.16	1	5

In the demographics questionnaire, the question "I often read other people's blogs on the Internet," showed participants in the current study were likely to be regular readers of other people's blogs, although two students in each group rated their response to this question as "absolutely false." On a five-point Likert scale, with five representing the highest agreement, means for Group 1 (Explicit) and Group 2 (Implicit) for this question were 3.08 ($n = 12$) and 3.14 ($n = 14$), respectively. Students were not asked if they regularly commented on others' blogs in the pre-blogging assessment.

Some minor differences in computer familiarity between the two groups may be noteworthy. Group 2 (Implicit) students appeared to be more familiar with creating their own blogs in answer to the reverse-scored question, "I have never created my own blog" ($M = 2.36$, $n = 14$) compared with Group 1 (Explicit) ($M = 3.17$, $n = 12$). Group 2 (Implicit) students also reported less enjoyment in blog creation ($M = 2.64$, $n = 14$) than

⁷ Students answered on a 5 point Likert scale, where 1 = "absolutely false" and 5 = "absolutely true."

Group 1 (Explicit) ($M = 3.00$, $n = 12$). In contrast, Group 1 (Explicit) students appeared to more likely to be sought out for help with computer problems. Group 1 (Explicit) mean response to the question "My friends often ask me computer-related questions" was 3.75 ($n = 12$); whereas, Group 2 (Implicit) response mean for the same question was only 2.79 ($n = 14$). This finding does not appear to be related to student program (the only two Computing Science students were in Group 2 (Implicit)), but may be related to a noted difference in GPA if higher GPA students were seen by peers as more knowledgeable. Mean GPAs for Group 1 (Explicit) and Group 2 (Implicit) were 3.5 ($n = 12$) and 3.01 ($n = 12$) respectively.

Student responses for enjoying learning to use computers to do new things and enjoying computer use generally were comparably high in each group in the current study, with means between 4.14 and 4.42 on a five-point scale. No student in either group rated these questions lower than a 3. The highest ratings came in response to the question "I use computers every day," with both Group 1 (Explicit) ($M = 4.92$, $n = 12$) and Group 2 (Implicit) ($M = 4.93$, $n = 14$) showing strong agreement both within and between groups.

Thus, students who rated their blogging exposure as poor nevertheless responded overwhelmingly positively to the enjoyment of using a computer to learn new things. Overall, these computer familiarity questions established that sample participants were either already familiar with blogging, either as content creators or readers, or they were willing to learn something new, that they had a high degree of enjoyment when using computers for learning, and that they had no barriers to computer access or use on a daily basis.

4.2. Metacognitive Awareness

Metacognitive awareness was assessed prior to commencement of student blogging and again once blogging concluded (see Table 4.2 for pre- and posttest MAI scores). Students in both explicit and implicit prompting conditions showed net gains pre- to posttest in metacognitive awareness. Although ranges and means were similar

for both groups, there was greater variability in the implicit (Group 2) prompting condition in both pre- and posttest scores.

Table 4.2. Group Pre- and Post MAI Scores

	Group 1 (Explicit)					Group 2 (Implicit)				
	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max
MAI										
Pretest	12	194.75	15.19	152	209	14	199.79	25.19	153	245
Posttest	12	207.08	13.12	181	232	14	204.14	24.79	157	243

Because research interests were focussed on changes in metacognitive awareness and not exact scores, all analysis of metacognitive awareness was done using the net change in metacognitive awareness (see Table 4.3).

Table 4.3. Group Net Change in MAI Scores

	Group 1 (Explicit)					Group 2 (Implicit)				
	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max
Δ MAI	12	12.33	20.36	-11	65	14	4.36	15.73	-23	32

Students who received Group 1 (Explicit) metacognitive prompts showed higher gains than their Group 2 (Implicit) counterparts, but also showed slightly more variability in changes in metacognitive awareness.

4.3. Audience Awareness

Blogs contained both indirect and direct evidence students were aware of, read blogs written by, and interacted in limited fashion with other students in their group. Indirect evidence was represented by view counts recorded automatically by the university platform. By the end of the semester, views ranged from approximately 30 to 60 for each student's blog (exact numbers are not available), which represents far more views than needed by each student to complete six blog entries or the research assistant to check new blog postings for students who may be in distress. Direct evidence students were expecting others to read their blogs came in the blogs themselves, with students sometimes addressing their blogging peers in aside

comments. Students defined jargon and explained procedures that they felt would be unfamiliar to others in their group. They often enclosed these remarks in parentheses, which they also appeared to use to convey honest comments directly to their peers. For example (bold emphasis added to language scored as audience awareness):

- *“Working in a research lab involves a lot of waiting time - eg. incubation (**time for the reactions to occur**) which takes from 15 minutes to 2 hours or even overnight depending on the type of experiments, or delivery of necessary reagents which could take up to months.”*
- *“I did spend first two months in boredom (**to be honest**) when I wasn't given specific things to do.”*
- *“Having only a very limited background in issues of gender violence (**read none**), I had no idea where to start looking for ideas.”*

Finally, evidence students did read each other's blogs was found in blogs that captured direct, sometimes rhetorical, overtures by students to their blogging peers:

- *“**I was reading [name]'s blog** and she commented on the amount of questions she was asking. I am finding myself doing the same thing.”*
- *“**If anyone reading my blog has any comment, please free feel to reply. I'd appreciate anything.**”*
- *“**It seems like you are actually doing something that is relevant to what you've studied**, which is really good. Project management sounds fun even if managing it in real life could be frustrating sometimes.”*
- *“**It must be fun to work together as a team supporting each other to become better at what you do. How's the workplace environment like at [company]?**”*
- *“**Yeah you don't want to be held back because of a bad manager. Great advice! J**”*

Students were not given any prompts or direction to interact or address each other, so these qualities were spontaneous occurrences. This is not necessarily a characteristic of conventional blogging, either, which commands a much larger audience, but could be a consequence of a closed group sharing a relatively small number of blogs over a defined time period while they go through a similar experience.

4.4. Research Questions

A quasi-experimental, semi-structured approach was used to create conditions favourable to production of reflective writing and to attempt to influence and analyze it relative to learner characteristics. Reflection itself was operationalized by looking for traces first identified by Dewey (1910) as evidence of disequilibrium. Research Question 1 addressed locating evidence of disequilibrium and examining linkages to the two prompting conditions. Research Question 2 examined any longitudinal effects of the two prompting conditions on learner metacognitive awareness. Finally, Research Question 3 explored differential effects of metacognitive prompting related to levels of student autonomy.

Research Question 1:

What effects does metacognitive prompting have on qualities of learner reflective writing in blogs produced during a co-operative education work term?

Student blogs were first coded for affect frequency, prompt reference frequency, and evidence of proximity. Proximity was defined as student language linking their written reflections to contemporaneous or recent events. Blog entry lengths were calculated using a standard word count feature. All blog content was selected to calculate word count, including any numbers, headings, and iconographic symbols. Following content coding and blog length calculation, blog sequence, authorship, and group assignment were revealed by the research assistant.

The following three themes emerged related to this research question. First, students in the explicit metacognitive prompting condition (Group 1 (Explicit)) had a higher per student use of negative affect overall than students in the implicit metacognitive prompting condition (Group 2 (Implicit)), with expressions of uncertainty approximately equal in both prompting conditions. Second, mean blog length was greater for students in Group 1 (Explicit) than for students in Group 2 (Implicit), with more variability. Group 1 (Explicit) mean blog length was still slightly longer than Group 2 (Implicit) even when blog postings containing prompt language were removed. Finally, student reflective writing contained more direct and indirect references to guiding prompts in Group 1 (Explicit) than in Group 2 (Implicit). A summary of all descriptive

statistics related to affect, uncertainty, blog length, and prompt references for both groups can be found in Table 4.4.

Table 4.4. Summary of Group 1 (Explicit) and Group 2 (Implicit) Dependent Measures

	Group 1 (Explicit)					Group 2 (Implicit)				
	n	M	SD	Min	Max	n	M	SD	Min	Max
Total Affect per Blog	12	8.75	5.15	0	21	14	9.36	3.52	0	15
Negative Affect per Blog	12	5.17	6.03	0	21	14	3.93	4.16	0	15
Positive Affect per Blog	12	3.58	4.21	0	16	14	5.57	2.71	1	10
Uncertainty per Blog	12	.36	.564	0	2	14	.43	.664	0	2
Posting Length per Group	72	308.85	132.09	145	779	84	263.99	119.57	139	986
Posting Length (no PR) per Group	40	279.65	107.97	145	643	78	265.99	122.08	139	986
Posting Length per Student	12	308.85	100.06	186.33	463.83	14	263.99	73.55	203.50	491.50
Prompt References per Blog	12	2.03	2.70	0	9	14	.07	.259	0	2

4.4.1. All Affect

Evidence of affect in student written reflections occurred in patterns related to both prompting condition and other student characteristics. Evidence of positive and negative affect was approximately equal in both groups combined, with a total of 117 negative expressions of affect ($SD = 1.73$) and 121 positive expressions of affect ($SD = 1.10$) in 156 blog postings. Each student contributed six blog postings; thus, mean frequency for both positive and negative affect is slightly less than one occurrence of affect per posting.

A pattern of high affect frequency posts was identified containing five individual blog postings from five different students. These postings contained multiple occurrences of negative affect and two of them also contained positive affect. Three of the students were from Group 1 (Explicit) and two of the students were from Group 2 (Implicit). All students exhibiting this high affect pattern scored in the upper two quartiles on the autonomy measure. In terms of metacognitive awareness, the three Group 1 (Explicit) students all increased metacognitive awareness pre- to posttest (by 13, 8, and 15 points respectively). The two Group 2 (Implicit) students showed decreased metacognitive awareness pre- to posttest (-8 and -23 points respectively). This subgroup of postings showing higher than normal frequency of affect is presented here in their entirety, with affect shown in bold with context included, where appropriate.

No apparent gender effects for affect were found in either prompting condition. Of the five students who did not use affect in any of their postings in the Group 1 (Explicit) prompting condition, three were male and two were female. Similarly, only two students – one male and one female – did not use any instances of affect in their reflective writing in among Group 2 (Implicit) students.

The first example of a high-frequency affect posting comes from a student whose blog reflection is triggered by an error she made in the workplace. She uses negative affect that was coded as emphasis, worry, uncertainty, embarrassment, and fear failure in describing not only how the error occurred, but her determination to fix it and contain the damage. She concludes by questioning her own abilities and devising a plan to avoid errors in the future.

Posting 687: Group 1 (Explicit); Δ MAI +13; SDS 39⁸

“Again, this will be a short and sweet posting.

I made a mistake at work!! Small, however it is a mistake I cannot let go unresolved.

⁸ The Posting number refers to the random number assigned to this entry. This posting has been identified as coming from a student in Group 1 (Explicit) whose difference in scores between the MAI pretest and posttest was an increase of 13 points. This student had an SDS score of 39. All personal and company names have been redacted. All subsequent posting examples follow these labelling conventions.

[Company] has some donors that donate a lot of money. We call these people "Leadership Donors". All donors are important, of course, to [company] (for now on known as [company]). In the name of time management, these Leadership Donors are made more of a priority because they donate so much money. For every account (a.k.a. company) that runs a [company] campaign, there is a list of the people who donate over \$500. As well, [company] makes personalized pledge cards that are stuffed into envelopes with a personalized letter from our CEO [name].

*Now, each account has a package that contains these letters as well as some other important campaign goodies. **Here's the mistake: I could have SWORN** I gave one of my accounts their package. Turns out... You guessed it: I didn't!*

*This is a problem, because now **I have to ENSURE** that all those leadership donors have received at the very least a pledge card. Such a silly mistake, I know. **Created MORE work for myself**, still learning to remain organized and write everything down. This one seems weird to me because I also had received a phone call from the woman running the campaign at this particular location asking for "more" pledge cards. **Did I make up that I had heard her say more, and assumed she had pilfered through her package? I'm beginning to believe I did.***

*In order to fix this, I will meet her tomorrow (at their wrap-up, **even bigger mistake to find out so late in their campaign!**) at lunch and go over the list with her. Any of those donors who hasn't received a pledge card either she or I will contact and have to explain why they didn't.*

***Hold on! It gets better still. I found out because my boss called me today (while I was training for my other job, even worse!)** to ask about the account because the package was still sitting in the office.*

***I am making an official goal for myself: REMAIN ORGANIZED AT WORK.** Keep notes on everything, check, check again, and check once more to sleep well. **I am utterly embarrassed, and worried about myself. Can I learn this skill?** I thought I was more organized than this. **I've got to step it up!** Use my agenda all the time, and keep that little notebook I use to jot everything down even closer.*

Never again!

My next dilemma: time management of two jobs! Until the next post..."

This next example of a posting showing high affect frequency also shows negative affect in the form of disappointment, lack of confidence, fear failure, uncertainty, and frustration from an acknowledged novice at blogging. This student uses the prompt structure to detail and negative dilemma she's facing on her work term: unmet

expectations in terms of work assignment and fear over personal failure consequent damage to her employer's business. She received one of the highest autonomy pretest scores and showed a gain of eight points from pre- to posttest in metacognitive awareness.

Posting 860: Group 1 (Explicit); Δ MAI +8; SDS 44

"Interestingly enough I do not meet the definition of a new-aged young adult because this will be my first blogging experience. Call me a fool if you must but I even looked up the definition of "a blog" to determine exactly what it is. Here is what I found

'Blog: an online diary; a personal chronological log of thoughts published on a Web page; also called'

Thus, this concept seems fairly low-key so here goes nothing!

Issue # 1

*One issue I am facing in my current Coop position is that **I am not an accountant and as a matter of fact HATE numbers**. I work for a sole-practicing lawyer and practically am expected to do everything the lawyer is not. Thus, I am legal assistant, paralegal, office manager, account etc. Originally when I accepted this position and started the job (back in July) I was told that the lawyer was going to hire an account to handle all the banking, accounting, and taxing needs. **Unfortunately, this had not occurred and it seems as though I have been stuck attempting to do all the "number" work of this office**. I find this very challenging because I am not a numbers-orientated individual. In fact any numbers-related courses have proved to bring my GPA down. I informed my employer of this at the time of me accepting this position and she suggested for me not to worry about this, as she was A) hiring me for my legal experience/background and B) was hiring an accountant to fill such needs in her practice. **This has obviously not happened and thus, for the past three months I have unconfidently been doing all the "numbers" work** for this practice*

1. How did I know what I was supposed to do when I was given a particular problem or task at work? For example, did I base my understanding of the task on what I was told by others, did I take clues from the situation, or did I base it on my own understanding of how the task related to others I had done?

When accounting work began to emerge I told my employer of it. After weeks of her not doing anything about it I chose to examine previous examples of the work. When GST or Employee Remittance is due it is not something you want to annoy the government with by not paying. Thus, by looking at past examples I submitted such required works to the best

of my capabilities. **My fear is however that I am doing such tasks incorrectly.**

2. How did I know how to approach a specific problem or task at work? What did I draw from my past experiences or learning that told me that my planning on how to accomplish the task was on the right track?

Unfortunately, I have not had any real past experience with doing this style of work thus I literally have had to trust my best judgment in coming up with the answers. I attempted to seek assistance from my employer; however, she is A) to busy with her legal duties and B) honestly, has no clue how to complete such tasks. **I still do not truly know if I have been on the “right track” with the accounting tasks I have done.** I have notified the lawyer of this and thus I just hope for the best.

3. After I began to work on a particular problem or task, how did I know if my chosen strategy was working? What, if any, changes did I need to make to my understanding of the task, my planning, or my strategies by the time I had finished?

I still do not know if my chosen strategies have worked. As of this point I have yet to receive any notification that they have been incorrect so I believe that is a good starting point.

4. In thinking about a past problem or task at work, what have I learned that will help me with future problems or tasks, either at work or elsewhere? What specific things do I still need to understand?

A lesson I have learned about this is to receive clear instructions about what a job entails before accepting a position. Possibly some kind of employment contract would have been helpful here. **I think if I literally started crying on my employer’s desk she would hire an account for the office; however, she sees the opportunity that I can be challenged by this experience and chooses to save her money and hope that I do it correctly. Unfortunately, her business is on the line if it is being done incorrectly.”**

This high affect frequency posting comes from a Group 1 (Explicit) student who, after outlining a high task value for one of her main responsibilities, expresses fear of failure, a lack of confidence, frustration, guilt, and disappointment, but finally acceptance of her need to persevere, over her situation and the adaptations she must make in order to succeed. She showed an increase of 15 points pre- to posttest on metacognitive awareness and placed in the upper two quartiles of autonomy scores, scoring 42 on the SDS.

Posting 684: Group 1 (Explicit); Δ MAI +15; SDS 42

*“We recently had a staff meeting and my supervisors informed us that there are more kids registered into the program for an approximate total of 60 per day. A problem that has been occurring is that the kids have begun to wander off around the school without telling a leader; some kids even went out of the school grounds and come back with ice cream from McDonalds. Although it is mentally demanding at times, as leaders, knowing exactly where each and every kid is at all times is crucial. Now we are to ask any kid who is remotely near the door of the classroom where they are going and if they had permission from another leader. We are also supposed to be stricter so that the kids understand the importance of this situation. **The difficulty I have with this is that some kids can lie pretty well and I would not be able to catch their lies every time.** One time, a kid told me they were going upstairs to their teacher’s classroom to do homework and that sounded fine with me – as long as they were doing homework! I had to check on the kids that I (or another leader) sent elsewhere other than the “Kids First Program” room every fifteen minutes or so. I went upstairs to find that the teacher wasn’t even there; doors locked and lights out. So I spent some good amount of time looking for the kid everywhere...only to find him back in the Kids First room in the corner chasing another kid. This sounds alright and quite easy to handle because it’s just one kid, but usually that’s not the case. I also find it difficult to have my eyes and ears on about ten kids who were not doing homework; they were either running around or sometimes doing something inappropriate for the classroom setting. **I would have to ensure these kids would settle down and do homework. This can get frustrating for me for two reasons.** Firstly, I would need to discipline those who aren’t behaving. **It gets really frustrating when they do not listen and either run away from me or continue their disruptive behaviour. I also have this guilty feeling when I give them a time-out or take away their privileged activity time.** However, this week I’ve been stricter and I find that it is such a challenge for me to discipline kids. For the past five summers I’ve been volunteering/working with preschoolers so being strict and disciplining kids that are older is something I am adjusting to in this workplace. Secondly, **it is frustrating, or more so disappointing, that I am amidst all these kids who don’t like to settle down; this prevents me from taking the time to sit down with a kid and help them with their homework individually.** These challenges will continue to be present at my workplace but I am more than willing to accept them to strengthen my skills and abilities.”*

This next high affect frequency posting example contains both positive and negative affect. The student (from Group 2 (Implicit)) dropped eight points pre- to posttest in metacognitive awareness and scored just above the median on autonomy with a score of 41 on the SDS. Her posting shows excitement, regret, and uncertainty.

Most interestingly, she also describes an awareness of how her internal affect differed from her external affect shown to others.

Posting 258: Group 2 (Implicit); Δ MAI -8; SDS 41

*“i cant believe it! im going to be presentig at a conference. my supervisor asked if i would like to do a demonstration of a database at a conference. **i was like "sure". on the inside i was like "hell yeah"**. i was just thinking about what a great opportunity it would be. this was about a week and a half ago. at first, it was just sitting on the back burner. i didnt put as much focus on it as i should have, cuz i had a couple other projects that were running behind (and still are). my supervisor wanted me to schedule a practice presentation with the whole department so that i could get some feedback on what i was presenting. **regretfully, i didnt start preparing for this until 2 or 3 days before the presentation.** that would have been plenty of time i guess if i knew what i would be talking about, but i didnt. the database they wanted me to present on was one that i wasnt too familiar with. id only had limited exposure to it in the weeks before, so i had to spend a lot of time figuring out what it could do. so why did my supervisor assign this task to me? well i guess its cuz he figured i would appreciate the opportunity to get some public speaking experience. and he was right, i really do. and the database isnt all that complicated. so i guess it was all good. the thing is that **giving myself only 3 days to prepare for the practice presentation wasnt enough.... and it showed** =(so after getting some feedback members of the department, im getting another shot to practice and get some feedback before the actual conference in about 3 more days. tomorrow ill be presenting in front of the department again. **i just dont feel that im ready. ive spent the last few days going over it. i think my housemates think im going crazy cuz its just looked like ive been talking to myself. its scary, kinda like going into a final not knowing if you've studied enough.** well, i guess i'll see tomorrow if its good enough. worst case scenario, my presentation isnt good enough and i dont get to present at the conference. now that would suck(obviously), so ill try my best and hopefully it all works out.”*

In this next example of a high-frequency affect posting, this Group 2 (Implicit) student reflects, using both positive and negative affect, on how a dramatically increased workload has affected her. She describes a series of increasingly demanding task conditions that are resulting in her slipping behind; however, she continues to try her traditional coping skills to get the work done instead of changing strategies and accepting the offer of help from her manager. Interestingly, she describes herself as “very overwhelmed and discouraged,” but concludes by categorizing her situation as a desirable form of “mild stress.” This student showed a decline in metacognitive

awareness of 23 points from pre- to posttest and received the highest autonomy value seen in either group with a score of 47 on the SDS.

Posting 885: Group 2 (Implicit); Δ MAI -23; SDS 47

*“Our contract administrator is going on vacation for 3 weeks starting today. I was assigned to be the person who takes over her responsibilities. There’s also another colleague to back me up whenever I need help. The first day was not a good start because I already have lots of backlog on everything. I seriously think these tasks should be assigned to at least 2 people, because we used to have another temporary employee to work on contracts. I’m basically doing the work that should be done by 3 people. **I feel very overwhelmed and discouraged.** By the end of today, I still have at least 15 email inquiries. **There’s just not enough time to finish all the work in one day!!** If I leave them for tomorrow, there’s more tasks coming in and the backlog is even bigger. Today was the busiest day for me since I started this job. I have tried my best to finish everything as soon as possible. Usually I do all the similar tasks together so I do not need to go back and forth. My manager cares about my workload and told me to let him know if I have too much to do. I will give myself a few days to see if I can handle everything. If not, I might need to talk to my manager and find a resolution.*

***Mild stress keeps me fulfilling and active.** I hope this will be one of my accomplishments at work and I will try my best.”*

Further examination of affect frequency once data were reassembled to identify all six individual blogs entries in chronological order per student per group revealed almost all students used expressions indicating affect in their blog writing. Affect occurrences appeared to be independent of student writing style in the majority of instances. Evidence for this independence was that affect frequency varied among posts by the same student, with some blog entries containing very few or no instances of affective expression while others contained numerous expressions of affect (see Figure 4.1). Only one student from Group 1 (Explicit) displayed affective reactions in all six blog entries. Another student from Group 1 (Explicit) had no instances of affect in any of his six blog entries ($n = 12$). In Group 2 (Implicit), five students used affect in all six of their blog entries and no student blogs contained zero instances of affect ($n = 14$). The remaining students showed a mixed frequency of affect in their six blog entries. No discernible pattern emerged relative to which sequence of blog entries (first, second, and so on) were more likely to contain expressions of affect.

Reassembled coded data into prompting condition groups revealed several patterns related to student use of affect in all six blog postings. Group 1 (Explicit) frequency for negative affect ranged from 0-21 occurrences per student per blog ($M = 5.17$, $SD = 6.03$, $n = 12$). Group 1 (Explicit) frequency for positive affect ranged from 0-16 occurrences per student per blog ($M = 3.58$, $SD = 4.21$, $n = 12$). Group 2 (Implicit) frequency for negative affect ranged from 0-15 occurrences per student per blog ($M = 3.93$, $SD = 4.16$, $n = 14$). Group 2 (Implicit) frequency for positive affect ranged from 1-10 ($M = 5.57$, $SD = 2.71$, $n = 14$). Group bivariate correlations were significant between positive and negative affect for Group 1 (Explicit) ($r(10) = 0.92$, $p < .01$), but not for Group 2 (Implicit) ($r(12) = 0.29$, $p = .31$).

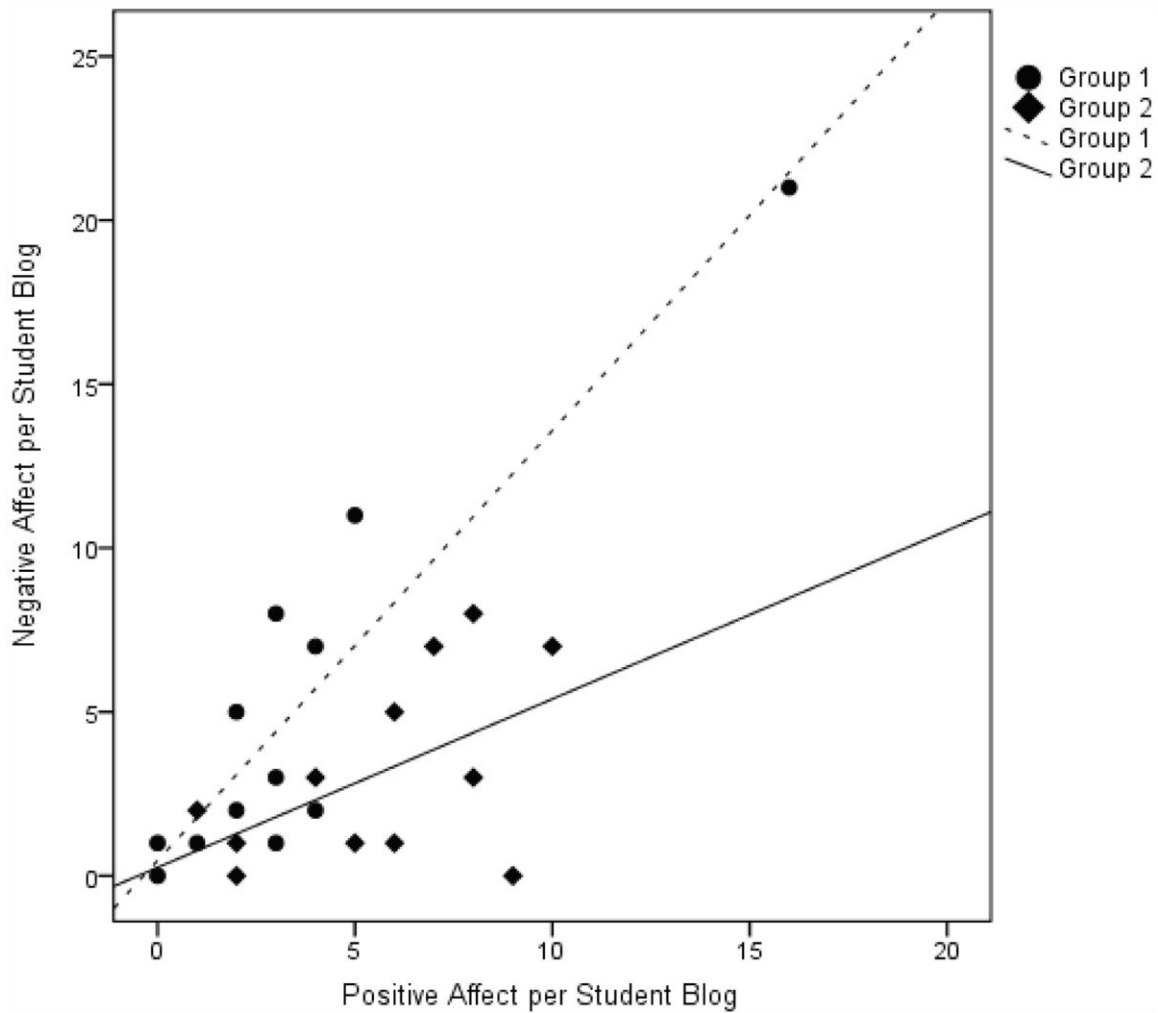


Figure 4.1. Group Affect Frequency

Taken together, frequency of positive and negative affect and correlations between positive and negative affect in Group 1 (Explicit) compared to Group 2 (Implicit) paint a picture of more cohesive use of affect in Group 1 (Explicit), with negative affect outnumbering positive affect. In contrast, Group 2 (Implicit) students used positive affect more frequently than negative and showed wider variation in frequency of the co-occurrence of both positive and negative affect in their blogs. These results appear to substantiate the use of the coding system to identify differences in use of affect in students' reflective writing.

4.4.2. Uncertainty

Uncertainty was identified through the literature review to be of particular importance to the research objectives. It also was one of the most frequently observed categories of affect in the data, occurring 62 times in 156 separate blog postings. Group 1 (Explicit) frequency for uncertainty ranged from 0-6 occurrences per student per blog ($M = 2.17$, $SD = 1.95$, $n = 12$). Group 2 (Implicit) frequency for uncertainty ranged from 0-7 occurrences per student per blog ($M = 2.57$, $SD = 1.68$, $n = 14$).

Thematic analysis identified uncertainty as a potential co-operative education student response to the University-work term transition. It was thereafter used as a diagnostic marker for negative affect calmly namely disequilibrium, hypothesized by Dewey (1910) and others to signify evidence of reflection.

The following data excerpts represent examples of coding for uncertainty (terms from scoring system appear bolded):

- *“The worst part, of course, is **having no idea** where to begin on this huge project.”*
- *“**I wasn’t quite sure** if I knew what I was supposed to do and did not feel too confident.”*

It should be noted that uncertainty is just one of the affective expressions that may signal disequilibrium. Other negative examples of affect that may also be representative of Dewey’s (1910) definition of disequilibrium included fear of failure, annoyance, disappointment, embarrassment, frustration, intimidation, nervousness,

overburdened, and even boredom. These examples comprised most of the rest of the scoring for negative affect in the data. Disequilibrium is only part of the Dewey (1910) conception of how reflection begins. He saw an individual's striving for equilibrium as the willingness to endure the discomfort, even pain, of disequilibrium. The research objectives for this study were nevertheless satisfied by coding positive and negative affect in broad categories and including a subset only for uncertainty.

4.4.3. Prompt Reference

One striking difference between Group 1 (Explicit) and Group 2 (Implicit) was the number of times students copied full, partial, or re-worded prompts into their written reflections, termed prompt references. Six of the 12 Group 1 (Explicit) students inserted prompt references into a combined total of 33 individual postings. Most of these postings contained multiple references, for a total of 152 prompt references. Four students in Group 2 (Implicit), in contrast, made a total of nine single prompt references in five postings. Averaged out over the entire groups, this becomes 12.17 prompt references per student blog for the 12 students in Group 1 (Explicit) and just 0.64 prompt references per blog for the 14 students in Group 2 (Implicit). In Group 1 (Explicit), the six students who used prompt references did so extensively in comparison to their Group 2 (Implicit) counterparts. These students averaged 24.3 prompt references in their 6 blog postings, whereas the Group 2 (Implicit) students who used prompt references averaged just 2.25 references per six blog postings (see Figure 4.2).

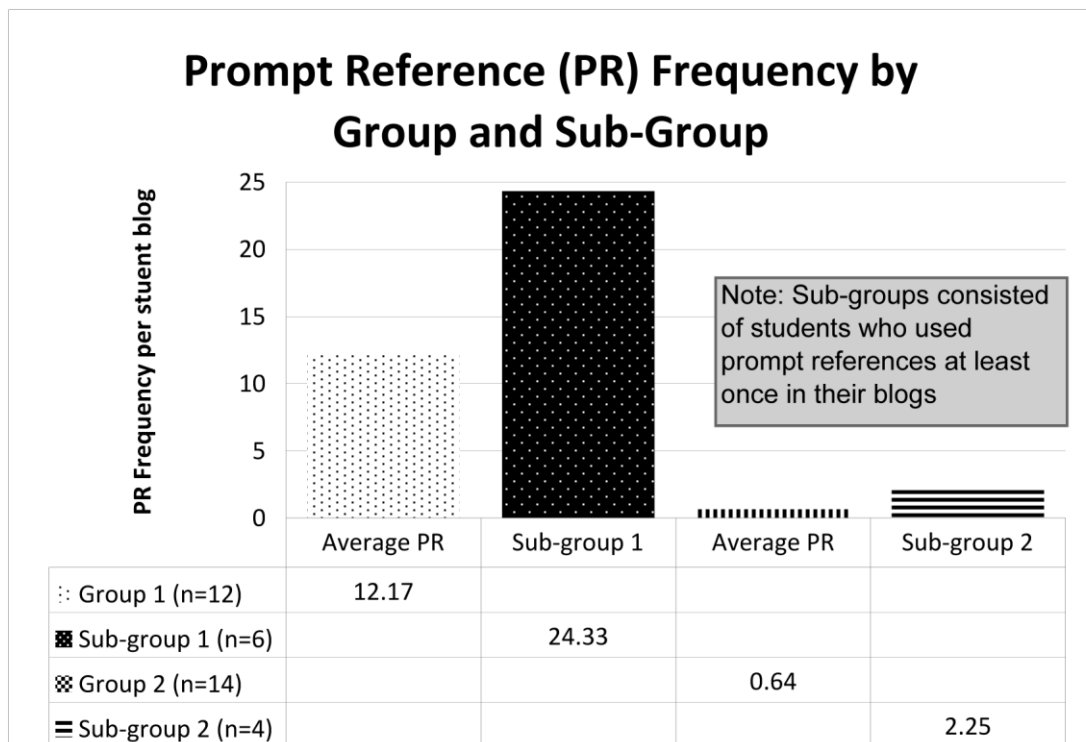


Figure 4.2. Prompt Reference Frequency by Group and Sub-Group

No apparent gender effects were found among those students who used prompt references, although conclusions are difficult to draw from these results due to the subjective nature of the coding, small sample sizes, and the low frequency of prompt references, especially among Group 2 (Implicit) students. In Group 1 (Explicit) ($n = 12$), three males and three females made references to explicit metacognitive prompts ($n = 6$). In Group 2 (Implicit) ($n = 14$), three males and one female made references to implicit metacognitive prompts in their reflective writing ($n = 4$).

Coded Qualitative Examples of Prompt Frequency

These first blog examples of prompt references illustrate prompt frequency. One blog example is included from each prompting condition. Each occurrence scored as a prompt reference is bolded. The blog postings are presented in their entirety to preserve full context. This first example (Posting 36) is from a Group 1 (Explicit) student. Her language shows evidence of engagement with the explicit metacognitive prompt language through rewording, sequencing, and even challenging (“*I was not sure what I*

was supposed to do” as opposed to the actual prompt: “How did I know what I was supposed to do when I was given a particular problem or task at work?”).

Posting 36: Group 1 (Explicit); Δ MAI +37; SDS 36

“I have been doing vessel functions studies for mouse aorta with the machine called myograph. The purpose of study is to observe how the blood vessels react to the injected drugs, and see if there are any notable differences between the aortas from two different groups of mice that have been treated with different substances.

1. Honestly I was not sure what I was supposed to do when my supervisor told me we would be doing the vessel function study. The procedure was quite complicated (8 pages long) and it was difficult to visualize what I was supposed to do. Fortunately one of the lab members had done the same study previously and she also knew a graduate student who is very knowledgeable in the field. I think visualization is a key in understanding the procedure (especially complicated one), as well as in any other situations. Even in academic situations, it's easier and more interesting to have pictures rather than 5 page long paragraphs to explain the same concept.

2. I had to perform this procedure by myself on the second day. I was feeling more confident after seeing how it's done. However, I misread the procedure and injected the wrong concentration of a drug. I sensed something was wrong after putting the drug as I noticed the graph shown on the computer was different from what I expected. As I read the procedure carefully once again, I realized my mistake. I did freak out a little, but I thought I should do wash procedure, which is performed at the end of the injection of each drug (ie. after we're done with drug #1, we wash it out and put drug #2 after). And I was right about wash procedure as I managed to continue with the experiment and obtained good results. **I definitely drew out from my past experience and observation to see if I was on the right track** with this relatively unfamiliar experiment.

3/4. Even with the same procedure, there's always something to learn from - even the smallest things. I have done this procedure three times in total, and I noticed what I could do differently to stabilize and improve my technique so that it's more effective. I think reflection is really important in learning and **seeing if my strategies are working and will certainly help with my future tasks.**”

The second example of prompt reference frequency is from a student from Group 2 (Implicit) (Posting 164). No prompt numbers were used, although the blog was structured into four paragraphs. This student used a slight rewording of prompt language and her writing showed evidence of sequencing.

Posting 164: Group 2 (Implicit); Δ MAI +19; SDS 35

*"In the last few weeks I haven't come across one particular problem at work per se rather my dilemma is recalling where certain things are when it comes to data entry/analysis. So **what I still needed** was where to save the information and how certain things needed to be saved.*

***The ideas I had about the task** were given to me in the first two weeks on the job. Without practice or having to do the task such as converting the energy data from the disk refiner to the spreadsheets for a while I found it difficult. While I was trying to find where the data goes I was a little frustrated, because I could only vaguely remember where the file was saved but couldn't pin point it amongst the other documents.*

I took the initiative to ask my fellow co-op buddy, and we discovered we both hadn't done this task for a while since one of the other co-op students had been doing it all this time. Together we figured it out and got the work done.

From this I learned that asking co-workers helps so that you can team together to better solve the problem, and to not be afraid to ask either your supervisor or fellow college for help (because they might just be in the same situation as you) ☺"

No blog entries in the implicit metacognitive prompting condition contained numbered paragraphs with corresponding verbatim, non-verbatim, or partial prompt language. In contrast, numbered paragraphs related to prompting language were found in 17 blog entries in the explicit metacognitive prompting condition.

4.4.4. Proximity

Evidence for the effect of proximity to workplace events as a marker for disequilibrium was found in student affective descriptions of ongoing or shortly completed tasks. This granular view of what students are immediately facing was found in these time-sensitive examples:

- *"This is currently my biggest concern at work." (Group 2 (Implicit), Δ MAI 4, SDS 47)*
- *"...my boss called me today ... to ask about the account because the package was still sitting in the office. I am making an official goal for myself: REMAIN ORGANIZED AT WORK. Keep notes on everything, check, check again, and check once more to sleep well. I am utterly embarrassed, and worried about myself. Can I learn this skill?" (Group 1 (Explicit); Δ MAI +13; SDS 39)*

- *“By the end of today, I still have at least 15 email inquiries. There’s just not enough time to finish all the work in one day. If I leave them for tomorrow, there’s more tasks coming in and the backlog is even bigger.”* (Group 2 (Implicit); Δ MAI -23; SDS 47)
- *“I am still unsure as to how I wish to face this problem. It’s a hard line to justify because you want change but you don’t want to be a nag or create further problems.”* (Group 1 (Explicit); Δ MAI -8; SDS 44)
- *“I think if I literally started crying on my employer’s desk she would hire an accountant for the office; however, she sees the opportunity that I can be challenged by this experience and chooses to save her money and hope that I do it correctly. Unfortunately, her business is on the line if it is being done incorrectly.”* (Group 1 (Explicit); Δ MAI +8; SDS 44)

Proximity appears to be related to the need to make decisions or problem solve to address a dilemma. Often, students seem to use their blogs to weigh both sides of an issue. These instances also appear to be linked to task value and a fear of failure.

4.4.5. Blog Length

Students in Group 1 (Explicit) wrote more words in their blogs ($M = 1853.08$, $SD = 131.17$, $n = 72$) than students in Group 2 (Implicit) ($M = 1583.93$, $SD = 118.85$, $n = 84$). This is equivalent to an average of 308.85 words per posting for students in Group 1 (Explicit) and an average of 263.99 words per posting for students in Group 2 (Implicit). Although it appears students in Group 1 (Explicit) wrote blogs that were 17% longer than their Group 2 (Implicit) counterparts, the length of the prompts may have been a factor. Each prompt contained two guiding questions; however, the length of prompts for Group 1 (Explicit) was 193 words, whereas the length of the prompts for Group 2 (Implicit) was 129 words. It was not possible to remove prompt language from student writing to assess length; therefore, blogs that contained no prompt references were compared from each group. Group 1 (Explicit) blogs postings with no prompt references were still longer ($M = 276.65$, $SD = 107.97$, $n = 40$) than Group 2 (Implicit) blog postings with no prompt references ($M = 265.99$, $SD = 122.08$, $n = 78$). When differences in prompt language were controlled, Group 1 (Explicit) postings appeared to be slightly longer, with 4% more words overall.

A striking characteristic of individual postings in both groups was the variability in length. Range for number of words in individual blog postings in Group 1 (Explicit) was

634 and, for Group 2 (Implicit), it was even larger at 847. The lengthiest single blog posting in Group 1 (Explicit) was 779 words (range in total blog for this student equalled 567) and was a student's first posting. In contrast, the lengthiest single blog posting in Group 2 (Implicit), at 986 words (range in total blog for this student equalled 788), was the sixth posting in a student's blog. To check to see if group variability in blog length was reflected within each student's blog or was primarily stemming from variability between student blogs, mean blog lengths for each student in each group were calculated. Group 1 (Explicit) total blog length showed more variability than Group 2 (Implicit), with a range of 277.5 and standard deviation of 100.06 based on a mean of 308.85, compared to a range of 288 and standard deviation of 75.55 based on a mean of 263.99 for Group 2 (Implicit). No discernible patterns were found related to blog length and frequency of positive or negative affect, uncertainty, or prompt reference.

The difference in mean length between Group 1 (Explicit) and Group 2 (Implicit) individual blog postings (308.85 words vs. 263.99 words) may therefore be influenced by being prompted with explicit metacognitive prompts and not simply the relative length of the two sets of prompts. Group 1 (Explicit) students not only copied, paraphrased, or challenged the explicit metacognitive prompt language much more frequently, they wrote longer postings even when not making observable prompt references.

- **Research Question 2:**

- What effects does metacognitive prompting have on levels of learners' metacognitive awareness?

Both groups showed increases in metacognitive awareness as measured by two administrations of the Metacognitive Awareness Inventory (MAI), one preceding any blogging activity ($M = 197.46$, $SD = 20.48$, $n = 26$) and the second following the completion of all blog entries ($M = 205.50$, $SD = 19.55$, $n = 26$). While this question would need a true experimental design to establish causality, this study took preliminary steps to create and test two conditions of metacognitive prompting. When qualitative results are integrated into and considered alongside these summary statistics, increases in metacognitive awareness in both groups support that student engagement with prompting in this sample was unlikely to hinder metacognitive awareness and probably strongly supported it, at least in some students.

This study also attempted to address this question in a mixed methods design by qualitatively assessing engagement with metacognitive prompting by identifying those students who made references to prompts in their reflective writing and examining their pre- and posttest scores in metacognitive awareness. Six Group 1 (Explicit) students and four Group 2 (Implicit) students met this criterion for prompt engagement. They copied verbatim prompt language, numbered their postings to coincide with the guiding questions found in prompts, or reworded prompt language in their postings (see Table 4.5).

Table 4.5. Level of Prompt Engagement and Change in Metacognitive Awareness

	Group 1 (Explicit)					Group 2 (Implicit)				
	<i>n</i>	Δ MAI (<i>M</i>)	SD	Min	Max	<i>n</i>	Δ MAI (<i>M</i>)	SD	Min	Max
Blogs with 1 or more prompt references	6	18.00	27.93	-11	65	4	1.50	16.22	-20	19
Blogs with no prompt references	6	5.17	6.03	-3	21	10	5.50	16.27	-23	23

While ranges for changes in metacognitive awareness in students who engaged with prompts by using prompt references spanned from the negative to the positive for both groups (Group 1 (Explicit), range = 76; Group 2 (Implicit), range = 39); interestingly, only one student who used prompt references in each of these groups showed a decline in metacognitive awareness (Group 1 (Explicit), *n* = 6; Group 2 (Implicit), *n* = 4). Similarly, only one student in Group 1 (Explicit) who did not use prompt references showed a slight decline in metacognitive awareness of three points (*n* = 6). In comparison, 4 out of 10 students in Group 2 (Implicit) who did not show prompt engagement through the use of prompt references declined in metacognitive awareness, dropping 2, 4, 8, and 23 points respectively. These mixed results show the effect of students with extreme changes in values on research instruments on overall results when dealing with small sample sizes; however, they may indicate a trend that changes in metacognitive awareness may be enhanced, although with nevertheless still a high degree of variability, among students who engage with explicit metacognitive prompts.

No apparent gender effects were observed in changes in metacognitive awareness for both groups combined. Males scores on the pretest ($M = 192.58$, $SD = 16.62$, $n = 12$) and the posttest ($M = 201.92$, $SD = 19.10$, $n = 12$) were consistently lower than females scores on the pretest ($M = 201.64$, $SD = 22.46$, $n = 14$) and the posttest ($M = 208.57$, $SD = 19.41$, $n = 14$).

- **Research Question 3:**

How does reflective writing of learners differ relative to learner autonomy and metacognitive prompting condition?

The first goal in addressing this research question was to confirm the trend indicated by the literature (Davis, 2003) that autonomy may be related to student response to varying prompting conditions and changes in metacognitive awareness. Whereas Davis (2003) used an internal/external belief scale to measure autonomy, this study employed the Self-Determination Scale (Sheldon & Deci, 1996 as cited in Reis, Sheldon, Gable, Roscoe, & Ryan, 2000), which was deemed more appropriate for adult learners. Despite the limitations of a small sample size, exploratory quantitative analysis was performed alongside qualitative assessment to address this research question in order to contribute to prior research findings and helped lay a foundation for further research directions.

Quantitative calculations were made using actual student autonomy scores (as measured by the Self-Determination Scale) and not the arbitrary high/low autonomy categories initially assigned to students based on a median split in order to do random group assignment. Using actual SDS values allowed quantitative assessment using a continuous rather than a categorical variable, thus enhancing overall accuracy. A metacognitive difference score was calculated for each student by subtracting a student's score on the MAI pretest from the student's score on the MAI posttest. Autonomy scores were found to be normally distributed in both groups combined according to Shapiro-Wilk's test of normality, ($p = 0.218$). Difference scores were also found to have normal distribution in both groups combined, as assessed by a Shapiro-Wilk's test ($p = 0.054$). A Pearson correlation for autonomy and difference in MAI pre- and posttest was conducted for all students combined, and confirmed the relationship between autonomy and changes in metacognitive awareness previously identified by Davis (2003). Autonomy was found to be significantly correlated to difference in MAI

scores, $r(24) = -0.408$, $p = 0.038$, with students who initially scored lower on autonomy realizing higher gains in metacognitive awareness pre- to posttest over the course of the 13-week semester. This trend was upheld in Group 1 (Explicit) ($r(10) = -0.595$, $p = 0.041$) but not for Group 2 (Implicit) ($r(12) = -0.205$, $p = 0.481$) after calculating correlations between student autonomy and difference in MAI scores for each group separately.

These exploratory quantitative findings are further supported by the qualitative analysis. The example given previously (Posting 36) for prompt referencing is also an excellent example for a learner who scored just below the median on autonomy (SDS 36) who makes significant gains in metacognitive awareness, with an increase of 37 points pretest to posttest. This next example shows a learner with the highest overall score in autonomy from Group 2 (Implicit) who writes about his successful struggles to restore equilibrium. No prompt references were used and net change in metacognitive awareness was a decrease of two points.

Blog Posting 197: Group 2 (Implicit); Δ MAI -2; SDS 47

"This week, I started getting a lot more work and responsibility at my job. It's as if when one thing comes along for me to do, there's immediately a second and third job right behind it. I finished a big job this Friday, and handed it into my supervisor. Thursday I received extra-provincial filings for the fiscal year end since some trust companies use October 31st as their year end instead of December 31st. On top of creating an entire new spreadsheet and updating figures for each trust company, I have the responsibility of calculating their annual fees which the Financial Institutions Commission bills out every year. This is a very precise job as I cannot miscalculate the fee in order to avoid charging the trust company too much or too little. Aside from this, I also have to do a risk scoring report and once again, since certain trust companies end off their year on October 31st, there are additional steps I have to account for when completing the report. In addition to all of this, I have my on-going project to focus on and finish in my last month of work. I haven't had a lot of time to focus on my on-going project as other things have come in and had greater priority, but I still need to find the time to finish it as well. On Friday, I organized a schedule of deadlines for myself so that I can keep myself on track, and keep away from worrying about whether or not I would have enough time to finish everything. I outlined each job that I have to do, and allocated a certain amount of time. After I did this, I felt a lot better, and am confident that I will stick to it and hand in everything on time."

This study thus showed both qualitative and exploratory quantitative support for differential effects of autonomy and prompting condition on degree of change in metacognitive awareness, especially among learners with lower autonomy scores relative to the remainder of their group.

Chapter 5.

Discussion and Implications for Future Research

The objectives of this research made this project unique. The primary purpose of this study was to investigate two conditions of metacognitive prompting on qualities of learner reflective writing and changes in metacognitive awareness while learners were engaged in their first co-operative education work term. Hatton and Smith (1995) stressed the importance of tracing reflective processes in novices in the workplace. Learners in this project were experienced academic learners -- mid-range undergraduates -- albeit novices in terms of learning in a co-operative education work term environment. Thus, this program of research looked at metacognitive awareness and reflection in a novel environment with learners experiencing an academic-to-workplace learning transition.

A secondary purpose was to assess if learner autonomy was related to changes in metacognitive awareness over the course of a 13-week university semester in two prompting conditions. Autonomy is a measure of the degree to which an individual feels grounded and that his choices are self-determined. Differential effects of prompting condition based on learner autonomy have been found in other research (Davis, 2003). The current study, however, did not replicate a generic prompting condition such as used by Davis, but used two metacognitive prompting conditions (explicit and implicit) based on the Winne-Hadwin model (1998) of self-regulated learning. Conditions varied according to the explicit details used to guide student reflections. Using an established framework for self-regulated learning may have supplied varying degrees of positive learner support. Davis concluded that “prompts worded more positively -- would be more beneficial for some learners” (p. 130). Using the Winne-Hadwin model as the framework for prompt structure provided scaffolded support for all learners, resulting in greater gains in metacognitive awareness, especially for students in this study placed in

the explicit prompting condition who scored less on the initial autonomy measure than their same group peers.

Thus, differential effects of learner autonomy and prompting condition were confirmed with this group of 26 students. While metacognitive prompting is generally shown to improve learners' levels of metacognitive awareness over time, it may be that mid to highly autonomous learners are less affected by the influence of explicit metacognitive prompts, preferring to use their already developed and refined autonomous strategies (Davis, 2003). In this study, implicit metacognitive prompting appeared to exaggerate this differential effect of prompting condition on net change in learner metacognitive awareness, with learner autonomy inversely correlated to changes in metacognitive awareness. According to the data in this study, implicit metacognitive prompting resulted in no net gains in metacognitive awareness for learners with higher autonomy scores relative to their group. Learner autonomy is thought to be advantageous for self-regulation; however, this study along with other prompting research (Davis, 2003), showed a potential differential response to a widely adopted research and instructional strategy of promoting metacognitive awareness, even when learners are given nonprescriptive guidelines for structure and timing of their responses, as they were in this study. Thus, learner autonomy differences may account for some of the variation found in the literature with regard to learner responses to prompting conditions.

A third purpose was to conduct an exploratory analysis of learner reflective writing done in a computer-mediated environment using Winne and Hadwin's (1998) four-phase model of self-regulated learning as a preliminary framework to design learner metacognitive prompts. Providing a range of optional prompts reflecting all SRL phases allowed learners to make independent decisions regarding selecting specific prompts. Such self-calibration to individual differences was identified by Azevedo and Hadwin (2005) as a way for researchers to avoid making assumptions regarding learner metacognitive readiness for prompts.

5.1. Disequilibrium

This study found supporting evidence that disequilibrium is occurring at three levels. The first level dealt with a dramatically changed learning environment found in the shift from university to a first work term learning environment. The second source of disequilibrium was the work term experiences themselves, which evoked affective responses to ongoing or very proximal work term events. The final level of disequilibrium came as a result of the prompting conditions. Evidence that students in the explicit metacognitive prompting condition were more unsettled was found in combined positive and negative affective responses, blog length (as an indicator of effort), and references to the prompts themselves. These indicators are consistent with Dewey's (1910) construal of reflection as painful, effortful, and uncertain.

Co-operative education students in this study underwent a temporary transition to their first work term from their University programs. Under the best of circumstances, such transitions take many months, if not a year or more, before an individual feels settled (Wendlandt & Rochlen, 2008; Kammerer-Mueller & Wanberg, 2003). Temporary work placements, such as co-operative education work terms, may place additional stressors on learners-as-workers because time to learn skills, complete tasks, acculturate to workplace dynamics and earn a satisfactory placement report from the employer is fixed.

Students also experienced disequilibrium as a result of workplace experiences themselves. The high degree of positive and negative affect found in student blogs indicated students were writing about their affective reactions to high-intensity workplace situations. Weiss and Cropanzano (1996) saw both a time and a shock factor to workplace affective response. They noted that workplace dimensions (pay, hours, etc.) were separate from the affective reactions employees had when unexpected events arose. In addition, individuals are in a state of affective engagement during episodes experienced in the workplace and may remain affectively engaged for a prolonged period thereafter in what Weiss and Cropanzano termed affective aftershocks (1996). Blog writing that occurred during or shortly thereafter such episodes appeared to capture evidence of affective engagement, with Group 1 (Explicit) exhibiting a qualitatively and quantitatively different response from Group 2 (Implicit).

Another characteristic of these work term blogs was proximity of student reflective writing to the immediacy of an ongoing or recent event. Students reflected in blogs knowing they were going back to face their work situation in the future, often imminently, using their blogs to actively problem solve and make decisions. Badley (2009) distinguishes between personal writing created within an experience, which he terms *reflective*, and retrospective writing, termed *reflexive*. Accordingly, these work term blogs were both reflective and reflexive. Students wrote concurrent to an experience, often submitting their blogs from work describing situations that were still ongoing and unresolved. Similarly, some students used their blogs to debate immediate consequences of their problem-solving decisions. Finally, evidence for disequilibrium from proximity of student reflective writing to affect-rich workplace events included affective responses to both personal consequences and failure of the business itself.

Affect was unprompted in both groups; however, the degree of metacognitive prompting appeared to influence student expressions of affect. Qualitative scoring and descriptive analysis revealed a trend that Group 1 (Explicit) students' use of positive and negative affect was more closely related than use of affect by Group 2 (Implicit) students. This was further supported by visual analysis in a frequency scatterplot. Thus, it appears that students in both groups used overall affect in comparable frequencies, but students in the implicit metacognitive prompting condition also displayed more instances of positive affect. Higher frequencies of positive affect in Group 2 (Implicit) may indicate students were in a lesser state of disequilibrium than students in Group 1 (Explicit). Each instance of affect was scored as positive or negative: the rubric did not include a measure of intensity. Therefore, it is unknown whether Group 2 (Implicit) also displayed any differences in intensity of expressions of negative affect than their Group 1 (Explicit) counterparts. If less intense expressions of negative affect were confirmed in future research in implicit metacognitive prompting conditions, combined with the trend towards higher frequencies of positive affect found in this study, this would lend stronger support to lesser shock and affective engagement (Weiss & Cropanzano, 1996) in the Group 2 (Implicit) condition and, therefore, less disequilibrium.

Prompting condition introduced additional sources of disequilibrium. To the extent that prompting based on a model of self-regulated learning serves as a

benchmark against which students can compare their ways of thinking about their understanding, actions, and evaluations of a task or experience, such prompting may result in student disequilibrium. Students must engage with the prompts; namely, they need to attend to prompt details for this source of disequilibrium to result. In this study, students' attention to and engagement with the prompts was directly observed by student repetition and rewording of the prompts themselves. The difference in numbers of prompt references between prompting conditions, reinforced by greater overall blog length irrespective of whether blog entries contained prompt language, may be a further example of disequilibrium in students in the explicit metacognitive prompting condition. Finally, students in the implicit metacognitive prompting condition may exhibit these proposed traces for disequilibrium, but at lower levels in this data. For example, students in Group 2 (Implicit) exceeded minimum blog length requirements even though their postings were not as long as those in Group 1 (Explicit). Similarly, a few Group 2 (Implicit) students did make prompt references and display comparable instances of negative affect. There were no apparent differences in frequency of uncertainty between the two prompting conditions. This may indicate that any degree of metacognitive prompting may lead to uncertainty or it may simply be that the transition from university to a work term and the learning challenges presented by workplace tasks may evoke uncertainty in all students.

John Dewey proposed that learners hold a certain number of beliefs or understandings about their learning and that they enter into a state of disequilibrium when presented with contrasting information. Dewey considered this unsettling comparison of what a learner thinks he knows with what he thinks he perceives to be a preamble to learning. It is important to note that learner judgments about their internal states and learning tasks are not necessarily accurate. Indeed, eventual learner recognition that their reflections do not hold up to the immediate learning situation would seem to only exacerbate any sense of disequilibrium.

Dewey could be seen as the forefather of self-regulated learning as proposed by Winne and Hadwin (1998). According to Dewey (1910):

Reflective thinking, in short, means judgment suspended during further inquiry; and suspense is likely to be somewhat painful. ... the most important factor in the training of good mental habits consists in acquiring

the attitude of suspended conclusion, and in mastering the various methods of searching for new materials to corroborate or to refute the first suggestions that occur. To maintain the state of doubt and to carry on systematic and protracted inquiry — these are the essentials of thinking (13).

Furthermore, Dewey's assertions imply an ability on the part of the student to adapt once the search for resolution to doubt and uncertainty concludes. Learning is a constantly evolving, dynamic process, which is reflected both in the theoretical model proposed by Winne and Hadwin (1998) and empirical findings, such as the longitudinal research conducted by Evensen, Salisbury-Glennon, and Glenn (2001) on first year medical students. Thus, a continuous thread links Dewey to contemporary theoretical models and empirical research that concludes self-regulation is iterative and adaptive, based largely on the skillful judgment of the learner.

Learner judgment is a key component of the Winne-Hadwin model (1998). The many iterations and evaluations depicted in the model imply a dynamic process. A capable self-regulated learner would presumably be confident knowing the process will help him achieve his desired level of performance if his evaluations are accurate and his adaptations appropriate. This is equivalent to the suspension of judgment and protracted inquiry proposed by Dewey. Learners willing to persist in the moment, not immediately knowing their course of action, demonstrate self-regulation.

A key element of disequilibrium appears to be the perceived size of the gap between learner internal factors and environmental external factors. If learners perceive this distance to be too great, specifically, too many demands or too few internal resources to reconcile the difference, they may disregard, adapt, or abandon their efforts. Similarly, if the perceived gap is too small, inattentive learners may not engage with the actions necessary to restore equilibrium. While disequilibrium and prompting do not replace the rich potential of a metacognitively-scaffolded instructional environment, prompts represent a comparative tool that may have offered learners more elaborate ways to think about tasks in the workplace than learners were able to create on their own. They served as a model against which learners could compare how they thought about their workplace experiences, identify discrepancies between the prompts and their own way of thinking, and confirm they were fully exploring all aspects of their chosen

topic. Even when learners did not elect to overtly use prompting language or structure in their current writing, the prompts served as a reminder about how to metacognitively reflect on their future learning. In both prompting conditions, prompts provided students structure to frame their writing. Furthermore, the findings of this research support Davis' (2003) contention that prompting condition may produce differential effects on learners, especially those who score higher on autonomy within a group. It appears mid- to highly-autonomous learners may not respond as positively to some forms of prompts as their lower-autonomy peers. These differential effects were upheld in this study, with autonomy inversely linked to changes in metacognitive awareness.

Based on this study's design, I propose that providing co-operative education work term students with more explicit metacognitive prompts in an unsupervised blogging environment introduced a potentially more apparent state of disequilibrium than those students provided with implicit metacognitive prompts. Many students in this study were engaged in often challenging and high-affect situations in their work terms. Students who entered the blogging environment to write about stressful events and who engaged with explicit metacognitive prompts showed evidence that they were in a state of disequilibrium. They not only seemed aware of the prompts, but they sometimes challenged the prompt language or used it as a springboard to describe their own thinking. Qualitative evidence for a state of disequilibrium in explicit metacognitively-prompted students included high-affect, often negative, student descriptions of the situation, student repetition, rephrasing, and answering prompt questions in their reflective writing, proximity to high affect workplace events, and lengthy written reflections. Each of those elements showed qualitatively different patterns when compared with students who were prompted less explicitly. In addition, changes in metacognitive awareness in explicit metacognitively-prompted students were inversely correlated with autonomy than changes observed in implicit metacognitively-prompted students.

Thus, between an individual's awareness of and comparisons between a present and future state is a theme that reverberates through how reflection is defined and, as this research found, measured and potentially influenced. When a person becomes aware that he can no longer respond to a present situation with routine thoughts and actions, effort and judgement are required to compare the two states. Disequilibrium will

exist until this discrepancy is resolved. This study supports an interpretation that such disequilibrium, described by Dewey (1910) as a precursor to reflection and self-regulation, left discernible traces in student reflective writing in their co-operative education work term blogs. Students sometimes responded to such disequilibrium in similar ways depending on how they were prompted, especially students who ranked lower in autonomy in an explicit metacognitive prompting condition. The transition between university and a work term and situations within these student work terms introduced two types of disequilibrium, what Dewey would call an unexpected conflict in how students thought or believed. The first type of disequilibrium results from the change from a familiar learning environment found in formal schooling to an unfamiliar learning environment in the workplace. This represents the transition from being a student experienced in formal learning to a novice in unfamiliar surroundings (Winne 1995). The second source of disequilibrium, evidenced by the heightened affective responses of students and other qualitative and descriptive elements of their reflective writing, stems from the high task value and demands faced by these students in the workplace. I conclude that prompting introduced a third type of disequilibrium, where students compared how they otherwise would write about their workplace experiences with a set of non-prescriptive guiding questions. Furthermore, students given explicit metacognitive prompts experienced greater gaps and, thus, greater disequilibrium associated with their reflective writing in their work term blogs.

5.2. Methodological Implications and Limitations

Sample size is the primary limitation governing interpretation of these findings. No outliers were omitted from data analysis in order to preserve the integrity of the data; however, the small sample sizes for both groups ($n = 12$ and $n = 14$) meant the effects of outliers may have influenced the pretest assessment scores and both the qualitative and quantitative analyses. A mixed method design must strike a balance between the greater richness afforded by qualitative analysis and the power of descriptive analysis and exploratory quantitative tests. The quantitative findings were consistently supported by thematic analysis when the data were reassembled and reassigned to each participant. These limitations, therefore, imply a need for further research to confirm with a larger sample where measures could be taken to study focused qualitative elements

rather than entire blogs and quantitative data to streamline analysis while minimizing sample size constraints.

The current study did not provide students with control over prompting options or individualized support; however, it did allow students to choose the timing of their written reflections, within a two-week spread, if and how they would use the prompts, the topic and length of their written contributions. My intent in this study was limited to observing differential impacts, if any, of prompting condition and autonomy on changes in metacognitive awareness and not generalizing to changes in student learning, even within this research's sample population.

Although all qualitative coding was done prior to blogs being reassembled according to author and group assignment, certain elements of blog content made total researcher blinding impossible. For example, even though names were deleted from the raw data prior to any coding by a research assistant, students repeated qualities about their work terms in their reflective writing, such as company line of business or nature of their tasks, that were readily recognized. After several coding passes and I was familiar with the postings. I never referred back to how I had coded a previous blog entry when I recognized that I was coding another entry by the same student. Similarly, blog sequence often was visible because students referred to dates or benchmarks in the semester and sometimes revealed authorship (for example, one student began every blog with "Welcome to my 1st, 2nd, 3rd... blog!). Again, by not reconstructing a student's blog until after all qualitative coding had concluded, I minimized any effects from recognizing these elements of writing style. Finally, because blog sequence was not important to any analysis, its disclosure by some students did not affect the conclusions of this study other than the extent to which it contributed to identifying postings written by the same student.

A particular limitation is the lack of inter-rater reliability. A sole researcher (me) analysed the data qualitatively, which resulted in the identified themes and patterns reflecting the researcher's own interpretation without the benefit of being double-checked by other researchers. I addressed this issue by developing strong rubrics to guide analysis. I also put the data aside for a few days or a couple of weeks and then returned to the raw data to revisit the analysis. Any discrepancies in either the rubrics or data

scoring were dealt with by re-interpreting and reconciling the whole data set. Thus, both the rubrics and the data analysis grew from an iterative process.

Despite attempts to mitigate effects of extraneous variables, any field setting potentially introduces many uncontrollable factors. At best, researchers can seek to mitigate any deleterious effects that may influence findings and acknowledge these limitations. One potential source of variability in this small sample that may have influenced the degree of disequilibrium noted in students' reflective writing was the effects of challenging or, conversely, mundane, workplace assignments. This variable was not collected or controlled; thus, it remains a subject for future research into disequilibrium brought about by work term placements.

One way to have strengthened the reliability and validity of this study's findings and offset some of these limitations would have been to perform post-work term interviews with a sub-group of participants. These post-interview discussions would have reviewed and triangulated initial data reduction into various codes and patterns. Rather than simply being ancillary to the initial study, such interviews would have formed an integral part of the final data analysis phase. They would have provided opportunities to discuss interesting elements of participants' reflective writing, how the interview related to other evidence, and finally how the evidence which is emerging related to the theoretical foundation of the current study.

Differences between Group 1 (Explicit) students and Group 2 (Implicit) students may be subject to a group effect and not a response to prompting condition whereby students observed patterns and reactions in others, which changed their expectations and, consequently, their own contributions. Evidence of audience awareness and view counts noted in this study confirmed students were aware of, read, and interacted with other student's blogs. Audience awareness in these blogging communities, even instances where students referred to another group member by name, do not constitute group discussions, so any influences on student writing due to increased social cohesion and identity would be minimal (Smith, 2008). Similarly, group effects due to cultural identification are not likely to have influenced individual writing. Group members knew each other only by student ID except in cases where they disclosed their names in their blogs. As noted previously, no language effects were detected that indicated any

student had difficulty communicating in English. No students disclosed they recognized each other from out of group interactions. Thus, individual student cultural identity was not likely to be visible within each group. One area where group effects may be present, however, is in writing characteristics, such as inclusion of affect and prompt references, both of which seemed to occur in distinct patterns in each group prompting condition. These groups, however, may have lacked the structure necessary for homogeneity of writing to stem from group effects. According to Postmes, Haslam, and Swaab (2005) group validation and convergence are necessary for groups to form social identities that may shape behaviour. Group validation occurs when group members acknowledge each other's contributions as being in alignment with group norms. No such acknowledgements were found in either group. Finally, group convergence occurs when groups interact in a series of give and take on a particular topic. Because group members decided on the content of their blogs, groups did not have an opportunity to interact on any group topics. The novelty of the blogging environment may have led to some students following the lead of another, appealing, student writing style. Notwithstanding this possibility, according to a study by Li and Chignell (2010), similarities in expressions of affect and other writing characteristics between blog writers may be due to pre-existing similarities in writer style and not influences of a more appealing writing style.

Affective Events Theory (Weiss & Cropanzano, 1996), which states people are likely to display affective reactions to workplace events, especially continuing or recent events, supports this study's findings that affect is readily found in student writing concerning recent workplace experiences. However, no intensity measurement was made for any instances of affect during the scoring process. Confirmation through MANOVA that explicit metacognitive prompting leads to fewer positive expressions of affect and potentially more intense negative expressions of affect is a subject for future research.

Group effects may also have influenced blog length and use of prompt references, although no discernible patterns were identified linked to longitudinal effects of either variable. For example, blog length was mixed both within and between students over the six entries made per student. Similarly, prompt references were plentiful in half of Group 1 (Explicit) students and absent in others. If a group effect

influenced student reflective writing, it presumably only influenced half the students. In Group 2 (Implicit), the results were even less indicative of a group effect: one third of students made a single and, in one case, a double prompt reference. These references were scattered throughout the semester.

This study did not collect demographic information on student cultural identity. Although the university is known to have a culturally diverse undergraduate population, it is unclear whether co-operative education students reflect the same degree of diversity. It remains unknown, consequently, whether culture exacted any influence on student self selection for participation in this study. There may also be cross-cultural differences in student interpretation of study expectations, assessments, and instructions, levels of disequilibrium experienced on work terms, or, finally, online reflective writing. Future researchers may wish to explore cross-cultural effects relative to prompting of online student reflections.

Finally, the prevalence of student uncertainty found in their written reflections confirms the appropriateness of this study's design. Using semi structured prompting environments in both groups provided a basic scaffolded framework and reduced any additional pressure students may have felt about participating in research during their work terms. Even though this study's findings indicated explicit metacognitive prompting creates more effortful reflections, an unstructured blogging environment with no guiding prompts may have introduced additional uncertainty and disequilibrium related to completing the research and work term requirements.

5.3. Conclusions and Future Implications

This study did not attempt to find reflection in student writing, but traces of presumed reflection. Similarly, this research did not set out to answer the question that if metacognitive awareness is good, or whether more metacognitive awareness is better. Ultimately, this research is a qualitative examination of hypothesized characteristics of reflection with established models of metacognition related to evidence found in online discourse and an attempt to influence both reflection and metacognition. There are three unique elements to this study: 1) the participants, who are experienced in learning

but novices in their co-operative education work term, 2) the prompting conditions, based on Winne and Hadwin's four SRL phases (1998), with more or less explicit metacognitive language to guide student writing, and 3) the blogging environment.

This study informs both research and pedagogy. It provides empirically-validated support of a novel way to prompt and assess learners' reflection through the use of theoretically-grounded principles. Within the stated limitations of this study, this research demonstrated a clear and common understanding of how to measure, prompt, and interpret reflection in support of learner metacognitive development as experienced adult learners in novice workplace settings. Its findings may inform pedagogy in terms of program structure and implementation. For example, using a framework based on an established model of self-regulated learning may be appropriate for designing prompting interventions for adult reflective writing activities. Furthermore, when co-operative education students are prompted to write about recent or ongoing workplace experiences, co-operative education coordinators may see regular expressions of affect, effort, and uncertainty when students enter into a state of disequilibrium. The nature and frequency of disequilibrium may be further influenced by providing students with metacognitive guiding prompts. These prompts may produce markedly different levels of affect, evidence of effort (length), and engagement with the prompts themselves. Differential effects of metacognitive prompting on changes to metacognitive awareness may be explained by varying levels of student autonomy. Future research is needed to determine optimal means to foster increases in metacognitive awareness in highly autonomous learners or, at the minimum, offset any deleterious effects of explicitly-structured reflective writing exercises.

This study not only confirmed the utility of the Winne-Hadwin model of self-regulated learning (1998) to design prompt interventions for student reflective writing during co-operative education work terms, it provided empirical support for disequilibrium, a key component of reflection hypothesized by John Dewey (1910) and many others. It concludes that affect, particularly negative affect, and uncertainty are characteristics of student writing representative of affective engagement with new and challenging workplace learning. Based on Dewey's depiction of reflection (1910), these characteristics depict disequilibrium that occurs when student engage in metacognitive thinking about perplexities and challenges in their workplace tasks. Increased

metacognitive expression and awareness are worthy goals for these adult learners in new workplace learning environments and their university co-operative education programs.

This study also establishes that work term student blogging is a viable alternative to conventional work term retrospective reporting, albeit with noted cautions about potential differential effects based on levels of student autonomy. From a university perspective, student reflections on workplace experiences provided a more granular and immediate look at the work term. In many cases, students readily admitted when they were faced with something unknown and made mistakes and provided details about their thinking behind their decision making and problem solving.

Most importantly, reflecting in blogs may have additional direct and indirect benefits to students beyond individual, offline reflection. Blogs provide a shared environment for students to express their insecurities and triumphs about their transition from being an academic learner to a workplace learner. Vicarious benefit or influence stemming from exposure to peer reflections while undergoing a similar experience remains an area for future research.

Finally, this research monitored authentic, real-time co-operative education student integration into the work environment as they begin to see themselves as employees and lifelong learners, rather than learners anchored to a particular university program. As such, this research differs from other research on reflection restricted to analyzing reflection in academic-only and retrospective applications. Through this approach, I captured the nature of self-regulation as expressed in reflective writing in blogs when co-operative education students, who are experienced academic learners, enter workplace learning environments as novices.

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Appendix A Consent Form

Consent Form for Research Participation - Birrell 39178

Title of Research: The Use of an Online Community to Prompt Learner Reflection during First Co-operative Education Work Terms

My name is Sandra Birrell and I am investigating the use of online environments by co-operative education students while engaged in first co-operative education work terms for my PhD research. My intention is to learn more about how students reflect on workplace learning experiences. I am being supervised in conducting this study by Dr. Phil Winne, Professor in the Faculty of Education at Simon Fraser University.

Your participation will not affect your SFU program or work term evaluation in any way. Only the research team (Sandra Birrell and one research assistant) will have access to your survey data. They, along with the other co-op students in your group, are the only people who will read your written reflections. SFU Online Community Managers automatically have access to every community, but they usually enter only if we encounter technical issues. It is entirely your choice to copy all or part of your reflections posted in your blog into your final work term report.

If you choose to participate, you will complete a brief online survey (total time approximately 15 minutes). After survey results have been submitted and organized, you will be sent an email with a link to a secure online area to start participating. Approximately every two weeks, you will receive a reminder to write a short reflection and post it in this secure online area. Sandra will post further instructions on what to include in your reflections online. You are required to submit a total of 6 reflections over the course of a single semester work term in order to participate. At the end of the semester, you will complete a final survey, which will take 5-10 minutes.

Every effort will be made to maintain confidentiality. The surveys and online community are hosted on a secure server on the Simon Fraser University system. Examination of identifying data from surveys and written reflections will be restricted to Sandra Birrell and a research assistant. Identifying information will not be used when compiling, analyzing, and reporting data or results. For example, all surveys and written reflections will be assigned a code that will be used instead of your name in all analyses. In addition, identities of persons, courses, employers, job titles and descriptions, and the like will be masked in all reporting of results. It is my intent to use the data from this study in future research examining how people learn.

You may withdraw your participation at any time.

You may register any complaint with the Director of the Office of Research Ethics:

Dr. Hal Weinberg
Director, Office of Research Ethics
Simon Fraser University
8888 University Drive
Multi-Tenant Facility
Burnaby, B.C. V5A 1S6

You may obtain copies of the results of this study upon its completion by contacting:

Ms. Sandra Birrell,
PhD Candidate in Education
Simon Fraser University
[REDACTED]

By clicking on the Submit button at the end of this page, filling out the online surveys, and posting your work term written reflections in the designated online research areas you are consenting to participate in this research study and to have anonymous data used in future research.

The following information will be used to understand who has agreed to participate and to give you access to the restricted online area.

Full name :
SFU Computing ID :
Preferred email address :
Number of semesters completed :
Primary language spoken at home :
Birthdate (month, day, year)
Select your SFU co-op program major
Select One...
Arts and Social Sciences
Business Communications
Computing Science
Kinesiology
Science and Environment
SIAT
Other (please describe below)

If you selected "Other" above, please complete this question.

Name of SFU co-op program major:

<Submit>

Appendix B. Demographic Form

Q1. Please answer the following questions in the space provided. Your identity will never be disclosed to anyone except Sandra Birrell (Principal Investigator) and her research assistant. It will not appear in any publications of this research.

Full name:

 *

SFU computing ID (needed to give you access to blogging community):

 *

Email address (a link to complete the last questionnaire will be sent to you via email at the end of the semester):

 *

Program of study:

Number of semesters completed:

Age:

Primary language spoken at home:

Q2. If you do not know your GPA, please provide the grades you received in your last 5 courses (e.g., B+, A, B-, B, A-).

GPA (or course grades):

Q3. You will receive 6 short reminders through the course of this research. Please indicate your preferred means to receive these reminders.

*

Q4. If you chose to receive the reminders through email, please provide your email address.

Preferred email address for reminders:

Q5. If you chose to receive the reminders via text message, please provide your cell phone number and cell carrier.

Cell phone number for text messages:

Cell phone carrier (Fido, Telus, etc.):

Q6. The next questions relate to your levels of computer use and familiarity. Select the number from 1 to 5 that best indicates your response to each statement, where 1 = "absolutely false" and 5 = "absolutely true."

1 2 3 4 5

I often read other people's blogs on the Internet:

I enjoy creating my own blogs:

I have never created my own blog:

My friends often ask me computer-related questions:

I enjoy learning to use a computer to do new things:

I enjoy using computers:

I use computers every day:

I worry about security on the Internet:

Appendix C. Metacognitive Awareness Inventory

Scale:

Absolutely False	Somewhat False	Neutral	Somewhat True	Absolutely True
1	2	3	4	5

1. I ask myself periodically if I am meeting my goals:
2. I consider several alternatives to a problem before I answer:
3. I try to use strategies that have worked in the past:
4. I pace myself while learning in order to have enough time:
5. I understand my intellectual strengths and weaknesses:
6. I think about what I really need to learn before I begin at task:
7. I know how well I did once I finish a test:
8. I set specific goals before I begin a task:
9. I slow down when I encounter important information:
10. I know what kind of information is most important to learn:
11. I ask myself if I have considered all options when solving a problem:
12. I am good at organizing information:
13. I consciously focus my attention on important information:
14. I have a specific purpose for each strategy I use:
15. I learn best when I know something about the topic:

16. I know what the instructor expects me to learn:
17. I am good at remembering information:
18. I use different learning strategies depending on the situation:
19. I ask myself if there was an easier way to do things after I finish a task:
20. I have control over how well I learn:
21. I periodically review to help me understand important relationships:
22. I ask myself questions about the material before I begin:
23. I think of several ways to solve a problem and choose the best one:
24. I summarize what I've learned after I finish:
25. I ask others for help when I don't understand something:
26. I can motivate myself to learn when I need to:
27. I'm aware of what strategies I use when I study:
28. I find myself analyzing the usefulness of strategies while I study:
29. I use my intellectual strengths to compensate for my weaknesses:
30. I focus on the meaning and significance of new information:
31. I create my own examples to make information more meaningful:
32. I'm a good judge of how well I understand something:
33. I find myself using helpful learning strategies automatically:
34. I find myself pausing regularly to check my comprehension:
35. I know when each strategy I use will be most effective:

36. I ask myself how well I accomplished my goals once I'm finished:
37. I draw pictures or diagrams to help me understand while learning:
38. I ask myself if I have considered all options after I solve a problem:
39. I try to translate new information into my own words:
40. I change strategies when I fail to understand:
41. I use the organizational structure of the text to help me learn:
42. I read instructions carefully before I begin at task:
43. I ask myself if what I'm reading is related to what I already know:
44. I reevaluate my assumptions when I get confused:
45. I organize my time to best accomplish my goals:
46. I learn more when I am interested in the topic:
47. I try to break studying down into smaller steps:
48. I focus on overall meaning rather than specifics:
49. I ask myself questions about how well I am doing while I'm learning something new
50. I ask myself if I learned as much as I could have once I finish a task:
51. I stop and go back over new information that is not clear:
52. I stop and reread when I get confused:

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Appendix D. Self-Determination Scale

Scale:

	Only A feels true	A feels more true than B	A and B feel equally true	B feels more true than A	Only B feels true
	1	2	3	4	5
1	A. I always feel like I choose the things I do				
	B. I sometimes feel that it's not really me choosing the things I do				
2R	A. My emotions sometimes seem alien to me				
	B. My emotions always seem to belong to me:				
3	A. I choose to do what I have to do				
	B. I do what I have to, but I don't feel like it is really my choice				
4R	A. I feel that I am rarely myself				
	B. I feel like I am always completely myself				
5	A. I do what I do because it interests me				
	B. I do what I do because I have to				
6R	A. When I accomplish something, I often feel it wasn't really me who did it				
	B. When I accomplish something, I always feel it's me who did it				
7	A. I am free to do whatever I decide to do				
	B. What I do is often not what I'd choose to do				
8R	A. My body sometimes feels like a stranger to me				
	B. My body always feels like me				
9	A. I feel pretty free to do whatever I choose to				
	B. I often do things that I don't choose to do				
10R	A. Sometimes I look into the mirror and see a stranger				
	B. When I look into the mirror I see myself				

Used with permission, E. Deci, personal communication.

Appendix E. Explicit Metacognitive Prompts

Welcome! Everyone in this study has been given a separate discussion area. The first step is to find your name and double click to enter your area. This is where you will place your reflections each time you write about your learning experiences during your current work term. Simply hit “Reply” to your previous reflection to add another one.

For each posting, **consider a specific problem or task you have come across at work**. It may be something that happened last week, or it may be part of a complex project that is still underway. The problem or task does not need to be task-related, for instance, it can relate to challenges you faced learning how to work with the people around you.

Once you decide on a specific problem or task to write about, **read over the following four groups of reflection questions each time you write a reflection**. Use one or more of them to write your current reflections on your chosen problem or task.

There is no set limit to how much you write, but try to write at least 150 words in each posting. You will receive a reminder approximately every 2 weeks to post a new entry. To participate in this research project, you are required to post 6 posts to your online area over your work term.

1. How did I know *what* I was supposed to do when I was given a particular problem or task at work? For example, did I base my understanding of the task on what I was told by others, did I take clues from the situation, or did I base it on my own understanding of how the task related to others I had done?
2. How did I know *how* to approach a specific problem or task at work? What did I draw from my past experiences or learning that told me that my planning on how to accomplish the task was on the right track?
3. After I began to work on a particular problem or task, how did I know if my chosen strategy was working? What, if any, changes did I need to make to my understanding of the task, my planning, or my strategies by the time I had finished?
4. In thinking about a past problem or task at work, what have I learned that will help me with future problems or tasks, either at work or elsewhere? What specific things do I still need to understand?

Appendix F. Implicit Metacognitive Prompts

Welcome! Everyone in this study has been given a separate discussion area. The first step is to find your name and double click to enter your area. This is where you will place your reflections each time you write about your learning experiences during your current work term. Simply hit “Reply” to your previous reflection to add another one.

For each posting, **consider a specific problem or task you have come across at work**. It may be something that happened last week, or it may be part of a complex project that is still underway. The problem or task does not need to be task-related, for instance, it can relate to challenges you faced learning how to work with the people around you.

Once you decide on a specific problem or task to write about, **read over the following four groups of reflection questions each time you write a reflection**. Use one or more of them to write your current reflections on your chosen problem or task.

There is no set limit to how much you write, but try to write at least 150 words in each posting. You will receive a reminder approximately every 2 weeks to post a new entry. To participate in this research project, you are required to post 6 posts to your online area over your work term.

1. What things did I wonder about when I was given a particular problem or task at work? What kinds of information did I still need before I could begin the task?
2. What ideas did I have about a particular problem or task at work I was just about to start? What was the source of my ideas?
3. What are some of the things I thought about while I worked on a particular problem or task at work? In what ways did my thinking help me, or not help me, with the task or problem?
4. What, if anything, has changed as a result of my involvement with a problem or task at work? In what way will my thinking about future problems or tasks be different?

Appendix G. Blogging Community Entry Page View

Discussions















 Search  Memberlist

[Enter Here](#)

SFU's Online Learning Community Forum Index » First Co-op Work Term Online Community » [Enter Here](#)



Moderators: None
Users browsing this forum: [sandra birrell](#)
[Mark all topics read](#)

Topics	Replies	Author	Views	Last Post
Sticky				
 Sticky: Welcome! Read first for blogging instructions!	0	sandra birrell	33	Sep 26, 2008 - 03:21 PM sandra birrell 
Topics				
 sfulD_1	6	sandra birrell	52	Dec 23, 2008 - 10:12 PM Mary Smith 
 sfulD_2	6	sandra birrell	41	Dec 18, 2008 - 09:32 AM John Doe 
 sfulD_3	6	sandra birrell	32	Dec 08, 2008 - 11:31 AM Becky Jones 
 sfulD_4	6	sandra birrell	43	Dec 05, 2008 - 11:35 PM Charles Thomas 
 sfulD_5	6	sandra birrell	32	Dec 05, 2008 - 04:58 AM Christine Lo 
 sfulD_6	6	sandra birrell	33	Dec 03, 2008 - 10:03 AM Kim Min Ho 

Appendix H. Sticky Welcome Message

Welcome!

Everyone in this study has been given a separate discussion area ("blog"). The first step is to find your SFU computing ID under "Topics" and double click to enter your blogging area. This is where you will place your reflections each time you write in your blog.

I have put a first entry in your blog that gives you some suggestions to help you write about your work term learning experiences. Simply hit "Reply" to my message to add your first blog reflection. Next time, hit "Reply" to your first blog entry, and so on, until you have made a *minimum* of six total blog entries over the course of the semester.

Although you will be able to read reflections written by other students participating in this study who are also on their first work terms, you are not required to respond. However, if you want to make a comment on someone else's blog, you are welcome to do so. Please follow good netiquette, be supportive of each other, and maintain community confidentiality.

Please do not start a new discussion, but keep all your reflections in one discussion thread. That way you will see all your postings together and can review them easily. If you are having technical problems with your blog, contact me, Sandra Birrell, at [REDACTED].

At the end of the semester, copy text from your blog into a Word document and edit, if necessary, before submitting as part of your work term report. You will need to copy and paste each entry separately ☺

Have fun!

Sandra

Appendix I. Student Blog View

sfuid_1

SFU's Online Learning Community Forum Index » First Co-op Work Term Online Community » Enter Here



Author	Message
sandra birrell	Posted: Sep 26, 2008 - 03:37 PM
 Joined: May 26, 2008	<p>Each time you post in your blog, consider a specific problem or task you have come across at work. It may be something that happened last week, or it may be part of a complex project that is still underway. The problem or task does not need to be task-related, for instance, it can relate to challenges you faced learning how to work with the people around you.</p> <p>Once you decide on a specific problem or task to write about, read over the following four groups of questions each time you write a reflection. Use one or more of them to write your current reflections on your chosen problem or task.</p> <p>There is no set limit to how much you write, but try to write at least 150 words in each blog posting.</p> <p><prompts deleted></p>

Prompts listed here

Mary Smith	Posted: Sep 29, 2008 - 09:36 AM
 Joined: May 26, 2008 Posts: 6 Location: xxxxxxxxxxx	<p>Interestingly enough I do not meet the definition of a new-aged young adult because this will be my first blogging experience. Call me a fool if you must but I even looked up the definition of "a blog" to determine exactly what it is. Here is what I found "Blog: an online diary; a personal chronological log of thoughts published on a Web page; also called"</p> <p>Thus, this concept seems fairly low-key so here goes nothing!</p> <p>Issue # 1 One issue I am facing in my current Coop position is that I am not an accountant and as a matter of fact HATE numbers. I work for a sole-practicing lawyer and practically am expected to do everything the lawyer is not. Thus, I am legal assistant, paralegal, office manager, account etc. Originally when I</p>

Appendix J. Prompt Reminder

It's time to post in your work term blog! Remember to review the instructions on the main blog webpage before writing your reflections. Simply reply to your last entry to add your latest posting.

Contact me at [REDACTED] if you have questions.

Thanks,

Sandra Birrell

Principal Investigator

Appendix K. Final Communication

Thank you for your participation this semester in the research study The Use of a Blogging Community to Prompt Learner Reflection during First Co-operative Education Work Terms.

Please ensure you have entered the minimum of 6 reflections in your blog before completing this final brief survey.

Here's the link to where you can find the final survey:

<link>

It should take you 5-10 minutes to complete.

Access to your blog will remain active for a few weeks. This will allow you to post any remaining reflections. You may also want to copy text from your blog into a Word document before editing, if necessary, and submitting as part of your work term report. You will need to copy and paste each blog entry separately.

If you are having technical problems with your blog, contact me, Sandra Birrell, at [REDACTED].ca.

Thank you again for participating.

Sandra Birrell

Principal Investigator